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Alice Scherer
Society of Bead Researchers
P.O. Box 13719
Portland, OR 97213
U.S.A.
AS-beadweaver@outlook.com

Manuscripts intended for the journal and suggestions for book reviews should be sent to:

Karlis Karklins
SBR Editor
karlis4444@gmail.com

Short articles and other items intended for the SBR newsletter should be sent to:

Michele Hoferitza
Newsletter Editor
beadforumnewsletter@gmail.com

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Cover. Dayak beaded baby carrier panel (*aban*) from Borneo; 29.5 x 27.5 cm (private collection) (photo: Larry Sanders).

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Karlis Karklins, *e*ditor

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EVOKING THE ASO': DAYAK BEADED BABY CARRIER PANELS WITH DRAGON-DOG MOTIFS

Valerie Hector

Although fairly well known, beaded baby carriers made by the Dayak peoples of Borneo have not been well studied. This paper focuses on one element of carrier decoration: the square or rectangular bead-plaited or -woven panels known as aban *or* tāp hawat *in Dayak languages. Designed by men, beaded by women, aban harness spiritual power, deploying talismanic motifs that help protect a child's body and soul from harm in the vulnerable first few years of life. One of the most potent motifs is the* aso' *or dragon-dog, an imaginary creature of the watery underworld, feminine in nature, a goddess-like being the Dayak depict in many media besides beads. Analyzing eleven aban dating to ca. 1896-1965, nine of which are previously unpublished, we trace the guises aso' assume, witnessing impressive artistic achievements while posing questions for further research.*

INTRODUCTION

The world's third largest island, Borneo encompasses an area of about 750,000 km^2 along the equator between peninsular Malaysia, the Philippines, and other Indonesian islands. Borneo contains diverse environments with mountainous interiors connected to the low-lying coast through five major rivers (King 1993:18; Sellato 2012a:12). Politically, Borneo is divided amongst three nations. Indonesia oversees Kalimantan which occupies most of the island. The Federation of Malaysia claims the states of Sabah and Sarawak to the north, while the Sultanate of Brunei Darussalam occupies a small area on the north coast (Figure 1).

Borneo is home to an estimated 20 million people, including the approximately 3 million indigenous inhabitants known as Dayak and Punan. While the Dayak are settled rice farmers, the Punan are nomadic or semi-nomadic hunter-gatherers. Both groups live in the interior, where they regularly interact, but only the Dayak make baby carriers with beaded panels. Borneo's remaining population consists of Chinese, Buginese, Javanese, Madurese, Bajau, Arabs, and South Indians in addition to the Malay, former Dayaks

Figure 1. Political map of Borneo (image: Peter Fitzgerald).

who relinquished their heritage and converted to Islam (Avé and King 1986:9-10; Sellato 2012a:9). The majority of these peoples live along the coast or major rivers where they work as traders, shopkeepers, and farmers. The coast also supports Borneo's major towns, commercial centers, and ports.

For millennia, the peoples of Borneo have been exposed to other cultures. Bronze artifacts likely produced by the Dong Son culture of Vietnam during the last half of the 1st millennium BC found their way into Borneo, where they may have inspired geometric and spiral motifs (Heppell 2015:32; Maxwell 2010:23-31). With the rise of maritime trade in the first millennium AD, Borneo's prime location brought sailors from distant parts of the world seeking forest products collected by the Dayak such as beeswax, camphor, incense wood, spices, birds' nests, and other items for

sale to wealthy elites in China, India, and the Middle East (Chin 1988:59; Jessup and Vayda 1988:11). In return, the Dayak received beads, ceramics, metal objects, and other exotic commodities, many of which became heirlooms functioning as repositories of family wealth. Soon, trading towns developed along Borneo's coast, followed by the first Indian, Islamic, and Chinese colonies and kingdoms (Sellato 1989:14-15). In the early 16th century, Islam penetrated further into Borneo just as Italian, Portuguese, and Spanish explorers appeared, followed later by the Dutch (Sellato 1989:16). The pace of change accelerated in the 17th century as the British and Dutch attempted to establish trading concerns (Sellato 1989:16). From the mid-19th century, when British and Dutch efforts to colonize portions of Borneo began to succeed, Catholic and Protestant missionaries arrived (Avé and King 1986:19-26, 103 ff.). The growing European presence undermined traditional Dayak ways of life, further eroded by the Japanese occupation of Borneo during World War II (King 1993:150, 161 ff.).

Since the Second World War, change in Borneo has increased as governments have instituted modernization, resettlement, and transmigration programs while allowing commercial exploitation of the island's extensive natural resources (Rousseau 1990:38-39). If Jakarta, Indonesia's flood-prone capital city, relocates as planned to East Kalimantan, the pace of change will intensify, further uprooting the Dayak who may be reduced to a "marginal position" in a "peasant economy" (Rousseau 1990:39). These issues bear mentioning here because the majority of aban discussed in this paper were made before traditional Dayak ways of life were altered forever; as of the early 1970s, beaded baby carrier panels were being made for sale as well as for indigenous use (Munan 1995:59; Whittier 1973:198-199). Before considering them in greater detail, we need a brief understanding of how the Dayak traditionally lived and what they believed.

DAYAK ORIGINS, ETHNIC GROUPS, AND SOCIAL STRUCTURE

The Dayak likely descended from Austronesian-speaking peoples who began arriving in Borneo ca. 2500 BC, where they eventually supplanted the hunter-gatherer populations that had inhabited the island since before 30,000 BC (King 1993:59 ff.; Sellato 2012a:10). Dayak groups settled in the interior, establishing villages along river basins between mountain ridges (Rousseau 1990:3). The name "Dayak" may derive from *daya*, an Austronesian word meaning "toward the interior" (Alpert 2016:117) or from *aya*, a Malay term for "native," or from various words in Dayak or Javanese languages (King 1993:30). Most Dayak self-identify not as "Dayak" but by their ethnonyms or toponyms, i.e., their group's name or geographic home base (Sellato 2012a:10). Scholars classify the heterogeneous Dayak into six major ethnic categories (not including the Punan) that may be subdivided into at least 80 ethnic subcategories (Sellato 2012a:xiv-xv).

Among the major categories, two seem to have produced aban in fairly high numbers: the Kayan and Kenyah who live largely in the upper reaches of rivers in Sarawak and East Kalimantan (Sellato 1989:21). Both the Kenyah and Kayan comprise multiple subcategories of people who may not have a common geographic origin or speak the same language. Thus, Kayanic peoples include the Busang, Bahau, and Mahakam-Kayan, while the Kenyah distinguish between Lepo' Time, Lepo' Tau, Badang, Sebop, etc. (Rousseau 1990:15-16). This is not to say that Dayak of other or related ethnic categories do not create aban; on the contrary, the Aoheng and Long Gelat certainly do (Sellato 1989:185, Figure 246, 2012b:268, Figure 23). As a general rule, the Dayak groups that produce baby carriers live in central Borneo and stratify themselves loosely or rigidly into three or sometimes four social classes governed by local and regional chiefs who, in former days, like other aristocrats, might own slaves captured in war (King 1993:26, 41-48; Sellato 2012b:262; Whittier 1973:87 ff.). With class status came rights to depict certain motifs in beadwork and other art forms; as we shall see, only aristocrats could render hornbill birds, tigers, and full-bodied anthropomorphs. In contrast to the Kenyah and Kayan, Dayak groups such as the Bidayuh and Iban of West Kalimantan and Sarawak maintained egalitarian social systems (King 1993:48 ff.; Sellato 2012a:xv). Though the Bidayuh and Iban produce exceptional pieces of beadwork, baby carriers are not among them.

Dayak men and women invested great physical, ceremonial, and spiritual effort to ensuring the success of their rice crops while supplementing their diets by growing yams, beets, and other vegetables and collecting forest edibles (Avé and King 1986:30; Padoch 1988). Traditionally, many Dayak lived in longhouses extending up to 300 m in length and sheltering 100 or more families flanking the chief's quarters in the middle (Jessup and Vayda 1988:12-14; Sellato 1989:21). Running along one edge of the structure, a verandah served as a place for work, play, meetings, or story telling (Jessup and Vayda 1988:13-14). Beadwork was typically done inside family apartments or on the verandah, where motifs and skills were easily shared (Figure 2). Communal living helped shield Dayak villagers from enemy attack; headhunting raids were common especially among the Kayan and Kenyah until the early 20th century (Sellato 1989:21). Dayak men also tested their bravery by taking long trips, on some of which they acquired beads.

Figure 2. Kenyah woman plaiting an aban on a longhouse verandah with two completed aban nearby, ca. 1960s (photo: Hedda Morrison).

DAYAK COSMOLOGY AND BELIEFS

Traditionally, the Dayak envisioned a dualistic cosmos divided into an upperworld and an underworld with the human world in between. While the upperworld was associated with heat, maleness, headhunting, war, and deities or spirits that might manifest to humans as birds, the underworld was associated with coolness, femaleness, fertility, agriculture, and deities and spirits that manifested as reptilian creatures including *aso'*, water serpents, crocodiles, and scorpions (Alpert 2016:118; Heppell 2015:47; King 1993:233). As upperworld deities and spirits looked after human welfare in general, lowerworld ones focused on human and agricultural fertility (Heppell 2015:47). As animists, the Dayak believed every entity in the universe possessed its own soul. Further, nearly every object, spirit, being, quality, energy, or condition had its complementary opposite. Thus, binary or dualistic pairs permeated the Dayak worldview, affirming the very structure of the cosmos (King 1985:134). Human beings felt compelled to create balance and harmony in matters cosmic and mortal, thereby producing the ideal state of coolness that repels negative spirits, attracts positive ones, and maintains balance and symmetry in the human realm (Heppell 2015:50-51). This was no easy task; at any moment, humans might be attacked by negative spirits floating freely through the air departing their inverted, disorderly, asymmetrical realm. Ancestor spirits and deities might also make their displeasure known by disturbing human endeavors. On occasion, good and evil spirits might battle over human well-being (Heppell 2015:51). Thus, for the Dayak, the supernatural world was an "ever-present reality" that demanded constant attention through "continuous dialogue" to promote order and friendly relations (King 1993:236, 245).

Humans could interact with the spirit world in several ways: by directly requesting protection from deities and spirits; engaging in rituals, sacrifices, and festivals; creating or wearing talismanic objects such as aban; accepting guidance from dreams; or engaging shamans or other specialists on their behalf (Heppell 2015:47 ff.; King 1993:234 ff.). One of the worst fates that could befall a human was to have his or her soul lost or captured at night during a dream. If that happened, a negative spirit might invade the body or the seat of the soul, which most Dayak located in the head (Heppell 2015:48-49). Spirits might attack rice crops as well, endangering the most important foodstuff. On the flip side, when properly propitiated, spirits such as the dragon goddess might assist mankind (Sellato 1989:39).

Although Dayak art and material culture are diverse, three motifs recur among many groups: the hornbill, an upperworld being; the aso' or dragon-dog, an underworld being; and the tree of life, a symbol of fertility par excellence linking the upperworld and underworld (King 1993:249; Sellato 1989:44-46).

DAYAK BEADS AND BEADWORK

That the Dayak love beads is well known; they have long favored both organic and inorganic varieties made domestically or abroad (Munan 2005). No matter the material or origin, beads were hard and durable, qualities believed to strengthen the Dayak who wore them. That many beads were rare, costly, or sourced from distant locales heightened their potential to serve as magical talismans (Maxwell 1980:36). Rituals validated the power, importance, and value of beads at all stages of Dayak life (Munan 2005:36, 71), while legends and myths told of brave heroes who went on arduous journeys just to find certain highly valuable beads (Maxwell 1980:136). Teeming with supernatural potential, glass beads in particular possessed high mana or life-force value (Sellato 1989:45). The Maloh of the Upper Kapuas River associated beads with fertility, believing that the more beadwork they wore, the more abundant their rice grains would be (Maxwell 1980:135). Bidayuh priestesses sprinkled rice seeds with beads dipped in water to facilitate germination (Munan 2005:56).While Dayak from all social strata could own and wear beads, aristocrats generally owned more and better, confirming their higher status (Rousseau 1990:187). One aristocratic Kayan woman sold "a great quantity of fine birds' nests from caves she owned"

in order to purchase the "fabulously expensive" beads she wore ca. 1862 (Jessup and Vayda 1988:8). Indeed, a photo from the late 19th century shows a chief's wife displaying her valuable beads to several respectful onlookers (Figure 3). Able to discern many bead types, women knew their relative values by heart (Munan 2005:78).

Figure 3. Sulau, the wife of a Kayan chief, displaying her collection of valuable old beads (Hose and McDougall 1912, 1:Plate 31).

Yet, beads were not just for adornment or storing wealth. They were made to perform in secular and sacred contexts whether healing, fertilizing, sealing agreements, restoring order, or communicating with the spirit world. For example, Dayak midwives used beads to soothe mothers during childbirth (Munan 2005:48). Dayak mothers tied beads to a newborn's wrist to deflect evil spirits (Nieuwenhuis 1904:71) or wore bead necklaces while nursing to keep a baby "cool" (Munan 2005:48, 54). Grooms gave beads to brides as engagement gifts (Munan 2005:59); builders buried beads in longhouse post holes (Maxwell 1980:136); shamans carried beads harboring potent spirits or treated patients by applying beads (Munan 2005:47-67); longhouse elders levied fines in beads (Munan 2005:75); marauding enemies could be pacified with beads (Munan 2005:79); warriors might fly or become invisible thanks to beads (Maxwell 1980:136); women sang songs or shared origin stories about valuable beads (Munan 2005:74); families interred loved ones with beads meant as gifts for ancestors (Munan 2005:62); and so on. In all these ways, beads enriched human lives and augmented human abilities.

Like other forms of Dayak art (Heppell 2015:23, 57; King 1991:117; Maxwell 1980:131), Dayak beadwork has not been sufficiently studied; three short publications focus on Maloh and Iban beadwork and the beadwork of central Borneo (Heppell 2020; Maxwell 1980:131-140; Westerkamp 2002). Several dozen other publications, however, feature one or more pieces of Dayak beadwork (pers. obs.).

Beadwork was largely a female specialty practiced in a woman's spare time using thread-based beading techniques ranging from simple stringing, spacer-plate stringing, looping, and embroidery to weft-wrapping, plaiting, and weaving. Needles were originally made from mammal and fish bones, or thorns (King 1993:254) while threads were refined from pineapple leaves or other vegetal fibers (Tillema 1989:Figs. 150-151). Girls started beading when young, gaining proficiency with smaller pieces (Sheppard 1978:91). Whether females or males practiced the simpler threadless beading techniques of inlay or matrix work remains to be established.

Costly in terms of material and labor, beaded objects not only signaled the wealth, status, and spiritual vitality of families that could afford to produce them but attracted positive spirits pleased to see beautiful things (Munan 2005:47). Beaded objects fascinated human viewers as well with lush, intricate surfaces bespeaking long hours of expert stitching; the laboriousness of the beading process could become an aesthetic consideration in itself (Taylor and Aragon 1991:28). Many beaded garments and accessories were made specifically for display on ritual or ceremonial occasions and carefully stored when not in use. As we shall see, other items, such as beaded baby carriers, were used on a daily basis yet regarded as treasured possessions to be kept within sight. To them we turn.

BABY CARRIERS

Made only by the Dayak and Punan peoples of central Borneo during the first two to five years of a child's life, baby carriers allowed a mother to secure her child to her chest or back as she worked in the forest or field or performed domestic chores. Baby carriers also provided spiritual protection by creating a familiar physical locus for a child's soul lest it wander and perish. Not long after birth, through rituals and incantations, mothers taught babies to stay close to their carriers in hopes the young soul will stay put (Capistrano-Baker 1994:34-35; Nieuwenhuis 1904:71-72), lessons reinforced by the presence of baby carriers in name-giving and other child-focused ceremonies (Figure 4) (Lau 1999:56; Whittier and Whittier 1988:53). Among the Kenyah, baby carriers strengthened social ties, temporarily redistributed wealth, and focused attention on new members of society as mothers borrowed from relatives and friends the heirlooms beads, bells, and other items needed for embellishment (Whittier 1973:221; Whittier and Whitter 1988:58).

Figure 4. Young boys with their baby carriers during a second and final naming ceremony at Long Selatong, Uku Baram, Sarawk, 1993 (photo: Dennis Lau).

Baby carrier materials, methods of construction, and forms of ornamentation varied widely among Dayak groups. To function properly, each carrier required a crescent-shaped wood seat, a backrest of wood or rattan, two carrying straps, and padding for comfort; ornamentation was optional (Sellato 2012b:263-264; Whittier and Whittier 1988:51-52). Suspended from a string running between a carrier's two upper corners, simple ornaments might include a snail shell filled with the child's umbilical cord (Whittier and Whittier 1988:Figure 7); small packets of edible offerings for the spirits; a dog's tooth; a European white porcelain button; two pierced conch shell disks; the child's first bracelets; woven pandanus-leaf strips; and strings of glass beads, or other talismanic items (Nieuwenhuis 1904:72). The clacking of the charms was believed to soothe the child while frightening away evil spirits.

More complex ornamentation might include a square or rectangular beaded panel known as *tâp hawat* among the Mahakam Kayan (Nieuwenhuis 1907:272) or *aban* among the Kenyah (Whittier and Whittier 1988:52). Hereafter, we will call such panels "aban." The Dayak have stitched these "fine beadwork panels" to baby carriers since at least 1862 (Whittier and Whittier 1988:54). From 1887-1901, approximately 20 aban attached to or detached from baby carriers entered the Rijskmuseum voor Volkenkunde in Leiden (RV-614-38a-b, RV-1305-53, RV-1308-24, RV-1308-305-307, RV-1308-427-435, RV-1308-499); the University of Pennsylvania Museum of Archaeology and Anthropology in Philadelphia (P627-8); and the Tropenmuseum in Amsterdam (TM-101-1). It remains to be seen how many aban, attached or detached, reside in other museums with major collections of Dayak art in Europe, the United States, Asia, or elsewhere (King 1991:108-109).

While it may seem inadvisable to discuss aban apart from the carriers for which they were made, in doing so, we follow precedents set by the Dayak themselves who detached and preserved aban after a child had successfully completed its first few years of life (Munan 2005:50; Whittier1973:197). The carrier structure was far less important; it could be disassembled or reused for another child (Munan 2005:50). Detached aban were put to use in several ways. Other mothers in the family or village might study an old aban when creating a new one in a similar style, just as Dayak women mat plaiters retained old mats with complex patterns or made pattern samplers for reference (Sellato 2012a:22). Indeed, a photo from the late 19th century appears to show an elderly Kayan woman beading a new panel, possibly an aban, while holding a pre-existing panel on her worktable (Figure 5), a practice still followed in 1970s Sarawak to make a beader's task "less formidable" (Sheppard 1978:91) and in Kalimantan in 1989 (Taylor and Aragon 1991:Figure VII).

Figure 5. Elderly Kayan woman (right) beading a new rectangular panel with a model beaded panel to her left; Kalimantan, 1899-1900 (photo: Dhr. Jean Demmeni; courtesy: Nationaal Museum van Wereldculturen, TM-60046433).

A tangible precedent not only provided a model, thereby easing the beading process, it affirmed the production of spiritually resilient patterns already tested by time and use. A woman engaged in beading a new aban might have felt a sense of spiritual kinship to the woman who beaded the old aban. By virtue of their proven efficacy, old aban might also be recycled and attached to newly made carriers or other objects (Sellato 2012b:262). Some of these motivations may have escaped Dutch explorer, collector, and physician A.W. Nieuwenhuis who complained that Dayak women he encountered in the 1890s kept reworking old aban designs without inventing new ones, as if iconographic continuity and respect for traditional forms of community practice sanctioned by the ancestors presupposed a decline in creative ability (Nieuwenhuis 1907:272). This could

be attributed to a misunderstanding possibly stemming from language difficulties (Sellato 1993:23). What Nieuwenhuis meant by "reworking" we do not know. Nor can we be sure beadworkers were producing literal copies of pre-existing aban; two seemingly identical aban show appreciable differences in color and detail (Nieuwenhuis 1907:Plate 71a-b) consistent with the notion that beaders were interpreting, rather than copying, existing aban incorporating culturally permissible variations (Taylor and Aragon 1991:30-31). As far as we know, no two aban were or are exactly alike.

Apart from interpreting pre-existing models, aban were beaded in various ways: by stitching beads directly to carrier backs (Tillema 1989:Figure 169) or to panels of cotton or bark cloth (Sellato 1989:Figures 241, 243-244); or by bead-plaiting or -weaving freestanding, textile-like panels (Nieuwenhuis 1907:Plates 69a-b, d, 70-72; Tillema 1989:Figure 158; Sellato 1989:Figures 225, 238-239, 245-246) over templates generated by male artists in return for small payments (for definitions of "bead plaiting" and "-weaving," see Hector 2016:68 ff.).

In use between the 1890s and 1920s, carved wood templates were apparently superseded by cut newspaper templates by the 1930s or before (Figures 6-7) (Nieuwenhuis 1907:Plate 69c, e; Tillema 1989:Figures 152-153; Westerkamp 2002:216). In some cases, as we shall see, close observation of an aban may reveal the type of template used to create it. According to received wisdom, a Dayak woman had little or no creative leeway when beading over a template. Her job was to select appropriate colors and exactly reproduce in beads the male artist's design without altering it in the least (Gill 1971:130; King 1993:254; Whittier 1973:193-194; Whittier and Whittier 1988:52). We will modify this time-honored formula, concluding that in some cases Dayak women beaders exercised considerable artistic agency within ostensibly acceptable norms.

No matter how they were created, all aban display bilateral symmetry along a vertical axis save for rare counterexamples (Capistrano-Baker 1994:35; Sellato 1989:27, Figure 48; Wereldculturen Museum, TM-391-91).[1] By conjoining complementary opposites, aban run counter to pan-Indonesian design preferences for asymmetrical compositions that also characterize other Dayak art forms (Taylor and Aragon 1991:31-32). Yet, aban structured in terms of binary pairs implicitly recapitulate the fundamental duality of the Dayak cosmos as well as the complementary male and female energies that together may make a piece more ritually powerful, assuring both protection and fertility (King 1985:134; Taylor and Aragon 1991:38-39). Moreover, the Dayak may have intuited what Western scientists have been able to prove: that the human visual cortex processes

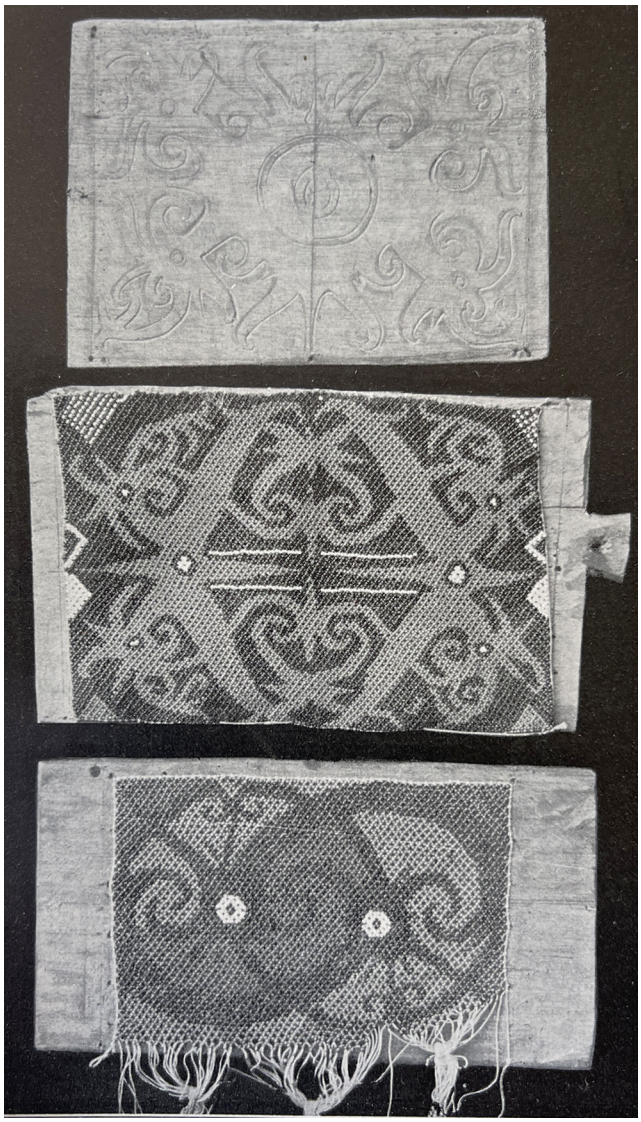

Figure 6. Three Kenyah carved wood template boards and two aban in the Jakarta History Museum, ca. 1913 (Loebèr 1913:Plate VII).

symmetrical images, especially vertically symmetrical ones, far more quickly than asymmetrical ones (Heppell 2015:171-172). Conceivably, the mere sight of an aban on the back of a baby carrier triggered a watchful response from a Dayak mother or father.

Even when not put to use, aban might be preserved as examples of what Westerners would call "works of art" and Dayak, not having words for "beauty" or "beautiful," might call them "good" or "superior" as in "well-made," meaning both "highly skilled" (Sellato 2012a:14) and "refined, well-mannered, polite," or respecting of tradition (Taylor and Aragon 1991:30). Not only did the finest aban inspire admiration (Whittier 1973:218), but the grandmother,

Figure 7. Kenyah woman bead-plaiting an aban over a cut paper template attached to a board, 1932 (courtesy: Nationaal Museum van Wereldculturen, Collectie Tillema, RV-A440-n-122).

mother, or female relative who beaded such an aban could take quiet pride in her work as other members of her village acknowledged her talent, skill, and in some cases, spiritual strength. At least one woman cared so deeply for a beaded hat panel she made that she vowed to take it with her to the afterlife (Nieuwenhuis 1907:275). Relatives took pride too. A Dayak family's most precious possession, a baby carrier was often included in formal photos, presumably as a status marker (Tillema 1989:Figure 24; Whittier 1973:219). On ceremonial occasions, multiple aban might be displayed. In the early 1970s, during a five-couple wedding among the Kenyah, ten aban were attached to the wall nearest a bridal bed, one aban for each bride and groom (Whittier 1973:217-218). Such a display must have made a compelling sight, betokening past and future fertility, the joint work of both genders.

Always the property of the child for whom it was made, an aban could be destroyed for only two reasons: if the child died at some point in time, or the need for beads was dire (Whittier 1973:216). For the Uma Jalan Kenyah of East Kalimantan, other occasions for community display arose during ceremonial masked dances promoting the fertility of the rice crop. In 1977, women dancers were photographed wearing *hudoq kibah* hood masks on their heads incorporating inverted baskets resembling baby carriers embellished with aban (Heppell 2015:154-155, Figure 198; Revel-MacDonald 1988:Figure 84). A desire to foster fertility may also have motivated some Dayak in the 1930s to attach aban-like beaded panels to baskets for carrying rice and other goods (Tillema 1930:Figure 3).

Before glass seed beads, commercial threads, and metal needles were available in large quantities, Dayak people may have preserved aban and other beaded panels as symbols of the effort expended to produce them. Dayak fathers once traveled many miles to obtain beads at great cost before creating the carrier's wooden seat, while women spent weeks or months beading an aban, making substitutions when supplies of a certain bead color did not suffice, a frequent necessity even in the later 20th century (Nieuwenhuis 1907:274; Whittier and Whittier 1988:56). Until at least the 1930s, women also refined vegetal fibers into beading threads through a multi-step process (Tillema 1989:Figures 150-151). Thus, like most heirlooms, aban represented not only an infant's successful rearing but repositories of memory, history, and hope, giving material form to a sequence of personal, familial, and social interactions evidently blessed by the spirits, who in their way, also invested in the baby. Moreover, baby carriers resonated with the family's identity, its particular place in the world (Rodgers 1985:2).

EXAMPLES OF ABAN WITH ASO' MOTIFS

Like the earliest evidence of beadwork in island Southeast Asia dating to ca. 4500 BC (Langley and O'Connor 2015), aban of centuries past may have been stitched with *Nassarius* or other shell beads (Taylor and Aragon 1991:Figure V.13; Tillema 1989:Figure 169). In contrast, all of the aban discussed below are plaited or woven with glass beads, most of which appear to be European, although one example features a few Chinese glass coil beads (Example 4 below). Aban made largely or wholly of Chinese coil beads and/or Indo-Pacific drawn glass beads have not been published. In some cases, heterogeneous beads sizes, shapes, and colors may encode the difficulties encountered in assembling the desired set of beads (Examples 2 and 9).

All of the aban in our study are square or rectangular in shape, ranging from 25 cm wide x 22 cm high (Example

8) to 39 cm wide x 29.5 cm high (Example 11). Most are worked in a single plaiting technique that deposits beads in a diamond-shaped lattice as parallel vertical threads anchored to a single horizontal thread are united with beads. Open-meshed versions of this technique, where beads are united three at a time (Examples 1, 2, 4, 6-9, 11) (Hector 1995:Figure 11a), are more common than closed-mesh versions where beads are united one at a time (Examples 3 and 5) (Hector 1995:Figure 11b). A second, less common technique weaves warp and weft threads combining beads at 45-degree angles in a herringbone effect (Example 10) (Hector 1995:Figure 16). While the open-diamond lattice plait produces a semi-permeable mesh, both the closed-diamond lattice plait and the herringbone weave produce impermeable meshes reminiscent of armor. All of the aban are beaded with handmade vegetal-fiber threads except for Example 11 which might be worked with commercial cotton threads although this has not been confirmed. The lower edges of an aban can be identified by the presence of knots, tassels, or interlaced fibers. In rare cases, two or three beaded panels were displayed on a single carrier (Rodgers 1985:Figure 98) but most carriers displayed only one. When detached from their carriers, bead-plaited or -woven aban are highly flexible textile structures ranging in weight from light to heavy depending on the size of the beads. Because of the multiple threads used to create them, aban are fairly durable.

As mentioned above, Aban bead colors were selected by women. A particular set of colors recurs in aban containing aso', with yellow beads depicting aso' and full or partial anthropomorphs; red beads generally reserved for eyes, mouths, or other focal points; white for aso', eyes, and accents; and black for backgrounds (King 1993:254; Whittier 1973:194). Apart from bead availability, there are several explanations for this set of colors, which not only corresponds to the colors of the sacred rhinoceros hornbill bird (Munan 1989:57; Sellato 1989:45-46) but implicates the ancient Austronesian color triad of red, white, and black (Maxwell 1990:98). Other aban incorporate shades of blue and green, developing distinct combinations.

As previously noted, in the late 19th century, aban templates consisted of wooden boards designed and carved by male specialists in exchange for a bead or other form of payment (Nieuwenhuis 1907:272, Plate 69c, e). Possibly due to the difficulties of carving perfectly symmetrical patterns in wood, some early aban templates appear to be asymmetrical (Loebèr 1913:Plate VII top; Nieuwenhuis 1907:Plate 69c, e). Not surprisingly, aban beaded over them appear to have preserved the asymmetries. By the 1930s, as newspapers became common, male aban template designers put them to use. After folding a section of newspaper in half or rarely, in quarters, the designer would sketch and cut out the pattern while the paper was still folded. Once unfolded, the aban template would be far more symmetrical (Tillema 1989:Figures 152-153). After pinning or glueing the template to a board, a woman would bead over it (Tillema 1989:Figure 155), distributing bead colors appropriately while carefully rendering motifs. As we shall see, some women exercised their own artistic agency, however, complementing the artistic agency of the male template designer. This conclusion challenges received wisdom which tends to assume that Dayak women beaders always "exactly reproduced in beads" (Gill 1971:130) the designs of men without altering them in the least (King 1993:254; Whittier and Whittier 1988:52). Reserving "template" for the wood or paper guides women followed as they beaded, we will use "pattern" in the sense of "overall composition" and "motif" for the individual design elements making up a pattern.

As we have noted, the aso' is an underwater goddess capable of protecting humans and ensuring fertility. Although aso' means "dog" in the Kenyah language, aso' motifs generally signify aristocratic rank, power, and prestige (King 1985:133, 138). Referring to dragon-like creatures as "dogs" might have mitigated fears of offending the dragon goddess by addressing her too directly (Sellato 1989:44). Both dragons and dogs are underworld creatures capable of protecting mankind; their once-distinct features may have merged over time (King 1985:134). On the aban in this study, the dragon-like nature of the aso' is often emphasized; only one aban in our study incorporates clear dog-like features (Example 10). Although some aso' show affinities with dragon motifs on ancient Chinese trade ceramics or other items, on the aban in this study, there are few, if any, obvious traces of foreign influence (Sellato 1989:44; Taylor and Aragon 1991:169). Aban with aso' recalling Chinese dragons have, however, been documented (pers. obs.). Motifs on aban not in this study include stylized boats, animal teeth, hornbills, tigers, and more, accompanied by aso' or not (Munan 2005:53 top right; Sellato 1989:Figure 242; Taylor and Aragon 1991:155).

Not wanting to reduce the aban in this study to mere products of time and labor, we may nevertheless gauge relative amounts of effort invested by contrasting bead sizes with bead density or the number of beads connected per square centimeter for the approximate total number of beads per aban. While beads per square centimeter ranged on average from 13, 14, or 15 on the low side (Examples 2-5, 10) to 34, 45, or 52 on the high side (Examples 6-8), the approximate total number of beads per aban varied from 7438 (Example 5) to 14,370 (Example 4) to an astonishing 36,495 (Example 7). Some aban likely occupied weeks of a woman's spare time; others surely took months.

Several caveats are in order. First, not all square or rectangular beaded panels are necessarily aban. As mentioned above, the Dayak also affixed beaded panels to hats, baskets, garments, and other items. Thus, we cannot be certain that a particular beaded panel was made for a baby carrier without locating comparable examples still attached to carriers. Second, even when an aban remains attached to a carrier, we may not be able to identify the Dayak group that produced it, an issue complicated by the fact that some Dayak groups produced aban in more than one pattern. Third, we cannot be sure that the motifs we identify as aso' are actually representations of aso' rather than snakes, water serpents, or scorpions (Maxwell 1990:Figure 82). Nevertheless, since the latter are all denizens of the watery underworld, they are symbolically equivalent to aso' (Sellato 1989:44).

Example 1: An Aso' Head with a Prominent Eye

The baby carrier in Figure 8 was collected in 1896 from Kayan peoples in Sarawak (Whittier and Whittier 1988:Figure 3). Plaited in tiny European glass seed beads, the aban is stitched to a panel of red trade cloth secured to the finely plaited rattan back. Ornaments include snail shells suspended from a doubled length of cord and conus shell disks stitched through glass beads and small cloth washers to the cloth background. Although the ornaments partially obscure the aban, the circular motif it depicts likely represents the head of an aso' with a single, large, star-like eye enlivened with a red pupil watching for predators. Spiraling limbs, tentacles, or horns radiating from the head increase its size and reach while creating a sense of the aso' as a net for trapping malevolent spirits (Heppell 2015:56). Although similar circular aso' head motifs appear in other examples of Dayak art including paintings and tattoos (Revel-MacDonald 1988:Figure 87; Sellato 1989:22-23, Figures 32-37), among published aban, the motif is rare.

Figure 8. Kayan baby carrier from the Baram District, Sarawak, bearing an aban depicting a yellow aso' head with a central eye, ca. 1896; 28.6 cm high (courtesy: University of Pennsylvania Museum of Archaeology and Anthropology, P628).

While the overall composition is bilaterally symmetrical, slight asymmetries in the motifs lend a sense of vibrant immediacy, as do the Venetian glass white-heart beads for the pupil, the only red beads in the aban. White hearts were produced in Venice from the 1830s on (Billeck 2008). How long they took to reach Borneo is not known. In this case, the asymmetries in motif may be due to the type of template guiding the beading as it progressed. In all likelihood, given the early date of this aban, it was beaded over a wood template board. In the lower half of the aban, motifs overlap, with diagonally intersecting yellow lines broken by small expanses of black implying three-dimensionality and distinctions between foreground and background. Granted, the effect might be more successful on the right side rather than the left. Overall, this aban is masterfully beaded, with smooth curves tapering down to a single bead (Whittier 1973:194), an admirable feat in a rectilinear bead-plaiting technique that disposes beads in an open-meshed diagonal grid (Hector 1995:Figures 9, 11a). Not only aban makers, but Dayak beadworkers in general have long favored this technique which recurs in the following examples. Although such a technique may look difficult to us, to the Dayak, many of whom were accomplished plaiters of rattan and other materials, it likely seemed very straightforward (Dunsmore 2012).

Example 2: Two Aso' Flanking a Large Central Eye

Like all the remaining examples in our study, the aban in Figure 9 has been detached from its carrier. No comparable example has been published. An enormous eye formed by eight concentric rings of color dominates the center of the composition, commanding attention with a "relentless, unchanging stare… disconcerting in its intensity and non-humanness" (Heppell 2015:54). This might be the eye of an aso' (Sellato 1989:44). Similar concentric-eye motifs stare out from Dayak shields, tomb paintings, masks, and longhouse wall murals or wherever a watchful presence is needed (Heppell 2015:33, 45, 94-96, Figures 16, 88, 90-92; Sellato 1989:26-27, Figures 37-39, 41-48, 104-105). Two yellow aso' flank the concentric eye, reinforcing its stare with eyes of their own as their limbs or tentacles arch around the concentric eye, sheltering it within a larger circle. On this aban, as well as the previous example, where limbs or tentacles intersect, thin black lines convey overlapping, with one member in front of the other, and white-heart beads are positioned for maximum impact. On a Kenyah carved aban template published in 1913, four aso' heads emerge from a single torso enclosing a large circular motif that might be an eye (Loebèr 1913:Plate VII top).

Figure 9. Aban featuring two yellow aso' flanking a large central eye, origin unknown, ca. late 19th-early 20th centuries; 31 x 25.5 cm (private collection) (photo: Larry Sanders).

Figure 10. Aban depicting two yellow aso' in profile above a central mask-like face, possibly Sebop peoples, Brunei, late 19th-early 20th centuries; 32.5 x 25.5 cm (private collection) (photo: Larry Sanders).

The glass beads composing this aban vary in shape and size, ranging from 2.5-3.5 mm in diameter by 1.5-3 mm in length. The yellow beads also vary with respect to hue and surface wear, possible signs they came from multiple sources. Irregular patches of red, green, blue, and white beads along the perimeters, as well as aso' tentacles ending in white, may be idiosyncratic design elements introduced by the beader or reflect a need to substitute colors. On this aban too, asymmetries within and between motifs interrupt a bilaterally symmetrical composition probably beaded over an imperfectly symmetrical, carved template board. It is also possible that the asymmetries are a byproduct of the beader's level of skill or her motley set of beads. In any case, she appears to have been less adept at tapering curves to a point than the beader of Example 1, although she too uses the conventional open-diamond plaiting technique.

Example 3: Two Aso' in Yellow Above a Mask-Like *Hudoq* Motif

Our third example depicts motifs from two points of view, adopting a profile view for the two aso' in the upper register and a frontal view for the mask-like face in the lower register, which is probably also an aso' abbreviated to a monster-like head (Figure 10) (Sellato 1989:25, 44, Figures 40-41). Common in other forms of Dayak art, mask-like motifs are often referred to as *hudoq* in the Kayan language; their purpose is to frighten (Heppell 2015:124; Sellato 1989:Figures 40-41). Juxtaposing frontal and profile modes of representation is a common design strategy among some Dayak groups, seldom if ever adopted in the beadwork of other Indonesian cultures, calling to mind an omnipotent presence watching from all directions at once. In the center of the composition, a geometric motif recalling an upside-down, footed heart or stylized hooked rhomb floats between the two aso's' open jaws, testing our sense of figure-ground relations as we try to decide whether the motif is merely outlined in yellow against a black inner ground, or composed of both yellow and black. Similar hooked rhomb-like motifs appear on other examples of Dayak aban depicting aso' (Loebèr 1913:Plate VIII, Figure 2) and on carved template boards (Nieuwenhuis 1907:Plate 69e). While it is tempting to liken this motif to a sprouting plant or other new life form, the Dayak artist who designed the composition may have inserted it as an offering to appease the aso' lest it turn on those who depict it (Maxwell 1990:6, Figure 82; Sellato 1989:44). As we shall see, differently shaped motifs float between aso' jaws on other aban as well and on Dayak carved wood tattoo blocks that also depict aso' (Sellato 1989:13,16, 24, 34, Figures 7, 15-17, 38, 67).

Although this aban is worked in the same bead-plaiting technique noted above, fewer beads were added per stitch, producing a closed-mesh diamond grid, in its way, impenetrable as armor. The European glass beads average 3-3.75 mm in diameter by 2-3 mm in length. Once again, white-heart beads depict the four eyes of the aso'. Looking more closely, we notice other white hearts dotting the two halves of the frontal mask in the lower register. These minor red design elements were arguably not present on the carved board over which the aban was probably beaded; they were likely installed by the beader. Why did she arrange the red

beads asymmetrically, contrasting a row of four beads on the mask's left perimeter with two red triangles on the right? What do these random red beads add to the whole if not spontaneity and a sense of the beader's personal aesthetic? Such a tendency to make bilaterally symmetrical designs more asymmetric has been noted among Indonesian women weavers as well, who forsake "absolute symmetry in order to achieve balance based upon complementarity" (Taylor and Aragon 1991:33) – exactly what male aban template carvers did too. In so doing, it can be argued that both women and men implicated higher levels of order capable of integrating both types of design. Yet, if beaders added their own touches to aban, then received wisdom must be revised. More than simply rendering designs drawn by men, women could assert their own artistic agency, however limited.

No hints of the beader's persona appear on a parallel aban still attached to a carrier collected in 1896 from the Sebop peoples of Brunei (Whittier and Whittier 1988:Figure 1). In contrast to the closed-diamond plait of Example 3, the beader of the Sebop aban opted for an open-diamond plait leaving small negative spaces between beads, producing a semi-permeable mesh. Although she rendered the same set of motifs on her aban, they are inverted, with the hudoq' motif situated above the two aso'. It follows that male artists could rearrange established patterns at will, combining the same set of motifs in different configurations. In other words, aban motifs and patterns were adjustable (Taylor and Aragon 1991:31), which might help explain why some endured for generations.

Example 4: Two Aso in White Above a Hudoq Motif

Like Example 3, the aban in Figure 11 presents two mirror-image aso' motifs depicted in profile above a mask-like face depicted frontally. While the aso' and hudoq' are rendered in white, the spiky, scrolling motif situated between them is rendered in butterscotch yellow. Once again, the background is black and most of the beads are European, averaging 2-4 mm in diameter and length. The blue beads at the center of the upper perimeter are coil beads typical of those made in China or by Chinese glass workers in Southeast Asia (Francis 2002:76-78). Although some coil beads date to the 8th century, they were not exported in quantity until about 1200, when Indo-Pacific drawn glass beads began to disappear (Francis 2002:76). The aban's blue coil beads are irregular: 4 mm in diameter by 2-4 mm in length. A few centimeters below the blue coil beads, three more Chinese coil beads appear, one yellow and two in the striated orange-red color known to Indonesians as *mutiraja* (Francis 2002:76, Plate 48). That the beader situated Chinese coil beads in focal positions suggests she regarded them highly, possibly as family heirlooms.

Figure 11. Aban featuring two white aso' above a mask-like face, possibly Kenyah; 35.5 x 27 cm (private collection) (photo: Larry Sanders).

Yet, unlike the previous aban, this one exhibits near-perfect symmetry of motif, placement, and overall pattern, introducing the possibility that it was beaded over a paper template instead of a carved board. Not especially significant on its own, the achievement of near-perfect symmetry via newsprint may have better fulfilled the Dayaks' desire to maintain cosmic balance and order, especially where children were concerned. If so, the irony of using a modern import such as newspaper for such an important project would likely not be lost on the Dayak. On the contrary, the Dayak embraced new materials and invented new methods for incorporating them into existing practices.

Compared with Example 2, which imparts a sense of three-dimensionality by overlapping aso' limbs or tentacles, those in Examples 3-4 are devoid of such gestures; the motifs remain two-dimensional. Nor does the spiky scrolling motif in the center of the aban in Figure 11 confuse our sense of figure-ground relations. As mentioned above, the motif may represent a spirit offering to the aso' or something else. Spiky, cilia-like projections also appear on Example 7, animating the scrolling horns, tentacles, and torsos of aso' and mask motifs.

Example 5: An Arching Single Aso' with Two Heads

Portraying a single black aso' on a yellow ground, the aban in Figure 12 reverses the color schemes of the three previous aban. Arching its back sharply between its two heads, the aso' seems to balance atop the vertical black motif below which resembles a stylized bamboo shoot, symbol of vital force or mana (Sellato 1989:48). Or, the

Figure 12. Aban exhibiting a single black aso' with an arched back and two heads, probably Kenyah; 29 x 19 cm (private collection) (photo: Larry Sanders).

motif might represent a rice plant, fern, tree of life, or a ceremonial carved post (Sellato 1989:35, 45, Figures 70-73, 97-98, 2012c:413, Figure 16). While the vertical black motif may represent an offering to the aso', it is not located between aso' jaws but rather serves as a fulcrum for the entire composition. Together, the arching aso' and stylized vertical motif seem to form a single sentinel blocking access to the child they protect. The beader's use of a closed-mesh diamond plait contributes to the angular shapes of the aso's horns, tentacles, or limbs, making the creature look both iconic and archaic, encapsulating the gravitas of many generations.

Enough asymmetries are present between the halves of the aban for us to surmise that it was beaded over a carved template instead of a paper cutout. All of the beads are European, 3-5 mm in diameter and 2-4 mm in length. The yellow beads appear to have come from different color batches, perhaps collected over time. While some are lemon yellow and opaque, others are pale yellow and translucent; still others exhibit faint yellow stripes.

A parallel aban attributed to the Kenyah manifests another horizontal, black aso' with two heads on what is probably a yellow ground (Munan 1989:Figure 29). Reproduced in black and white, probably mid-20th century in date, the aban is difficult to see clearly, but seems to be lacking the eyes that are so prominently rendered in the aban in Figure 12, where the presence of one white eye unsettles the viewer. The beader could have distributed the white beads evenly between both eyes. By concentrating them in one eye, she not only accentuates the aso's otherworldly, watchful nature, but establishes an asymmetrical focal point in an otherwise largely symmetrical composition, generating another kind of complementarity.

Example 6: A Two-Headed Aso' Supporting a Third, Aso-Like Motif

Like Example 5, this one (Figure 13) also endows a single horizontal aso' torso with two heads, each marked by a prominent eye. A third eye-like motif occupies the center of the aso's torso, where it sits between two bands of vertical stripes whose significance, if any, is unknown. Rendered in green, a second large motif is supported by the horns or tentacles spiraling up from the aso' heads. The presence of a large concentric eye imbues the green motif with life and an allied guardian function. In fact, the overall shape of the green motif approximates an aso.' More research is needed to determine whether and how often spirit offerings depicted on aban closely resemble aso' or whether such motifs are better understood as young aso' being nurtured by their elders – the underworld counterpart of the human parent-child paradigm, possibly a new development in aban design.

Figure 13. Aban depicting a single yellow aso' with two heads supporting a green aso'-like motif, origin unknown; 28.75 x 25.75 cm (private collection) (photo: Larry Sanders).

The brightly colored European glass beads likely hail from the second or third quarter of the 20th century. Highly uniform in size and shape, they are 1.5-2 mm in diameter, 1-1.75 mm in length, and connected in the Dayak's typical open-diamond plait. On the whole, the beading is accomplished, though some motifs have irregular outlines. The careful, crisp symmetries of the aban's two halves suggest beading was done over a paper template. The 20 small white and orange star-like motifs dotting the upper background of the aban were probably not present on the template, but added by the beader herself in an

asymmetrical alignment countering the overall symmetry of the composition while imbuing it with spontaneity and lightheartedness.

A row of interlocking triangular motifs borders the lower perimeter of the aban. Among scholars of Indonesian textiles, such triangles are known as *tumpal* motifs (Taylor and Aragon 1991:39). When positioned along the borders of woven textiles with the upward-pointing triangles assuming one color and the downward-pointing ones another, tumpal motifs may be associated with a union of male and female elements engendering both fertility and protection achieved through complementarity and balance (Taylor and Aragon 1991:39). Tumpal motifs appear on other aban as well, constituting the upper border of one collected in the late 19th century among the Mahakam Kayan (Nieuwenhuis 1907:Plate 70b); two horizontal borders in the lowest register of a 20th-century aban still attached to a carrier attributed to the Kenyah or Kayan (Taylor and Aragon 1991:Figure V14); and two columns that border the left and right edges of an aban attributed to the Kayan (Munan 2005:52 top right). Both tumpal and other triangular motifs frame borders on various pieces of Dayak beadwork, including shell- or glass-beaded ceremonial skirts and vests of the Iban and Biadju (Murray 2021:Figures 3.38, 3.56-58) and beaded garments made by the Maloh (Munan 2005:104, 106-109).

Example 7: Impeccable Quadrilateral Symmetry

The aban in Figure 14 embodies a near-flawless union of pattern and technique rendered more impressive by the minuscule size (1.5-2 mm in diameter by 1-1.5 mm long) of the European glass beads. They are connected in the usual open-diamond plait. Yet, judging by small tears in the aban, beading progressed with threads flowing diagonally instead of vertically; the former demands far greater mental concentration without leaving a visible trace on the surface. Why did some Dayak beaders opt for this extra layer of difficulty (Hector 1995:Figure 9, 2005:56, bottom right)? Were beaders compelled by tradition? Or did they believe that diagonal threads made a piece less susceptible to time and wear, which is probably true?

No parallel to this aban has been published. Like the female beader, the male artist who conceived the design also possessed advanced expertise. After folding a piece of newspapers in quarters, he drew one quarter of the entire design. He likely cut out the design as well. Once unfolded, the cut paper template expressed his original vision: to create a quadrilaterally symmetrical composition featuring four aso' heads in profile emerging from a single body flanked by two frontal hudoq' motifs. Eyes energize motifs

Figure 14. Quadrilaterally symmetrical aban displaying a single white aso' with four bodies and heads plus two yellow mask-like motifs, origin unknown; 29.5 x 27.5 cm (private collection) (photo: Larry Sanders).

in all quarters, including the two motifs suspended between paired aso' jaws. Again, we wonder: if such motifs depict spirit offerings for appeasing the aso', why do they echo the aso' in shape to the point of having aso'-like eyes?

A single large eye inscribed in the center of the aso' body monopolizes the center of the aban with an 8-pointed star for a pupil, not unlike the 10-pointed star observed in Example 2. Other eyes may also be present: in the two columns of small concentric circles running up the necks of the hudoq' motifs; in the pairs of tiny black circles studding the chests of the aso'; and in two small aso'-like motifs truncated by the upper border. If one major theme of this aban is watchfulness, another is harmonious enmeshment or intertwinement. Almost all motifs interlink, overlap, or otherwise closely relate to neighboring motifs, resulting in a well-balanced organism for repelling negative entities. The spiky cilia-like projections from the hudoq' and aso' motifs add notes of dynamic, aggressive tension.

The beader seems to have limited her personal contributions to the long narrow bands framing the aban's perimeter which are unobtrusive in the extreme. Perhaps, knowing herself to be in the presence of a masterful template, she realized that merely rendering the pre-drawn motifs to the best of her ability would be contribution enough. Then again, the bands of color around the necks of the aso' may derive from her input alone, as may the eye-like motifs lining the necks of the hudoq.

Only three other quadrilaterally symmetrical aban have been published, both featuring aso' motifs (Hector 2005:7 upper left; Loebèr 1913:PlateVII middle; Munan 2005:53 lower right). A third aban, apparently informed by quadrilateral symmetry, eschews it (Wereldculturen Museum, TM-391-91; *see* Endnote 1). Quadrilateral symmetry is rare in Indonesian beadwork, but the inner register of a *tampan maju* (ceremonial mat) created by the Paminggir peoples of Lampung, Sumatra, displays near-quadrilateral symmetry by structuring stupa-like motifs and angular lines in a manner reminiscent of architectural mandalas in the Indianized Southeast Asian world (Maxwell 1990:202-203, Figure 290). Rather than a mandala per se, the aban in Figure 14 might be likened to a cosmic map, an expression of complementarity, balance, and order.

Example 8: An Idiosyncratic Approach

Comparatively speaking, if the aban in Figure 14 emanates composure, order, and balance, the one in Figure 15 exudes hectic disarray. Who beaded it, under what circumstances, and over what kind of template, we cannot say. As the two main motifs, two aso' bodies in loose mirror image sprout three distinct heads. Near the top of the aban, the two largest heads call to mind human faces with wide open eyes and mouths that seem to be screaming. To the left and right of the large heads are smaller aso' heads with single eyes. Near the bottom of the composition, two more one-eyed aso' heads appear, this time resembling open-jawed aso'. Below them, a seventh head with two tiny eyes hangs upside-down as if issuing from the union of the two aso' bodies beneath a large concentric eye. We have the sense of a drama unfolding and of forms writhing in flux as their horns, tentacles, or limbs overlap or intersect, raising the remote possibility that this is a birth-giving scene. Or, does the upside-down head represent a slave being sacrificed to the aso' (Sellato 1989:47)? Alternatively, are Dayak notions of the otherworld in play, where the things of this world are reversed?

Figure 15. Idiosyncratic aban displaying two aso' with multiple heads, origin unknown; 25 x 27 cm (private collection) (photo: Larry Sanders).

This aban abounds with the beader's personal touches. She not only studs the background with tiny dot-like motifs akin to stars in a night sky, but she colors outside of the lines so to speak, edging the two aso' bodies with irregular bands of contrasting colors while inserting green lines inside some motifs, in effect, drawing upon them. The overall result is electric; her work pulses with life. While she may not have conformed to traditional Dayak canons of representation, she achieved an aban's most important purpose: to frighten away evil spirits. Her achievements seem greater when considered in light of the European glass beads she used. Among the smallest on record for aban, they average 1-1.5 mm in diameter and length. Further, while her ability to render smooth curving lines rarely makes itself felt, in general, she expertly executes the open-diamond plait she is using, especially in the lower register of the piece where the beads average a scant 1 mm by 1 mm. The very fact that this aban was preserved leads us to believe that the Dayak respected its point of view and regarded it a success. Parallels may well exist in private collections.

Example 9: Aso' Serving as Anthropomorph Hands and Feet

The aban in Figure 16 situates aso' motifs in subsidiary positions as the hands and feet of a yellow squatting anthropomorph. Similar pairings appear on other aban; one Kenyah example gives aso' paws to a tiger (Sellato 2019:Figure 27). While the aso' that serve as hands are clearly defined and given single eyes, as feet, the aso' are eyeless and smaller; perhaps they are not aso' per se but stylized feet. Two partial aso' with eyes seem to extend right and left from the figure's oversized head; their connection is underscored by horizontal blue lines. Concentric rings of color form the figure's wide, staring eyes, while its mouth opens in a tooth-baring grimace or growl reminiscent of the open mouths on the aban in Figure 15. Four irregular star-like motifs call attention to the figure's shoulders and thighs. We have encountered this eye-like motif before in Figures

Figure 16. Aban with yellow anthropomorph having aso' for hands and feet, origin unknown; 7.5 x 25.5 cm (private collection) (photo: Sanders Visual Images).

8 and 14 where it also occupies focal positions. In Figure 16, however, the star-like motifs might also be interpreted as tattoos (Tillema 1989:Figure 146). In stratified Dayak societies such as the Kenyah, as we noted, only aristocrats could depict full-bodied anthropomorphs which might represent helpful slaves or godly beings (Munan 2005:52 top; Sellato 1989:43-44; Tillema 1989:Figure 158).

The many asymmetries between the two halves of this aban may be traced to the template board over which it was probably beaded in the usual open-diamond plait. The beader's personal touches likely include the tiny white motifs peppering the background, possibly intended as stars. Numerous and asymmetrical as the dots in the previous aban, they contribute a sense of life and spontaneity. Another personal touch is not readily apparent. The beader has finely graded the European glass beads, reserving the largest yellow beads, averaging 2 mm x 2 mm, for the figure's torso, thighs, and two ovals flanking the torso. Slightly swelling this part of the composition, the larger beads strengthen the figure, enhancing its muscle mass, even as the smaller yellow beads (0 .75-1.75 mm in diameter x 0.5-1.5 mm in length) impart refinement to the shoulders, head, and other areas. Not just the sizes but the shades of the beads are expertly orchestrated, with darker shades of yellow defining the upper contours of the figure's head and lighter shades for the torso and limbs, even as the white-heart beads call attention to the figure's eyes, mouth, earrings, neckbands, armbands, and wristbands.

Example 10: Aso' with Dragon-Like Heads and Dog-Like Bodies

The aban in Figure 17 departs from the previous aban in two ways: by portraying aso' with dragon-like heads and dog-like bodies and by using a bead-weaving technique that disposes beads at 45-degree angles. We will approach these issues in sequence.

In this aban, four yellow aso' rendered in profile face one another on either side of a black, front-facing, squatting anthropomorph with pronounced horns, shield-like arms or wings, and what might be an upturned snout above an open mouth (Hector 2021b:511, Figures 13-14). Large black mask-like faces appear without bodies in focal position on other aban worked in this technique (Nieuwenhuis 1907:Plate 70b; Sellato 1989:Figures 239, 246). Variously identified as hudoq, monster faces, lightning faces, or *kohong ledjo* tiger faces, they tend to be flanked by squatting anthropomorphs on aban attributed to the Mahakam River region or to the Aoheng. The aban in Figure 17 is unique for introducing aso' motifs whose bodies interlock with the perimeters of the black anthropomorph.

Yet, we have not seen this kind of aso' before, with dragon-like heads, jaws, and horns but dog-like torsos, paws, and tails. Represented in profile, the four aso' squat on their haunches as if at attention, watching with single eyes. Similar dragon-dog motifs have been observed in other Dayak art forms too (King 1985:134-135). Both were viewed as underworld creatures, with the dog's ferocious bark and ability to guard a paramount consideration (King 1985:135). Yet, instead of guarding the black anthropomorph, the aso' in Figure 17 seem to be guarding two large green figures with headdresses, bat-like wings, and single eyes. Whether the artist who designed the cut-paper template for this piece intended the green figures to be present, or whether they were an accidental artifact of pattern production, we cannot say. By depicting them largely in green, however, the beader seems to have recognized their potential, materializing them into being and challenging our sense of figure-ground relations (Hector 2021a). Blue concentric diamond motifs in the heads of the green figures link them to the diamond made of white hearts in the black figure. A parallel aban in the Yale University Art Gallery displays neither ambiguous green motifs nor aso' (ILE2019.12.456).[2]

Example 10 was woven with a relatively rare beading technique that creates a mesh as dense as the meshes on closed-diamond bead plaits; as mentioned, both conjure armor. The same bead-weaving technique also appears on a ca. 1875 vest made largely of Chinese glass coil beads and

Figure 17. Aban featuring four yellow aso' flanking green and black anthropomorphs, possibly Aoheng; 42 x 18 cm (collection of Thomas Murray, no. 15027).

attributed to the Iban or Maloh (Hector 1995:Figure 16) and on headbands, necklaces, and other pieces of Dayak beadwork (Hector 1995:29-30; Westerkamp 2002:223 bottom).

Example 11: Introducing the Christian Cross

The final example (Figure 18) superimposes a large red cross on an ambiguous yellow motif that might be an aso' or godly being. While the ambiguous motif is given small black eyes, they look out from a subsidiary position below the cross, as if they are no longer needed; now, the cross will do the protecting. On the right and left sides of the aban, broad yellow scrolling motifs align without intersecting. In places, their curves seem somewhat angular, almost as if molded by a machine. Ten concentric diamond motifs dot the expansive background while two small white dots near the bottom corners might be eyes or decorative elements. Although the motifs are nicely contoured and the beading is masterful, the composition appears rigid, stark, and static. Beaded over a cut-paper template using glass beads averaging 1.75-2 mm in diameter x 1-1.75 mm in length connected in an open diamond plait, it exhibits perfect bilateral symmetry. Apart from color selection, the beader has left no traces of herself. Visually and technically impressive, this aban succeeds in balancing two different world views and ways of life, the indigenous and the Christian. As mentioned above, Christian missionaries began working in Borneo in the 19th century. By the early 20th century, Dayak peoples began converting, in some cases, abandoning their native traditions (Avé and King 1986:39, 58; King 1993:142-143, 271-272). By the mid-20th century, cross motifs became more common in Dayak daily lives, an accepted aspect of a new visual, material, and spiritual culture.

Figure 18. Aban juxtaposing Christian cross and aso'-like motifs, origin unknown; 39.5 x 28.5 cm (private collection) (photo: Sanders Visual Images).

While it must have been challenging to integrate such different aesthetics – one curvilinear, the other rectilinear – the Dayak blend them well, combining crosses with indigenous motifs not just in beadwork but in paintings and sculptures (Sellato 1989:351-352, 408). In so doing, the Dayak demonstrate remarkable resourcefulness, skill, and assimilation of foreign deities – just like they assimilated foreign glass beads. We do not know who first inserted a cross motif into an aban. Chances are she was an elderly

beader whose work was widely respected (Buckley 2023). Following her example, other beaders in her community may have done likewise. That said, no other aban bearing a cross has been published. Nor have Islamic motifs been recorded in aban, despite the number of Dayak peoples who have converted to that major world religion (King 1993:125 ff.). By far the largest of the aban studied (40 cm wide x 29 cm high), it would have covered most of the front of the carrier with a scale as bold as its iconography.

CONCLUSION

The eleven aban discussed above tell a particular story. Another set of aban featuring other aso' motifs might have generated a different narrative. Nevertheless, the shape-shifting nature of the aso' might still be clear. Whether shown frontally or in profile, alone or with other motifs, in the minds and hands of Dayak artists aso' are metamorphic, enigmatic, watchful beings, mindful of human needs and desires. Analyzing the eleven examples we have concluded that, instead of copying pre-existing aban, Dayak women may have used them as guidelines; that the type of pattern template (wood or paper) can sometimes be discerned from the finished aban; that Dayak women beaders could exercise far more artistic agency than received wisdom indicates; and that more research is needed to identify the motifs poised between aso' jaws and in other parts of aban. Additional research may also reveal a correlation between the bilateral symmetry characterizing aban and that of certain Dayak tattoos and painted war shields. We might also question why so many newly produced aban appear to depict tigers, hornbills, and full-bodied anthropomorphs, the very motifs formerly off-limits to Dayak of lower social orders.

Future researchers might begin by cataloging aban in global museum and private collections, tying motifs, patterns, and styles to the real-world Dayak who made them. Only then might we glimpse the true magnitude of the Dayak's capacity for rendering artworks in beads – and for loving their children.

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ENDNOTES

1. The counterexample may be seen at: https://collectie.wereldculturen.nl/#/query/2a6b9233-6bec-4770-a0bb-3a0d1e7ec02c, accessed 5 September 2022.

2. The baby carrier with the green background in the Yale University Art Gallery collection may be seen at https://artgallery.yale.edu/collections/objects/275650, accessed 20 July 2022.

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Valerie Hector
Independent Researcher
Evanston, IL
valeriehector@sbcglobal.net

THE BEAD TRADE DURING THE LATE THIRD AND SECOND MILLENNIA BC AT THE ISLAND OF FAILAKA, KUWAIT, UPPER PERSIAN GULF

Ann Andersson

The island of Failaka (Kuwait) is favorably situated in the Persian Gulf at the inlet of the Mesopotamian harbor cities of the 3rd to 2nd millennia BC. The island was investigated between 1958 and 2017 by several different archaeological projects focusing on the remains from the Bronze Age. Two settlements (Al-Khidr and Tell F3) and two large monumental buildings (Tell F6) were uncovered. A substantial number of beads made from semiprecious stones (carnelian, agate, jasper, turquoise, and lapis lazuli) were found. Lesser numbers were made of glass, faience, and paste, as well as bone, shell, ostrich eggshell, and clay. The majority of the beads must have been brought to the island as finished goods since raw materials for their production were not locally available and little evidence of bead production has been identified on the island. The beads found at Failaka suggest that the island was tied into extensive trading networks reaching from the Indus region to the Mediterranean.

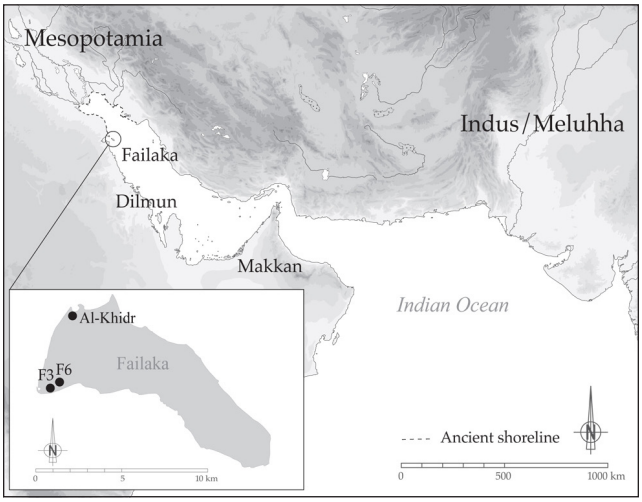


Figure 1. The situation of Failaka Island in the ancient world (image: Ann Andersson, after Hélène David-Cuny; ancient coastline after Steinkeller 2013).

INTRODUCTION

During the late 3rd millennium BC, the kingdom of Dilmun was centered on Bahrain and excavations have uncovered the capital city of Qala'at al-Bahrain, the Barbar temples, and the burial mounds of Dilmun royalty (Andersen and Højlund 2003; Højlund and Andersen 1994, 1997; Laursen 2017). In the early 2nd millennium BC, Dilmun took control of Failaka, an island in the Persian Gulf, which is favorably situated at the inlet to the harbor cities of Mesopotamia, such as Ur and Gu'abba (Figure 1). Archaeological evidence from ca. 2200-2000 BC suggests that prior to annexation by Dilmun, the island was inhabited by a population with a Mesopotamian material culture characteristic of the UR III period (Højlund and Abu-Laban 2016). Perfectly situated along the trade route between southern Mesopotamia and the Indus region, Failaka island was a valuable way station with fresh water and safe anchorage, which could be used on the route to and from the Mesopotamian markets. A large variety of goods were traded to the southern Mesopotamian cities, including perishable goods such as barley and sesame oil, as well as luxury goods such as ivory, copper, gold, exotic animals, different varieties of exotic wood, and semiprecious stones (Laursen and Steinkeller 2017). It is likely that beads, made of many different materials, were also traded and moved regularly along this network. Such trade is demonstrated by the large number of beads (922 to date) found at Tell F3 and Tell F6 in levels of the late 3rd and 2nd millennia. While the bead assemblages from the Danish excavations at Tell F3 and Tell F6 have been published by the author (Andersson 2014, 2016, 2021, 2022), this article provides a complete overview of the Bronze Age beads from the island. Therefore, beads from the American (Johns Hopkins University), French (Maison de l'Orient, Lyon), and Slovak (Institute of Archaeology of the Slovak Academy of Sciences) Bronze Age excavations at Failaka are also be treated herein.

ARCHAEOLOGICAL RESEARCH AT FAILAKA

The 1958-1963 Moesgaard Museum excavations at Failaka uncovered a monumental building, the so-called "Palace," which is now interpreted as a building with storage functions (Tell F6) and a settlement (Tell F3) (Figures 2-4). The Bronze Age tells were heavily disturbed by stone robbers, complicating the assignment of small finds to specific stratigraphical phases. Immediately west, Johns Hopkins University excavated smaller areas (trenches FH-1, FH-3 to FH-5, and FH-9) in 1973-1974 that uncovered small storage structures. Johns Hopkins University also excavated a small trench at Tell F3 (FH-2) east of the Danish excavations. No architecture was uncovered, only debris from mixed Early Bronze Age contexts, probably indicating a refuse area (Howard-Carter 1984). In 1984-1985, another area east of the Tell F6 "Palace" was excavated by the French Archaeological Mission to Failaka (Calvet and Pic 1986). The excavation revealed another large monumental building, identified as a temple. Excavations by Moesgaard Museum resumed at Tell F6 in 2008 and continued until 2012. They investigated the east corner of the "Palace," an outdoor area between the "Palace" and the temple, and an area south of the temple. Moesgaard Museum resumed excavation of Tell F3 from 2013 to 2017, uncovering an occupation sequence from ca. 1750-1350 BC, i.e., phases 1-5, which corresponds with periods 2, 3B, and 4A (Højlund 2021:162-166). In 2019, the Moesgaard Museum team returned to Tell F6 where a small temple platform was discovered east of the main temple (Højlund and Hagelquist 2019). Lastly, a small Bronze Age settlement named Al-Khidr was excavated from 2004 to 2009 by the Kuwaiti-Slovak Archaeological Mission (Benediková 2010). This site is situated some distance from the rest of the Bronze Age tells on the northwestern coast of Failaka Island (Figure 1) and was interpreted as a seasonal settlement or a small redistribution center (Benediková 2010:320-321).

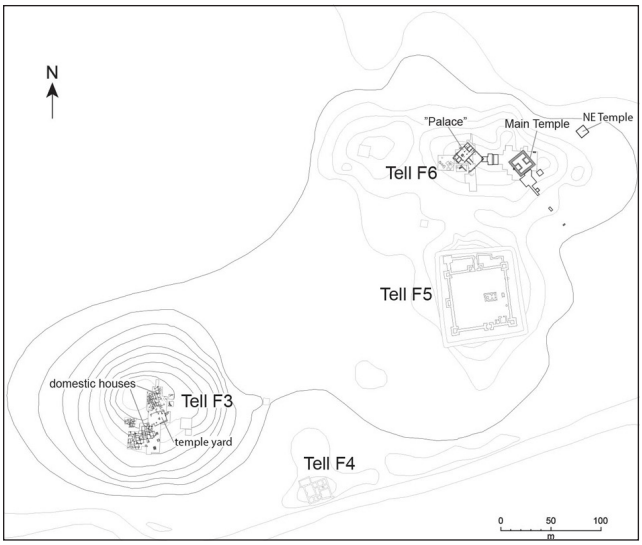


Figure 2. The archaeological area on the southwest portion of Failaka Island. Tell F3 and Tell F6 are Bronze Age settlements, while Tell F4 (workshop) and Tell F5 (fortress) are Hellenistic (Højlund Abu-Laban 2016:Figure 3).

Figure 3. The many small row houses and the square temple at Tell F3. At the top of the mound is the house of Sheikh Ahmad, the 10th Emir of Kuwait, 1921-1950 (photo: Thomas Sagory).

Figure 4. Tell F6 with the "Palace" and temple in the foreground. The Hellenistic fort (F5) is in the background (photo: Thomas Sagory).

THE BRONZE AGE BEAD ASSEMBLAGE

In total, 922 beads, pendants, and semi-finished products (i.e., roughouts, blanks, and semi-drilled beads) have been recovered from Tell F3 and Tell F6. The majority of the beads (92%) were found in the Danish excavations. Of these, 348 beads were found in the "Palace" at Tell F6, while 167 came from Tell F3. The assemblage from the two sites originally

included 114 additional beads, but these were unfortunately lost during the Iraqi invasion of Kuwait in 1991 (Andersson 2022:7). The recent excavations at Tell F6 recovered 200 beads, while the latest excavations at Tell F3 added 27 beads to the assemblage (Andersson 2016, 2021).[1] The Tell F3 excavation by Johns Hopkins University recovered four beads (Howard-Carter 1984). The excavations of the temple and the storage structures outside the "Palace" uncovered an additional 51 and 11 beads, respectively (Calvet and Pic 1986:66-71; Howard-Carter 1984). Including the smaller Bronze Age Tell of Al-Khidr, with 13 items (seven beads made from carnelian, quartz, copper, bitumen, and bone; one stone pendant; and three stone semi-finished products), the Bronze Age bead assemblage consists of 935 beads (Benédikova 2010).[2] This is a high number, in contrast to the numbers found at other Dilmun sites in Bahrain, e.g., Qala'at al Bahrain (30 beads), the Barbar temples (10 beads and a shell disc) and the Saar settlement (104 beads) (Andersen and Højlund 1994:391-392, Figures 1941-1966, 2003:316-317; Højlund and Andersen 1997:36, 73, Figures 95, 96, and 301; Killick and Moon 2005:181-186). Thus, the only assemblage that is somewhat comparable in terms of quantity comes from the Saar settlement, but this assemblage is quite different in nature, as it contains a large number of clay beads (n = 47, ca. 45%). In that Saar is an inland settlement, the difference between the two assemblages likely derives from differentiated access to high-prestige materials. The clay beads from Saar are interpreted as local imitations of semiprecious stones and contrast with the beads from Failaka that consist mainly of high-prestige materials such as carnelian, agate, lapis lazuli, glass, and faience which were acquired through maritime trade (Andersson 2022:48-54; Killick and Moon 2005:181).

Sadly, due to extensive stone plundering at the two tells, it is not possible to firmly assign the beads from the 1958-1963 Danish excavations to the different settlement periods that were identified. Similarly, the Bronze Age levels of the Tell F6 temple were severely disturbed and damaged, complicating the dating of the beads found there (Calvet and Pic 1986:14). Fortunately, the beads found during the recent Danish excavations at Tell F3 (2013-2017) and Tell F6 (2008-2012) could be much more precisely dated.

Ur III Beads (Late 3rd Millennium) at Tell F6

A major discovery of the 2008-2012 Danish excavations was the existence of a settlement phase dated to the Ur III period (2112-2004 BC) with distinct Mesopotamian material culture (Højlund and Abu-Laban 2016:15-30). Until this finding, a 2nd-millennium occupation was thought to be the first on the island. The recovery of 62 beads from this occupation phase (Phase 1) at Tell F6 (Trench C) testifies to beads arriving at the island ca. 2200-2000 BC. These beads may have been part of the early systematic bead trade coming via the island. Their raw materials (such as carnelian, rock crystal, lapis lazuli, and ostrich eggshell) confirm that the beads must have been imported from distant places because these materials were not locally available. Other finds of this phase document connections with Makkan (UAE-Oman) and Meluhha (Pakistan-India) (Højlund 2016:251-252; Højlund and Abu-Laban 2016:16-20).

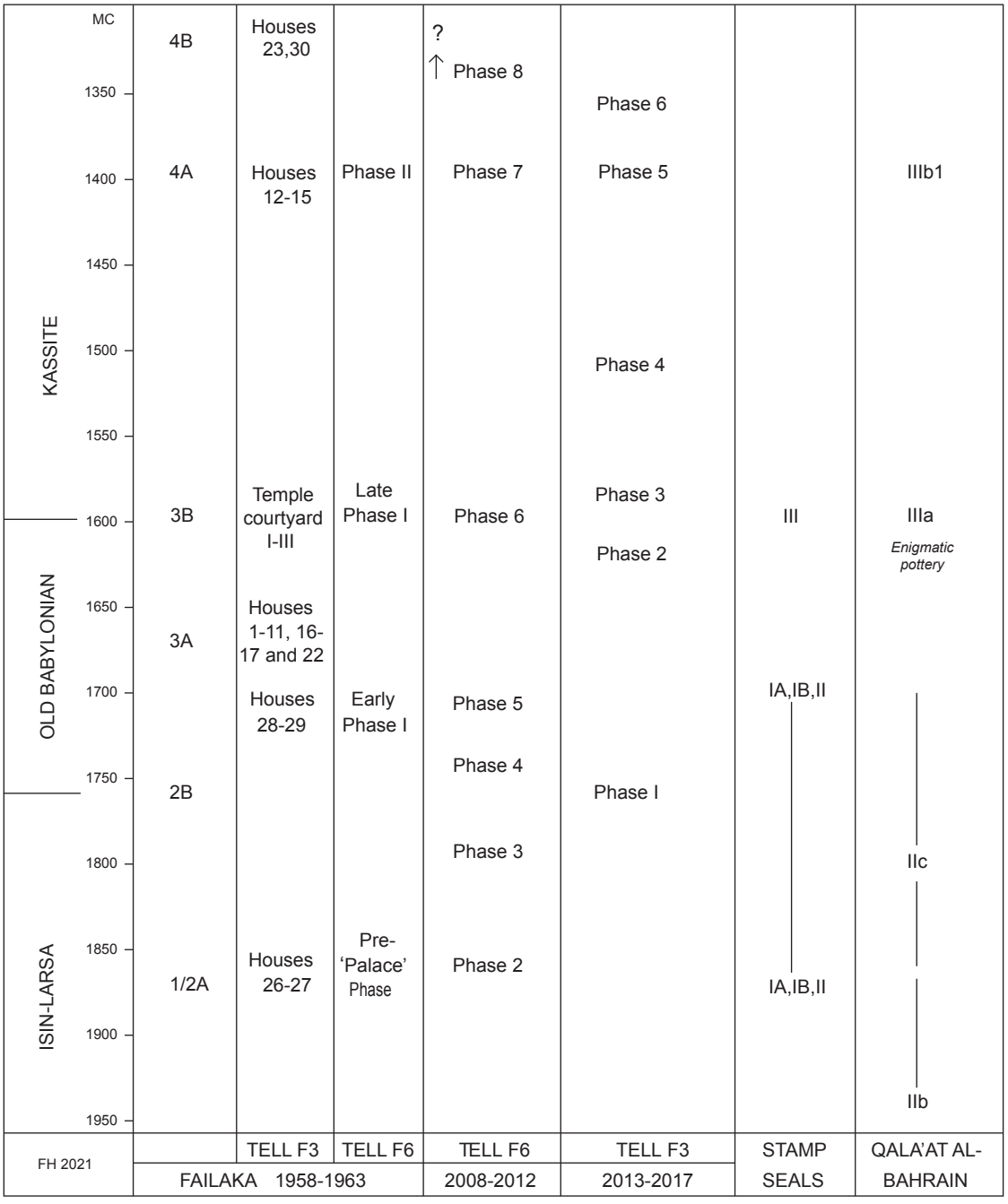
2nd-Millennium Beads at Tell F3, Tell F6, and Al-Khidr

The majority of the beads found in the Danish excavations at Tell F3 and Tell F6 belong to a period of occupation spanning the early and late 2nd millennium. The settlement periods identified during the 1958-1963 excavations are periods 1, 2, 3A, 3B, 4A, and 4B, while the architectural phases uncovered during the 2008-2017 excavations were labeled phases 1-6 at Tell F6 and phases 1-8 at Tell F3. Generally, the duration of the 2nd-millennium occupation at Failaka covers the Isin-Larsa period, the Old Babylonian period, and the Kassite period (Table 1).

Tell F3 Settlement

The excavations at Tell F3 yielded 198 beads, which is approximately 21.1% of the entire Bronze Age bead assemblage. The excavations uncovered a sequence of domestic occupation spanning periods 2-4B, as well as a small temple belonging to Period 3B (Kjærum and Højlund 2010). Due to the disturbed stratigraphy, 99 (59.2%) of the beads are from unknown contexts (Andersson 2022:35, Figure 70). Thus only 47 beads could be ascribed to individual excavation layers on the basis of the accompanying pottery. Two beads (1.2%) were found in contexts dating to Period 2, 12 (7.2%) to Period 3A, 2 (1.2%) to Period 3B, 9 (5.4%) to Period 4A, and 22 (13.2%) to Period 4B. A number of beads (n = 21, 10.6%) were found in contexts that could not be assigned to individual periods and may belong to one or the other of two periods represented at the tell. Of these, a small number come from successive periods, for instance, from periods 3A/3B (n = 1, 0.5%) and periods 4A/4B (n = 9, 4.5%). A similarly small number come from layers in which pottery dating to non-successive periods was present, e.g., periods 3A/4A (n = 1, 0.5%) and 3B/4B (n = 10, 5%) (Andersson 2022:35, Figure 70). Since only 28.2% (n = 47) of the beads could be dated to a specific period, it is not possible to establish if beads were more prominent in one period or another. Generally, a dating to

Table 1. Chronological Sequence at Tell F3 and Tell F6 Compared to Qala'at al-Bahrain (Højlund and Hilton 2021:Fig. 50).



the first three quarters of the 2nd millennium is proposed. The Johns Hopkins University excavations (1973-1974) at Tell F3 excavated a trench (FH-2) which revealed a stratified rubbish dump dated to the early 2nd millennium. Only four beads (0.4% of the entire Bronze Age assemblage) were found in these contexts (Howard-Carter 1984).

Moesgaard Museum excavations at Tell F3 from 2013 to 2017 uncovered an occupation sequence from ca. 1750-1350 BC (phases 1-5) that corresponds with periods 2, 3B, and 4A. Phase 6 includes a mix of material dating from Period 4A, as well as post-4A material (20th-century contamination, likely related to the construction and

maintenance of Sheikh Ahmad's house) (Figure 3; Table 1) (Højlund 2021:164; Højlund and Hilton 2021:63). Twenty-seven beads were recovered and relate to Phase 2 (n = 3, 1.5%), Phase 3 (n = 1, 0.5%), Phase 5 (n = 6, 3%), and Phase 6 (n = 17, 8.5%).[3]

Tell F6 "Palace", Temple, and Intermediate Area

Excavations at Tell F6 uncovered 610 beads which is approximately 65.5% of the entire Bronze Age bead assemblage. Most of the beads from the 1958-1963 Danish excavations were recovered from inside the "Palace." These could only be tentatively assigned to settlement periods 2-4A (n = 142, 23.3%) which span approximately 550 years between ca. 1900-1350 BC (Højlund 2021:7). Due to the extensive disturbance from robber's pits and the stratigraphic implications, it is not possible to date the beads more precisely (Andersson 2022:36). A few beads (n = 24, 3.9%) may date to an earlier settlement that predates the "Palace" (i.e., Period 1, the pre-"Palace" phase, which has not been further dated), having been found below the earliest floor of the structure. It is, however, possible that they may have come from disturbed "Palace" contexts and may be intrusive into earlier layers.

A sizeable quantity (n = 182, 29.8%) of beads was found in contexts of unknown date (Andersson 2022:36-38, Figures 70 and 72). Fifty-one beads (8.3%) were recovered by the French 1973-1974 excavations from different stratigraphic levels of the temple (Calvet and Pic 1986:66-72). They only comprise 5.5% of the entire Bronze Age bead assemblage. The beads were mainly found in Level Va (n = 17) and Level III (n = 23) or other levels dated to the 2nd millennium. Very few beads were found in levels dated to other periods.[4] Level Va is dated to the early centuries of the 2nd millennium and represents the first period of temple use. Level III is dated to the second half of the 2nd millennium and consists of poorly preserved (looted) walls and thick abandonment layers (Calvet and Pic 1986:19).

Johns Hopkins University excavated two trenches (FH3-5 and FH9) that encompassed part of the "Palace" structure and an area outside its walls where auxiliary structures were located. Several levels contained remains of kilns, vats, and small rooms used for industrial purposes. Generally, the structures date to the 2nd millennium (Howard-Carter 1984). Few beads (n = 11, 1.2%) were found in the trenches.[5] The recent Danish excavations recovered 200 beads from an area between the "Palace" and the temple, but as these beads were found outside the building, they cannot be used to date the beads found within the structure.

Above the Ur III occupation, excavators uncovered architecture in trenches A, E, and H that belonged to a pre-"Palace" period (phases 2 and 3) beginning ca. 1900 BC (Højlund 2016:252). The initial function (Phase 2) of this area remains undetermined, but it may have had ritual functions in Phase 3. Phase 2 (the thick-wall phase in periods 1-2) had no beads in association and only four beads relate to Phase 3, the thin-walled building of periods 1-2 which is represented by small rooms, a pavement, and a sacrificial fire installation (Andersson 2016:Figures 823, 893-896; Højlund and Abu-Laban 2016:31-42).

The "Palace" was built during periods 1-2 (phases 4-5) and the investigated area is located east of this building. The area is paved with a heavy floor, above which is a ca. 2-m-thick series of mainly thin layers of floors and refuse which dates to periods 1-2 (phases 4-5), 3B (Phase 6), and 4A (Phase 7). After Phase 5 (ending in the late 18th century BC), the "Palace" was abandoned throughout the 3A period (ca. 1700-1500 BC) due to the collapse of Dilmun trade and the Dilmun stately level of control over Failaka Island (Højlund 2016:255-256; Højlund and Abu-Laban 2016:48-58). The "Palace" was reoccupied in Period 3B (Phase 6). but no beads are associated with it. The occupation of the "Palace" continued in Period 4A (Phase 7), and is represented by 15 beads found in the area between the temple and "Palace." The associated material culture has many Kassite parallels, hinting at a situation where Dilmun (i.e., both Failaka and Bahrain) had become a Babylonian province (Højlund 2016:260, 2021:165). Phase 8 represents a post-"Palace" period dated somewhere between period 4A and the Hellenistic period; 18 beads belong to this phase (Andersson 2016:Figure 823; Højlund and Abu-Laban 2016:59-69).

Al-Khidr

The occupation at Al-Khidr consisted of either two or three subsequent Early Dilmun settlements occupied during the first half of the 2nd millennium BC or one large settlement compound encompassing three low hills (KH-1, KH-2, and KH-3) and perhaps the area in between them (Benediková 2010:320-322). In the first scenario, the settlement is proposed as developing from a seasonal settlement in its earliest phase to a small redistribution center connected to the maritime trade in its latest phase (Benediková 2010:320-321). Regardless of the scale of the occupation, Al-Khidr was likely contemporary with parts of the early 2nd-millennium occupation at tells F3 and F6, but in contrast to the tells, only 13 beads were found at the settlement.[6]

BEAD DISTRIBUTION AT TELL F3, TELL F6, AND AL-KHIDR

At Tell F6, large quantities of beads were excavated from the interior of the "Palace." More specifically, there was a large concentration of beads in the area around rooms 2 and 3 (Andersson 2022:36-38). Due to the difficulties involved in interpreting the stratigraphy, it is not clear if the concentration represents a single hoard lost when the building was abandoned and later scattered during stone plundering, or is an accumulation of beads lost over time, but the likelihood is that these rooms were a preferred place to store beads. No other such concentrations have been found on the island.

Since the beads were found in a building with evidence of storage and production functions, they are interpreted as part of the different trade goods that passed through Failaka. The presence of beads at a monumental building implies a local authority with close ties to trade. This authority was probably under the control of Dilmun. The area between the "Palace" and the temple did not yield many beads. While those found in this area cannot be related to any of the large buildings (i.e., the "Palace" or the temple), their presence in the outdoor area between them does indicate a general consumption of beads. The beads were individual finds, suggesting that they were lost during transport or usage.

It has not been possible to examine the distribution of beads within the temple in detail, as they were mostly associated with abandonment layers (Level III) (Calvet and Pic 1986:19, Figures 27-28, nos. 106-107, 109-113, 115-116, 119, 121, 123-130, 135, 142). In the earlier Level Va, a group of 15 blue and white faience beads, a faience (Egyptian blue?) bead, and a carnelian bead were found associated with Floor 312 or related loci (Calvet and Pic 1986:24, Figures 121, 131, 140). Unfortunately, considering the poor stratigraphic evidence, it is uncertain if the beads were part of temple paraphernalia, such as adornment for cult statues, or trade goods.

The bead distribution at Tell F3 is very different from Tell F6 with only very small concentrations of beads scattered across the excavated area. These might represent small caches of personal belongings of the people who lived here, whether they were permanent residents or travelers and merchants staying temporarily in the small houses at Tell F3. The remarkable number of beads found at Tell F3 and Tell F6 suggest that large volumes of beads were transhipped at the sites. This may have been how trade between Dilmun and Mesopotamia was normally organized, as it seems that beads were stored at the Tell F6 "Palace." Alternatively, beads could have been traded as part of less formalized exchange system that took place during encounters on Failaka in connection with the service, maintenance, and repair of the cargo ships.

A different scenario of bead consumption seems to have taken place at Al-Khidr, where very few beads were found. The beads were scattered across the settlement and there is no clear pattern in their distribution. It appears that the residents of this small settlement and minor redistribution center may not have had access to beads and may have mainly dealt with other types of trade goods.

BEAD MATERIALS

Most of the beads from Failaka are made of semiprecious stones such as carnelian, agate, jasper, and different varieties of quartz. Less numerous are beads made of lapis lazuli, turquoise, and porphyry. Metal (gold, copper, and bronze) beads are very rare. There are also a few beads made of organic materials, such as different varieties of seashells, ostrich eggshell, bone, and ivory (Table 2). Beads made of artificial materials such as glass, faience, and paste occur in small numbers. The majority of all these materials were brought to the island since the raw lithic materials do not occur there naturally. Neither is there any evidence for local production of the man-made products.

The various materials present on the island reveal the role of Failaka as a node in a vast trading network operating in the Persian Gulf during the late 3rd and the 2nd millennium BC. Part of the raw materials may be attributed to specific geographical regions, suggesting the possible extent of the contacts and trading networks that Failaka was tied into.

Stone

Many of the beads found at Failaka are made of carnelian (Figures 5e-f, h; 6d, f-h; 7g). Much of the carnelian occurring in the Middle East is traditionally ascribed to the Indus Valley Civilization (ca. 3300-1300 BC) that produced carnelian beads in large numbers from abundant local stone (Kenoyer 2005; Lankton 2003:35; Moorey 1994:97). Carnelian, however, is also found in many other regions, such as the central, southern (at Bandar Bushire), and eastern parts of Iran, the UAE (at Jebel al-Ma'taradh in Ras al-Khaimah), Afghanistan, Saudi Arabia (near Tayma), Yemen, Egypt, and Anatolia (Brunet 2009:90; Hausleiter 2011:109; Kenoyer and Frenez 2018:399; Law 2011:282; Moorey 1994:97; Vogt 1996:98).

Like carnelian, different forms of agate, quartz, and jasper are also found across the Near East and the Indus region. Agate (Figures 5b-d, j; 6i-j; 7h-i, n-o) has been reported in the Gulf

Table 2. Bead Materials at Failaka.*

Materials \ Tell and Excavation		Danish excavations (1958-1963) Tell F3	Danish excavations (2013-2017) Tell F3	American excavations (1973-1974) Tell F3	Tell F3 total	Danish excavations (1958-1963) Tell F6 "Palace"	Danish excavations (2008-2012) Tell F6	American excavations (1973-1974) Tell F6	French excavations (1984-1986/1988) Tell F6 Temple	Tell F6 total	Slovak excavations (2004-2009) Al-khidr	Total
Stone	***Chalcedony***											
	Agate	36	1	-	37	40	15	2	10	67	-	104
	Carnelian	60	6	2	68	171	94	6	8	279	1	348
	Chrysoprase	1	-	-	1	-	1	-	-	1	-	2
	Jasper	19	1	-	20	23	4	-	-	27	-	47
	Moss agate	-	-	-	-	1	-	-	-	1	-	1
	Unid. chalcedony	-	-	-	-	-	4	-	-	4	-	4
	Quartz											
	Amethyst	1	-	-	1	-	-	-	-	-	-	1
	Milky quartz	6	-	-	6	3	2	-	-	5	-	11
	Rock crystal	2	-	-	2	2	5	-	-	7	-	9
	Rose quartz	1	-	-	1	-	-	-	-	-	-	1
	Smoky quartz	-	-	-	-	1	1	-	-	2	-	2
	Unid. quartz	3	1	-	4	1	1	-	-	2	2	8
	Other stone											
	Calcite	4	-	-	4	1	-	-	-	1	-	5
	Chlorite	2	-	2	3	2	1	1	-	4	4	11
	Hematite	1	1	-	2	1	-	-	-	1	-	3
	Limestone	5	-	-	5	5	2	-	-	7	-	12
	Lapis lazuli	4	1	2	6	8	2	-	2	12	-	18
	Porphyry	-	-	-	-	2	1	-	-	3	-	3
	Turquoise	1	-	-	1	4	2	-	-	6	-	7
	Unid. stone	1	-	-	1	4	11	-	6	21	3	25
Metal	Bronze/Copper	-	-	-	-	-	-	1	-	1	1	2
	Clay	1	-	-	1	-	-	-	-	-	-	1
	Gold	-	-	-	-	1	1	-	-	2	-	2
Artificial	Faience	9	-	-	9	14	22	-	19	55	-	64
	Glass	5	3	-	8	53	9	1	5	68	-	76
	Paste	-	-	-	-	5	1	-	-	6	-	6
	Unid. art. mat.	-	-	-	-	-	1	-	-	1	-	1
Organic	Bone	2	-	-	2	-	1	-	1	2	1	5
	Bitumen	-	-	-	-	-	1	-	-	1	1	2
	Fossilized coral	-	-	-	-	1	-	-	-	1	-	1
	Ivory	1	-	-	1	-	-	-	-	-	-	1
	Pearl	-	-	-	-	2	-	-	-	2	-	2
	Ostrich eggshell	-	-	-	-	-	9	-	-	9	-	9
	Shell	3	13	-	16	2	9	-	-	11	-	27
	Unid. org. mat.	-	-	-	-	1	-	-	-	1	-	1
Total		167	27	4	198	348	200	11	51	610	13	821
%		17.8	2.9	0.4	21.1	37.2	21.4	1.2	5.5	65.5	1.4	88

*excluding 114 missing beads from the Danish Bronze Age excavations at Tell F3 and Tell F6.

Figure 5. Failaka beads: (a, k) lapis lazuli, (b) jasper, (c-d, j) banded agate, (e-f, h) carnelian, (g) turquoise, (i) rock crystal, (l-m) ostrich eggshell (photo: Lisa Yeomans).

at al-Ghail (Jebel al-Ma'taradh), in Ras al-Khaimah (UAE), and in neighboring countries such as Iran, Pakistan, India, and more-distant Anatolia. These regions are all potential sources for the agate found at Failaka (Charpentier et al. 2017; Law 2011; Moorey 1994:99). Likewise, jasper (Figure 5b) is relatively frequent in the Near East as large outcrops or as washed sediments (Moorey 1994:98). Jasper sources are reported in the mountainous zones of the southern Elburz and the central Zagros, the Makran coast of Baluchistan, and in northern Oman (Moorey 1994:98). It is likewise widely available in the greater Indus region (Law 2011).

Nine beads are made of rock crystal (Figure 5i) (Andersson 2016:Figures 835-837, 891,1020, 2022:Figures 93, 134, 140, 542). The stone may have arrived on Failaka from many different regions, such as India, Iraq (near Eridu), Iran, Anatolia, and Cyprus (Moorey 1994:95).

Lapis lazuli beads (Figures 5a, k and 7b) are quite rare at Failaka and have so far only been found at Tell F3 and Tell F6 (n = 18) (Andersson 2016:Figures 863 and 1001, 2021:Figure 428, 2022: Figures 80, 105, 253, 275, 426, 460, 530, 545, 551, 554, 560, 569; Calvet and Pic 1986:Figure 110 and 116; Howard-Carter 1984). This material was highly valued in the ancient Near East for personal ornaments, amulets, and seals (Moorey 1994:85). There has been much discussion about the place of origin for lapis lazuli, but sulfur-isotope analysis by Law (2014) suggests that deposits of the Sar-I-Sang in the Badakhshan region of Afghanistan were the only exploited source. Lapis lazuli was circulated widely along the trade networks to Mesopotamia and Egypt, either by land or sea routes. In 3rd-millennium textual sources, Dilmun is described as one of the transit regions for lapis lazuli arriving in Mesopotamia (Moorey 1994:85).

Only three hematite beads were found on the island (Andersson 2021:Figure 422, 2022:Figures 286 and 528). The exact source of the hematite is unknown. It may have come from Syria (the limestone plateau bordering the Euphrates near Tell Bazi) or the mountainous regions in Anatolia (Taurus) and Iran (Zagros and Elburz). The material is also reported to occur in Israel, Jordan, and

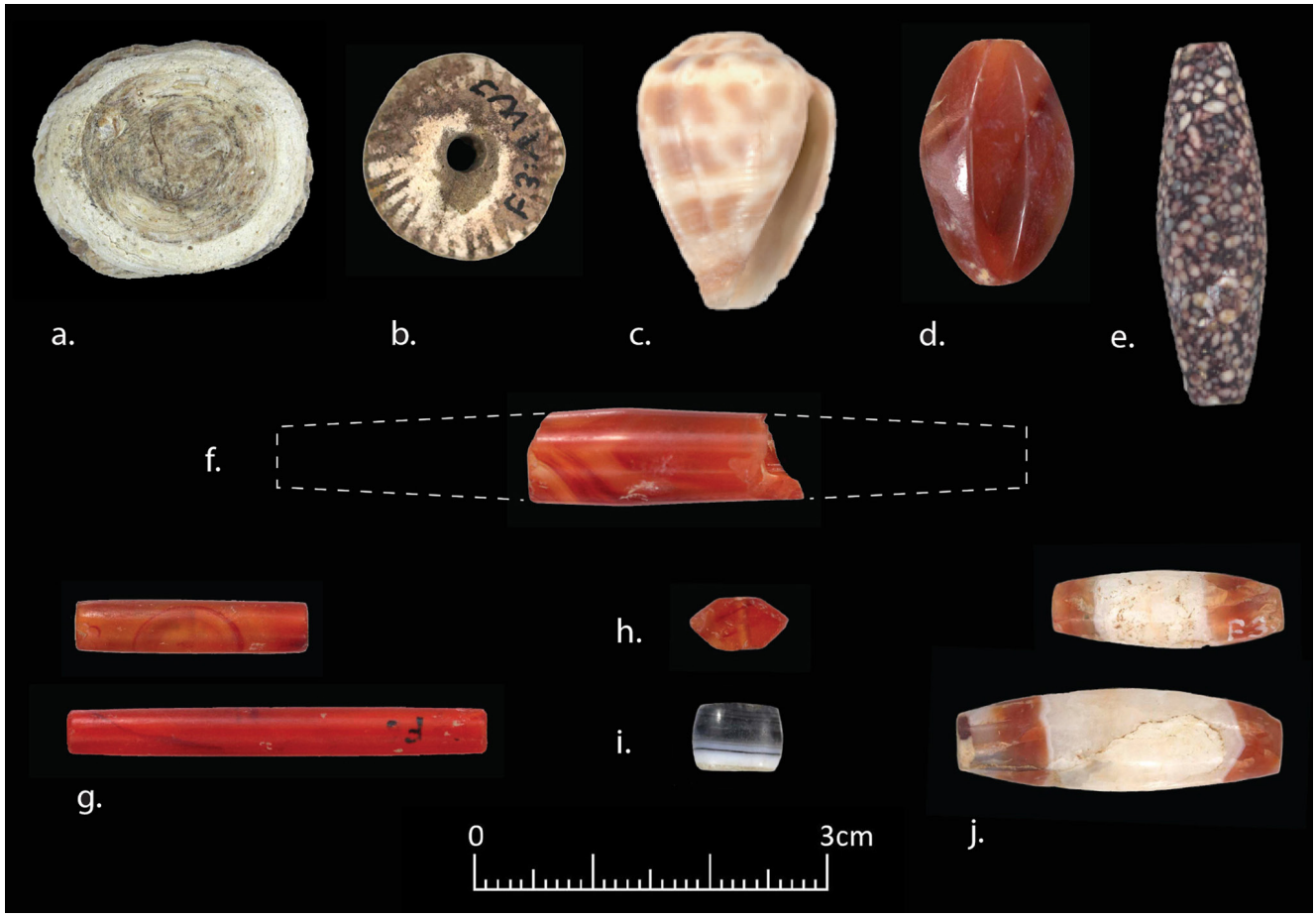


Figure 6. Failaka beads: (a) glass, (b) faience, (c) *Conus ebraeus* shell, (d, f-h) carnelian, (e) porphyry, (i-j) banded agate (photo: Ann Andersson).

Greece (Melein 2018:19; Moorey 1994:84). Southeast of Failaka, hematite can be found on Hormuz Island, but it is unclear if this source was exploited during the late 3rd and the 2nd millennium. Mesopotamian weights made of hematite have been recorded at Tell F3 and Al-Khidr, suggesting a northern provenience for at least some of the hematite objects at Failaka (Benediková 2008:Figure 105; Højlund n.d.). Hematite weights of Mesopotamian style have also been found at several sites in Bahrain (Andersson 2022:30-31).

Four beads from Tell F6 are made of turquoise (Figure 5g) (Andersson 2022:Figures 118, 162, 216, 461). It has not been identified from other Bronze Age excavations on Failaka and is generally reported to only occur rarely in Mesopotamia, while being more common in Iran and Central Asia (Aruz 2008:243). Present-day turquoise sources are the Sinai Peninsula, northeastern Iran (the Nishapur and Damgham mines), Afghanistan, and the Kyzul Kum Desert in Uzbekistan. It is, however, uncertain if these sources were exploited in antiquity (Law 2011:90; Moorey 1994:101-103).

Three beads in the Failaka assemblage are made of porphyry (Figure 6e) (Andersson 2016:Figure 926, 2022:Figures 326, 377), a hard stone with a purplish hue and beige inclusions (also called Imperial Porphyry). Purple porphyry is assumed to have originated only in Egypt, at the Mons Porphyrites/Gebel Dokhan in the Eastern Desert, but the mining of the material is usually related to the Roman period since the only two quarries discovered so far are attributed to this period. The use of this stone is attested in Egypt in the earlier Predynastic and Early Dynastic periods, but the quarries supplying this material remain unknown (Aston, Harrell, and Shaw 2000:48). In Mesopotamia, the presence of porphyry is attested by two beads in burial contexts at Kish (Mackay 1925:188), but this stone has not been identified in other Dilmun bead assemblages. While Egyptian contacts with Mesopotamia have been attested since the 4th millennium, contacts between Egypt and the southern Persian Gulf are much later, around the Ptolemaic period (Frenez 2021:3; Shaw and Nicholson 1995:109; Stevenson 2013).[7]

Metal

The Failaka bead assemblage contains a few copper (Benediková 2010:Figure 67f.; Howard-Carter 1984) and gold beads (Figure 7c-d), as well as stone beads with gold caps (Andersson 2016:Figure 991, 2022:Figure 554 and 578), all of which were probably imported. There is evidence of copper metalworking at Tell F3 involving the reuse of scrap metal (Højlund 2021:130-136), and a single piece of gold foil was found in disturbed layers at Tell F6 (Højlund 2021:Figure 1135), but there is no evidence for the manufacture of metal jewelry. The finely shaped lapis lazuli cylinder bead with one gold cap (Figure 6b) might originally have been fitted with gold caps at both ends (Andersson 2022:Figure 554). Gold- capped beads were in fashion from the Ur III period into the Kassite period (Maxwell-Hyslop 1971:68).

Artificial Materials

The Failaka excavations yielded beads of artificial materials such as faience (Figures 6b, 7f), glass, and paste. The glass beads (Figures 6a, 7j-m) may date to the 2nd half of the 2nd millennium when glass became widespread and was adopted as a new prestige material, perhaps first imitating banded-agate beads (Lankton 2003:39-40, 45). A few blue paste beads (Figure 7e) have been identified as Egyptian blue (Andersson 2022:47, Figures 141, 146, 239, 215), which was produced in both Egypt and Mesopotamia during the second half of the 2nd millennium BC (Hatton, Shortland, and Tite 2008:1591-1592, 1603; Moorey 1994:187). Given Failaka's geographical proximity to Mesopotamia, it may be the most likely place of origin for the Egyptian blue beads. A bead similar to the Egyptian blue bead from the "Palace" (Figure 7e) was found in the temple (Calvet and Pic 1986:Figure

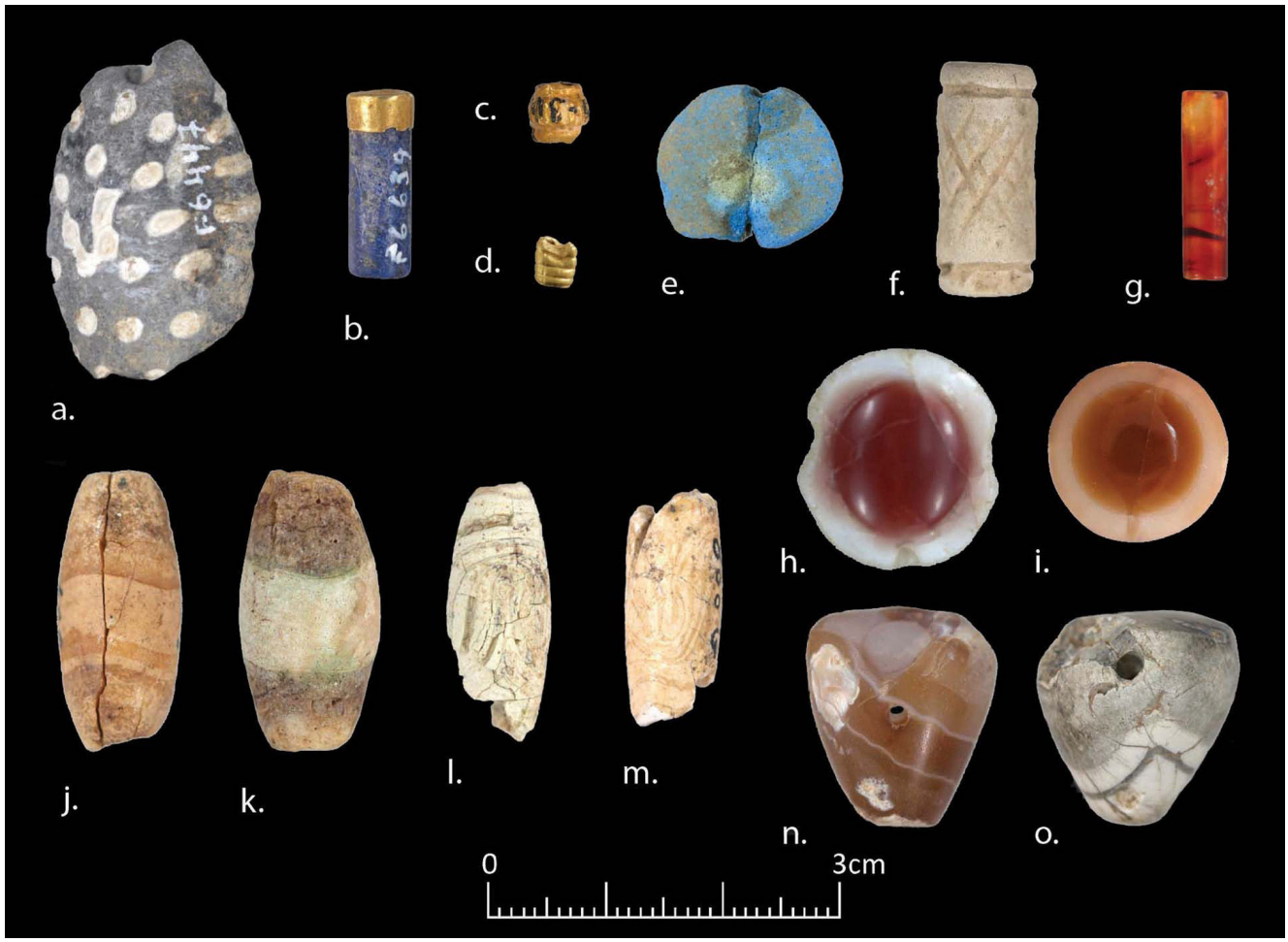


Figure 7. Failaka beads: (a) fossilized coral (*Waagenophillum* ?), (b) gold and lapis lazuli, (c-d) gold, (e) paste/Egyptian blue, (f) faience with incised lattice design, (g) carnelian bead drilled with a constricted cylindrical stone drill, (h-i) agate eye beads, (j-k) glass with band decoration, (l-m) glass with trailed decoration, (n-o) agate cone pendants (photo: Ann Andersson).

140). The glass, paste, and faience beads are also thought to be imports, as there is no evidence for their production at Failaka (Andersson 2022:52-53)

Organic Materials

While some of the organic materials may be found naturally near the island (bone, pearls, and some species of mollusks), those such as bitumen, *Conus ebraeus* shells, ivory, and ostrich eggshell must have been imported. One bitumen bead was found at Tell F6 (Andersson 2016:Figure 1007) and another one is known from Al-Khidr (Benediková 2010:127, Table 2). Bitumen is a material that was widely traded and used for a wide array of practical purposes, but it does not appear to have been a desired material for ornaments at Failaka. Some bitumen objects at Saar have been identified as large "bitumen beads" (ca. 2-2.5 cm in diameter), but these have also alternatively been suggested as net floats or spindle whorls (Crawford, Killick, and Moon 1997:63, Figure 5; Killick and Moon 2005:181, 193-195, Figure a-h; Moon 2000:65). These share little similarity with the Failaka bead. Bitumen beads covered with gold foil have been reported at sites in Mesopotamia, such as Ur and Abu Salabikh (Killick and Moon 2005:193; Postgate and Moon 1982:134, Plate Vc), but plain bitumen beads do not appear to have been favored, and there is no trace of gold foil on the Failaka bitumen bead. While the bead was not chemically analyzed, much bitumen from the Danish Tell F6 excavations comes from seepages in the Deh Luran plain (Iran) and possibly from a yet unidentified seepage (Velde 2016:220).

A single worked *Conus ebraeus* shell bead (Figure 6c) is another strong indicator of southeastern contacts. At the Saar settlement in Bahrain, such shells are considered clear evidence of imported goods (from Oman) (Killick and Moon 2005:177, Figure 5.7, q), as the species does not occur north of the Musandam Peninsula (Killick and Moon 2005:180). Additional parallels come from grave contexts in Bahrain and these shells are also considered evidence of transit trade (Lombard 1999:71, Figure 64; Mughal 1983:Plate LIV). The example from Failaka is an indicator of contacts with regions beyond the Musandam Peninsula.

A bead tentatively identified as ivory was recovered from Tell F3. This material may have been imported from several regions, depending on whether it is from an elephant, hippopotamus, boar, or dugong (Andersson 2022:34, Figure 534). Mesopotamian cuneiform sources report Dilmun as an intermediary in the ivory trade through the Persian Gulf from the Indus region (Laursen and Steinkeller 2017:68). Merchants returning from Dilmun with ivory and ivory objects are mentioned in Ur texts dated to around 2000-1800 BC (Moorey 1994:118-119). Ivory trade may be reflected in finds at Failaka, where several elephant tusks, identified by Schreger lines, were found in the "Palace" at Tell F6 in a probable Period 4A context (ca. 1400 BC) (Højlund n.d.; Moorey 1994:119).

Nine disc beads are made of ostrich eggshell (Figure 5l-m) (Andersson 2016:Figures 844-846, 850-851, 865, 868, 973-974). It is unlikely that ostriches (and ostrich eggshell) were present at Failaka, unless imported. It is far more likely that the eggshell was brought there either as raw material, as an object later recycled into beads, or as finished beads (Andersson 2016:182). Ostrich eggshell beads are generally rare outside Africa (Cluzan 2008:326), but a few have been found with two burials at Qarn al-Harf, Ras al-Khaimah, U.A.E., dated to the late 3rd millennium or the early 2nd millennium (Hilton 2013:15, Figures 30-31, 2015: pers. comm.).

One bead is cautiously identified as fossilized coral (Figure 7a) (Andersson 2022:32, Figure 370). This material has not been recognized in other Dilmun bead assemblages. It appears similar to a white-in-black fossiliferous limestone, discussed by Frenez and tentatively identified as *Waagenophillum* (Frenez 2021:Figure 4). Originating at Jabal Al-Akhdar in Oman, this material is described as having had some appeal from the Late Neolithic to the Iron Age (Frenez 2021:4).

STYLISTIC PARALLELS

While most of the beads found at Failaka occur in generic forms, a small number are stylistically characteristic products known to have been produced in distinct geographic regions during the Bronze Age. Between 2450-1900 BC, very long carnelian bicone beads of exceptional quality were produced in the Indus region (Kenoyer 2017:154; Lankton 2003:35). These were likely sold to merchants and entered the trade bound for the Persian Gulf and Mesopotamia. Production of the long bicone beads required time, exceptional skill, and the use of constricted cylindrical drills (Kenoyer 2016:200-201; Kenoyer and Vidale 1992; Lankton 2003:35). Long bicone beads are not only found in Mesopotamia (Ur, Kish, Girsu, Mari, Tell Brak, and Ebla) and Iran (Susa, Jalalabad, and Marlik), but also in Anatolia and the Aegean region (Hattusa-Bogazköy and Troy) (Chakrabarti and Moghadam 1977; Ludvik, Pieniążek, and Kenoyer 2014; Ludvik et al. 2015; Peyronel 2015).

After 1900 BC, there was a significant decline in the quality of stone workmanship in the Indus region and the production of long bicone beads ceased, though large

quantities of medium to small carnelian beads were still made.[8] Two fragments of these very long bicone beads were found at Tell F3 and may demonstrate the earliest bead trade coming through the island ca. 2200-2000 BC (Figure 6f) (Andersson 2022:Figures 501, 506). Alternatively, the beads may be heirloom items that came to be deposited on the island after a long period of use. A very long and slim carnelian cylinder from Tell F6 is noteworthy (Figure 6g bottom) because of the time and expertise that would have been needed to drill the perforation (Andersson 2022:22-23, Figure 562). Furthermore, the bead was worked and polished into a cylinder with very thin walls, adding to the impression of a bead of exceptional quality. Such beads have been found at the royal cemetery at Ur in Akkadian or Ur III contexts (ca. 2350-2000 BC) and at Susa. Shorter slim cylinders (Figure 6g upper), comparable to several Failaka examples (Andersson 2022:Figures 539, 547, 552, 555, 563), were found at Ur and Susa (these examples are dated between ca. 2100-1750 BC).[9] Beads of this form are also known in the Indus repertoire, but are not very common (Kenoyer 2016:206).

Another part of the carnelian bead assemblage has clear stylistic parallels in the Aegean (Figure 6d). These are called amygdaloid beads (Ludvik et al. 2015:10-11, Figures 5d-e) and described by Lankton (2003:40) as typical of the Late Bronze Age (ca. 1600-1200 BC). Such beads are present in the entire Aegean region, but were especially popular in the southeastern part (Pieniążek 2012:505-506). There are parallels on Cyprus (Maroni and Enkomi), at Rhodes (Ialysus) and Anatolia (Troy and Bersik-Tepe), as well as northern (Ugarit, Minet el-Beida and Emar) and central (Mari) Syria.[10] A single carnelian bead (Figure 6h) has parallels in southern Mesopotamia, where this bead form occurs in grave contexts at Ur dated to the Early Dynastic III (ca. 2600-2350 BC) and Akkadian (ca. 2350-2150 BC) periods (cf. Pollock 1985:139; Woolley 1934:32). In the Gulf, two similar beads have been discovered at Ras al-Khaimah in an early 2nd-millennium tomb context at Qarn-al-Harf (Hilton 2021: pers. comm.).

Banded-agate beads from Failaka also have stylistic parallels in Mesopotamia. A small banded-agate bead (Figure 6i) (Andersson 2022:Figure 357) has parallels in graves P.G. 1932/51 and P.G. 1422 at Ur dating to the Akkadian period (ca. 2350-2150 BC) and the early Ur III period (ca. 2100 BC) (Maxwell-Hyslop 1971:65-68, Plate 48a-b). Comparable beads are also present at Susa (LM no. SB 24038). Grave P.G. 1422 also contained a parallel for a large agate bead (Figure 5c) (Maxwell-Hyslop 1971:68, Plate 48c). An additional parallel for the same bead comes from grave P.G. 1847, Burial R (PM no. 32-40-227). Two red-and-white banded-agate beads (Figure 6j) also have parallels at Ur, most prominently in the grave (P.G. 800) of queen Pu-abi dated to the Early Dynastic III period (ca. 2650-2550 BC).[11] Two agate cone pendants found at both Tel F3 and Tell F6 have quite distinct forms (Figure 7n-o). A possible parallel from Susa has largely the same form. The banding and colors of the stone bead from Susa (LM no. SB 21853) are very similar to the white and grey-colored cone pendant (Figure 7o). The Susa bead dates to the Middle Elamite period (ca. 1500-1100 BC) (Andersson 2022:25-26, Figures 587-588).

Two agate beads (Figure 7h-i) are so-called eye beads which are characteristic of the Kassite period (late 2nd millennium) in Babylonia (Campbell et al. 2017:38). The bead type may also testify to the far reach of the trade networks in question, with a widespread distribution from Cyprus to Anatolia, across Mesopotamia to different regions in Iran and through the Gulf with the examples found at Failaka and in Oman (Clayden 2009:41; Frenez 2021). There are also eye beads made of glass at Failaka (Figure 6a) (Andersson 2022:Figure 380 and 382). These have good parallels in Mesopotamia, e.g., at Tell Khaiber and Nuzi (Campbell et al. 2017:38, Figure 18; Vandiver 1983:242, Figure 3 lower right), and first appear in the middle of the 2nd millennium (Clayden 2009:44).

Although most of the Failaka glass beads are poorly preserved, it has been possible to determine some of their designs which have parallels at 2nd-millennium Nuzi (Vandiver 1983:Figures 1, 3). Decoration on the glass beads includes trailed designs (Figure 7l-m), zig-zags, and bands (Figure 7j-k) (cf. Andersson 2022:Figures 126, 130, 295, 299, 304 327, 335). Some of the spherical wound beads have good parallels in the material from the 14th-century-BC Uluburun shipwreck and at Nuzi, which would also point to a mid-2nd-millennium date for this part of the bead material (Andersson 2022:46; Ingram 2005). Generally, the glass at Failaka is unlikely to have been imported from the Indus region, as glass production did not become common until ca. 1450-1200 BC. Glass seems to have appeared about 500-1000 years later in the Indus Valley than in Mesopotamia and Egypt (Kanungo 2008:1024-1025, 1031).

A distinctive group of faience beads (Figure 6b) compares well with late 2nd-millennium examples at Uruk with parallels found in a wide region stretching between Hattusa-Bogazköy (Anatolia) and Choga Zanbil (Iran) (Andersson 2022:Figures 446-447, 449, 451-453, 455-457; Limper 1988:20, 125-126, cat. nos. F222-F224). A faience cylinder with an incised lattice pattern is the only one in the Bronze Age assemblage (Figure 7f) (Andersson 2022:Figure 557). Parallels can be found at Uruk (Limper 1988: cat. no. F217-221). Here similar beads are described as reproductions of Jemdet Nasr cylinder seals. These beads

came into fashion in the middle of the 2nd millennium and continued in use until the second half of the 1st millennium. The best parallels for the Failaka bead are at Uruk (from a Neo-Babylonian context) and 13th-century-BC (Middle Elamite period) Choga Zanbil (Limper 1988:19, Figure 218). A similar bead made of bone was found at Al-Khidr and looks to be an imitation of finer examples (Benediková 2010:Figure 111d).

A small, collared, gold melon bead (Figure 7c) originally had a core made of another material (perhaps clay or bitumen), which has since disappeared so that only the gold foil remains (Andersson 2022:Figure 578). Parallels for this bead can be found in Mesopotamia, more specifically in the Dilbat (Tell al-Deylam) gold hoard that was deposited no later than the early Kassite period (ca. 1600 BC) (Maxwell-Hyslop 1971:88-91, Plates 61, 63a-64b).

LOCAL MANUFACTURE OR IMPORTS?

It is conceivable that all of the bead raw materials could have been brought to Failaka for local bead production. There is, however, little evidence for this. No drills have been uncovered at Tell F3 or Tell F6, nor at the Al-Khidr settlement. Only a small selection of rough outs, blanks, and semi-drilled beads have been recovered from the Bronze Age excavations. Five blanks made of calcite, carnelian, agate, and jasper were found at Tell F3 and Tell F6. One agate bead from Tell F6 is partially drilled (Andersson 2021:125, Figure 418, 2022:Figures 211, 252, 315, 434, 438). Three possible bead rough outs have been identified at Al-Khidr (Benediková 2010:Figure 104c-d, f).

There is some evidence of stone-working activity on the island where discarded soft-stone vessels were reworked into objects like pendants and spindle whorls (Hilton 2014:163). The majority of the vessels were fashioned from chlorite and the Failaka bead assemblage contains a few chlorite beads that could have been made from vessels. Three of these come from Tell F3, four from Tell F6), and another four from Al-Khidr (Andersson 2022:Figure 336, 342, 408, 439; Benedikova 2010:Figure 90a; Howard-Carter 1984).[12] The 2012-2017 excavations did identify a lapidary workshop at Tell F3 relating to periods 2-4A (ca. 1800-1400 BC) where stone debitage and chunks of raw material (flint, carnelian, and jasper) testify to some kind of production, perhaps Dilmun stamp seals (Hilton 2021:123-129). A single jasper blank was also found here (Andersson 2021:117, Figure 418).

While the few rough outs, blanks, and semi-drilled beads may be explained as accidental imports arriving along with the finished beads, it is also possible that they represent a local production. Yet, if there was bead production on the island, it must have been on a minor scale (Andersson 2022:41). A study by Kenoyer (2016) of the techniques used to drill 19 carnelian beads recovered from Tell F6 revealed that three types of drills were used: stone drills (tapered cylindrical and constricted cylindrical), solid-copper drills, and tubular copper drills. Tapered cylindrical drills were used across a wide region from Egypt to China (Kenoyer 2016:200). It is, therefore, impossible to pinpoint a specific geographic region as the place of origin for these beads. At least eight of the Failaka beads were drilled with tapered cylindrical stone drills (Kenoyer 2016:Figure 1049).

Constricted cylindrical drills, on the other hand, are "a very specialized form of drill developed by bead makers of the Indus Civilization using a unique stone raw material that is called Ernestite" (Kenoyer 2016:200-201). Only one bead (E200-X1035) in the sample was perforated with such a drill (Kenoyer 2016:200-201, Figure 1049, 2016:Figure 901). It is a slim cylinder (Figure 7g), several examples of which are in the Failaka bead assemblage. The rest of the sample beads were drilled with solid-copper or tubular copper drills using emery abrasive, a technology more related to bead material from Troy, Anatolia, and the Eastern Mediterranean, rather than the Indus region (Kenoyer 2016:201). Use-wear analysis of the bead assemblage suggests that a portion of the beads are fresh products, while others show extensive wear and must have been in use for quite some time before being deposited (Andersson 2022:41-47; Kenoyer 2016:200).

CONCLUSION

The Bronze Age assemblage from the settlements at Failaka suggests that beads were imported to the island over a long period of time spanning the late 3rd millennium and through the 2nd millennium. The uneven distribution of beads between Tell F6, Tell F3, and Al-Khidr implies that a central authority dealt with the storage of beads, probably due to the valuable nature of these goods.

The materials and stylistic parallels present in the assemblage suggest that the beads may have originated in the Mediterranean region, the Middle East, North Africa, and southern Asia. The stylistic parallels also indicate that the beads may date between the mid-3rd millennium through the 2nd millennium. While some beads, which are distinctly "older" in style, may be evidence of an early bead trade on the island, they could also be heirloom beads imported along with brand new ones. The glass and faience material especially points to close contacts with Mesopotamia, which was doubtless due to the proximity of Failaka to the southern Mesopotamian harbor cities. The drill technology noted in the Failaka beads points to their coming from both

the Mediterranean and the Indus region. Taken together, the Failaka beads add to the impression of a vast and dynamic trade network that operated across long distances. This trade not only comprised perishable goods and metals, but also a wide array of luxury products, including beads.

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ENDNOTES

1. The Danish excavations are still in progress on the island and the number of beads from the Bronze Age settlements that might be added to the total assemblage of 935 beads is at present unknown.

2. A larger number of items (n = 56) classified as "Bead/Ornament" were found at Al-Khidr (Benediková 2010:136, Table 6). This category includes shell and stone semi-finished products along with soft-stone pendants. These have been excluded from this study; only finished beads and pendants are included here.

3. The bead assemblage from Tell F3 also includes a number of semi-finished products which mainly relate to Phase 6. This likely indicates the production of shell products, most likely shell rings, which may have been exported from the island, very few finished shell rings or beads having been found on the island (Andersson 2022:46).

4. The rest of the beads from the temple are undatable surface finds (n = 4), as well as two beads from 1st-millennium levels and five beads from other 2nd-millennium levels: IIa (n = 2), IV (n = 3), IV-V (n = 1), and Vb (n = 1) (Calvet and Pic 1986).

5. Trenches FH3-5: eight beads made of bronze, carnelian, agate, and unidentified stone. Trench FH9: three beads made from carnelian, glass, and chlorite.

6. As at Tell F3, the high number of shell semi-finished products at Al-Khidr may be indicative of local shell ring production, rather than imported trade goods.

7. Frenez (2021) has discussed the identification of Egyptian porphyry at Ras Al-Jinz RJ-2 in Oman (ca. 2500-2000 BC), reconsidering the Egyptian origin of a stone vessel. Instead, the Indus Valley region is suggested as the source.

8. Archaeological evidence indicates that bead production at the larger Indus centers varied and that there was also variation within the different subregions of the Indus region (Uesugi 2018:32). Beadmaking at Lothal, Mohenjo-Daro, Harappa, Dholavira, and Nagwada focused on the production of small and medium beads, while preforms for classic long Indus bicones have only been found at Chanhu-Daro (Roux and Matarasso 2000).

9. Ur: BM no. 122435 (long cylinder beads, dated to Akkadian or Ur III contexts, ca. 2350-2000 BC), BM no. 122448 (short cylinders dated to the Ur III period, ca. 2100-2000 BC), BM no. 123158 (short cylinders dated ca. 2000-1750 BC). Susa: LM no. SB 23975. Abbreviations: British Museum (BM), Louvre Museum (LM), Metropolitan (MM), and Penn Museum (PM).

10. Maroni: BM no. 1898,1201.52. Enkomi: BM nos. 1897,0401.605, 1897,0401.692, 1897,0401.738.3. Ialysus: BM nos. 1872,0315.7, 1872,0315.8. Ugarit: LM no. AO 24009 (a hoard of jewelry found in a Mycenaean vessel), LM no. AO 30799 (ca. 1200-1150 BC), LM no. AO 17401. Minet el Beida: LM no. AO 14846 (ca. 1550-1150 BC). Emar: LM no. AO 27835 (ca. 1200-1150 BC). Mari: LM no. AO 30030 (tomb 208), LM no. AO 19038 (Tomb 119) (ca. 1392-911 BC).

11. There are several parallels in the Penn Museum (PM) online collections from Grave P.G. 800: PM 83-7-1.4, PM 83-7-1.8, PM 83-7-1.19, PM 83-7-1.22, PM 83-7-1.27, PM 83-7-1.31, PM 83-7-1.35, PM 83-7-1.45, PM 83-7-1.52, PM 83-7-1.54.

12. The chlorite beads from the Danish 1958-1963 excavations at Tell F3 and Tell F6 were compared to the typology created for the stone vessels at Failaka by Hilton (2014: pers. comm.). The four beads correspond to Hilton's stone type 2 (Figure 342) and type 3 (Figures 336, 408, 439), both of which are common in the stone vessel assemblage from Tell F3 and Tell F6 (Hilton 2014:Figure 15). The chlorite found at Failaka could have come from several different sources in Iran, the Oman Peninsula, Saudi Arabia, and Yemen (Hilton 2014:14).

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Ann Andersson
Moesgaard Museum
Aarhus
Denmark
ana@hum.ku.dk

HEIRLOOM BEADS AMONG THE DAYAK OF BORNEO

Barbie Campbell Cole

Research on Borneo's heirloom beads has so far largely focused on the Dayak tribes of Sarawak in Borneo's north. To expand the study area, the author has undertaken fieldwork in both Sarawak and Kalimantan and focused on Borneo's links with regional and international trade routes along which its heirloom beads traveled. A further area of research has been British and Dutch colonial literature and collections of heirloom beads outside Borneo.

INTRODUCTION

Borneo straddles the equator and is the largest island in Asia (Figure 1). Most of the island is covered by dense equatorial forest, its remote mountainous interior cut by fast-flowing rivers which radiate from a central upland spine. Travel by land is slow and difficult and despite dangerous rapids and waterfalls upstream, Borneo's rivers are its main axes of trade and communication (King 1993:20; Rousseau 1990:103).

Because of its geography, Borneo is sparsely populated in relation to its size and has a great ethnic and cultural diversity. Malay groups have traditionally occupied Borneo's ports and the lower reaches of the major rivers (Rousseau 1990:11). In the rivers' upper reaches are scattered populations of Dayak or Orang Ulu, the peoples of the highland interior of central Borneo. Trade and tributary relations existed between Borneo's Malay river-mouth port states and the mosaic of Dayak tribes. In exchange for jars, gongs, and beads, the Dayak traded downriver forest products much sought after in the regional and international trade. Control of Borneo's river-mouth trade provided Malay rulers on the coast with substantial wealth, but they were never able to establish political control over the Dayaks in the interior (King 1993:24-28, 103). The Dayak were self-sufficient in the necessities of life and the imported goods obtained by trade were not essential for survival, although they were regarded as highly valued luxuries which reinforced a Dayak chief's dominant position (Rousseau 1990:282).

Figure 1. Political map of Borneo (Borneo2 map english names. svg).

The Dayak live in stratified societies and practice shifting agriculture. They dwell in longhouses raised off the ground on stilts which accommodate many families. Populations are small and dispersed. Over time, migration caused by disputes over land, slaving, head hunting, and inter-village feuds created an ethnic mosaic of tribal groups and sub-groups randomly distributed across Borneo's interior between which tribal boundaries became inevitably blurred (King 1993:26; Rousseau 1990:1, 119). Larger Dayak groups include the Kayan, Kenyah, Iban, Bidayuh, Maloh, Kelabit, and Lun Bawang, and smaller groups often known by different names in different regions such as the Kajang, Melanau, Kanowit, and Tanjong. Many of the smaller tribes were subject to pressures from the dominant

Kayan and Kenyah. Lastly, the nomadic Punan live at the headwaters of all the rivers in central Borneo. They collected forest products for other Dayak tribes by whom they were often exploited (King 1993:29, 36, 44, 46).

BORNEO HEIRLOOM BEADS AND TRADE

Borneo was on the margins of the early trade routes between India, China, and the Spice Islands of eastern Indonesia. Because of environmental constraints, Borneo did not produce agricultural surpluses but it did provide important luxury goods for the Asian-wide and international trade such as gold, diamonds, and camphor, one of the costliest items of earlier sea trade (King 1993:105; Meilink-Roelofsz 1962:101; Schoff 1912:355). As a result, from at least the middle of the first millennium AD, port states in Borneo slowly became more involved in the region's international maritime trade with India, China, and countries beyond (King 1993:6), although this was probably via entrepôts on Sumatra, Java, or the east coast of the Malay Peninsula (Wolters 1967:344). Over the centuries this trade brought a variety of glass and stone beads to the Dayak, some highly valued as heirlooms. This high value inspired beadmakers elsewhere to produce copies, some of which are now valued as highly as the originals.

Beads were valued by all the Dayak tribes, particularly the Kayan. There were few Dayak families of the upper class that did not own a certain number of old beads which formed an important part of a family's prestige and wealth, and were one of the principal forms of currency (Hose 1926:85; Hose and McDougall 1912, 1:226; Rousseau 1990:3). A Dayak longhouse chief had the right of first choice when a trader arrived with new goods or beads, a custom which ensured his family's dominant position (Rousseau 1990:282). The Dayak's earliest heirloom beads date back to the second half of the 1st millennium.

The Kayan were aggressive traders and beads were particularly highly valued. Many Kayan women were expert in identifying genuine old beads and distinguishing them from more recent imitations (Rousseau 1990:157, 284; St. John 1862, 1:111). The Iban, formerly known as the Sea Dayak, showed less interest in beads than other Dayak tribes (Hose and McDougall 1912, 1:226).

The Kayan and Kenyah place more value on ornate and decorative beads, particularly those known to them as *lukut* beads (Chin 1980:4). The coastal Melanau also value blue glass barrel beads as bride wealth and grave goods (Chin 1980:2, 49; Munan 2005:20).

Aristocratic status among the Kelabit depends above all on inherited wealth (jars, beads, gongs, porcelain, and stoneware) (LeBar 1972:162, quoted in Rousseau 1990:186). Unlike the Kayan and Kenyah, they place more value on beads of monochrome blue glass and carnelian (Chin 1980:49).

The coastal Melanau also value blue glass barrel beads as bride wealth and grave goods (Chin 1980:2, 49; Munan 2005:20). They are also valued by Bidayuh who string them on rattan into necklaces known as *taya babut* with the teeth and claws of honey bears and wild boar. These are worn along with other charms by healers and priests during ceremonies (Chin 1988:61). The same beads were also made into belts.

The more significant Borneo heirloom beads are discussed below.

Rayed-Eyed Beads

Lukut sak badak, kelam song (Kayan) (Hose and McDougall 1912, 1:Plate 130; Munan 2005:134).

Rayed-eyed beads (lukut sak badak and kelam song) are Borneo's earliest heirloom beads. Lukut sak badak are mosaic beads with eyes with projecting rays known by collectors in Kuching, Sarawak's capital, as "palm leaf beads" or "spider bum beads" (Munan 2005:30, 132). The rayed-eye design appears in several Borneo heirloom beads. Firstly the oblate lukut sak badak with large multiple eyes in the Southwell Collection which may be of Islamic origin (Figure 2 upper center). The rayed-eye design also appears in glass beads known as Jatim – mosaic beads with a thin layer of preformed cane slices over a monochrome drawn glass core. Rare but valued in Borneo, Jatim beads are thought to have been made in eastern Java between the late 5th/early

Figure 2. Rayed-eye bead in the Southwell collection (upper center) (detail of Mohtar 2011:Plate XLIX).

6th and 7th centuries (Lankton, Dussubieux, and Rehren 2008:336-338). Visually very similar beads, also known as lukut sak badak and highly valued by the Dayak, are found in the Indonesian archipelago (Figure 3) (Adhyatman and Arifin 1993:50, 69). These are Early Islamic mosaic glass beads without a core, said to post-date Jatim beads by several hundred years (Lankton, Dussubieux, and Rehren 2008:353).

Figure 3. Lukut sak badak Jatim bead without a core (right) and later Islamic lukut sak badak (left) (Adhyatman and Arifin 1993:50, Plate 55).

A third lukut sak badak has large red/white/black eyes with green and yellow rays (Munan 2005:30). It is also an Early Islamic mosaic bead dating from the 4th-9th centuries. In the Islamic West, rayed-eye beads were made in various colors, shapes, and sizes (Lankton, Diamanti, and Kenoyer 2003:77, Figure 8.3) and were widely distributed in Mali and Mauritania (Panini 2007:54, 57, 58, 78), Middle Egypt (Then-Obłuska and Pleşa 2019:68), and elsewhere.

The kelam song is another early Dayak heirloom rayed-eye bead (Figure 4H). In the late 19th century, this bead was valued at £4-£6, the cost of an adult female slave. The *lukut sekala* (*see* below and Figure 4A) was the Kayan Dayaks' most highly valued heirloom bead. It was valued at £10-£15, or one healthy adult male slave (Hose and McDougall 1912, 1:Plate 130). This makes the kelam song the Kayan Dayak's second-most valuable bead, suggesting ownership was very rare.

Many early Islamic beads have been found on the Malay Thai peninsula at ancient sites thought to have been major entrepôts on the main international maritime trade routes between the Middle East, Island Southeast Asia, and China (Francis 1999a:2, 28; Pongpanich 2009:87, 120, 131). Some of these beads traveled further east on regional trade networks. A few may have arrived in Borneo as it became more involved in regional and international trade, but it was only later that beads began to reach the scattered Dayak tribes in Borneo's interior in sufficient quantities to become heirlooms which would define tribal identity (Francis 1991b:110).

Figure 4. Old beads worn by Kayans (Hose and McDougall 1912, 1: Plate 130): (A) lukut sekala, (E) kelem buang ("bear bead"), (F) kelam buang butit telawa ("bear bead with spider belly"), (H) kelam song, (I) kelam, (J, K) false chevron.

Due to their high value, several copies of early rayed-eye beads were made in the late 19th or early 20th century, presumably in Venice. One example appears on a high-status baby carrier from the Upper Mahakam region (Figure 5 left). Another lukut sak badak copy appears in a women's waist string in the Charles Hose collection acquired by the British Museum in 1900 (As1900-756). This bead has an additional red dot in the center of the eye. Yet another copy is displayed in the Tun Jugah Foundation Museum, Kuching, Sarawak. No copies of the lukut sak badak are in the Picard collection of beads used in the Africa trade (Picard and Picard 1987-1991) or in the Murano Glass Museum's extensive collection of bead sample cards (Panini 2017). This would appear to suggest that the lukut sak badak copies were made specifically for the Borneo market. Today, excellent copies of the Jatim lukut sak badak are made from recycled glass in small village workshops near Jember in East Java (Figure 5 right) (pers. obs.).


Figure 5. Rayed-eye bead copies: left, an early 20th-century copy of a lukut sak badak rayed-eye bead on a high-value baby carrier, Upper Mahakam, Kalimantan; right, modern copy of a lukut sak badak Jatim bead made near Jember, East Java, from recycled glass (photos: author).

Carnelian Beads

Tong b'ao buror ma'un (Kelabit), *aki* (Lun Bawang), *lameang* (Dunsun), *marik pelaga*, *pelage batu*, *pelaga labang* (Iban) (Munan 2005:134).

Carnelian beads have a long history in Borneo. Hexagonal faceted bicones formed part of the Sambas treasure, an 8th-9th centuries hoard of ancient gold and silver Buddhist sculptures found near Sambas in northwestern Borneo (West Kalimantan). The Sambas beads include bicone and spherical carnelian examples with a distinctive mottled appearance (McKinnon 1994:19).

Ancient carnelian beads have also been found in Kalimantan near Pontianak at Sungai Serok, along with a boat frame, lingga, and yoni (Musium Negari Kalimantan Barat, Pontianak, West Kalimantan), as well as in Sarawak at Bongkissam (11th-12th centuries) and Gedong (9th-13th centuries) (Francis 1989a:24-25) in the Sarawak River delta. The oblate, barrel, and faceted carnelians found at Bukit Maras (7th-13th centuries) and Santubong, also in the Sarawak River delta, were described as made "of a local conglomerate… of cornelian type, probably locally obtained" (Everett and Hewitt 1909:7). According to Peter Francis (1989a:24-25), close inspection and a silicon impression of the perforation confirmed that the beads were ground, polished, chip dimpled, and then bored with a diamond drill. The excavations at Santubong suggest that traders with an Indian influence were settled or trading at and about the Sarawak River delta, side by side with Chinese activity, which continued up to the Sung period (960-1279) and possibly to the 14th century (Francis 1989a:24-25; Harrisson 1955:514-515). Some of these beads have a similar mottled appearance to the Sambas Hoard beads.

Where did the "local conglomerate" used to make the Santubong carnelian beads come from? Sources of mottled orange carnelian are found in Java (Adhyatman and Arifin 1993:19, 22-23; Francis 1991a:222-223), but a far closer source with a history of the manufacture of carnelian beads was in the "kingdom of Succadana" in the Kapuas Delta region of West Kalimantan where "they mine… oblong red agate stones and rings" (Dovey 1979:71). In the 19th century, British colonial officials Hose and McDougall (1912, 1:226) commented that "most of these valuable beads [in Borneo] are of foreign manufacture, though a few made from shell and agate are of the country."

The author's fieldwork has shown that sources of carnelian in the Borneo Kapuas River region have been confirmed by local geologists. The best carnelian comes from Ketapang and is still used today by Malays and Dayaks to make beads or to set in rings. Carnelian and agate are also found in the headwaters of the Kapuas River at Putussibau, at Badau near the Sarawak border, and at Sepauk village between Sanggau and Sekadau, West Kalimantan.[1] Examples seen by the author have the same mottled appearance as the Santubong and Sambas Hoard beads. Similar mottled carnelian beads are on display in a Dayak shaman's heirloom necklace at the Negari Museum in Pontianak in the Kapuas delta (Figure 6). Only chemical analysis will determine whether the source of the Sambas and Santubong carnelian beads was the Kapuas region, Java, or even Khambhat (Cambay) in India which remained an important source of carnelian beads in Southeast Asia and Borneo.

Carnelian beads were valued by many Dayak tribes in both Sarawak and Kalimantan (Adhyatman and Arifin 1993:89). They were worn as heirloom beads and valued for their healing and protective powers (Bock 1881:153, 187). They continued to be used by Dayak Bidayuh healers in Sarawak long after they ceased to be worn as heirlooms. By the third quarter of the 19th century, copies of carnelian hexagonal bicone beads were being imported into Borneo from Idar-Oberstein, Germany, and subsequently from Brazil (Everett and Hewitt 1909:7). At the end of the 19th century, beads from Bohemia began to dominate bead imports into Borneo from Singapore (Cheah 2003:31) and included glass imitations of carnelian hexagonal bicones. As we shall see, the Dayaks were not deceived by what they regarded as copies of Borneo's most highly valued heirloom bead, the lukut sekala, but the Bohemian glass bicone imitations were considered equally powerful as real carnelian beads (Munan 2005:45). During a field trip to Sarawak, Peter Francis (2002:186) attempted to explain to Dayaks the difference between true carnelian beads and their glass imitations, but his views were dismissed as those of an ignorant outsider. Of two carnelian hexagonal bicones seen by the author in a high-value bead collection in the Upper Mahakam, it was the glass imitation, rather than the true carnelian hexagonal bicone, that had been mounted in costly gold wire for use as a pendant (Figure 7).

Figure 6. A shaman's necklace of the Menyuke Dayak, Pontianak district, West Kalimantan, which includes long carnelian biconical beads from Khambat or Idar-Oberstein, with an elongated barrel and spheres of mottled agate (Negari Museum, Pontianak) (photo: author).

Figure 7. A long carnelian bicone (top) and a glass imitation mounted in gold (bottom), Tiong Ohang, Upper Mahakham, Kalimantan (photo: author).

Figure 8. Blue barrel bead (let) in a Selakau multi-strand girdle or belt with one blue melon bead (Textile Museum Kuching) (photo: author).

Blue Barrel Beads

Let mitem, *let Itam*, *let silo*, *ba let*, and numerous other *let* variants (Kelabit), *marik kelam tetak* (Iban), *manik tolam*, *tumbis tolam* (Bidayuh) (Bala 2013:10, 11; Munan 2005:132).

Let beads (Figure 8), known as blue barrel beads by Sarawak bead collectors, are of wound translucent glass ranging from deep bluish black to light green, light blue, and transparent turquoise. Most are barrel shaped but some are more tube-shaped (Bala 2013:10-11; Munan 2011:132-133). They vary from 8.5-11 mm in length and 7-10 mm in diameter. Let beads are particularly valued by the Kelabit Dayaks who consider them to be Borneo's most ancient heirloom beads (Elizabeth Deng, Miri, Sarawak 2019: pers. comm.). They are also valued by the Selakau Bidayuh Land Dayaks of southwestern Kalimantan (Bala 2013:11; Chin 1980:49; Harrisson 1964:37; Munan 2011:138), but are found in most parts of Borneo and were widely used in the interior barter trade as far west as the Kenyah-Kayan Dayaks of the Bahau and Apo Kayan (Harrisson 1964:37).

Similar beads have been found in Southeast Asian sites at Kuala Selinsing on the Malay peninsula and Pulau Kukao off Thailand, as well as at Borneo sites of the 9th-10th centuries at Tanjong Kubor and Sungai Jaong (Santubong, Sarawak River delta) and the Niah Caves (Ling Roth 1896:282). The origin of these early let beads is not clear. Despite their similar appearance, they have a much lower lead content than the let heirloom beads circulating in Borneo today and appear to have a different origin (Francis 1989b:3, 1989c:14; Harrisson 1968:127-130).[2]

In the early 17th century, Banten-based British East India Company factors noted glass beads "of colour blue, and in fashion of a tunne (barrel), but of the bignesse of a Beane" made by expatriate Chinese beadmakers at the Javanese port of Banten. The beads were traded by the Chinese – and subsequently by the colonial Dutch who had arrived before the British – to the West Borneo port of Sukadana in the Kapuas River delta region, "which place yieldeth great store of diamonds" (Danvers 1896:221, quoted in Francis 1985b:6; Purchas 1625, 3:513-514). A second Chinese glass beadmaker was based in Sukadana itself (Francis 1985b:6). Why were Chinese beadmakers based in Banten?

In the 14th century, a community of immigrant Chinese beadmakers were operating at Fort Canning in Singapore. They made *mutiraja*, small glass coil beads which had by the 13th century replaced drawn Indo-Pacific beads in the region (Francis 1989a:20). Singapore appears to have been a flourishing port and center of power but its decline was brought about by the foundation of Malacca in the early 15th century (Borel 2010:139; Miksic 1995:258; Seidel 2000:3). Malacca was strategically located on the Malay peninsula on the main international maritime trade route between East and West, and became Southeast Asia's main entrepôt. It attracted traders from China, the Middle East, South and East Asia, and the Indonesian archipelago. The Javanese controlled the Indonesian island trade to and from Malacca (Coedes 1968:241; Hall 1985:21). After the 15th century, however, this trade seems to have passed from the Javanese to the Chinese who controlled the trade in pepper, sandalwood, ivory, tortoise shell, and Baros camphor, as well as the trade in Borneo gold and diamonds. The Chinese also controlled the trade in "*moetisalahs*" (mutisalahs) and "other kinds of beads" (Rouaffer and Ijzerman 1915, quoted in Meilink-Roelofsz 1962:246, Note 72; Tiele 1877, quoted in Schrieke 1955:22, 42), exchanging "*paternosters*" (beads), "certainly in part *Mustisalahs*," for products such as stick lac as far away as Burma.

In the early 16th century, the Portuguese arrived in Southeast Asia and captured Malacca. To avoid the high tolls exacted by the Portuguese, many Asian traders moved from Malacca to Banten in western Java (Sar Desai 1969:507) which became one of the two chief Southeast Asian ports for the international and local trade (Schrieke 1955:46, 50). Banten controlled much of the Kapuas River trade which depended almost entirely on exchange with the interior. It is unclear when Chinese beadmakers arrived in either Banten or Sukadana and whether, in addition to the let beads mentioned above, they also made mutisalahs and "other kinds of beads" (Rouaffer and Ijzerman 1915, quoted in Meilink-Roelofsz 1962:246, Note 72). British East India employees were aware of the Banten Chinese let beads because they were bartered for diamonds, a trade in which the British wished to become involved. It is possible that the Chinese community in Banten made other beads of which the British were unaware because these were exchanged for regional products in which the British had no interest.

British attempts at Banjarmassin, a large port on Borneo's southeast coast, to barter the Banten Chinese let beads for diamonds were rejected: only gold coins were accepted by local traders (Ogden 2018:4). It is sometimes assumed that contemporary ports on the same trade networks received the same beads, but the Banten let show that this was not always the case.

Many let beads traded to Sukadana are on display at the Museum Negeri Kalimantan Barat at nearby Pontianak in the Kapuas River delta region, including a large Selakau Dayak belt similar to the example in Kuching (Figure 8), and a Bidayuh Dayak warrior neckpiece of let beads and animal teeth.

The Kelabit identify 14 different varieties of let beads (Bala 2013:11; Chin 1980:49; Munan 2011:138), suggesting that they were made over a very long period at several different sites. New beads visually similar to those found in pre-1200 AD burial caves at Niah, West Borneo, were still being traded inland from Brunei Bay to the Kelabit Dayak uplands in the late 1940s (Harrisson 1964:40).

Blue Barrel Melon Beads

Klam dian (Land Dayak), *alet (let) lobak* (Kelabit, Lun Bawang) (Harrisson 1950:214).

The *let labak* is the only let bead with "grooves and ridges." Because of its scarcity, it was particularly highly valued by the Selakau and Kelabit Dayaks (Harrisson 1950:208). A single dark blue let labak is included in a Selakau girdle in the collection of the Sarawak Museum (Figure 8 bottom left). Tom Harrisson, former head of the Sarawak Museum in Kuching, reported that Anyi, Kelabit headman of Pa Bengar and one of the most aristocratic of Kelabits, was one of the few Dayak who owned a few grooved let or melon beads (Harrisson 1950:214; Manis 1949:10-13). One or two let labak were sometimes included in Bidayuh Dayak warrior necklaces, along with blue let beads, cowries, claws, and brass bells (Munan 2005:42).

Let melon beads made of opaque black and white, rather than translucent glass, are included in a Dayak heirloom necklace in the Hilde May collection made in the Upper Mahakam region of Dutch Borneo (Kalimantan) (Figure 9).[3] The necklace also incorporates let beads of opaque black,

Figure 9. Dayak heirloom necklace from the Upper Mahakam region of Kalimantan with melon, blue barrel, and raspberry beads (Hilde May collection, Völkerkundemuseum, Heidelberg; photo: author).

white, yellow, and turquoise glass, which are less often seen in Sarawak. A small group of opaque black and white let labak barrels and melon beads from Borneo are also found in the collection of the British Museum (As1972,Q.949.b, As1972,Q.925a-g). Were these opaque glass beads also made by the Chinese at Banten, or perhaps at a different site on the Chinese mainland or elsewhere at an earlier or later period? Were they traded up the Kapuas River, or up the Mahakam on the opposite side of Borneo on its southeast coast, suggesting a quite different trade route?

The opaque let badak melon beads, particular those in white, bear a resemblance to the heirloom beads of the Tani tribes in Arunachal Pradesh (Campbell Cole 2012). They are made of potash-lime glass that was probably produced in China (Carter et al. 2018).

Green Bubbly-Glass "Bear" Eye Beads

Buah (or *buang*) *wang lutong*, *kelam buang* (bear bead), *kelam buang butit telawa* (bear bead with spider belly (Kayan), *kelam* (Kenyah), *kelom kawit* (Kutai Kartanegara, East Kalimantan), *marik limau* (Iban) (Hose and Dougal 1912, 1:Plate 130; Munan 2005:135, 136; Tun Jughah Museum).

Kelam buang are wound beads of semi-transparent bubbly glass with somewhat carelessly applied red, yellow, or white trails creating multiple rings or eyes (Figure 10). Kelem buang were particularly valued by the Kayan and Kenyah Dayaks who are often found as close neighbors (King 1993:44).

Figure 10. Green bubbly-glass "bear" eye beads (kelem buang) (Tun Jugah Foundation Museum, Kuching, Sarawak) (photo: author).

There is considerable variation in the appearance and size of kelem buang. Most are spherical and 14-18 mm in diameter (Figure 4E-F), while others are barrel shaped (Figure 4I) and said to have been Kenyah rather than Kayan beads (Hose and McDougall 1912, 1:Plate 130). Some kelem buang have additional white or pale blue rings around the perforation (Figure 10 lower left). Others have blue as well as yellow, red, and white rings forming the eye. Some have many smaller or just a few larger red and yellow eyes (Pavaloi and Dietrich 2015:167, Figures 242-245), sometimes unevenly distributed (RV-614-113, Rijksmuseum voor Volkenkunde, Leiden). In some beads, the eyes are so badly executed they are trails rather than eyes (Dubin 1995:227).

In the late 19th century, a kelam buang bead was worth only 15 English shillings, in contrast to the lukut sekala, Borneo's most highly valued bead, at £10-£15 (Hose and McDougall 1912, 1:Plate 130). At 20 shillings to the UK pound, the lukut sekala was worth 12-18 times more than the kelam buang.

All kelam buang beads have a pitted or apparently corroded surface. This could be the result of poor quality glass or lack of beadmaking expertise. Repeated heating would normally allow the glass trails to meld with the body of the bead to create a smooth surface. In some beads the trail decoration has fallen out, leaving depressions.

Munan (2019: pers. comm.) is aware of only around 100 kelam buang in western Borneo, although examples are found in several collections of Borneo heirloom beads in Borneo itself and elsewhere.[4] Kelam buang were until recently thought by Kuching collectors to have been found only within trading distance of the Kapuas River in its middle

and upper catchments near the Bahau Dayak homeland (Munan 2005:35). The author's research, however, has shown that kelam buang beads in European collections were found at the mouth of the Mahakam River at Kutai Kartanegara, East Kalimantan, on Borneo's east coast (the beads were known locally as *kelom kawit*),[5] and in the upper Mahakam region, also in East Kalimantan (Pavaloi and Dietrick 2015:167). These kelam buang could have traveled along an important cross-Borneo trade route described by Dutch colonial administrator Nieuwenhuis (1904a:141) in the late 19th century which went up the Kapuas River on Borneo's west coast, across the Müller range in the central Borneo mountain watershed to the Upper Mahakam River region in Dutch Borneo (now East Kalimantan) and on to its mouth on Borneo's east coast. Alternatively the beads could have been traded up the Mahakam via Kutei.

It is tempting to identify kelam buang with beads that Nieuwenhuis found on the surface at an old burial site, also in the Upper Mahakam region, at Tjëhan, a tributary of the Mahakam. While he does not give the color or design of the beads, he describes them as having

> lost their shiny surface... partly weathered to the middle... In the fabric of the beads numerous bubbles occur, opened by the weathering process, sometimes their surface shows even deep pits. For many enameled beads, the enamel falls out of the pits or it is destroyed faster than the rest of the bead (Nieuwenhuis 1904a:139).

Francis knows of no parallels of the kelam buang outside Sarawak. He describes them as very crudely made and doubted they were made in any established glassmaking center in China, Japan, or Europe, but suggested they could have been made in Borneo or Indonesia (Francis 1989b:16). Their wound manufacture suggests a Chinese origin. From the 14th and 15th centuries, Chinese beadmakers were familiar with the technique of applying trail decoration to wound beads (Borel 2010:Plate 4). Trail decoration was also used by the Chinese on their copies of the chevron beads imported from Venice into Island Southeast Asia after the 1480s.

Perhaps the more crudely made kelam buang were the products of the less-skilled Chinese expatriate beadmaker community in Banten, Java, or Sukadana on Borneo's southwest coast who, as we have seen, were making blue barrel let beads which were also traded up the Kapuas. Or were the many variants of the kelam buang discussed above the product of several competing Chinese workshops elsewhere?

What was the source of the glass from which the kelem buang were made? In the 14th century, recycled Chinese bottles are thought to have been used to make glass bangles by Chinese immigrant glassmakers at Fort Canning, Singapore (Miksic 1995:345). In the 15th century, the glass used by Banten Chinese beadmakers may also have been recycled or imported from glassmaking workshops on the Chinese mainland. Munan (2005:32, 135-136) suggests recycled ginever bottles, discarded by the colonial Dutch in Java in the early 17th century, may have been used to make the kelam buang. Extravagant consumption of alcohol by colonial Europeans, often the result of the noxious state of the local drinking water, would have made bottle glass readily available (Dalrymple 2004:407). Only chemical analysis of the kelem buang glass will begin to unlock its origin.

Beads With Trailed Decoration

The author's research has revealed some less-familiar Borneo heirloom beads of opaque glass with applied trails. These beads appear to be more associated with the Upper Mahakam region in former Dutch Borneo (East Kalimantan) than with Sarawak. The reason for this is not clear but it may be that they arrived by different trade routes via Borneo's east coast ports.

These include an oblate, opaque turquoise glass bead with yellow and white trails around the perforation (Figure 11 right). A slightly lighter turquoise glass bead of the same design with similar red and white wavy trails is also found in the Upper Mahakam region (pers. obs.). The opaque turquoise glass and delicate wavy trails suggest a Chinese origin. Are these beads copies of, or related in some way to, marbled glass beads made in Song/Yuan China (AD 960-1368) (Kwan 2001:342, Plate 159)? The technique of manufacture is different but the wavy trail design is very similar.

An opaque black bead found in Kalimantan with turquoise trails encircling the bead with red, yellow, and black eyes illustrated by Dubin (1995:227) is another less familiar bead of possible Chinese origin. The origins of two more beads – an irregular barrel-shaped dark blue or black bead with green and yellow trails (Figure 11 second from left) and a dark blue bead with red, yellow, and green trails (Figure 12 top row) – are less clear. Some of them may have been produced by more highly skilled Chinese beadmaking workshops at Quanzhou or elsewhere on the Chinese mainland, made only for export (Borel 2010:3; Francis 2002:78-80; Seidel 2000:3). The Chinese mainland beads form part of a group of combed polychrome beads sometimes associated with beads found in the Philippines, Trowulan, Java, and elsewhere dated to the 14th and 15th centuries (Francis 2002:78-80). According to Francis (2002:79), the distribution of these polychrome beads is

Figure 11. Beads with trailed decoration on a high-status baby carrier, Upper Mahakam, Kalimantan (photo: author).

Figure 12. Other baby carrier beads: striped bead (kelem bela) (bottom right), next to it, a presumed lukut sekala copy, and above it, a bead with trailed decoration, possibly Chinese (photo: author).

restricted to the eastern route of the China Sea trade. Francis adds that combed beads that may be Chinese have also been found at Bonkissam and Bukit Sandong in Sarawak, although the author has been unable to locate them in the Sarawak Museum collection.

This group of polychrome beads with trails also includes a translucent red barrel bead with a combed white wavy design (Borel 2010:Plate 4). It has a high lead content and is assumed to be Chinese. Fragments of glass with similar polychrome decoration have been found at Penkalan Bujang, the site of an entrepôt during the 13th to early 14th centuries, in Kedah on the Malay Peninsula (Jacq-Hergouach 1992:204-210, quoted in Seidel 2000). Beads of this type have also been found at Fort Canning, a site of the 14th or 15th century in Singapore, and at Banten Girang, West Java (Francis 2002:79). According to some reports, an almost identical red barrel bead in shape, size, and design was found in Sarawak (Francis 1991a:Figure 2, 1996:155).

Beads in necklaces of the Hilde May collection (Figure 9) (*see also* Pavaloi and Dietrich 2015:167) and those on the baby carrier illustrated above – both found in the Upper Mahakam region – appear to contain more opaque plain turquoise glass beads often (although not always) thought to be of Chinese origin. The mouth of the Mahakam is on Borneo's east coast and may have been on different trade routes and attracted different beads.

False Chevron Beads

Purung manuk kiking, *purung matu* (Kayan), *kelam* (Kenyah), *lukut miruk* (Miruk), *bao mon* (Lun Bawang), *manik burong tiong*: (Melanau), *manik chunt* (Bidayuh), *alan ba'un lan* (Pelang) (Hose and McDougall 1912, 1:Plate 130; Munan-Oettli 1988:106, 2005:134).

The false chevron is a wound bead having a white core and a blue outer layer, with applied wavy trails of red and white glass around the ends. They were made to imitate early drawn Venetian chevrons so the earliest false chevrons must date to after the arrival of Europeans in Southeast Asia in the 16th and 17th centuries (Francis 1989b:5; Munan 1988:106).

Early false chevrons are found in Sarawak and western Borneo, as well as Malaysia, Bali, Taiwan, and the Philippines. Francis (1989b:5) reports a false chevron excavated at Batanes in the Philippines (PNM 184-AT) which was paddled at the ends to resemble a true, faceted seven-layer chevron. The high lead content of this bead, its locale, a similar bead from Taiwan (Chen 1968:Plate 78F), and the fact that false chevrons are not known in Europe or in the Africa trade or found on any European bead sample cards, confirms that their source was most likely the Chinese mainland, or perhaps communities of expatriate Chinese beadmakers elsewhere in Southeast Asia (Francis 1989b:2, 5). Nevertheless, their exact place of manufacture remains unclear.

Later false chevrons (Figure 4J-K), made in the same way but larger and more oblate, were made to resemble later European chevrons with rounded ends. These chevrons are found in Formosa, Bali, and the Malay peninsula (Francis 1989c:5), as well as in Sarawak (Beck 1930:179). In the late 19th century, large false chevrons (Figure 4J-K) were valued at 10 shillings, the value of a gong, and among the lowest value of all the Kayan heirloom beads illustrated by Hose and McDougall (1912, 1:Plate 130). The false chevron was never a top-value bead in Borneo, but both true and false chevrons were sought after by all ethnic groups in Borneo (Munan 2005:134). They were particularly valued by the Kayans of Sarawak (Munan-Oettli 1988:410).

Yet more false chevrons, probably also of Chinese manufacture and dating to the late 19th or early 20th century, are found in Borneo in a variety of colors and sizes (Munan 2005:28). In an heirloom necklace seen by the author in the Upper Mahakam, East Kalimantan, black has replaced the traditional blue (Figure 13). In these "copies of copies of copies" of the true chevron, the large wavy trails are so carelessly applied that any resemblance to the original is almost lost.

Figure 13. False chevrons in a multi-strand necklace of the late 19th or early 20th century, Upper Mahakam, West Kalimantan (photo: author).

Mulberry, Pentagonal Faceted, and Melon Beads

Mulberry (aka raspberry), pentagonal faceted (aka twisted square), and some types of melon beads of translucent glass are furnace-wound products formerly thought to be of Dutch manufacture (Francis 1999b; Karklins 1987:12-14). Recent archaeological research has, however, determined that they were actually made in various regional centers in eastern Bavaria, adjacent southern Bohemia, and Upper Austria, and only traded through Amsterdam. They are generally attributed to the 18th and 19th centuries (Karklins 2019; Karklins et al. 2016).

Both mulberry and pentagonal faceted beads were widely exported around the world through Amsterdam, including to Island Southeast Asia. They appear to have been plentiful in Sumatra (Liu 1995:93), Sulawesi (Adhyatman and Arifin 1993:103), and Flores as a result of Dutch involvement in the eastern Indonesian spice trade (Sleen 1973:98).

Melon, amber pentagonal-faceted, and an almost black mulberry bead appear in a necklace dated to the 17th century in the Jakarta National Museum (Adhyatman and Arifin 1993:102). These forms appear to be relatively rare in both Sarawak (Beck 1930:127) and Dutch Borneo (Kalimantan) (Francis 1987:81). A mulberry bead is in a necklace in the Hilde May collection from the Upper Mahakam region (Figure 9 next to bottom row, between two melon beads). In another necklace in the same collection, a single orange bead may also be part of the mulberry/pentagonal-faceted bead group.

Striped Beads

Kelem bela, *kelem angab* (Kayan), *marik gamang* (Iban) (Munan 2005:136).

The *kelem bela*, known as "pyjama beads" by Sarawak collectors, is a wound barrel-shaped bead of blue or blue-black glass with applied longitudinal trails of red, yellow, green, and white (Figure 12 bottom right). They are regarded as heirloom beads in both Sarawak and Kalimantan (Francis 1989b:4; Munan 2005:136). Kelem bela (13.3 mm by 13 mm) have been found in excavations at Bukit Sandon, a site of the 14th-16th centuries in the Sarawak River delta. The stripes are often in the same sequence: red, yellow, red, two greenish-white, red, yellow (or green), red, and two greenish-white (Francis 1991a:234). Most common in Borneo are longer, thinner kelem bela (10.5 mm by 13 mm) but with exactly the same sequence of stripes (Adhyatman and Arifin 1993:43).

A very close match for these longer thinner versions of the kelem bela is on a sample card of Venetian bead supplier Francis Greil (no. 91, Peabody Museum, object no. 65-33-40/8015) who may have been the source of the large number of kelem bela in circulation in Borneo today (Francis 1991a:234; Munan 2005:139). The stripes and size of kelem bela (1.2 mm by 10 mm) in the collections of the British Museum (As1896,0317.47) donated in 1896 by Lady Margaret Brooke, Ranee of Sarawak, also appear to match those of the Francis Greil kelem bela. As we shall see, the kelem bela is not the only Borneo heirloom bead copy on the Francis Greil bead sample cards. No kelem bela have been found in Europe or on other European bead sample cards (Francis 1989b:3).

There is no evidence of kelem bela at early sites on the Thai/Malay peninsula, nor are they recorded in the Africa trade (Panini 2007; Picard 1987:91). This absence led Francis (1989b:3) to suggest an Asian origin for them. Their wound manufacture, trailed stripes, and presence at a site of the 14th-16th centuries in the Sarawak River delta (Francis 1991a:234) suggest the kelem bela were produced by Chinese beadmakers in Singapore, Banten, Java, or on the Chinese mainland, or even perhaps at several of the above sites at different periods.

Striped beads of two different sizes of the kelem bela type are in the Southwell collection (Figure 2 upper left and bottom center) (Francis 1989b:3; Mohtar 2011:124).

They are not similar in either shape or pattern to the kelem bela discussed above (Adhyatman and Arifin 1993:43) and are referred to as *kelem bela pa'un lan*, again suggesting manufacture at several different Chinese beadmaking sites.

Later copies of the kelem bela have turquoise or pink stripes, while others have red, yellow, black, and white stripes, or just white stripes (Francis 1989b:4). These may have been made by Venetian manufacturers and reached Borneo at the end of the 19th and beginning of the 20th century when large numbers of Venetian beads of many different designs were imported into Borneo via Singapore. The kelem bela is another example of a Borneo heirloom bead that has been copied many times over many centuries. It was one of the first Borneo heirloom beads to be copied by the emerging beadmaking industry in East Java in the late 20th century (Munan 2011:139).

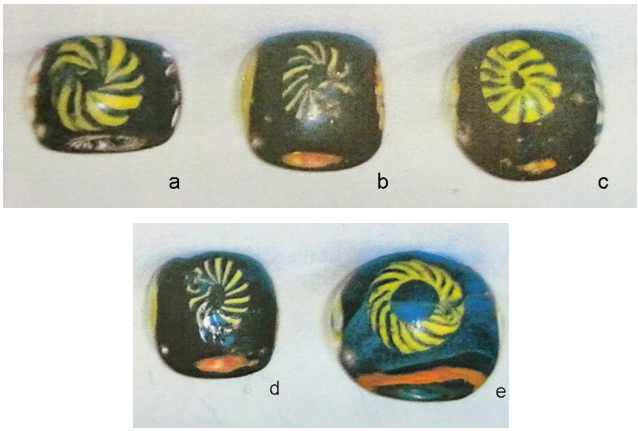

Figure 14. Relative values of lukut beads: (a) lukut selibau, (b) sekala doh, (c) lukut sekala (RM 2000), (d) lukut sekala doh (RM 1000), (e) lukut selibau (RM 500) (Elizabeth Deng, Miri, Sarawak).

Swirled-Eye Beads

Lukut sekala (Kayan, Kenyah), *mata tiong* ("bird eye") (Kalimantan; pers. obs.).

Lukut sekala, swirled-eye beads known locally as "rosette" beads (Figure 12 bottom row center), are a group of small lamp-wound oblate beads of black glass, approximately 10 mm in length and diameter, with filigree and swirled-eye inlays (*ekang na*) on the sides, and sometimes cane inlays around the perforation (Francis 1989b:15; Munan 2005:136). The true lukut sekala is Borneo's most highly valued heirloom bead. In the late 19th century, it was worth the price of an adult male slave (Hose 1926:opp. 89, Bead A). The lukut sekala with yellow or sometimes bright red swirled eyes (Figure 4A) was regarded by the Dayak as the most highly valued lukut sekala, with the *lukut sekala telang usan* a near perfect example (Munan 2005:135). Ownership of a bead as rare and as valuable as a true lukut sekala would have been known to Dayaks throughout a wide area. There are said to be only 40 or 50 true lukut sekala in Sarawak today, and a few dozen more in Kalimantan (Munan 2005:79). There are a few lower ranking versions. These include the *lukut bela daha*, a smallish bead of the same family, black with bright red or yellow inlays, while the *lukut sekala barong* and the *lukut selibau* (Figure 14) are larger variants (Munan 2005:136).

There appears to be disagreement among Dayak informants on the exact appearance of the true lukut sekala. One illustrated by Hose and McDougall (Figure 4A) and another from a necklace belonging to the Ranee of Sarawak in Beck (1930:Plate K, Bead 29) have white or orange cane decoration around the perforation. The lukut sekala in the Southwell collection (Munan-Oettli 1988:Plate, Bead 406) appears to have no decoration around the perforation although it may have worn off. Informant Elizabeth Deng (2019: pers. comm.) of Miri, Sarawak, states that the ekang na or swirled inlays of the true lukut sekala should twist to the right (Figure 14). The example of the true lukut sekala provided by her also has no decoration around the perforation.

It is generally believed by the Dayak that lukut sekala are ancient beads of unknown origin of which copies appeared in Borneo in the late 19th century. Genuine lukut sekala are said to be rounder, smoother, and with a better patina than the imitations. Yet no exact parallel of the lukut sekala has been recorded outside Borneo (Francis 1989c:14-15) nor found at archaeological sites within Borneo itself. Where were true lukut sekala beads made? Francis (2002:185) suggests a Middle Eastern origin. Islamic beads from the first millennium circulated for centuries in many markets, including the trans-Sahara Africa trade. These beads include some with twisted radiating motifs around an "eye," somewhat reminiscent of lukut rayed-eye beads (Panini 2007:50, 110). No Islamic parallel of the lukut sekala has been reported, however. Francis (1989c:13, 1992) also suggests an origin in Japan or China, but agrees that there is no evidence for this and believes the most likely source is Venice.

In mid-19th century Venice, techniques such as lamp winding reached their zenith (Francis 1988:13, 20). The glass was purer, shinier, and more brilliant. Black and other dark colors were common and designs included cane inlays and floral motifs (Francis 1999b:9). Many of these new Venetian bead designs were intended for the highly profitable trans-Sahara Africa trade and were inspired by ancient Islamic beads, particularly Islamic eye beads

which had remained highly sought after in West Africa because of their supposed protective powers. The inlays on some Islamic eye beads may have provided Venice with the inspiration for the original lukut sekala (Panini 2007: 45,72,110,111,151,159,160,326, 2017:323-328). Other mid-19th century Venetian beads with Islamic or African precedents include combed (feather) beads and the West African *bodom* and *akuso* beads (Francis 1999b:12, Plate 4B). Very few 19th-century beads of the lukut sekala type have been found in Africa, however. Collector Michael Heide found only one string in all his years in West Africa (John Picard 2022: pers. comm.), and only one strand and five individual beads of the lukut sekala type are in the Picard collection (Picard 1987:Bead 672, 1988:Bead 779, 1989:Bead 784, 1991:Beads 83-84). No lukut sekala beads appear on bead sample cards circulated in Africa. So, how did they reach Borneo?

At the end of the 19th century, author and ethnologist William Furness (1902:118) claimed that a sample of a lukut sekala had been sent by the Chinese traders in Borneo to be copied in Germany. Furness spent a year traveling in Borneo in the late 1890s, but is not among the 19th-century informants respected by Borneo scholar Victor King (1993:15).[6] Is there any truth to Furness's claims? It seems unlikely that Borneo's Chinese traders would have had direct contact with Europe's beadmakers in the last quarter of the 19th century. How, then, did European beads other than the lukut sekala reach Borneo? Was it via the colonial Dutch in Java, or the British in Singapore? In the late 19th century even the colonial Dutch bought their beads for the Borneo market in Singapore because the beads desired by the Dayak were not available in Java (Nieuwenhuis 1904:140).[7] It is clear that British Singapore dominated the European bead trade in Southeast Asia, but it was only in the late 19th century that the import of European beads into Borneo began to grow.

In the 1840s, Sarawak's Malay *nakodahs* (ship captains) sailed only annually to Singapore using the monsoon winds, individual traders assisting each nakodah in navigating and maintaining his ship in return for the carriage of an agreed tonnage of trade goods. Goods included sago and other forest products from Borneo which were exchanged in Singapore for European products, Javanese cloth, brassware, and Chinese jars. Beads may have been included but not in sufficient quantities to attract comment (Low 1848:116, 135).

Singapore was located along the main trade route between India and China and had been occupied by the British East India Company in 1819 to prevent Dutch attempts to restore their monopoly over the Southeast Asian regional trade. By the 1880s, with its free-port status and strategic position, Singapore had emerged as the region's leading entrepôt. Steamers had begun to compete with traditional Malay sailing vessels. Singapore also acted as a distribution center to satisfy a growing regional demand for beads. Some 40% of the imported beads were from Venice, the other 36% from Germany, Bohemia, and the United Kingdom (Cheah 2003:30, 31). Beads were also imported into Singapore from China (Low 1968:116; Nieuwenhuis 1904a:140).[8]

The increase in trade between Borneo and Singapore was the result of a growing colonial demand for local products such as sago, which were exchanged in Borneo for beads, but the eradication of Dayak inter-tribal warfare and head hunting in the late 19th and early 20th centuries was also an important factor. Prior to eradication, because of the risk of attack, Dayak villagers would congregate together in one or a few elevated longhouses and Dayak visits to other river basins were rare (Rousseau 1990:9, 33, 103, 120). With the eradication of inter-tribal conflict, Dayak villages formerly hidden in remote tributaries could settle along major rivers. Chiefs who had previously controlled trade routes and levied payments on traders were no longer able to do so. The collection of jungle produce became easier for Dayak populations as well as Malay jungle collectors and the volume of trade increased (King 1993:35; Rousseau 1990:33, 120). As European control extended inland, colonial forts were established upriver to maintain order (Tillema 1989:17). Malay traders began to gather around the safety of the forts, and over time colonial presence made possible the development of inland bazaars (Rousseau 1990:292).

The growing security also stimulated Borneo's bead trade. It allowed Dayaks to make trading trips lasting several months to neighboring tribes or to the coast to find work. As Dayak bead fashions changed, less favored beads could now be traded over greater distances to Dayak tribes where they were still highly valued (Harrisson 1954:8; Janowski 2003:12; Nieuwenhuis 1904a:139). Where Malay influence spread up the lower reaches of Borneo rivers, Dayaks who embraced Islam and "became Malay" would sell their beads, which led to a lively trade in beads between the coast and the interior (Nieuwenhuis 1904a:139). Beads also arrived in Borneo via the indigenous inter-island trade. Traders with beads from Sumatra traveled up the Kapuas River to the interior, across the watershed to the Mahakam, and downriver to Borneo's east coast to return home (Nieuwenhuis 1904a:141). Newly arrived European colonial officers brought beads with them. Dutch colonial officer Tillema bought glass beads in Amsterdam before his departure. On his sea voyage to Borneo, he bought more beads in Port Said (Tillema 1989:43, 50) at the head of the

Suez Canal. Once in Dutch Borneo, Dutch colonial officials received a monthly allowance to buy beads, salt, and tobacco to give as presents to the Dayaks during their tours into the interior (Tillema 1989:42). European visitors such as Low (1848:243, 258), Boyle (2007 [1865]:186), Bock (1881:13), and Beccari (1904:263) also bought beads to trade and give as presents.

The beads were shipped to Borneo from Singapore on a now-regular weekly steamer (Nieuwenhuis 1904a:140). Along with salt and cloth, the beads were bartered to the Dayak in exchange for forest products from the interior (Janowski 1990:286; Low 1968:323). The Malay traders were, however, aware that the new Singapore beads were less valued by the Dayak than ancient beads, whose true origin had remained a mystery (Janowski 1990:286; Ranee of Sarawak 1913:247). The price differential between new and old beads led some unscrupulous Malay traders to claim that new beads from Singapore had been found at the entrance to a cave, or were made by spirits (Nieuwenhuis 1904a:139). It is possible that the Dayak could have been deceived by an initial small group of lukut sekala, imported from Venice to Singapore and sold by a dishonest Malay trader to the Dayak as ancient beads. But were Borneo's Chinese traders, as Furness (1902:118) claimed, also involved in Borneo's bead trade?

Responding to Borneo's increasing security, Chinese traders began to open shops at key trading points along Borneo's major rivers (Tillema 1989:17). Dutch steamers were able to reach villages higher up the larger rivers, such as the Kapuas. The more competitive Chinese traders began to take on the role of intermediaries between the Dayak providers of forest products and the international market (King 1993:154). Soon Malay middlemen traders were run out of business by small traders up river, many of them Chinese, who were able to send orders via the weekly steamer directly to Singapore (Nieuwenhuis 1904b:15; Rousseau 1990:292, Note 6), making Furness' claims regarding Borneo's Chinese traders' involvement in obtaining copies of lukut sekala from Europe highly credible. In Singapore, European trading houses acted as agents, ordering goods from their respective head offices in Europe. Arab, Armenian, American, Jewish, Indian, and Chinese merchants also set up trading houses in Singapore. Many Chinese middlemen handled trade between European and Asian merchants (LePoer 1989:16-21).

That the lukut sekala was copied in Germany was perhaps a misunderstanding on Furness' part due to the many carnelian bicones then being imported via Singapore into Borneo from Idar-Oberstein. Furness' claim that by the end of the 19th century lukut sekala were regarded by the Dayak as either "old" or "new" is, however, supported by the original label attached to two lukut sekala beads in the collection of the Museum of Archaeology and Anthropology, Cambridge, England, donated by colonial officer Charles Hose (Figure 15). The Dayak called the "new" lukut sekala beads *lukut barong* or "boat beads" because they were brought upriver into Borneo by Malay or Chinese traders (Munan 2005:34).

Figure 15. The label on a lukut sekala in the Hose collection confirms that some lukut sekala were regarded as "old" and others as "new" in the late 19th century (Museum of Archaeology and Anthropology, Cambridge, England; MAA - Z.2217 CH 159).

It is also clear from Nieuwenhuis (1904a:139, 1904b:9, 143) that by the 1890s, and probably earlier, the beads available in Singapore from Bohemia and Venice included imitations "of old beads" (Beccari 1865:371-373). That lukut sekala copies were made in Venice is confirmed by examples on Venice-based Francis Greil's sample card (Figure 16) which include a small lukut-type bead (Bead 53) and a somewhat larger type with yellow lines between

Figure 16. Detail of a Francis Greil sample card, late 19th century. Beads 53-54 are lukut swirled-eye beads (Peabody Museum, object no. 65-33-40/8015).

each eye (Bead 54). Sadly, the author's research into Greil's activities in Venice has yielded little other than that he was likely to have been a bead distributor rather than a manufacturer.[9]

What appear to be further lukut sekala copies from the late 19th or early 20th century, perhaps supplied by Venetian merchants other than Greil, are more crudely made and in brighter colors. Examples are in the British Museum collection (As1936,1205.1) with an acquisition date of 1936. Yet more copies of the lukut sekala, along with those of many other Venetian beads and other Dayak heirloom beads, are produced today by beadmakers in East Java from reclaimed glass (pers. obs.).

At the end of the 1980s, the value of a true lukut sekala was reported to be $10,000 (Munan-Oettli 1988) and remains high today. Sadly, this makes it problematic to analyze the glass in order to confirm its true origins.

Small Lukut

A final group of valued beads associated with Borneo appears to be represented more in museum collections than in Borneo itself. The author will refer to these beads as "small lukut," lukut being the Dayak name for high-value beads of various types. Of high quality, small lukut beads are smaller and of greater finesse than the average Venetian beads destined for the foreign barter market. They include slim elongated barrels, slender tubes, and unusual partially segmented beads with the outline of a figure eight. Decorations include stripes and filigree eyes. The only beads of the small lukut type illustrated by Munan (2005:71) appear to be two slender barrels with filigree eyes in a high-value necklace in which every bead is a lukut filigree-eye type, some of which are said to be true lukut sekalas.

Examples of small lukut beads appear in a necklace (Figures 17-18) (As1936,1205.1) and in two small bracelets (As1936,1205.3, As1936,1205.2) held by the British Museum. They are described as originating in Borneo and attributed to the 19th century. Both the necklace and bracelets were acquisitioned in 1936, donated by a Mrs. Diana Good.

More examples of small lukut beads are in a necklace said to be from Kalimantan displayed in the National Museum of Indonesia, Jakarta (inv. no. 21151) (pers. obs). The same necklace is illustrated by Francis (1992:Plate 3A) and described as "a strand of Kayan beads collected in Sarawak in 1936, priced at half to one Straits dollar apiece"... containing "a few Venetian lamp-wound beads mostly from late in the nineteenth century, most of these glass beads are

Figure 17. Necklace collected in Borneo in the early 20th century which includes several small lukut beads (courtesy: British Museum, As1936,125.1)

Figure 18. Detail of the small lukut beads in the above necklace (third from the left) (photo: author).

Chinese, including many wound false chevrons." Perhaps significantly, the necklace was acquired by the National Museum of Indonesia in 1936, the same year as the British Museum's small lukut beads (Francis 1992:Plate 3A). Was this necklace also obtained from Mrs. Diana Good,

as were the British Museum's small lukut beads? A few slender barrels and spherical small lukut are also included in a necklace of mostly Venetian beads on display in the Sarawak Textile Museum, Kuching (no. 70/101).

All of the necklaces and bracelets mentioned above that incorporate small lukut include false chevrons. Some also exhibit kelem bela, and a small tube-shaped green bead with red, white, and blue eyes (Figure 18 third from left in both rows). This green eye bead, like the kelem bela, is included on a Francis Greil sample card (Bead 58, Peabody Museum, object no. 65-33-40/8015). This bead may have been strung with small lukut beads because of its similar small size and tubular shape. The presence of the larger kelem bela and false chevrons is more difficult to explain.

The author is not aware of examples of small lukut beads outside Borneo other than in the museum collections mentioned above. In their finesse, small lukut are somewhat reminiscent of a string of beads owned by a wealthy Pyuma tribal chief in southeastern Taiwan (Dubin 1995:234), although none of the Pyuma beads are of the same design or shape. Some of the beads in the Pyuma necklace are described today in Taiwan as Osaka-type beads said to be from 18th- or 19th-century Japan (Dubin 1995:234). Are the small lukut beads also from Japan? If so, it is unlikely that they were intended for Japan's local market. Do the lukut sekala type filigree-eye motifs on some small lukut beads (Figure 18 bottom right) suggest they were intended for the Borneo market? Perhaps they were made in limited quantities in a single Osaka workshop. Did they arrive in Borneo through the indigenous inter-island bead trade, or perhaps via a European who had visited Japan?

Some of the false chevron beads (Figure 18 second from right, both rows) included with the small lukut beads in the British Museum necklace and bracelets and in the Kuching Textile Museum necklace mentioned above are of an unusual finesse. This raises the question as to whether the false chevrons are of Chinese origin, or copies perhaps made in Japan? Are the kelem bela and the green eye beads mentioned above also Japanese copies of Greil beads? Are the small lukut from Japan or from elsewhere? The small lukut and the less-familiar, possibly Chinese polychrome trailed beads discussed above suggest that more beads than have at present been identified were circulating on trade networks in the Indonesian archipelago and traded to Borneo.

CONCLUSION

Several points have emerged as a result of the author's research. Firstly, how frequently Borneo heirloom beads have been copied over the centuries. Dayak conservative tastes ensured that traders sought out copies of already valued heirloom beads (Nieuwenhuis 1904a:152). The Javanese may have copied Islamic beads. The Chinese copied earlier versions of the let blue barrels and Venetian chevrons and in the 19th century, the Venetians copied the lukut sekala, kelem bela, and lukut sak badak. Idar-Oberstein, and subsequently Bohemia, copied the Cambay carnelian bicones, and perhaps the Japanese copied at least the Chinese false chevrons. Today beadmakers in Jember and Jombang Jatim in East Java continue this tradition, making copies of Jatim beads, lukut sekala, and many of Borneo's imported Venetian beads (pers. obs.).

Secondly, despite Francis' (1990:108) belief that beads were no longer buried with the dead in Sarawak after the Sung dynasty (AD 960-1279), beads and graves are closely linked in Dayak myths and there are many references to beads being found by chance in the ground (Ranee of Sarawak 1913:257). Nieuwenhuis (1904a:139) reports that the Dayak were buried with necklaces and belts of precious beads which each year formed a group of beads withdrawn from circulation until rediscovered. He believed that a significant number of the old beads worn by the Dayak had already been buried in graves at least once. Dayak women were reluctant to buy old beads from sellers who could not account for their origin, but a difference was made between beads found by chance as opposed to those known to have been looted from graves (Munan 2005:65). Kenyah tribes based along the Tawang, a tributary of the Kapuas, rejected beads found in local graves if they were not part of their own tradition, but they had no scruples in selling them without revealing their origin to passing traders, who then sold them to unsuspecting buyers further along the Kapuas (Nieuwenhuis 1904a:139).

Despite their dangerous rapids and falls, Borneo's many rivers provided the ancient highways along which beads traveled from the coast inland to the Dayak. Several of Borneo's heirloom beads – let blue barrels, the mottled carnelian beads, the green kelem buang, and even the copies of the lukut sekala – have associations with the Kapuas, suggesting it was an important trade route for Borneo's local and inter-island bead trade (Nieuwenhuis 1904a:139). The Kapuas is Borneo's longest river, navigable along most of its length, an excellent trade route to and from the interior and the chief waterway of western Borneo. The Kapuas River delta on Borneo's west coast faces the China Sea, the geographic center of maritime Southeast Asia and from early times the focus of Indian, Arab, and Chinese traders (Heidhues 1998:273, 275).

Archaeological data show Hindu-Buddhist influence in the Kapuas region dating to the 7th century and 13 sites have been recorded in the region (Utomo 2006:435, 438, 440).

Kapuas River trade depended almost entirely on exchange with the Dayaks of Borneo's interior. Its early ports, such as Lawe, Tanjungpura, and later Sukadana, were the source of highly sought-after goods, such as gold, diamonds, forest products, and perhaps local carnelian. The Kapuas delta ports became feeder ports from which goods were transported to and from major trading hubs in Java, Sumatra, and beyond (Heidhues 1998:273, 275). The Kapuas river also provided the Kapuas/Mahakam cross-Borneo route, used by the Dayak and inter-island bead traders from Sumatra (Nieuwenhuis 1904b:141). Today, Dayaks who spent their youth in Putussibau in the Upper Kapuas remember traders from Sarawak coming to the region in search of beads (Ekodemus, Pontianak 2019: pers. comm.).

Seven of the eleven heirloom beads discussed above have, or appear to have, Chinese origins. Even the arrival of the Venetian lukut sekala copies appears to be linked to late-19th-century Chinese traders. Chinese beads began to dominate at importing sites in Borneo beginning in the late Sung dynasty (AD 960-1279) (Francis 1991b:110). The Chinese were highly organized and competitive traders and, starting in the 15th century, were in control of the Indonesian intermediary trade in luxury goods and the regional bead trade (Rouaffer and Ijzerman 1915:Plate 3; Tiele 1877, quoted in Schrieke 1955:22, 42).

Much work remains to trace the origins of Borneo heirloom beads and the trade routes along which they travelled. The glass of the Borneo beads in the British Museum collections has been analysed by the Institut de Recherche sur les Archéomatériaux (IRMAT) in Orleans, France. The results will be published in 2023. Sadly, the British Museum collections do not include examples of all Borneo heirloom beads. It is hoped that this article will encourage other museums with Borneo heirloom bead collections to follow the British Museum example.

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ENDNOTES

1. Geologist Novery Nazuluddin, Ekodimus, Government Office, Toho District, Pontianak, West Kalimantan.

2. Let type beads, also with a high lead content, have been found at the Calatagan cemetery (ca. 1450-1600) in the Philippines.

3. Between 1977 and 1985, Hilde May lived in Samarinda at the mouth of the Mahakam River in East Kalimantan. She assembled a large collection of artifacts from the Benuaq, Tunjung, Bahau, Kayan, Modang, and Kenyah – the Dayak tribes living upriver in the Mahakam River Basin in Dutch East Borneo (now East Kalimantan). The material is now in the Völkerkundemuseum in Heidelberg, Germany.

4. Tun Jugah Museum and Gallery, Kuching, Sarawak; Hose and McDougall (1912, 1:Plate 130); Southwell collection, Sarawak Museum, Kuching; Hilde May collection, Völkerkundemuseum, Heidelberg, Germany; J. Camp Gallery, New York; Rijksmuseum voor Volkenkunde, Leiden, the Netherlands.

5. Object number: RV-614-113. Origin: Zuidoost-Azië: Insulair / Indonesië / Kalimantan / Kalimantan Timur (provincie) / Kutai Kartanegara (regentschap) "*kelom kawit*;" https://collectie.wereldculturen.nl/#/query/831e7c7c-8f21-43d4-9f54-33315201d442.

6. These were Carl Lumholtz (1920), Charles Hose (1912), and Hendrik Tillema (1989).

7. Beads were very popular among the Dayak but if they did not conform in color and shape to what was desired, they were rejected (Tillema 1989:42).

8. In Singapore, Nieuwenhuis (1904a:140) also reported glass beads "from or recently imported from China, which were sold in Chinese boxes and China paper. These were purely blue, transparent and yellow, opaque glass beads usually cylindrical, 7 mm. long and 8 mm. thick. Other round, red, transparent glass beads of 4 mm diameter, according to my guess, from China."

9. Extensive research in national archives and bead trade journals of the late 19th and early 20th centuries in Venice yielded no further information on Greil. The heading, however, on a bead sample card held by the Old Fort Johnson Museum, Fort Johnson, New York, reads "Francis Greil, Commission Merchant, Venice, Italy," suggesting that he was a bead supplier or wholesaler in Venice, rather than a manufacturer.

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Barbie Campbell Cole
Independent Researcher
London, United Kingdom
barbie@barbiecampbellcole.com

EIGHTEENTH-CENTURY NORTH AMERICAN FIREARMS DECORATED WITH INLAID GLASS BEADS

Karlis Karklins

Over the millennia, glass beads have been used to ornament a wide array of objects. A rare application in the 18th century was their use to personalize and adorn firearms used on the North American continent. Only five examples have been encountered so far.

THE FIREARMS

From the collection of the late Walter O'Connor, the first example is a better-quality flintlock Northwest trade gun with a cast brass serpent side plate. It was made by Wilson of London (Bradley and Karklins 2012:93-94; O'Connor 1980). The buttstock exhibits the initials GG6 on the right side and the date 1777 on the other (Figures 1-2). These are formed of 147 white glass seed beads pressed into pre-drilled holes. A row of beads outlines the fancy butt plate tang. The 1777 date fits well with the attributes of the gun and suggests it was used during the American Revolutionary War, but by whom and on which side remains undetermined.

A second example, from the Walter O'Connor collection, was recently auctioned by Morphy Auctions (2018) of Denver, PA. It is a *fusil du chasse* produced by Tulle, a principal French weapons manufacturer. It is similar to the first example in that the right side of the butt bears the fancy initials IW while the other side exhibits the date 1759, all formed by white glass seed beads set in the wood (Figures 3-4). White beads also extend along the top of the butt comb, and form a curvilinear decoration around the front of the comb as well. Three rows of beads run along the bottom of the butt, becoming two that run along either side of the trigger guard (Figure 5). At the front of the guard, the beads (all now missing) formed a single line that extended along the base of the fore-stock to the ramrod entry thimble.

Figure 1. The right side of the Wilson Northwest trade gun stock exhibiting the initials GG6 (courtesy: T.M. Hamilton and Pioneer Press, a Division of Dixie Gun Works, Inc.).

Figure 2. The left side of the Wilson gun stock with the 1777 date (courtesy: T.M. Hamilton and Pioneer Press, a Division of Dixie Gun Works, Inc.).

It is estimated that 244 beads originally ornamented the fusil, 152 of which remain. O'Connor believed that the gun may have been in the possession of someone in Captain Hezekiah Dunn's New Jersey Ranging Company which was active on the New York frontier during the French and Indian Wars between 1756 and 1760.

The third example is a club butt fowler from the collection of the late Tom Patton (Riser, Riser, and Weil 2022). Based on the club butt and the flat cock with a reinforcing ring below the lower jaw, the gun likely dates to ca. 1690-1715 (Jones 2019:39). The right side of the butt is decorated with two crosses composed of white beads. While the rear cross simply consists of two intersecting lines, the smaller front one has an additional bead inserted in each corner where the lines cross (Figure 6). As this description is based solely on the image, it is unknown if the same configuration appears on the other side of the stock.

Figure 3. The right side of the Tulle fowler stock with the fancy initials IW (courtesy: Morphy Auctions, www.morphyauctions.com).

Figure 4. The 1759 date on the left side of the Tulle fowler stock (courtesy: Morphy Auctions, www.morphyauctions.com).

The bead inlay on a Wilson trade gun dating to about 1765-1780 is restricted to three vertical rows on the right side of the stock (Figure 7) and an elongated "T" configuration on the upper part of the wrist (Gale 2010:135-136). Unlike the other guns discussed herein where the beads are set so the hole is visible, the beads on this example are inserted sideways. It is believed that this fowler was among those imported by Sir William Johnson while he was Superintendent of Indian Affairs for the northern colonies from 1755 to 1774 (Gale 2010:135).

The final example is what might best be called a fowler. Auctioned by Jeffrey S. Evans & Associates (2020) of Mt. Crawford, VA, it is a relatively recent reconversion to flintlock. In addition, the ca. .68 cal. barrel (marked LONDON) is a replacement, as are some of the white glass beads that form the inlays. A row of beads extends along the comb as well as the underside of the butt. The date 1769 is on the left side of the buttstock (Figure 8) and what appear to be initials on the other (Figure 9). The left initial (a barred I) and the bead configuration to the right of it are reminiscent of the fancy IW on the Thulle fowler discussed above. The size and style of the date are also similar to that on the Thulle gun. Are these two firearms related, possibly owned and/or personalized by the same person... or has the present fowler been enhanced at some point, possibly based on the Thulle inlay? Only closer examination of the piece will reveal the answer.

Figure 5. The beads set into the underside of the Tulle stock (courtesy: Morphy Auctions, www.morphyauctions.com).

Figure 6. The early 18th-century club butt fowler from the Patton collection (Riser, Riser, and Weil 2022).

DISCUSSION AND CONCLUSION

The cross configurations on the Patton fowler are very similar to those on an incomplete club butt musket recovered from the wreck of the *Elizabeth and Mary* which sank in a cove at l'Anse aux Bouleaux, Quebec, in August of 1690 (Bradley and Karklins 2012). The ship had been part of a fleet commanded by Sir William Phips that attacked Quebec City during the second year of King William's War. Two simple crosses composed of shell wampum beads set into the wood on end adorn either side of the stock. In addition, a row of wampum runs along the lower edge of the stock beneath the crosses (Figure 10). In that wampum inlays in weapons were fairly common among the Indigenous peoples of the Eastern Woodlands, it is possible that the firearm was either owned by an Aboriginal member of the war party or was obtained from such a person. It is uncertain whether the Patton fowler was once the property of an Indigenous person or the cross design was simply adopted by a white individual.

Regarding the other firearms, the geometric nature of the bead inlay of the Wilson gun in Figure 7 suggests it originally belonged to a Native person. Conversely, the initials and dates on the two remaining guns intimate white ownership. Although some Indians living in the Northeast did have Anglo names in the 18th century and likely knew about the use of initials, the combination with dates seems more a Euro-American trait. Nevertheless, it is possible that the actual bead inlay was done by an Indigenous person.

Based on the guns discussed here, the inlay of firearms with wampum and glass seed beads is restricted to a relatively short time span between 1690 and 1777. How prevalent this practice was and how long it persisted remains to be determined. Hopefully, additional inlaid firearms will come to light that will help to answer these questions.

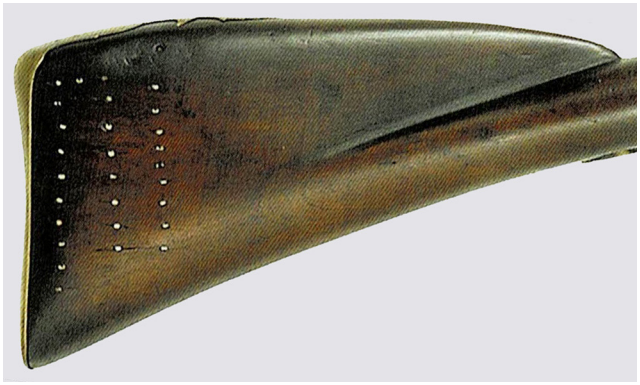

Figure 7. The glass bead inlay on the right side of the Wilson trade gun stock (ca. 1765-1780) (Gale 2010:135).

Figure 8. The 1769 date on fowler stock (courtesy: Evans 2020).

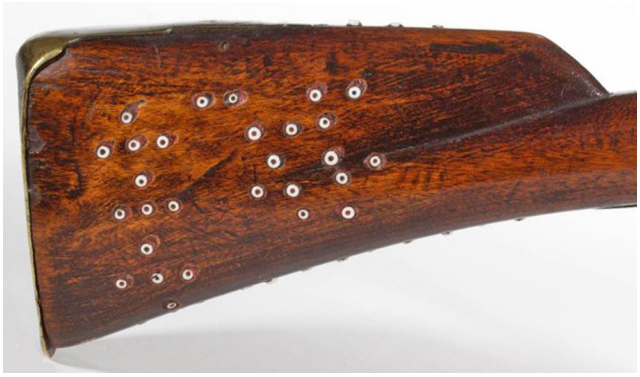

Figure 9. The possible initials on the right side of the 1769 fowler stock (courtesy: Evans 2020).

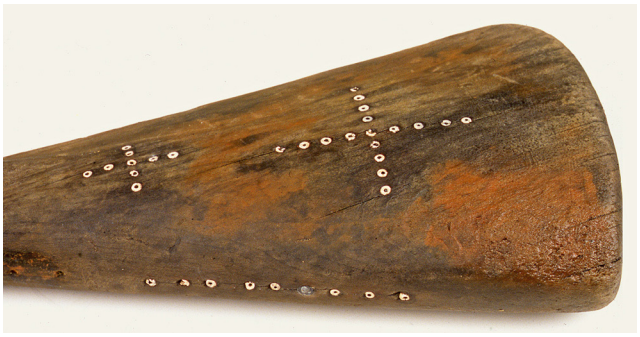

Figure 10. The wampum inlay on the left side and underside of the musket stock recovered from the 1690 wreck of the *Elizabeth and Mary* (photo: George Vandervlugt, Parks Canada).

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Karlis Karklins
Independent Researcher
Ottawa, ON
Canada
karlis4444@gmail.com

PEAKE, WAMPUM, OR *SEWANT*? AN ANALYSIS OF SHELL BEAD TERMINOLOGY IN THE SEVENTEENTH-CENTURY CHESAPEAKE

Rebecca J. Webster

Beads and the terminology used to describe them provide a powerful look into the colonial relationships negotiated by both Indigenous groups and European settlers. Peake*,* wampum*, and* sewant *are terms used by both groups to describe tubular white or purple shell beads that developed as a result of colonial interactions between them. This paper uses 17th- and 18th-century documents from Virginia and Maryland to examine the contexts in which bead terminology shifted throughout the region over time. In examining these shifts from the Chesapeake vernacular, this paper provides another avenue by which to understand not only how people used beads to negotiate colonial relationships, but also to demonstrate who was building relationships with whom and the effects of those relationships.*

INTRODUCTION

Archaeologists working throughout eastern North American have adopted *wampum*, a British truncation of the Algonquian word *wampumpeag* ("strings of white [shell beads]") (Otto 2017:28) as the unofficial terminology for tubular beads manufactured from *Busycon* whelk or *Mercenaria* clam shells recovered from archaeological sites (Bradley 2011; Ceci 1989; Flick et al. 2012; Gleach 1997; Peña 2006; Shell 2013; Webster and King 2019). While the use among researchers of wampum as a term for shell beads has always been popular, Lynn Ceci (1989) solidified its use in the archaeology community when she established a system to classify wampum at various temporal stages based on morphological changes that occurred pre- and post-European colonization (*see* Bradley 2011 and Ceci 1989 for further discussion). Wholesale use of wampum within archaeological and historical research, however, disguises the fact that various colonial peoples – including Iroquoian-speaking groups, the British Chesapeake, the Dutch, and the French – used other terms (*onekoera*, *peake*, *sewant*, and *porcelain*, respectively) throughout the first centuries of settlement in eastern North America (Otto 2013, 2017). While understanding how the physical shell beads changed over time is important to interpreting the archaeological record, Otto (2013:111) argues that analysis of shell bead terminologies allows for synthesis of a "narrative that captures the breadth of wampum's historical development." In this paper, I synthesize historical documents created throughout the colonial Tidewater Chesapeake that mention bead terminology in order to better understand the relationship between colonization and the effect that the materiality of beads had on people operating within the colony.

INDIGENOUS-ANGLO INTERACTIONS IN THE TIDEWATER CHESAPEAKE

At the dawn of European settlement, there were two Indigenous chiefdoms already established in the Chesapeake Tidewater. The Piscataway Confederacy emerged in the 14th century as the result of a number of smaller communities along the southern portion of Maryland's western shore allying themselves together (Cissna 1986; Flick et al. 2012; Potter 1993). The Powhatan Paramount Chiefdom emerged later in the 1560s after Wahunsenacawh, or Powhatan, began incorporating polities outside of those he inherited through intimidation and force (Clark and Rountree 1993; Gallivan 2016; Potter 1993; Rountree 1993). It is within this complex sociocultural system that European settlers entered during the 17th century (Binford 1964; Fausz 1977; Feest 1966; Potter 1993; Rountree 1993; Turner 1993).

Despite previous attempts, European settlers had not successfully established a permanent settlement in the Chesapeake until the founding of Jamestown in 1607. As it would happen, the British colonists settled within the core area of Wahunsenacawh's chiefdom, the James and York River valleys. Early interactions between members of the Powhatan paramountcy and the Jamestown settlement ranged from cordial to violent due to British misunderstandings of Algonquian systems of reciprocal exchange and settler encroachment onto Indigenous lands as a result of tobacco

agriculture (Arber 1910; Mallios 2004; Rountree 1990). Tensions between the settlers and Powhatan culminated in three distinct conflicts known as the Anglo-Powhatan Wars (1609-1614, 1622-1632, and 1644-1646) (Fausz 1977; Potter 1993; Ragan 2006; Rountree 1990, 2005). These conflicts were, however, centered along the lower Virginia Tidewater, and Indigenous groups living along the upper Virginia Tidewater (the Rappahannock and Potomac River valleys) primarily remained on the periphery of Indigenous-settler interactions until the 1640s (Flick et al. 2012; Heath, Webster, and Parker 2021; Potter 1993; Ragan 2006).

At the end of the Third Anglo-Powhatan War, the colonists and the remaining Powhatan signed the Treaty of 1646 that included clauses that all Indian nations would pay an annual tribute; the colonial government would extend protection to signing Indian groups; and that these groups would submit to English laws. While not initially included in the treaty, the Indian groups living along the upper Virginia Tidewater soon agreed to the terms of the peace (Ragan 2006; Rountree 1990; Strickland et al. 2016). Colonial documents created from the 1650s to the 1670s highlight the continued tensions between the encroaching English settlers and Virginian Algonquians, as well as additional tensions created by raiding and settling northern Iroquoian-speaking groups (Ragan 2006; Strickland et al. 2016). These conflicts reached a boiling point among English settlers leading to an assault against all Indians in the colony during Bacon's Rebellion (1676-1677), which ended with the Treaty of Middle Plantation (Ragan 2006; Rice 2009, 2013; Strickland et al. 2016). Indigenous-settler interactions throughout the remainder of the century can be told through documentation of various land disputes and criminal cases. Finally, in 1705, the Virginia Assembly passed a series of laws that severely limited the rights of the Indigenous population and set about the historical, though not actual, erasure of Indigenous groups living within the Virginia colony (Ragan 2006:2860; Rountree 1990; Strickland et al. 2016).

While all of these events occurred in Virginia, settlers in Maryland established and developed their colony separately, but in conversation with their Chesapeake neighbors. Continuous European settlement within the boundaries of modern Maryland did not begin in earnest until the establishment of Kent Island in 1631 followed by the Maryland colony at St. Mary's City in 1634. In the time between the establishment of Virginia and Maryland, the Maryland government tried to learn from the interactions between the Virginian settlers and the local Indigenous tribes.

The Maryland government sought to take measures to avoid conflict with the Piscataway and other Indigenous groups within the colony, however, as with Virginia, colonists continued to encroach onto Indigenous lands, threatening that peace. Acknowledging the growing tensions felt between the Piscataway and the colonists, the Maryland government and eleven Piscataway affiliated groups signed the Articles of Peace and Amity in 1666. Articles within the treaty included the Maryland government agreeing to protect the lands and lives of the signing groups and the Indian groups not treating with groups outside the colony without governmental approval (Cissna 1986).

After the peace, however, the English encroachment continued and the Piscataway were subjected to increasing raids by Northern Iroquoian-speaking groups, including the Susquehannock, with whom the Maryland government had also signed a treaty (Cissna 1986). In maintaining their peace with the Maryland Colony, the Susquehannock blamed the Piscataway for a colonist-led siege on a Susquehannock fort and increased the frequency and intensity of their raids on the Maryland Indians along with their Haudenosaunee allies (Cissna 1986; Flick et al. 2012). The continuous Susquehannock raids on Piscataway settlements led the Maryland Indians to ask the colonial government for protection. Little protection was forthcoming until the government granted the Piscataway land at Zekiah Swamp in 1680, an action that did little to protect them (Cissna 1986; Flick et al. 2012; Seib and Rountree 2014). Historical documents from 1681 point to accusations that the Piscataway attempted to establish peace talks with Northern Indigenous groups, possibly against the Maryland colony, without the government's knowledge (Flick et al. 2012). The conflict between the Piscataway and the Susquehannock and their Haudenosaunee allies reached such a point that the New York government negotiated with the northern groups on Maryland's behalf in 1682 and again in 1685 (Cissna 1986). The peace between the Maryland colony, Piscataway, Susquehannock, Haudenosaunee, and New York colony was just one in a series of treaties that represented Maryland's and the Piscataway's place in the colonial Covenant Chain.

Similar to the end of the century in Virginia, Indigenous-Anglo relationships in Maryland were plagued by land disputes and court battles. Colonial encroachment onto Indigenous lands reached a point that some members of the Piscataway, including the Tayac, removed themselves to outside the colony's boundaries in 1695 (Cissna 1986; Curry 2014). Despite this, the Piscataway continued to experience tense relations with the Maryland government such that by 1712, the tribal nation's government, but not with all its people, left Maryland to settle in Pennsylvania (Cissna 1986; Curry 2014; Tayac 1999).

The interactions between Indigenous populations and colonists living within Maryland and Virginia followed

similar trajectories throughout the 18th century. Due to the colonial policies of Maryland and Virginia discussed above, the Tidewater Indian groups who played active roles during the 17th century were largely ignored in the historical record throughout most of the 18th century. Additionally, especially after 1720, Indigenous-Anglo interactions occurred outside the 17th-century bounds of these colonies as European settlers expanded colonial frontiers into the Piedmont (Figure 1) (Heath and Breen 2017:32-33). The new Maryland and Virginia Piedmont frontiers acted as buffer zones between the central areas of settlement and hostile French and Indigenous attacks and centers of intercultural interaction (Heath and Breen 2017:33). The Seven Years War (1754-1763) further increased the intercultural interactions between British and Indigenous populations throughout the colonies as British forces created tenuous alliances with Native groups throughout the Eastern Seaboard, including the Haudenosaunee and Cherokee.

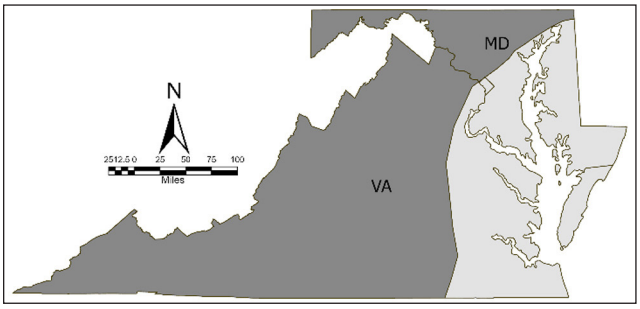

Figure 1. The Tidewater (light gray) and Piedmont (dark gray) regions of Maryland and Virginia (image by author).

SHELL BEADS IN THE TIDEWATER CHESAPEAKE

Beads are a key aspect of European colonization stories in North America. According to John Smith's *Map of Virginia* (Arber 1910:28), he and Captain Christopher Newport traded a pound or more of "blew beads" with the Powhatan for 200-300 bushels of corn, saving Jamestown from starvation (Lapham 2001). Yet, while Europeans saw beads as useful in an economic and sometimes political sense, local Indigenous groups viewed beads as highly ritualized and prestigious objects. The Powhatan and Piscataway imported the shell used to make beads, and sometimes the beads as well, into their territories from elsewhere, most likely the Eastern Shore of the Chesapeake (Bradley 2011; Rountree 1989; Rountree and Turner 2002; Shepard 2015). Ethnoarchaeologists have demonstrated that it took a skilled individual to manufacture shell beads. Thus, in concert with their importation, Chesapeake Algonquians valued shell beads as important, symbolic objects (Bradley 2011; Rountree 1989; Rountree and Turner 2002; Shepard 2015). Indians in the region used beads as a physical representation of diplomacy, a form of tribute used for reciprocal exchange, and a spiritually imbued object (Shepard 2015; Turner and Rountree 2002).

At first, colonial chroniclers like John Smith primarily used the term "bead" to denote beads of all shapes, sizes, and manufacture (Arber 1910). As the century went on, however, colonists recorded various terms used to describe shell beads in the Chesapeake. Individuals understood the term *roanoke* to describe small discoidal beads made from *Busycon* whelk or *Mercenaria* clam shells and *peake* to describe tubular shell beads. Both terms are English bastardizations of Algonquian terms. John Smith recorded a number of Algonquian phrases in his *Map of Virginia*, including the original Algonquian term for roanoke: "Kekaten pokahontas patiaquagh niugh tanks manotynes neer mowchick rawrenock audowgh," which he translated as "Bid Pokahontas bring hither two little Baskets, and I wil giue her white beads to make her a chaine" (Arber 1910:46). Peake, like wampum, is a British truncation of the Algonquian word wampumpeage ("string of [white beads]") (Otto 2017). Otto (2017) noted, though, that unlike wampum, which translates to white string, peake references the shell beads. Archaeologists have, however, found that shell bead terminology in colonial records does not indicate the presence of shell beads in the physical world. Webster and King (2019) demonstrate that glass beads were used in place of shell beads during exchanges between groups despite being called peake or roanoke. In their study, they argue that within the colonial Chesapeake, the context in which a bead was being used determined the term, not the material of manufacture.

METHODOLOGY

For this study, I analyzed 224 individual references to beads from historical documents associated with Virginia and Maryland dating from 1607 to 1770. The documents associated with Virginia that I sampled include travel narratives, minutes from Virginia Council meetings, Hening's (1823) *Statutes*, and the order and deed books from Northumberland, Westmoreland, Lancaster, and Old Rappahannock counties (Arber 1910; Fleet 1961; Hening 1823; Hilliman 1966; Major 2016; McIlwaine 1915, 1916, 1917, 1918, 1919, 1925; Neill 1869; Sparacio and Sparacio 1991, 1994a-c). I sourced all the references for my Maryland sample from the Archives of Maryland Online (AOMOL). It is important to highlight that European individuals authored or transcribed all the documents sampled for this study. Therefore, it is possible that the authors did not completely understand the intent of use within Indigenous contexts, and they did not witness or record the actual frequency of use.

In an attempt to mitigate the recording bias of the documents, I critically mined the texts that comprised my dataset. I evaluated each reference for the following information: year, decade, term(s) used, context of use, persons involved, and the colony in which the term was being recorded. The decades I analyzed ranged from the 1600s to the 1770s. When I cataloged the terms used in each reference, I broke the information down into the presence or absence of a term (roanoke, peake, wampum, wampumpeag, sewant, and bead).[1] Then, I determined the context of term use based on the described use of the bead in the document, rather than the type of document. The contexts I identified include adornment, criminal cases, descriptions, diplomacy, exchange, government relations, inventories, rituals, and translations. If multiple bead references were made to various contexts of use, I created a separate entry for each reference. Additionally, I cataloged individuals involved in the use of the term based on context of use, rather than who was involved in the creation of the document. My options for persons involved included British, French, Dutch, Chesapeake Algonquian, Susquehannock, Northern Algonquian, Northern Iroquoian-speaking, Southern Iroquoian-speaking, and unidentified Indigenous persons.

The following is an example of how I analyzed references. In 1681, the Maryland Council interrogated an Indigenous woman regarding her knowledge of the murder of an English man. During her interview, she referenced that a Nanticoke man offered her peake to marry him (AOMOL 1681). For context of use, I cataloged the reference as "exchange" rather than "criminal case" because the Nanticoke man offered the woman the peake as an exchange for marriage. In addition, I cataloged the persons involved as a Chesapeake Algonquian (the man) and an unidentified Indigenous person (the woman) because her ethnic affiliation was never recorded.

Finally, I performed simple statistics, including creating histograms and line charts, and ran linear and multilinear regression models to identify potential trends in bead terminology usage with 95% confidence. In the section below, I discuss the results of my analyses.

RESULTS AND DISCUSSION

I identified a total of 224 references to bead terminology, 24 of which contained the use of multiple terminologies. When comparing the documents from each colony, references from Virginia occur at the highest frequency (n = 130), however, there is not a large discrepancy in the frequency of occurrence between the colonies. Amongst all the references, colonial authors recorded the term roanoke (n = 81) most frequently, followed by the term bead (n = 70) (Table 1).

When analyzing the distribution of the terms bead, roanoke, peake, and wampum over time, there appear to be four distinct phases of terminological use that occurred in Maryland and Virginia. Phase 1 dates from the beginning of Jamestown in 1607 to approximately 1630 and is associated with colonial writers using the term bead. Phase 2 includes the period from 1630 to 1665 in which colonial documents reference roanoke at the highest frequencies. Phase 3 highlights the period from 1666 to 1710 when colonial authors utilized the term peake the most. Finally, Phase 4 is based on the prominent use of wampum in documents that date from 1710 to 1770. Linear regression models revealed that there is a statistically significant relationship in the use of the terms bead, roanoke, and wampum and the decade and phase of use. The linear regression models for the use of peake highlight the variations in its use over time. The models also indicate that there is a significant relationship between the use of peake and the decade, but the relationship between its use and the phase can only be determined with 90% confidence. These results are likely to be caused by the relatively small assemblage and the fact that peake episodically appeared in colonial documents throughout the study period, but occurred at the highest

Table 1. The Frequency of Term Use by Colony.

Colony	Roanoke	Peake	Wampum	Wampumpeag	Sewant	Bead	Total per colony
Maryland	54	31	19	5	4	5	118
New York*	0	0	2	0	0	0	2
Virginia	27	5	31	2	0	65	130
Total per term	**81**	**36**	**52**	**7**	**4**	**70**	**250**

* References to wampum from New York relate to diplomatic correspondence from the governor of New York to the Virginia Council.

frequency during Phase 3. What is more notable, though, is that the period associated with Phase 3 is significantly associated with the use of beads as a mode of diplomacy. In the discussion below, I provide evidence for how these phases of terminological use emphasize sociocultural developments within the Chesapeake.

Phase 1: "a few blew beads"[2] (ca. 1607-1630)

I documented a total of 57 references in association with Phase 1 (Figure 2; Table 2). In the case of each reference, colonial authors used the term bead. Additionally, the authors describe Chesapeake Algonquians (n = 56) using beads as objects for a variety of purposes including adornment (n = 6), diplomacy (n = 8), exchange (n = 28), and rituals (n = 8). These early accounts also highlight the fact that British settlers (n = 28) were statistically likely to use beads as objects of diplomacy (n = 8) and exchange (n = 19).

The ubiquity of a Chesapeake Algonquian presence within these early documents is, in part, due to a sampling bias. I sourced 56 of the references from this phase from travel narratives and promotional materials; John Smith's *Map of Virginia* is the source of 28 of the references (Arber 1910).

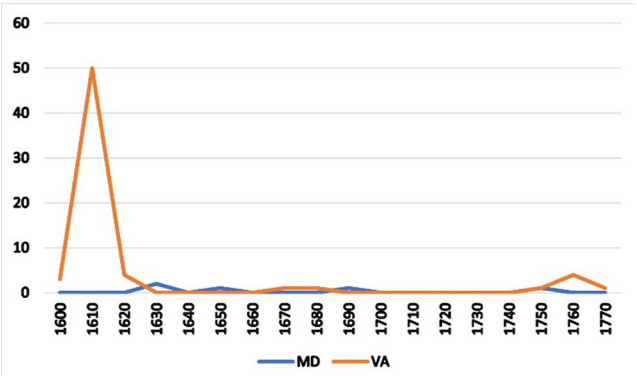

Figure 2. Phase 1 (ca. 1607-1630). The frequency of the use of the term *bead* by colony.

The prominence of Chesapeake Algonquians throughout Phase 1 references also means it is difficult to determine statistically significant relationships in association with their use of beads because Chesapeake Algonquians acted as a baseline for individual bead use during this period.

Despite the sampling bias, this assemblage highlights an important aspect of the early colonization efforts of the Chesapeake: the role early narratives played in establishing the Chesapeake within a British worldview and how these cultural translations led to ideological misunderstandings. The authors of these narratives made note of the various purposes for beads amongst Chesapeake Algonquians, but they still used terms (e.g., bead) familiar to their European audiences. While the authors' use of the term bead was meant to familiarize the audience with the object, their initial description of settlers and Algonquians using beads in contexts of one-off exchanges (95% confidence) hints at the underlying issues settlers faced by situating the Chesapeake primarily within their worldview. During the initial settlement of Jamestown, there were fundamental misunderstandings between the British and Algonquians with regard to systems of reciprocal exchange, especially when it came to the value of objects like beads. Mallios (2004) argues that in the early Virginia Tidewater there was a pattern of settlers misunderstanding their role as reciprocal partners with the Virginia Algonquians, who believed a central purpose of exchanging goods was to build and maintain relationships. In contrast, the historical record highlights how colonists understood these interactions as one-off exchanges: beads for corn (Arber 1910). Mallois (2004) contends that there was a pattern of the settlers' inadvertent rejection of the Algonquian reciprocal relationship followed by an outbreak of violence. In his analysis of copper, another spiritually imbued material, Potter (2006) argues that the colonists flooded the area with beads, copper, and other European goods that threatened the reciprocal relationships between Algonquian commoners and *werowances* (chiefs) and long-existing Algonquian social hierarchies. This threat was met by werowances attempting to forcefully control the flow of these objects, sometimes by violence (Mallios 2004; Potter

Table 2. The Frequency of Term Use by Phase.

Phase	Bead	Roanoke	Peake	Wampum	Wampumpeag	Sewant	Total per phase
1	57	3	0	0	0	0	60
2	3	57	14	0	3	0	77
3	3	18	16	7	4	4	52
4	7	3	6	45	0	0	61
Total per term	**70**	**81**	**36**	**52**	**7**	**4**	**250**

2006). The sample underlines these early misunderstandings as the majority of references that include settlers using beads (n = 28 of 30) occurred in contexts of exchange with various Algonquian individuals, primarily for corn, and during a period when there were two Anglo-Powhatan Wars.

Phase 2: "an Act that Roaneoke shall pass currant"[3] (ca. 1630-1665)

The data associated with Phase 2 demonstrates that colonists continued to think of beads as a form of currency. There was, however, a terminological shift during this period from the use of bead to roanoke (Figure 3; Table 2). Throughout Phase 2, individuals recorded 64 instances of bead use, 57 of which included the term roanoke. The individuals referenced in these documents utilized roanoke for a variety of purposes including damages in criminal cases (n = 8), a method of exchange (n = 34), and items of value within inventoried estates (n = 8). Linear regression models also indicate that there is a significant relationship between British settlers using roanoke in instances of exchange amongst themselves as well as with Chesapeake Algonquians (n = 23 and 11, respectively). While the sample size is small (n = 14), the documents indicate individuals thought of peake as a conduit of exchange. I argue that the use of roanoke, and to a lesser extent peake, in British contexts of exchange, criminal cases, and estate inventories demonstrates that settlers used roanoke as a currency during this period.

Beverly Straube (2019) recounts the attempts of the Virginia Company of London (1609) and Governor John Harvey (1636) to establish a coin currency in Virginia. She argues that these attempts failed due to crises within the colony and the cost of coin mintage (Straube 2019). Additionally, after its introduction in the 1610s, tobacco became the central commodity throughout the Chesapeake

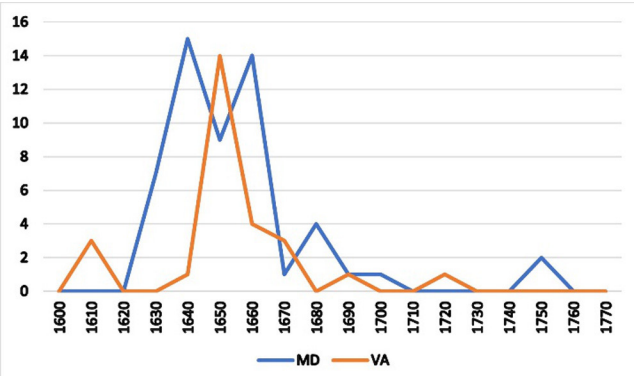

Figure 3. Phase 2 (ca. 1630-1665). The frequency of the use of the term *roanoke* by colony.

and acted as a form of currency. While tobacco could be exchanged, inhabitants of the region needed something that could be used for smaller transactions, especially as the economies of both Maryland and Virginia grew (Straube 2019). My textual analysis of bead references demonstrates that roanoke, and to a lesser extent peake, filled that need during this period. In 1656, the Virginia Council determined that "*wampumpeak* and roanoke would keep their value" while pieces of eight made of silver were valued at five shillings (Hening 1823:397). Seven years later in Maryland, the government decided roanoke should be used as the colonial currency for transactions worth less than 300 pounds of tobacco (AOMOL 1663). Like any currency, the value of roanoke changed over the century in both Maryland and Virginia. In 1639, the assessors of Justinian Snow's estate in Maryland valued roanoke at 6 pounds of tobacco per arm's length, whereas in 1643 Francis Posie sued Thomas Moss for 40 arm lengths of roanoke at a rate of 10 pounds of tobacco per arm (AOMOL 1639, 1649). Likewise in Virginia, John Hughlett sued Martine Cole for 63 arm lengths of roanoke or 315 pounds of tobacco (5 pounds per arm's length) (Sparacio and Sparacio 1994c:85). Then in 1672, the Virginia Council offered local Indians the equivalent of 20 arm lengths of roanoke, or 250 pounds of tobacco (12.5 pounds per arm's length), for their returning of runaway laborers (Hening 1823:299-300).

The linear regression models of the use of roanoke by decade and phase demonstrate that the settlers used roanoke as a form of currency with less frequency over time and their use of it concentrated within Phase 2. It is important to note that the majority of the exchanges of roanoke occurred between settlers, rather than between settlers and Indians. I make this distinction to highlight that these exchanges primarily operated within the settlers economic systems and worldviews, making them fundamentally different than the exchanges referenced in Phase 1. The decrease in the colonial use of roanoke over time could be explained by the fact that as the century progressed, Chesapeake settlers became more involved in intercolonial trade (Hatfield 2007). As roanoke was a regionally specific currency, its use was not conducive within this growing trade network. Consequently, there was increased use of British currencies, in concert with tobacco, moving forward, with the possible exception of the use of cowrie shells in 18th-century Virginia (Heath 2016).

It is also important to note that the sample for Phase 2 is heavily skewed toward British uses of roanoke, specifically in contexts of exchange. After two Anglo-Powhatan wars and the growing success of the tobacco economy, Powhatan influence and control within Virginia weakened, and the Piscataway also witnessed what happened to their Indigenous neighbors (Cissna 1986; Rountree 1990). It is likely that

Chesapeake Algonquians and British colonists interacted through what Richard White (1991) has described as purposeful misunderstandings in order to maintain peaceful relations. Through the use of ethnographic analogies, I argue it is possible to highlight how Indians and settlers used beads to establish these misunderstandings. For example, in 1661, the Virginia Council punished Moore Fauntleroy for kidnapping, two years earlier, the Rappahannock werowance who was on his way to Jamestown to present the governor with the group's annual tribute of roanoke (Hening 1823:152-153). Within a settler worldview, members of the Virginian government might have considered the annual tribute as a tax on a group that was subject to colonial laws. Within the Algonquian worldview, tributary groups might have compared the annual tribute to the ones previously offered to Wahunsenacawh, the leader of the Powhatan, and considered it as a yearly physical reaffirmation of their treaty with the English. It is likely that after multiple violent conflicts and the growing economic success of the British in the region, Chesapeake Algonquians attempted to maintain peaceful relations by resituating their cultural ideologies to fit within this new creolized Chesapeake.

Phase 3: "A present to make peace with the Sinniquos... in a belt of peake"[4] (ca. 1666-1710)

I identified 47 references to beads and 52 specific terms during this period with colonial authors employing the term roanoke (n = 18) at the highest frequency followed closely by peake (n = 16) (Figure 4). When individuals recorded the use of roanoke, they primarily based its use as a currency (n = 15). It is again important to note that when compared to Phase 2, colonial use of roanoke decreased dramatically. Additionally, the authors of these documents increased their use of bead terminologies in diplomatic contexts (n = 20). It is also worth mentioning that during this period, the first

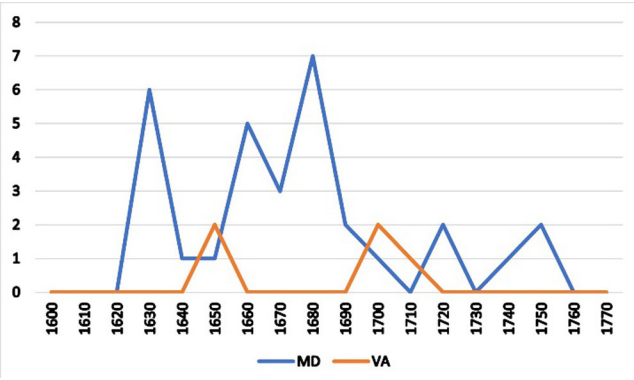

Figure 4. Phase 3 (ca. 1666-1710). The frequency of the use of the term *peake* by colony.

instances of colonial use of sewant (n = 4) and wampum (n = 7) were observed. When authors recorded these terms, they were primarily used in diplomatic contexts (sewant n = 3 and wampum n = 5) that included Indigenous peoples to the north (sewant n = 4 and wampum n = 5), e.g., the Haudenosaunee, Susquehannock, and Delaware. Finally, the majority of the references to beads during this period occurred in association with the Maryland colony (n = 41 of 52). My interpretation is that these data emphasize the different philosophies toward relations with local Indians by the Maryland and Virginia governments during this period, and the colonies' growing involvement in intercolonial politics.

There was great diplomatic fervor in Maryland during the 1660s-1680s. In the 19 instances of bead use in contexts of diplomacy, British settlers were associated with 14. This is in contrast to the happenings within the Virginia colony, in which I found no references to peake or wampum diplomacy involving settlers. It is notable that the Maryland colonists, specifically those in government, appeared to be learning from the previous conflicts that occurred within Virginia. Additionally, it is crucial to remember that the Calverts, the proprietary family of Maryland, were Catholics who had already faced a Protestant coup in 1645-1646 (Riordan 2004). Peace with the Piscataway and other neighboring Indians provided the sometimes-unpopular Catholic Calvert government allies against their adversaries and a buffer for the colony against raids from northern Indigenous groups (Cissna 1986). The Piscataway position as the colony's allied buffer became even more apparent in the late 1670s and early 1680s, when the Susquehannock raided them, rather than British settlements, as part of a mourning war in response to the 1675 siege of the Susquehannock fort (Cissna 1986; Kruer 2017). The relationship between the Calvert government and local Indians (strengthened by the diplomatic exchange of peake and roanoke) also meant that the Piscataway were subjected to anti-Catholic sentiments from the Protestant majority, especially after the removal of the Calverts in 1689 as a result of the Glorious Revolution in England (Cissna 1986). The tensions between the Piscataway and the encroaching settler majority meant that there was a continual need for the Indians to return to the colonial government for promises of peace and protection.

Piscataway unease and displeasure as a result of these growing tensions between themselves, settlers, and raiding northern Indigenous groups can be seen through their use of beads during this period. Colonial officials recorded multiple reports that Piscataway leaders had offered belts of peake to members of the Susquehannock and Haudenosaunee as a peace offering without the knowledge or permission of the Maryland government, which went against the 1666 Articles of Peace and Amity (Cissna 1986; Flick et al. 2012;

Webster and King 2019). An Indian informant also claimed that the Piscataway had sent a dull axe to be sharpened accompanied by belts of peake throughout the Northeast in an attempt to gather Indigenous allies in a conflict against the Maryland colonists (AOMOL 1666). Webster and King (2019) argue that the high frequency of red and black glass beads (representing anti-social emotions) archaeologists recovered from the Zekiah Fort site further support the colonial reports of Piscataway anger against the Maryland colony for failing to properly protect them according to the regulations set forth in the Articles of Peace. The tensions amongst the Piscataway and settler community continued to the point that the Piscataway leadership felt the need to leave the colony in 1695, returning once, and then completely removing themselves in 1712 (Cissna 1986; Curry 2014; Flick et al. 2012).

In comparison, the documents from Virginia show that individuals continued to use beads for a variety of purposes during Phase 3, but colonial officials did not record references of bead use in association with Indigenous-Anglo diplomacy. The sole exception occurred in 1699, when local Indians asked for permission to send the Haudenosaunee a belt of peake as an offer of peace to end their raids, which the Council rejected (Ragan 2006:283). More often, individuals in Virginia, specifically settlers, used beads as a form of payment, especially to Indians for goods and services. I contend that the trend in the lack of the use of peake diplomacy is related to the colony's previous conflicts with local Indigenous groups and the subjugation of these peoples after the Treaty of 1646. The treaty and its later ratifications gave the government the right to declare signing Indians groups enemies if they acted against the colony (Ragan 2006; Strickland et al. 2016). Indigenous-Anglo tensions also rose throughout the century as a result of colonial encroachment and northern Indian raids. These culminated in pan-Indian violence during Bacon's Rebellion. Local Indian groups were considered enemies, but the Virginia Assembly offered Indigenous individuals payment for their services (fighting, scouting, or guides) in roanoke or matchcoats (a broad woolen cloth) for joining the settler forces (Hening 1823:341-350). In contrast, the government offered British individuals tobacco as payment for their service. The 1677 Treaty of Middle Plantation also further limited the rights of Indians living within the colony under the guise of protecting Indian lands (Ragan 2006). These actions and the lack of references to diplomatic relations suggest that the Virginian government, unlike the Maryland government, felt secure in its position during this period.

The majority of the references to diplomacy involve Indigenous individuals from the Northeast (n = 19 of 20) and British individuals (n = 14). The introduction of northern Indigenous individuals demonstrates the incorporation of the Virginia and Maryland colonies in the Covenant Chain, a series of treaties that allied British colonies with various Indigenous groups along the Eastern Seaboard (Foner 2010). The incorporation of the Chesapeake into the Covenant Chain also highlights greater involvement of individuals from the region in intercolonial political and exchange networks and the movement towards a more unified British-American empire that continued throughout the remainder of the colonial period.

Phase 4: "Inclosed a Belt of Wampum in token of their Affection & Love"[5] (ca. 1710-1770)

For the period from ca. 1710-1770, I identified 56 references to beads and colonial authors using 61 specific terms, especially wampum (n = 45) (Figure 5). The references to beads were primarily employed in diplomatic contexts (n = 52). I identified British individuals as having engaged in diplomacy at the highest frequency (n = 42), followed by members of the Haudenosaunee (n = 25) and Southern Iroquoian-speaking peoples (n = 23), including the Cherokee. There is also a significant decrease in the use of roanoke and peake from Phase 3 into Phase 4. Based on this sample, I argue that the references to beads during this phase highlight the expansion of the Chesapeake colonies into the Piedmont region and the unification of British identities during the 18th century.

Beginning in the 1720s, settlers throughout the Chesapeake immigrated to the Piedmont with increasing frequency (Heath and Breen 2015). This extension outside the Tidewater led to settlers interacting with Indigenous communities other than the Chesapeake Algonquians with greater frequency. As a result, British Chesapeake settlers interacted with Indigenous groups and other colonists, both to the north and south, who used the term wampum to

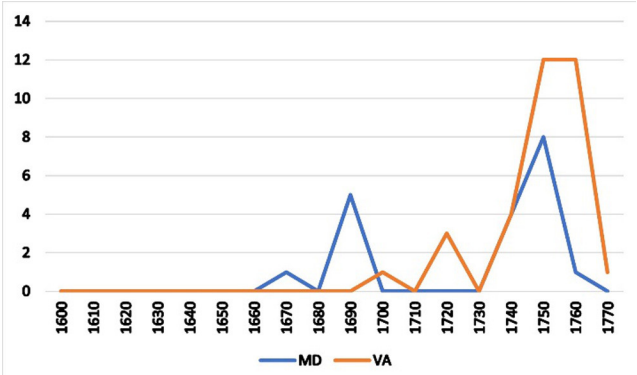

Figure 5. Phase 4 (ca. 1710-1770). The frequency of the use of the term *wampum* by colony.

describe shell beads. As the settlers expanded out from the Tidewater, it became clear that terms like roanoke and peake were regional vernacular.

The increase in frequency of wampum during the 18th century demonstrates the growing sense of a pan-British society within the empire. Anthropologists describe this period as "Georgianization," meaning colonial identities were recentered around their British connections (Deetz 1996; Heath and Breen 2017). The use of wampum (n = 33) is prevalent during the 1750s and 1760s, a notable era in colonial history as it encompasses the Seven Years War (1756-1763). During the war, members of the British Empire entered into a series of treaties across the colonies and with Indigenous allies against the French and their Indigenous allies. The colonial officials and their allies recorded these treaties through both documents and wampum belts. Additionally, within the treaties, members of the British colonies collectively referred to themselves as the "English" and "brother" as well as having a collective enemy in the French (AOMOL 1758:266-270). British settlers also demonstrated their unified identity both by entering treaties together and using similar terminologies within treaties. Rather than isolating themselves as members of the Chesapeake colonies, government officials from Maryland and Virginia began using wampum to align themselves more closely with the other British colonies. Foner (2010) describes the period directly after the Seven Years War as the time when colonial settlers were the most British.

While the British settlers and northern and southern Indigenous groups used wampum, Chesapeake Algonquians were less involved in these interactions. Despite the Virginia government passing their biracial legal code in 1705 and the Piscataway leadership leaving Maryland in 1712, many Indigenous families and communities remained in the area (Cissna 1986; Flick et al. 2012; Ragan 2006; Strickland et al. 2016; Tayac 1999). The continued use of roanoke and peake (which were distinct regional terms) by Chesapeake Indians throughout the 18th century underlines their resistance to and persistence through settler attempts of erasure (AOMOL 1721a-b, 1742, 1754b-c). While settlers throughout colonial North America united through their shared British identity, Indigenous groups living within the Chesapeake maintained their regionally based identity.

CONCLUSION

By critically analyzing the use of shell bead terminology in historical records, researchers can demonstrate the dynamic histories of colonial materiality and colonization throughout eastern North America. Therefore, I caution other archaeologists to think critically about the language they use to characterize tubular shell beads recovered at archaeological sites. While my sample size is small, I demonstrate how processes of colonization and ideas of identity during the colonial period affected the use of bead terminology over time. I was able to identify four phases of bead terminological use within the colonial Chesapeake based on term usage, context of use, and the individuals involved. The four phases I highlight are representative of the shifts in Indigenous-settler interactions that occurred throughout the colonial period. Thus, as researchers, we cannot solely rely on the morphology of the actual artifact to understand the context in which individuals used beads. We also need to comprehend the situational context of the word's use to appreciate the range of meanings associated with shell beads.

ACKNOWLEDGEMENTS

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ENDNOTES

1. I acknowledge that there are alternative spellings for each of the terms I analyze in this paper, and I took this into account when sourcing my data. For the purposes of this paper, though, I will use the spellings for each term identified above.

2. Lapham (2001).

3. AOMOL (1663).

4. AOMOL (1666).

5. AOMOL (1754).

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Rebecca J. Webster
Department of Anthropology
University of Tennessee
Knoxville, TN
rwebste8@vols.utk.edu.

NORTHWEST CAMBODIA AND THE MEKONG INTERACTION SPHERE: GLASS AND STONE BEADS FROM LOVEA, PREI KHMENG, AND SOPHY

Alison Carter, Dougald O'Reilly, Louise Shewan, and Laure Dussubieux

This paper reviews stone (agate and carnelian) and glass bead assemblages from three sites in northwest Cambodia: Lovea, Prei Khmeng, and Sophy. Beads from all three sites were largely found in burial contexts dating to the Iron Age or protohistoric period (500 BCE-500 CE). While stone and glass beads are frequently markers of contact with South Asia, they are also informative for understanding intra-regional exchange networks within Southeast Asia. An analysis of the glass beads identifies that most beads were made from a high-alumina mineral-soda glass. Compositional and morphological analysis of the stone beads suggests that they were likely produced from an Indian raw material source and using South Asian production techniques. Overall, the bead assemblages from all three sites show connections to other sites in Cambodia and Thailand and especially seem to be part of the broader Mekong Interaction Sphere exchange network.

INTRODUCTION

The Iron Age or protohistoric period of mainland Southeast Asia (ca. 500 BCE-500 CE) is notable for evidence of the earliest contact with South Asia, a process which kickstarted a variety of socio-political and ideological changes (Bellina and Glover 2004; Manguin, Mani, and Wade 2011; Murphy and Stark 2016). Early material evidence for this contact was frequently found in burial contexts and especially included glass and stone beads (Bellina 2003; Bellina and Glover 2004; Francis 1996; Glover 1989). On the one hand, studies of these beads are informative for identifying external connections, especially between South and Southeast Asia (Basa, Glover, and Henderson 1991; Carter and Dussubieux 2016; Dussubieux and Pryce 2016; Francis 1996; Glover and Bellina 2003; Lamb 1965). Scholars have, however, also demonstrated that beads can reflect local socio-political developments and connections within Southeast Asia (e.g., Bellina 2014, 2018; Carter 2015; Theunissen, Grave, and Bailey 2000).

In Cambodia, there were several robust and culturally distinct groups living in various parts of the country who were trading and consuming beads. Previous work has identified distinct differences between beads found at sites in the Mekong Delta, including the major center of Angkor Borei associated with the Funan polity, and the site of Prohear in southeastern Cambodia (Carter 2010, 2012, 2015; Carter et al. 2021). Bead assemblages at sites in northwestern Cambodia were, however, similar to those found in the Mekong Delta, prompting scholars to propose the presence of a "Mekong Interaction Sphere" that connected sites within the delta to communities further inland (Carter et al. 2021). This has been represented materially not just through the presence of stone and glass beads (Carter 2015; Carter et al. 2021), but also earthenware ceramics (Stark and Fehrenbach 2019) and inscriptions (Lustig, Evans, and Richards 2007).

In this paper, we present the results of a study of stone and glass beads from three sites in northwestern Cambodia that we argue were part of the Mekong Interaction Sphere: Lovea, Prei Khmeng, and Sophy (Figure 1). Following

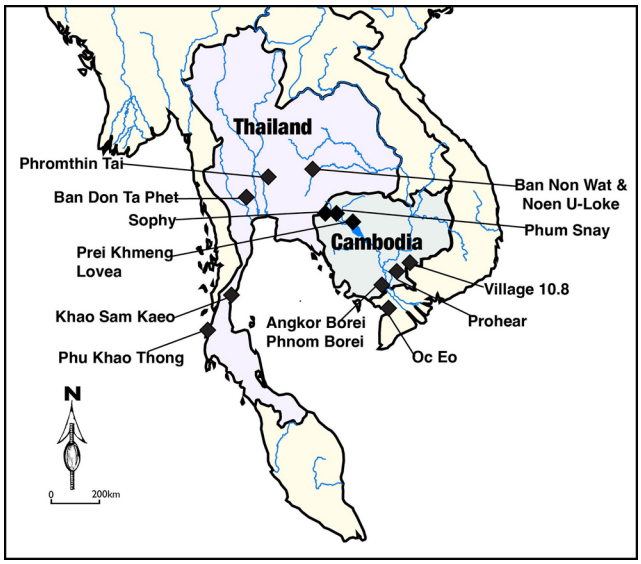

Figure 1. The location of Lovea, Prei Khmeng, Sophy, and other contemporary sites discussed in text (all images by A. Carter).

an introduction to the three sites in this study, we discuss the glass and stone beads from each site, contextualizing them with bead assemblages from contemporary sites in Cambodia and Thailand. We first consider the glass beads, focusing on their colors and compositions, noting that the bead assemblages at these three sites are similar to one another and some other sites in mainland Southeast Asia (MSEA). We then discuss the stone beads including their morphology, perforation technology, and geochemical composition that suggest connections with South Asia, but the overall patterning in stone bead assemblages presents linkages to different communities across Southeast Asia. We conclude with a consideration of the mortuary contexts in which beads were found and how the patterns from the assemblage data point towards a relationship between communities in northwest Cambodia and sites in the Mekong Delta.

SITE BACKGROUND

The three sites in this study were excavated as part of projects codirected by Dougald O'Reilly and Louise Shewan. Lovea and Prei Khmeng were excavated as part of the Paddy to Pura project, which aimed to investigate the origins and rise of the state in Southeast Asia through the excavation of sites in Cambodia and Thailand. Sophy was studied as part of the History in Their Bones Project, which focused on a bio-archaeological study of diet, mobility, and social organization in Cambodia. Appendix A contains information on the beads and their contexts from all three sites. Appendix B presents the results from compositional analysis with major elements reported in weight percent (wt%) and minor and trace elements in parts per million (ppm).

Lovea

Lovea is a circular earthwork site in Siem Reap province in northwest Cambodia (Figure 1). The site was initially investigated by Louis Malleret (1959) and later observed to be similar to moated sites found across northeastern Thailand (Moore 1988). The site was selected for excavations by the Paddy to Pura team as the presence of moats has been argued to indicate the emergence of hierarchical social structures (Higham 2011; O'Reilly 2014; O'Reilly and Shewan 2016). Twelve burials were excavated over the course of two field seasons, encompassing a time period from ca. 130-350 CE (O'Reilly and Shewan 2016). A total of 805 glass beads and 25 stone beads were recovered largely from burial contexts, of which 22 glass beads and 7 agate/carnelian beads were selected for LA-ICP-MS analysis (Table 1).

Prei Khmeng

Prei Khmeng is located in the Angkor plain, near the West Baray and just outside of the Tonle Sap Lake flood zone (Figure 1). The site is home to a small pre-Angkorian brick tower and lintel, one of the oldest in the Angkor area. Three excavations conducted from 2000-2003 by the Mission archéologique Franco-Khmère sur l'Aménagement du Territoire Angkorien (henceforth MAFKATA) project led by Dr. Christophe Pottier uncovered several prehistoric burials and an occupation area that dates from the 1st-6th centuries CE (Pottier et al. 2001a, 2001b, 2003; Zoppi et al. 2004). Glass beads from these earlier excavations were analyzed in previous studies and discussed below (Carter 2010, 2015; Latinis 2004). An additional excavation was conducted under the Paddy to Pura project in 2014, which uncovered an additional 11 burials or mortuary contexts dating from 200-400 CE (O'Reilly et al. 2020). A total of 534 glass beads and 15 agate and carnelian beads were recovered, largely from burial contexts. Of these, 19 glass beads and 3 stone beads were selected for LA-ICP-MS analysis (Table 1).

Sophy

Sophy (sometimes referred to in the literature as Phum Sophy) is a burial site located in Banteay Meanchey

Table 1. Quantities of the Analyzed Beads.

Site	Glass Beads	Stone Beads	Glass Beads Analyzed Using LA-ICP-MS	Stone Beads Analyzed Using LA-ICP-MS
Lovea	805	25	22	7
Prei Khmeng	534	15	19	3
Sophy	1842	327	17	11
Total	3181	367	58	21

province in northwestern Cambodia (Figure 1). The site has experienced significant looting and two field seasons of excavations in 2009-2010 were undertaken as part of the History in Their Bones Project. Fourteen mortuary contexts containing 20 individuals were identified dating to 87-526 CE (O'Reilly et al. 2015). A total of 327 agate and carnelian beads and approximately 1900 glass beads were recovered, of which 17 glass and 11 stone beads were selected for LA-ICP-MS analysis (Table 1).

METHODS

The glass and stone beads were examined to note shape/typology, manufacturing method, and compositions (Carter 2013). Both glass and stone beads underwent compositional analysis using laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS) at the Elemental Analysis Facility (EAF) at the Field Museum, Chicago.

LA-ICP-MS combines laser ablation for the micro-sampling of the objects using a laser beam with a diameter of 100 µm or less with mass spectrometry for the measurements of a wide range of elements (50 or more) with concentrations ranging from several percent to less than a ppm (1 ppm = 0.0001%) (for more details *see* Dussubieux, Robertshaw, and Glascock [2009] and Carter and Dussubieux [2016]). This technique is now widely used to determine the compositions of ancient glass (e.g., Gratuze 2016). With the measurements of the major (present in the range of 1% and more) and minor (less than 1% but more than 0.1%) elements, it is possible to reconstruct ancient glass recipes that are often specific to a region and to a particular time period. Trace elements that are present in very small quantities (<0.1%) are indicative of the geological environment of the ingredients and can be indicative of the provenance of the glass (e.g., Schibille 2011). For stone, LA-ICP-MS is used to match the trace element signature measured in each artifact with the trace element signature specific to a given raw material source to determine where the stone comes from (Carter and Dussubieux 2016). Overall, elemental analysis of glass and stone beads provides an opportunity to examine similarities and differences in more detail for beads obtained from different sites.

GLASS BEADS

The majority of the glass beads from the three sites are of a type known as Indo-Pacific (Figure 2a). They are small, monochrome, oblate, and widespread in the ancient world (Francis 1990b, 2002; Kanungo 2016). Indo-Pacific beads were produced using a technique in which glass was melted in a furnace and then pulled or drawn into long tubes using an iron hook. The tubes were then sliced into small segments and reheated to round the edges (Francis 1990b; Kanungo 2016). A small number of non-Indo-Pacific glass objects were also identified and are considered in more detail below.

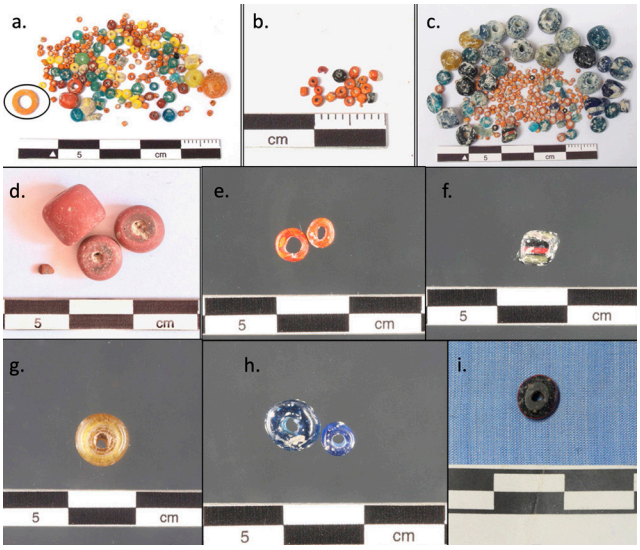

Figure 2. Glass beads from Lovea, Prei Khmeng, and Sophy: (a) typical Indo-Pacific glass beads from Sophy; the wrapped-glass bead is circled; (b) microbeads from Sophy; (c) beads from Burial 14 at Sophy, including the large blue beads; (d) large red beads with black interiors from Lovea; (e) mixed red-orange glass beads from Sophy; (f) polychrome striped bead from Sophy; (g) false gold-glass bead from Lovea; (h) dark blue m-Na-Ca-Al glass beads from Sophy; (i) black bicone with red trim from Prei Khmeng.

Opaque orange Indo-Pacific beads dominate the assemblages at all three sites (Figure 3), with opaque red and opaque black beads also present in significant quantities. In this respect, the three sites are similar to Phum Snay in northwestern Cambodia and Ban Non Wat and Noen U-Loke in northeastern Thailand, which also have large quantities of opaque orange glass beads. At Sophy and Prei Khmeng, there are also beads with a mix of opaque red and orange glasses (discussed below). Most beads are 2-5 mm in diameter, but there are also some interesting distinctions between sites. Notably, at Sophy, 78% of the total bead collection consists of opaque orange beads that are less than 2 mm in diameter (Figure 2b). Such tiny "microbeads" make up about half of the collection at Lovea (n = ca. 393) of which the majority (95%) are opaque orange. At Prei Khmeng, a previous study from the MAFKATA collections identified a large quantity of small opaque orange (n = 1078) and opaque black beads (n = 564) measuring approximately 1-3 mm in diameter within a single burial (Carter 2013). Only 52 beads in the current study from Prei Khmeng are less than 2 mm in diameter.

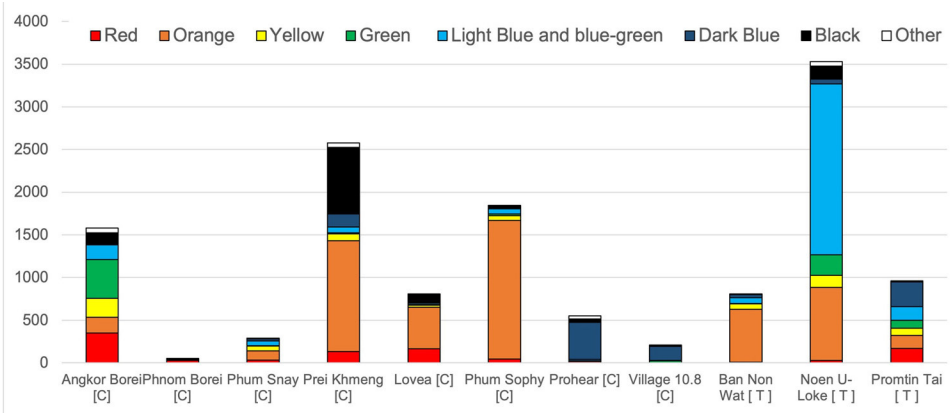

Figure 3. The distribution of glass bead colors by site including comparative sites in Cambodia [C] and Thailand [T].

A small number of translucent blue beads over 5 mm in diameter were also found in a single burial (no. 14) at Sophy (Figure 2c). At Prei Khmeng, most beads over 5 mm in size (n = 54) are opaque red or orange. At Lovea, there are several large (6-8 mm diameter) opaque red beads with a black ring around the hole (Figure 2d). It is not clear why these beads have this feature; James Lankton (2013: pers. comm.) has proposed it is related to the manufacturing technique in which a black core was encased in red glass, perhaps as a cost-saving measure. In these beads, and similar beads analyzed by Dussubieux (2001:157-158), the red and black glasses have differing concentrations of copper and other elements, suggesting the use of two different glasses.

Glass Compositions

Multiple glass recipes have been used to produce Indo-Pacific and other beads. While one is often not able to identify the glass recipe visually, compositional analysis of the glass using techniques like LA-ICP-MS can help determine them. They, in turn, can provide clues regarding when and where the beads were produced. A subset of glass artifacts from the assemblages at Lovea, Prei Khmeng, and Sophy was analyzed and several glass compositions were identified across the three sites, with two glass compositions dominating the assemblages: high-alumina mineral soda 1 (m-Na-Al 1) and a mineral-soda glass with variable amounts of alumina and lime (m-Na-Ca-Al). Two objects from non-burial contexts at Prei Khmeng have different compositions (potash and lead-potash). Also included in this discussion is a plant-ash soda-lime glass identified in a previous study at Prei Khmeng (Carter 2010).

High-Alumina Mineral-Soda Glass (m-Na-Al 1)

The majority of the glass beads analyzed from the three sites have compositions with alumina concentrations higher than 5wt%, high soda (ca. >10wt%), and low magnesia (<1.5wt%), classifying them as high-alumina mineral-soda glass (m-Na-Al) (Appendix B). Nearly all are monochrome, drawn, Indo-Pacific beads, although a small number are more unusual, including two specimens that are opaque red with black interiors, several mixed red-orange, a drawn polychrome bead (black with red and yellow or white stripes), and a false gold-glass bead (*see* below).

Previous work by Dussubieux, Gratuze, and Blet-Lemarquand (2010) has identified different subgroups of high-alumina mineral-soda glass, associated with different time periods and exchange networks. These can be distinguished by principal components analysis (PCA) using the elements Mg, Ca, Ba, U, Sr, Zr, and Cs (Dussubieux, Gratuze, and Blet-Lemarquand 2010). A comparison of the high-alumina mineral-soda beads from the three sites with different subgroups of m-Na-Al glass (Figure 4) demonstrates they are compositionally analogous with high-alumina mineral-soda glass type or group 1 (m-Na-Al 1). This subgroup of m-Na-Al glass is particularly abundant in South India where it was likely produced (Dussubieux 2001) and circulated in South and Southeast Asia from the 4th century BCE through the 1st millennium CE (Dussubieux, Gratuze, and Blet-Lemarquand 2010). Indeed, this particular type of high-alumina mineral-soda glass is the dominant glass type found in mainland Southeast Asia during the 1st millennium CE (Carter 2016; Lankton and Dussubieux 2006).

The beads in the m-Na-Al 1 group come in a variety of colors. Opaque black beads appear to have been colored using iron (ca. 1-2wt%), while the blue beads have significant levels of copper (0.7-1.2wt%). It is important to note that cobalt was not used to color blue beads in the m-Na-Al 1 group (Dussubieux, Gratuze, and Blet-Lemarquand 2010). The opaque orange and red beads have elevated concentrations of copper as a colorant (ca. 1-11.5wt%). Three beads with a mixed orange-red color (Figure 2e)

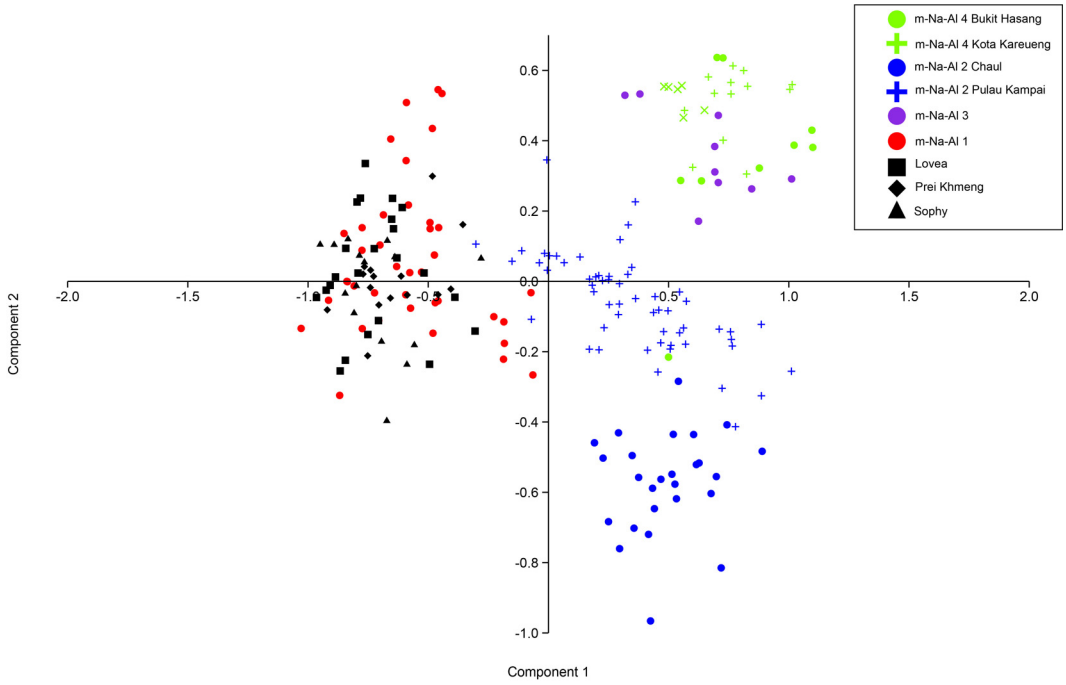

Figure 4. Biplot of components 1 and 2 from a PCA using Ca, Mg, Ba, Sr, Zr, U, and Cs to distinguish between different types of high-alumina mineral-soda glass.

from Sophy (AKC03850big, AKC03850sm, AKC03831) are also classified as belonging to the m-Na-Al 1 group, but have elevated levels of magnesia, lime, potash, phosphorus, and iron in comparison to other m-Na-Al 1 beads. This is common for this particular bead type and likely relates to the coloring process (Dussubieux and Gratuze 2013:403). Most of the opaque green and yellow beads have elevated concentrations of lead and significant concentrations of tin. Lead stannate is a known yellow opacifier in ancient glass. The green beads also have elevated concentrations of copper.

Several other unusual beads also have an m-Na-Al 1 composition, including the large opaque red beads with a black ring around the perforation from Lovea (AKC03906red2, AKC03921r). Additionally, a polychrome striped bead from Sophy belongs to this type (AKC03083black, AKC03803yellow, AKC03803red) (Figure 2f). The bead appears to have red and yellow stripes, but perhaps the stripes were white and have yellowed with age. A similar bead with red and white stripes has been identified at the Phromthin Tai site (Carter 2013; Carter et al. 2022; Lertcharnrit and Carter 2010) and at Khlong Thom (Francis 1990a). Francis (1990a:70-71) describes these beads as "children" of the more common monochrome Indo-Pacific beads, noting possible manufacturing centers at Mantai, Sri Lanka, and Takua Pa, Thailand.

A false gold-glass bead (Figure 2g) from Lovea (AKC03892) has an m-Na-Al 1 composition as well. The bead is made from a drawn tube, similar to the Indo-Pacific beads, but is likely part of a larger segmented bead that broke, as indicated by the rough edges around the hole. Although it appears gold in color, no significant amounts of gold were recorded. Francis (1990a, 2002) has argued that false gold-glass beads were produced at the site of Takua Pa, Thailand. Instead of sandwiching a piece of gold foil between two layers of clear glass, a false gold-glass bead is produced by layering a milky-white glass with amber-colored glass. It is also possible that an embedded gold foil layer was missed by the laser during LA-ICP-MS.

Mineral-Soda Glass with Variable Amounts of Alumina and Lime (m-Na-Ca-Al)

A small number of beads were classified as belonging to a mineral-soda glass group with variable amounts of alumina and lime (m-Na-Ca-Al). Compositionally, this glass type looks quite similar to the m-Na-Al 1 glasses but can be distinguished through a PCA using the elements Na, Al, Zr, Rb, La, Hf, and Th (Dussubieux and Gratuze 2010). Figure 5 displays a biplot of a PCA using these elements which shows the differentiation between the m-Na-Ca-Al and m-Na Al 1 beads at all three sites.

Four of the six beads in this group are a translucent dark blue and. colored with cobalt (Figure 2h). Scholars

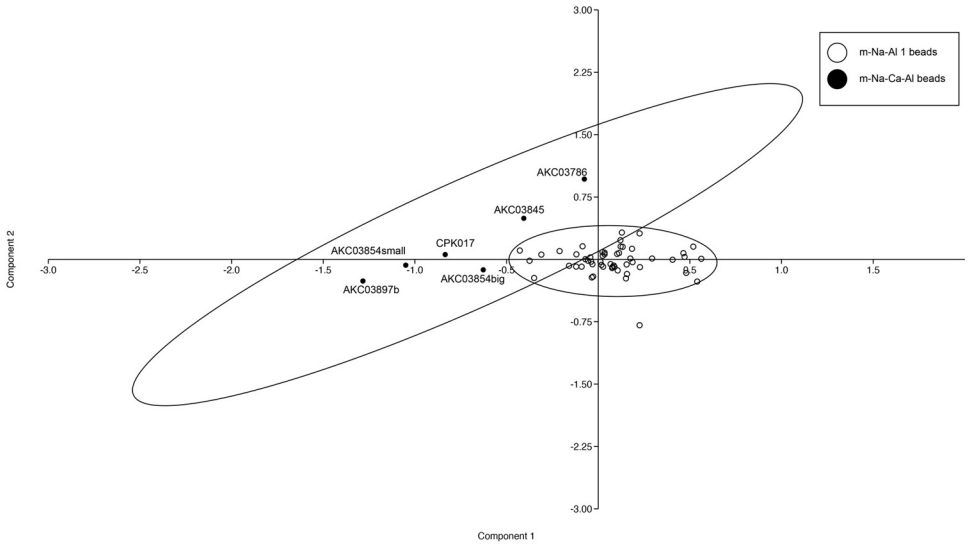

Figure 5. PCA displaying the m-Na-Ca-Al (black circles) and m-Na-Al 1 (white circles) beads from Lovea, Prei Khmeng, and Sophy. The 95% concentration ellipses estimate a region where 95% of the population points are expected to fall.

have proposed that beads with this composition may have been produced at Khlong Thom/Khuan Lukpat, Thailand (Lankton and Dussubieux 2013), Phu Khao Thong, Thailand, or Arikamedu, southern India (Dussubieux et al. 2012). Similar dark blue cobalt m-Na-Ca-Al glasses have also been found at Angkor Borei and Prohear in Cambodia (Carter 2010, 2013; Carter et al. 2021), Ban Non Wat in Thailand (Carter and Lankton 2012), Phromthin Tai, Thailand (Carter et al. 2022), and the sites of Aw Gyi and Maliwan in southern Myanmar (Dussubieux et al. 2020). Such glass has also been reported at sites in Indonesia, Thanh Hoa, Vietnam, Karaikadu, India, and Ridiyagama, Sri Lanka (Dussubieux 2001). One drawn yellow bead from Sophy also falls into this compositional group and is likely colored with lead stannate (Dussubieux, Gratuze, and Blet-Lemarquand 2010:252).

An unusual disc-shaped opaque orange bead with a large hole (AKC03845) from Sophy is the last bead to be classified in this compositional group (Figure 2a). Instead of being drawn, this bead appears to have been wrapped, similar to beads identified in northeastern Thailand at Ban Non Wat and Noen U-Loke (Carter and Lankton 2012). These beads may have been produced by wrapping a flat glass strip around a metal rod, forming a long tube from which discs could be sliced (Saitowitz and Reid 2001). Previous studies (Carter and Lankton 2012; Saitowitz and Reid 2001) have shown that these wrapped opaque orange beads have a mixed alkali composition, with elevated levels of both soda and potash. This bead, however, appears to belong to the m-Na-Ca-Al group (Figure 1). Opaque orange m-Na-Ca-Al beads have not been reported at other sites so it is unclear how these beads fit within the production and circulation of other m-Na-Ca-Al and/or wrapped glasses. This bead does have a notable quantity of cobalt (323 ppm), which may be related to the copper source used to color the glass. Dussubieux (2001:176) has observed that copper ore from the Khetri copper mine in India contains significant amounts of nickel and cobalt. This particular kind of glass has been found in high quantities at the port sites of Arikamedu, India, Phu Khao Thong, Thailand, and Aw Gyi, Myanmar on the Bay of Bengal, suggesting that these beads were brought by sea to these sites (Dussubieux et al. 2020). It is unclear how these beads may have then been circulated within Southeast Asia.

Other Glass Types

Two glass objects were identified that do not fall in the major glass compositional groups discussed above. Both were found at Prei Khmeng in non-burial and likely disturbed contexts. The first object is a dark blue glass bangle fragment containing high levels of potash (11.3wt%) and slightly higher alumina (2.7wt%) than lime (1.3wt%). The second object is a melon-shaped bead with elevated concentrations of lead (50wt%) and potash (5wt%). The addition of potash to lead-glass recipes appears to have begun around the 6th century CE in China and was initially used to produce glass vessels (Fuxi 2009:28). This glass recipe was used into the Ming Dynasty (1368-1644) (Brill, Tong, and Dohrenwend 1991; Gratuze 2001:10). This bead was found in a mixed context in the upper layers of the site from a unit that included materials dating to the late 20th century,

as well as Angkorian ceramics and Pre-Angkorian or early Angkorian bricks. Melon-shaped beads are common across the ancient world (e.g., Eisen 1930), but opaque light blue melon glass beads have been popular within contemporary upland communities, with some beads perhaps dating as far back as the 15th century CE (Campbell Cole 2012).

A previous study of beads from Prei Khmeng identified two beads with elevated concentrations of magnesia (2-4.7%), soda (14-18wt%), and lime (6-9wt%) (Carter 2010, 2013), also called plant-ash soda-lime glass (v-Na-Ca). One is a broken drawn blue glass bead; the other is an unusual black bicone with red trim (Figure 2i). This glass composition is strongly associated with Middle Eastern glass production and long-distance exchange between this region and South and Southeast Asia (Carter et al. 2021). Other sites in mainland Southeast Asia where this glass type has been found include Angkor Borei, Cambodia, Oc Eo, Vietnam, and Phum Snay (Carter 2010; Gratuze 2005; Ly 2007; Song 2008).

Contextualizing the Bead Collections at Lovea, Sophy, and Prei Khmeng

The high quantities of m-Na-Al 1 beads found at the three sites is not unexpected for sites dating to the early 1st millennium CE, as this glass type was in wide distribution during this period (Carter 2016; Dussubieux, Gratuze, and Blet-Lemarquand 2010). Figure 6 presents an estimate of the proportions of the different glass compositions found at Lovea, Prei Khmeng, and Sophy, as well as other contemporary sites in Cambodia and Thailand. The proportions of different glass types at all sites were estimated based on bead contexts, visual similarities between bead types, and compositional data. Lovea, Prei Khmeng, and Sophy show similarities with Angkor Borei, Phum Snay, and Phnom Borei in Cambodia and Ban Non Wat and Phromthin Tai in Thailand in that their glass bead assemblages consist primarily of m-Na-Al 1 glass.

STONE BEADS

Agate and carnelian are the primary stone bead types found at all three sites. The term agate is generally used to describe banded translucent stone that usually includes shades of white, grey, and brown. These colors are sometimes enhanced by beadmakers using a dying process, resulting in darker browns and blacks that archaeologists have called onyx (Francis 2002; Kenoyer 2003). Carnelian refers to translucent stone that ranges in color from yellow, orange, to deep red, which are naturally occurring or enhanced by heating the stone (Kenoyer 2003). In this section, we first discuss the results from a morphological study, including examination of the perforation type. We then discuss the results from compositional analyses of stone beads to determine the origin of the raw materials.

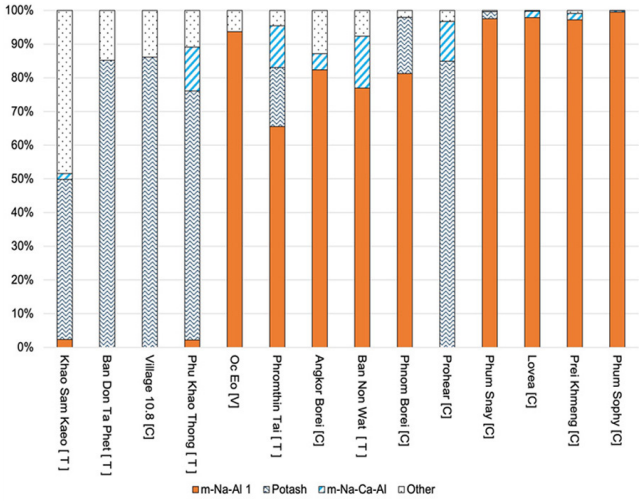

Figure 6. Estimated proportions of glass types by site in Southeast Asia: Khao Sam Kaeo (ca. 400-100 BCE); Ban Don Ta Phet (ca. 400-200 BCE); Village 10.8 (ca. 400 BCE-100 CE); Phu Khao Thong (200 BCE-200 CE); Oc Eo (1-600 CE); Phromthin Tai (ca. 400 BCE-500 CE); Angkor Borei (200 BCE-200 CE); Ban Non Wat Iron Age Period 2 (ca. 200 BCE-200 CE); Phnom Borei (200 BCE-1 CE); Prohear (200 BCE-200 CE); Phum Snay (350 BCE-200 CE); Lovea (130-350 CE); Prei Khmeng (200-400 CE); Sophy (87-526 CE). Based on Carter (2013, 2015) and Lankton and Dussubieux (2013). [C] Cambodia, [T] Thailand, [V] Vietnam.

Bead Morphology

Previous studies of Southeast Asian stone beads have identified differences in their manufacturing methods that appear to vary over time (Bellina 2007, 2014; Carter 2015). Studies of stone beads in Cambodia and Thailand (Carter 2015), drawing on work by Bellina (2003, 2007, 2014), have identified two broad types of stone beads. Type 1 beads are generally made with higher-quality manufacturing techniques, frequently found in more complex shapes, such as faceted types, and with small perforation sizes (<1.5 mm). These beads are generally found at early Iron Age sites. Type 2 beads are found in simpler shapes and with evidence of lower manufacturing quality and larger perforation sizes (>1.5 mm). These beads are more frequently found at later Iron Age sites. Appendix A lists the beads from each site, their shape, color, context, and measurements. Table 2 summarizes the bead shapes found at each of the three sites. It should be noted that the shape typology used in this study is a general one and that scholars working elsewhere in Asia have used more specific typologies (e.g., Kenoyer 2017a;

Table 2. Quantities of Stone Bead Shapes at Lovea, Prei Khmeng, and Sophy.

Shape	Raw Material	Lovea	Prei Khmeng	Sophy	Total
Long cylinder	Agate	0	7	7	**14**
Spherical	Carnelian	6	0	289	**295**
Spherical	Agate	0	1 (broken)	0	**1**
Rough spherical	Carnelian	3	0	19	**22**
Long barrel	Agate	7	3	2	**12**
Long barrel	Carnelian	1	1	0	**2**
Short barrel	Carnelian	2	1	2	**5**
Short barrel	Agate	1	0	0	**1**
Long elliptical barrel	Carnelian	1	0	0	**1**
Long bicone/barrel	Carnelian	1	1? (broken)	0	**2**
Long bicone	Agate	0	1	0	**1**
Oblate disc	Carnelian	1	0	0	**1**
Short bicone	Carnelian	1	1?*	0	**2**
Long square bicone	Carnelian	1	0	6	**7**
Hexagonal faceted bicone	Carnelian	0	0	2	**2**
Long rectangular pendant	Agate	0	0	1	**1**
Total		**25**	**16**	**328**	**369**

*A possible short bicone that could not be examined due to being in a museum exhibit.

Kenoyer et al. 2022). Some researchers in Southeast Asia have also used slightly different terminologies (e.g., Bellina 2007; Georjon et al. 2021).

Simple shapes make up the majority of the assemblages at the three sites. Spherical, barrel, and bicone beads are fairly common and have been reported at numerous sites across mainland Southeast Asia (Bellina 2007; Carter 2013; Theunissen 2003). Long agate barrel beads (Figure 7a) have been found at all three sites but seem to have a more restricted distribution within mainland Southeast Asia, primarily being recorded at sites in northwest Cambodia and at sites like Ban Non Wat in northeastern Thailand (Carter 2013). Carnelian beads are generally more common than agate beads, with only 30 agate beads having been recorded, although agate beads are more numerous than carnelian at Prei Khmeng (n = 12).

Several unusual bead shapes were recorded at each site and worthy of discussion. Perhaps the most striking stone bead found at Lovea is a large carnelian in the shape of a short bicone (AKC03917/Cat 86) (Figure 7b). The bead is ca. 34 mm wide and 17 mm long. A smaller carnelian oblate disc (72/AKC03922) (Figure 7c) found with the same burial has a somewhat analogous shape. A similar but smaller bead may have been found at Prei Khmeng, but it has not been closely examined due to its being in a museum exhibit.

A striking, long, flat, agate pendant was found in a burial at Sophy (Figure 7d). A similar piece measuring almost 8 cm is reported from Oc Eo (Malleret 1962:214, Plate LV). These long rectangular pendants may be similar to smaller brown and white or black and white banded pieces found in central Thailand (Rammanat 2009) and Ban Non Wat in northeastern Thailand (Theunissen 2003).

Eight faceted carnelian beads are in the Sophy collection (Figure 7e), two of which have six facets (hexagonal) and six have four facets (square bicone). One of the hexagonal faceted bicones (AKC03768/Cat 168) (Figure 7e) at Sophy, as well as an additional bicone bead from Lovea (cat. no. 260, Burial 8), are roughly shaped with many nicks and scratches on the surface, similar to a group of hexagonal bicone beads found in Burial 9 at Phum Snay. A broken large spherical

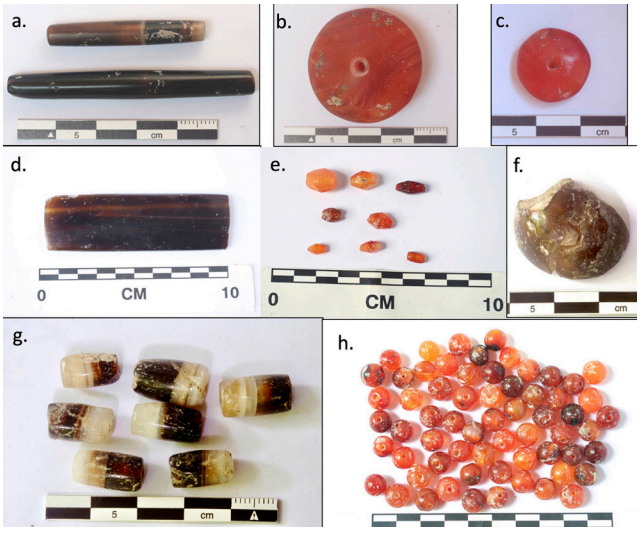

Figure 7. Agate and carnelian bead shapes: (a) long agate barrel beads from Lovea; (b) large carnelian short bicone from Lovea; (c) small carnelian bicone from Lovea; (d) long, flat, rectangular agate pendant from Sophy; (e) hexagonal faceted beads from Sophy; the rough hexagonal bead is in the upper left; (f) broken large spherical bead from Prei Khmeng; (g) agate cylinders from Prei Khmeng; (h) spherical carnelian beads from Sophy.

agate bead found at Prei Khmeng (Figure 7f) appears similar to spherical agate beads excavated in Bali (Calo et al. 2015). One burial (no. 3) at Prei Khmeng contained seven agate cylinders, with one half of the bead white or transparent in color and the other half dark brown or black (Figure 7g). These may be related to the fairly common banded-agate barrel beads found at multiple sites in mainland Southeast Asia, which have dark black or brown ends and white opaque centers (Carter 2013:200-201; Theunissen 2003:122). Many of the agate beads appear to have been dyed to enhance their dark brown to black color, including those in Figure 7g.

Bead Manufacturing and Perforation Technology

In addition to primarily being made with simple shapes, the beads at all three sites largely show manufacturing methods and quality associated with the Type 2 category. Many of the Lovea beads have smooth surfaces exhibiting a medium or low luster polish, but have imperfections such as nicks and chips. The presence of rough spherical beads at Lovea and Sophy is also indicative of expedient and less-careful bead production. Rough spherical beads were usually intended to be spherical, but one end becomes damaged during the drilling process (i.e., the force of the drill causes a "pop-out"), creating a concave and uneven shape.

Only one bead in burial 4 at Lovea, a large bicone (AKC03917/Cat 86), is well-made with a smooth and highly polished surface. At Prei Khmeng, several of the agate beads do have a medium-high polish, indicative of a more careful finishing technique. Most of the carnelian beads were, however, roughly made with some damage around the perforation. An exception is a large short bicone, with a smooth medium-low luster. This broken agate bead has numerous flake scars on the surface and may not have been carefully finished. Determining the quality of the stone and polish on beads from Sophy was difficult due to the concretions on their surfaces. Several beads are roughly made, such as the spherical and faceted bicones discussed above, but many spherical beads and faceted bicones are largely symmetrical with a smooth, polished surface (Figure 7h).

The size of the bead hole or perforation can also be used in conjunction with morphological observations to assist in assigning a bead to Type 1 (smaller perforation sizes) or Type 2 (generally larger perforations). Table 3 summarizes the mean perforation sizes from each of the three sites. The large perforations at all three sites classify the beads as Type 2 and are similar to average bead perforation sizes at Phum Snay (1.72 mm), Angkor Borei (1.63 mm), and Ban Non Wat (1.66 mm) (Carter 2015).

Previous studies of bead perforations from sites in Cambodia and Thailand have revealed that agate and carnelian beads were drilled using a diamond or double-diamond drill (Carter 2013; Carter et al. 2022; Gorelick, Gwinnett, and Glover 1996). In India, a diamond-tipped drill has been used to perforate beads since at least 600 BC (Kenoyer 2003). Modern Indian bead drillers use a special drill with two diamond chips mounted on the drill tip (Kenoyer and Vidale 1992). These drills produce a straight cylindrical perforation with distinctive spiraling striations on the hole's walls. The double-diamond technique appears to be limited to South Asian beadmakers, specifically peninsular India, and is still widely practiced in Khambhat, Gujarat (Kenoyer, Vidale, and Bhan 1991). Single-diamond drills were also used, but this drill type is more commonly found in the northern and western parts of Asia (Kenoyer 1992, 2003).

Silicone impressions were made of the perforations of several beads from Sophy: the long agate pendant (AKC03701), the long agate barrel (AKC03702), and three spherical carnelian beads (AKC03714, AKC03746, AKC03756). These were examined under a Scanning Electron Microscope (SEM) by Mark Kenoyer at the University of Wisconsin-Madison (Gorelick and Gwinnett 1978; Kenoyer 2017b; Kenoyer and Vidale 1992). Figures 8 and 9 display the beads and their SEM images. All impressions display a pattern of regular, spiraling striae or grooves, representative of the double-diamond drilling technique (Gorelick and Gwinnett 1988). Notably, the SEM

Table 3. Mean Perforation Diameters of the Agate and Carnelian Beads.*

Site	Mean Perforation Size (mm)	Standard Deviation (mm)	Total Perforations/ Beads Measured
Lovea	1.96	0.46	47/24
Prei Khmeng	2.01	0.33	26/13
Sophy	1.84	0.41	156/78
*Perforation measurements taken from both sides of the bead when possible. Due to the large number of spherical beads at Sophy, a subsample of perforations was measured.			

image of AKC03714 exhibits evidence of heavy string wear in the perforation that has obscured the drilling striae (Figure 9 top).

Compositional Analysis of the Stone Beads

One persistent question regarding the agate and carnelian beads found in Southeast Asia is: were they produced locally or imported as finished products (Bellina 2003; Carter and Dussubieux 2016; Francis 1996; Glover 1989; Theunissen et al. 2000)? One method to address this question is to undertake geochemical analysis of the beads and determine the source of the raw material (Law et al. 2013; Theunissen, Grave, and Bailey 2000). A previous compositional study of agate and carnelian beads from sites in Cambodia and Thailand compared these artifacts to four potential raw-material sources (Carter and Dussubieux 2016): two sources in the Deccan Traps in western India (Mardak Bet and Ratanpur), one source in Iran (Shahr-i-Sokta), and another in central Thailand (Ban Khao Mogul). Artifacts in this earlier study were compositionally analogous to the raw material from the Deccan Traps in western India (Carter and Dussubieux 2016).

Twenty-one beads from the three sites in this study (Table 1) were selected for compositional analysis using LA-ICP-MS and compared to the four potential sources described above following Carter and Dussubieux (2016). In the earlier study, it was found that three elements were able to separate the four geologic sources: B, Sb, and Sc. Figure 10 presents a 3D scatterplot of the geologic sources and artifacts from this study plotted by these elements. As with previous studies, this analysis shows that the artifacts from

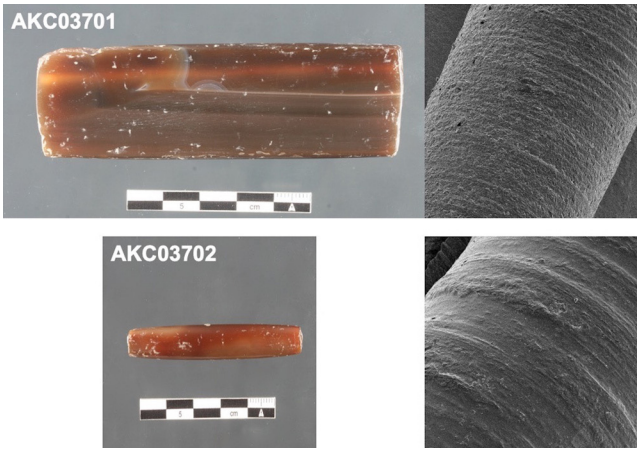

Figure 8. Beads from Sophy and SEM images of their perforations at 50x magnification. Note the parallel striae typical of the diamond-drilling technique.

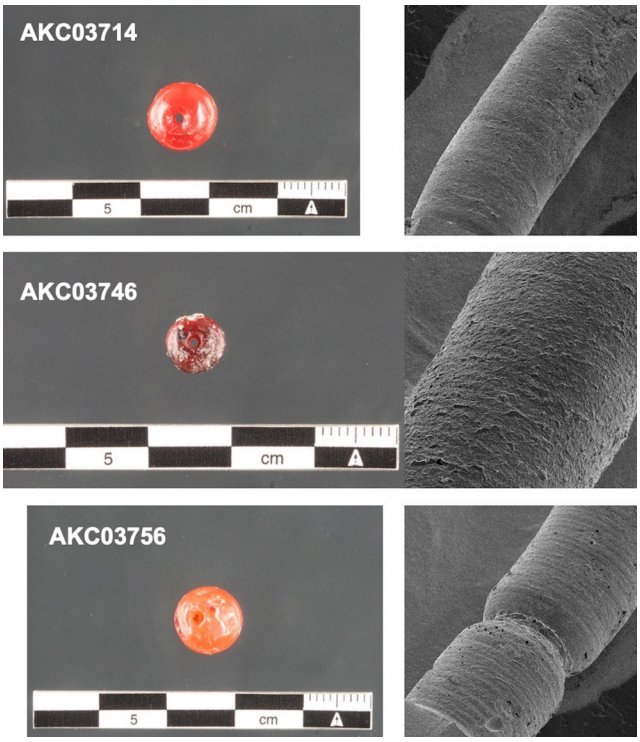

Figure 9. Beads from Sophy and SEM images of their perforations. The top and bottom images are at 25x magnification, the middle image is at 50x. The bottom image shows the juncture of the two perforation segments drilled from either end.

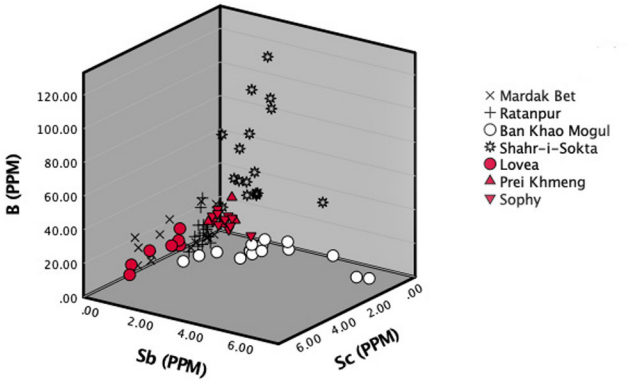

Figure 10. Three-dimensional scatterplot of agate/carnelian geographical sources and the beads from Lovea, Prei Khmeng, and Sophy.

northwestern Cambodia are most compositionally analogous to the Deccan Traps sources in India. The compositional data combined with analyses of bead perforations strongly suggests connections to the South Asian stone beadmaking industry. It is not clear if beads were imported as finished products or produced in Southeast Asia usin g imported raw materials at sites like Khao Sam Kaeo, Thailand (Bellina 2017). This study is limited in its small number of raw material sources, but expanding the comparative database is a long-term goal. This may help to identify the sources of the different bead types.

THE DISTRIBUTION OF BEADS IN BURIALS

As most of the beads in this study were found in burial contexts as grave goods, we can use the associated bioarchaeological and mortuary data to consider who was utilizing beads at these sites. First, it should be noted that beads were not evenly distributed within burials (Table 4). Not all burials contained beads, and stone beads were less commonly found in burials than glass beads. This observation is not statistically significant as we do not know the total number of mortuary contexts at each site. It is, nevertheless, consistent with the distribution of beads in burials at other sites in mainland Southeast Asia (Carter 2015).

Table 5 lists the mortuary contexts at each site, the number of stone and glass beads in each burial, as well as available information on the individual(s). More information on the beads and their contexts can be found in Appendix A. Beads from both the Paddy to Pura and MAFKATA excavations at Prei Khmeng are reported (Bâty 2003; Demeter 2004a, b; O'Reilly et al. 2020). Burials at Prei Khmeng and Lovea were more poorly preserved than at Sophy. Due to these poor preservation conditions, there were several contexts in the Prei Khmeng MAFKATA excavations that contained beads but had no bone, making it unclear if they were burials. It is uncertain how representative these burials are of the communities at each site and in the case of Sophy, looting has made comprehensive analysis of the mortuary data impossible. Nevertheless, some preliminary observations can be made. Agate and carnelian beads appear to have been more common grave goods at Sophy, where they are found in higher quantities than at Prei Khmeng or Lovea. Beads appear primarily in adult burials, but at Prei Khmeng and Sophy, juveniles and young children were also buried with beads, indicating that these objects were not exclusively for adults in these communities.

The large number of stone beads in Burial 14 at Sophy and glass beads in MAFKATA Burial 4 at Prei Khmeng may shed light on the nature of the bead trade during this period. While beads might have traveled individually or in small quantities in down-the-line exchange networks, the number of spherical beads in Burial 14 and black and orange glass beads

Table 4. Number of Mortuary Contexts with Agate/Carnelian and Glass Beads.

Site	Total Number of Mortuary Contexts	Mortuary Contexts with Agate/Carnelian and Glass Beads	Mortuary Contexts with Agate/Carnelian Beads Only	Mortuary Contexts with Glass Beads Only	Mortuary Contexts Without Beads
Lovea	11	6	0	5	0
Prei Khmeng (MAFKATA)*	ca. 12	1	0	6	ca. 5
Prei Khmeng (P2P)	11	2	0	7	2
Sophy	14	7	0	1	6
Total	**ca. 48**	**16**	**0**	**19**	**ca. 13**
* The Prei Khmeng MAFKATA data include contexts that contained artifacts but no bone, yet may have been burials.					

Table 5. Burials with Beads at Lovea, Prei Khmeng, and Sophy.

Site	Burial Number/ Mortuary Context	Age/Sex	Number of Agate/ Carnelian Beads	Number of Glass Beads
Lovea	1	Adult, sex unknown	3	109
Lovea	2	Adult, sex unknown	0	10
Lovea	3 intermingled with Burial 3.2	Adult, possibly male	0	49
Lovea	3.2 intermingled with Burial 3	Young adult, male	0	48
Lovea	4	Adult, sex unknown	4	411
Lovea	6	Adult, sex unknown	7	7
Lovea	7	Adult, sex unknown	4	11
Lovea	8	Adult, sex unknown	2	72
Lovea	9	Adult, possibly male	4	48
Lovea	10	Adult, possibly male	0	19
Lovea	11	Adult, sex unknown	0	4
Prei Khmeng (MAFKATA)*	12-1 (12221)	Unknown	1	7**
Prei Khmeng (MAFKATA)	Burial 2 (16016/15017)	Juvenile, sex unknown	0	36 (includes 12 beads analyzed by Latinis 2004)
Prei Khmeng (MAFKATA)	Burial 3 (21040/15021)	ca. 28 years old, female	0	144
Prei Khmeng (MAFKATA)	Burial 4 (21045/15061)	25-28 years old, female	0	1766 (includes 16 beads analyzed by Latinis 2004)
Prei Khmeng (P2P)	1	13-15 years old, sex unknown	0	54
Prei Khmeng (P2P)	2	Mid-old adult, male	0	34
Prei Khmeng (P2P)	3	1.5 years old, sex unknown	7	53
Prei Khmeng (P2P)	5	Middle-aged adult, possibly female	0	72
Prei Khmeng (P2P)	6	Young adult, male	0	16
Prei Khmeng (P2P)	7	Neonate	0	87
Prei Khmeng (P2P)	8	0.5 year old, child	0	31
Prei Khmeng (P2P)	9	Young adult, male	2	20
Prei Khmeng (P2P)	10	Young adult, possibly female	0	162

Table 5. Continued.

Site	Burial Number/ Mortuary Context	Age/Sex	Number of Agate/ Carnelian Beads	Number of Glass Beads
Sophy	5 (contained three individuals)	Young adult, female; adult, sex unknown; young adult, sex unknown	1	181
Sophy	6	5-7 years old, child	20	329
Sophy	7	Adult, male	17	448
Sophy	8	2-4 years old, child	1	4
Sophy	9	2.5 years old, child	1	9?
Sophy	10	6-9 years old, child	7	441
Sophy	11	15-18 years old, female	0	119
Sophy	14	Middle aged, female	280	264

*Only burial contexts with bone from Prei Khmeng are included.
**Burial 12-1 beads were observed on display in the National Museum, Phnom Penh, but not recorded.

in Burial 4 point towards the movement of large quantities of goods through more organized bead exchange networks.

Within each community, a small number of burials/ individuals had a larger quantity of beads than others. A study of ceramics and grave goods from these three sites by Lim (2020) identified the wealthiest burials at each site as determined by the quantity of associated bronze artifacts. At Sophy, the three wealthiest burials (nos. 7, 4, and 10) contained most of the stone and glass beads found at the site. Similarly, a relationship was identified between the distribution of glass beads and the wealthiest burials at Prei Khmeng and Lovea. Adult Burial 4 at Lovea contained hundreds more glass beads than other burials at the site, as well as the large carnelian bicone. At Prei Khmeng, the burial of an adult female contained over 1700 glass beads. Few burials at Prei Khmeng contained stone beads, but one child was buried with seven agate cylinders. At Sophy, the burials with the highest number of stone beads also contained the highest quantity of glass beads. Burial 7 is notable for containing the long agate pendant, as well as two other agate beads, and 14 spherical carnelians. One of the wealthiest burials at the site (no. 14) contained 280 beads, including over 250 spherical carnelians. This burial has the highest number of stone beads from a single burial thus far recorded in Cambodia, and perhaps mainland Southeast Asia.

Who were these individuals whose burials contained high quantities of beads? It does appear that they were largely adults who may have earned their status within the community through their achievements in life. The presence of children or infants with beads, however, also points towards emerging inequality and inherited wealth or ascribed status in some contexts (Peebles and Kus 1977). While most people at all three sites were likely agriculturally focused, there is evidence for iron working, and pottery and textile production at Sophy (O'Reilly et al. 2015). Similarly, Lovea and Prei Khmeng also show evidence for textile production and iron working, in addition to an agrarian economy (O'Reilly and Shewan 2015, 2016; O'Reilly et al. 2020). Did some individuals at these sites acquire beads due to their particular crafting skills similar to the notable "princess" of Khok Phanom Di? This burial contained thousands of shell beads that are believed to be related to her status in the community as a skilled ceramicist (Higham 1991). It is also possible that individuals with beads held other roles of status within their community that may be archaeologically invisible, such as a spirit medium or healer.

DISCUSSION AND CONCLUSION

The presence of beads at Lovea, Prei Khmeng, and Sophy are material indicators that these communities were participating in long-distance exchange networks. All three have large quantities of orange high-alumina soda-glass beads. The distributions of stone beads shows

some variation in the bead morphologies present, but all three sites contained primarily Type 2 agate/carnelian beads. A small number of unusual stone bead shapes show possible connections to communities in the Mekong Delta and northeastern Thailand. Overall, all three sites share a pattern of bead assemblages dominated by high-alumina soda-glass beads and Type 2 agate/carnelian beads. This is typical of other sites within the Mekong Interaction Sphere and in contrast to sites with different glass and stone bead assemblages (those that contain largely Type 1 stone beads and potash-glass beads) that date to the early Iron Age and/or are more connected to a South China Sea exchange network (Carter 2015; Carter et al. 2021). This result is not entirely unexpected as previous work on bead collections at Prei Khmeng and the northwestern site of Phum Snay has shown similar patterns in their bead assemblages (Carter 2010, 2015).

Studies of earthenware ceramics show comparable linkages between the Mekong Delta, northwestern Cambodia, and northeastern Thailand (Lim 2020; Stark and Fehrenbach 2019). All three regions share similar earthenware production techniques called the Reduced Ceramic Horizon in which vessels were fired in a reduced or incompletely oxidizing environment that resulted in ceramics with a dark grey, brown, or black surface (Stark and Fehrenbach 2019). Within this broad regional tradition were more localized ceramic practices of which, it appears, Sophy was more closely linked to sites in northeastern Thailand, while Prei Khmeng and Lovea showed stronger affinities to the Mekong Delta (Lim 2020:441). Within the bead assemblage, the best evidence for similar connectivity between Sophy and sites in northeastern Thailand is the presence of the orange wrapped disc bead, which has been found in large quantities at several sites in northeastern Thailand, including Ban Non Wat and Noen U-Loke (Carter and Lankton 2012; Saitowitz and Reid 2001).

In an earlier study, it was proposed that the similarity in bead assemblages seen at many sites in Cambodia was likely due to the emergence of a powerful polity in the Mekong Delta around the site of Angkor Borei and referred to as Funan in Chinese historical documents (Carter et al. 2021). Further work is needed to better understand the relationship between communities in the Mekong Delta and those in northwestern Cambodia. Nevertheless, the present study demonstrates that the communities of Lovea, Sophy, and Prei Khmen benefitted from the growth of this polity and its seemingly increasing access to South Asian goods, including beads.

Other localized bead exchange networks are difficult to discern within the existing dataset, but the broad patterns in the beads from northwestern Cambodia demonstrate that these sites were not isolated backwaters, but part of a robust regional exchange network. Future work can add nuance to these regional networks by identifying more specific bead subgroups. This should include reanalysis of stone beads using an expanded, comparative, agate/carnelian raw-material database (an ongoing project being developed by several scholars), continued careful analysis of bead perforations, and updating the stone-bead-shape typology to use more precise terminologies. Overall, this study joins others in demonstrating the utility of studying bead assemblages to assess intra-regional exchange within Southeast Asia, rather than focusing on imported beads solely as indicators of connectivity with South Asia (Bellina 2018; Carter 2015; Dussubieux and Pryce 2016; Lankton and Dussubieux 2013; Theunissen, Grave, and Bailey 2000).

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APPENDICES

Lovea, Prei Khmeng, and Sophy Bead Datasets (Appendix A: Bead Morphology and Context Information and Appendix B: Glass and Stone Bead Compositions) are archived at the University of Oregon Scholar's Bank/Harvard Dataverse and can be accessed at the following address: https://doi.org/10.7910/DVN/MDXVTU.

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Alison Kyra Carter
Department of Anthropology
University of Oregon
Eugene, OR USA
Acarter4@uoregon.edu

Dougald O'Reilly
School of Archaeology and Anthropology
College of Arts and Social Sciences
The Australian National University
Canberra, Australia
dougald.oreilly@anu.edu.au

Louise Shewan
School of Geography, Earth, and Atmospheric Sciences
The University of Melbourne
Melbourne, Australia
louise.shewan@unimelb.edu.au

Laure Dussubieux
Elemental Analysis Facility
The Field Museum
Chicago, IL USA
ldussubieux@fieldmuseum.org

THE BEADS OF ATHRIBIS, MIDDLE EGYPT: AN OVERVIEW AFTER 10 YEARS OF EXCAVATION

Patricia Elsner and Marcus Müller

It was in 2012 that the University of Tübingen started the proper excavation of the temple of King Ptolemy XII at Athribis. This temple was reused for many years during the Late Roman (Coptic) and medieval (Islamic) periods until its destruction between the mid-10th and the mid-11th century. During that time the temple was filled with debris and rubbish, and several rooms were temporarily used as animal pens. Besides a variety of objects such as wood, fabrics, and coins, we found hundreds of beads, several pendants, and other jewelry, like horn bracelets, bronze rings, and hairpins. We have started to classify the beads in order to produce a catalog of all the jewelry as a basis for further in-depth research.

INTRODUCTION

The archaeological site of Athribis in Middle Egypt (Figure 1) is located about 7 km west of the modern city of Sohag. Covering more than 30 hectares, it consists of four main zones. The first zone is a settlement area of around 16 hectares with mudbrick buildings for housing and workshops. The settlement is presumably early Ptolemaic, but the 30th Dynasty is also possible due to the presence of a limestone block of Nectanebo II (El-Sayed 2012:17, 33, Figure 1.1.10). Furthermore, there is the 1.7-km-long necropolis of rock-cut tombs in the Gebel Adruba directly adjacent to the west side of the site.

The temple of Repit (Figure 2) is one of the last unexplored large stone temples of the Ptolemaic era. It is 75 m long, 45 m wide, and preserved to a height of slightly more than 5 m. Our present excavation is part of a multidisciplinary project that started in 2003 and is led by Christian Leitz and directed in the field by Marcus Müller (Eberhard Karls-Universität Tübingen, Germany). During this time the team carried out archaeological excavation of the temple and research on the archaeological remains, as well as epigraphic, architectural, and art-historical studies.[1] Since 2012, a team of international conservators has provided emergency conservation for the archaeological finds and excavated areas of the temple, as well as moving sections of limestone columns, walls, architraves, and ceilings to newly created storage areas.

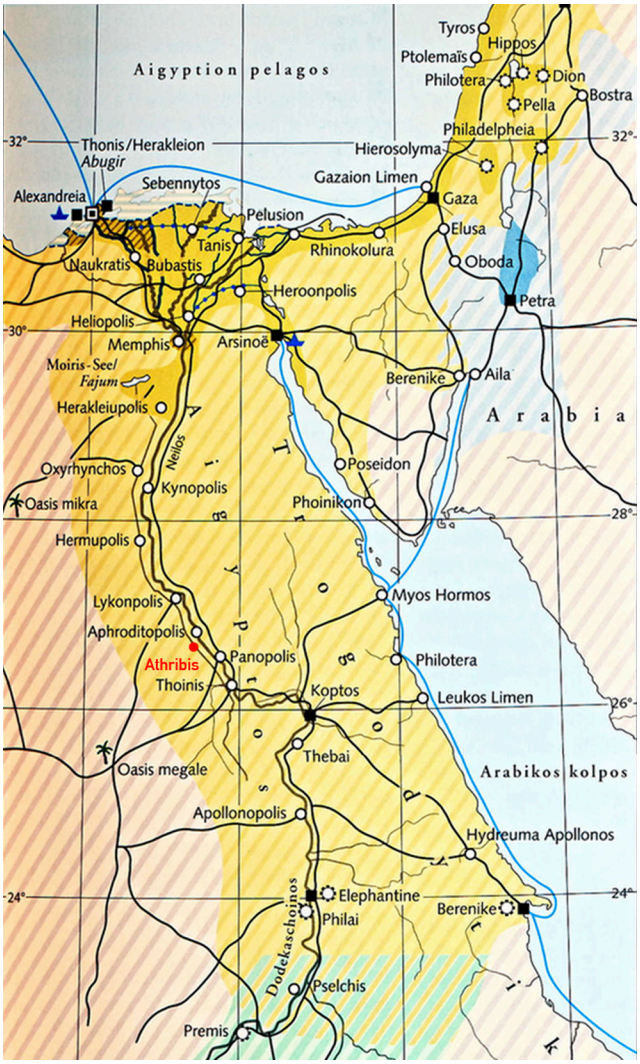

Figure 1. Ancient Egypt during the Ptolemaic era (after Wittke, Olshausen, and Szydlak 2012:121).

Figure 2. The temple of Repit at Athribis (all images © Athribis Project).

Dedicated to the lion-goddess Repit (Figure 3), her husband Min, and their son Kolanthes, the temple was built during the reign of Ptolemy XII (81-58 and 55-51 BC). Its decoration was completed over a period of 200 years, the inner part under Ptolemy XII, then during the reigns of the 1st-century Roman emperors Tiberius, Caligula, Claudius, Nero, Vespasian, Titus, and Domitian (Altmann 2012:200-206). In addition, repurposed stone blocks inscribed with the name of Emperor Hadrian were discovered in a secondary-door blocking which dates to the late Roman period. It was perhaps in the 2nd and 3rd centuries AD that stables were built in the outer western courtyard, perpendicular to the temple wall, thereby partly damaging the reliefs and hieroglyphic texts.

Figure 3. The goddess Repit wearing a bead necklace.

Presumably in the mid-4th century, the temple became part of a Coptic nunnery and was greatly transformed by the addition of monastic installations: the main entrance was blocked and a church was built in front. Workshops were installed in the main sanctuary and other rooms of worship, leaving behind ceramic vessels and large masonry vats, perhaps used for dyeing textiles. In addition, water channels were carved into the stone floors.

During this period, decorative elements were destroyed or damaged. In particular, divine figures and symbols were meticulously hacked or covered with a lime plaster which, in actual fact, protected the painted layers beneath. The northern ambulatory L2 was largely transformed by cutting the column bases and by building an imposing gate with pilasters, thus creating a new space within the ambulatory that was defined with sockets in the floor. It was during this Coptic re-use of the temple that its three crypts, with all their valuable goods, were plundered.

In early medieval times, i.e., after the Arab conquest in 642, the temple was again repurposed. As early as the 8th century, the roofs and columns of the large pronaos (room A) and the roof of adjacent room B collapsed, most likely by human influence because the walls of the temple show no evidence of earthquake damage. The fallen blocks were

removed, and the rooms cleared. Both rooms were divided into several smaller units by walls built of mudbricks and reclaimed limestone rubble, with new stone-tiled floors. In the pronaos, these rooms are aligned along a surprisingly prestigious corridor with small columns of fired bricks. Two of these rooms served as kitchens, others as workshops and storage facilities. They even built a complete wall in room B by setting small Late Roman stone columns next to each other. Large jars and small pots in the floor indicate storage of nourishment, whereas hearths point to cooking activities. Other rooms were mainly used as stables and waste depositories, e.g., the eastern ambulatory L1 and the corner of the northern and western ambulatory. From the mid-10th to the mid-11th century, the temple served as a quarry for building stone and lime production, until its ruins disappeared under centuries of debris and sand.

As with many other sites across Egypt, the temple was initially partly excavated by Flinders Petrie (1908) in 1907-1908. During a blitz one-month campaign, trenches were dug along the walls to establish a ground map and document some of the reliefs. The temple then lay untouched until the end of the 20th century, when the Egyptian Antiquities Organization led the next work phase from 1981 to 1997 (El Farag, Kaplony-Heckel, and Kuhlmann 1983; El Masry 2001). Around one third of the temple was left unexcavated, due to the fact that these areas were topped by huge stone blocks from the collapsed ceiling, columns, and walls. Work was only resumed in 2003 with the Eberhard Karls-Universität Tübingen project led by Christian Leitz. The initial focus was on epigraphic work, but since 2012 work centered on the stratigraphic excavation of the remaining third of the temple under the field direction of Marcus Müller, together with the removal of more than 400 collapsed blocks of up to 37 tons (columns, capitals, architraves, ceilings, and walls). Moreover, in 2018 we started to excavate west of the temple of Repit searching for a temple of Osiris that is mentioned in a newly discovered hieroglyphic inscription. Consequently, this trench was named "Osiris-Sondage." It turned out to be very rich in single finds, namely ostraca (potsherds with inscriptions) and beads. The trench was therefore enlarged to the south (Figure 4). Due to the very high number of ostraca that were found there, we labelled this area "Ostraca Excavation." Until now we have discovered nearly 20,000 ostraca in both areas. It is worth mentioning that the excavation of the temple of Repit was completed in 2019, and has been open to the public since April 2020. The Mission continues to dig in the area west of the temple.

In all the layers, both in the temple and the outer areas, there was a great variety of objects and materials that

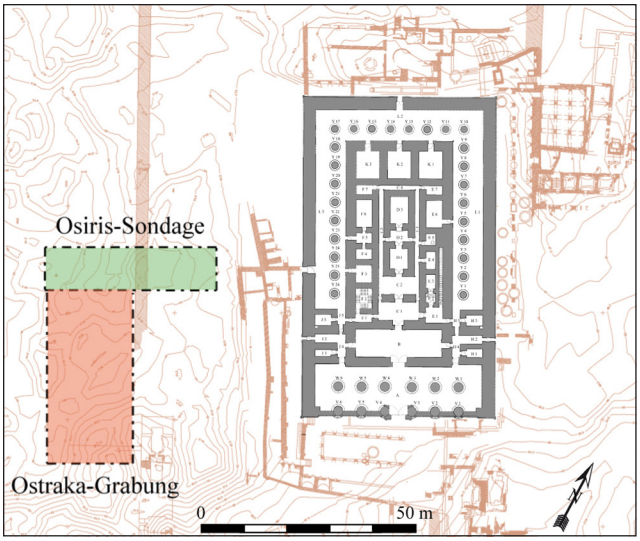

Figure 4. The temple of Repit and the excavation areas to the west of it.

provide a glimpse of the daily life of the people who lived in the surrounding settlement of Athribis that was inhabited until the High Medieval Period. Thus, the finds enable us to imagine what clothes they wore, which tools, tableware, and coins they used, which animals they kept, what they ate, and with which objects they adorned themselves. Amongst heaps of fragmented pottery, animal bones, fabrics, ropes, mats, and glass, we also found spindle whorls, parts of furniture, working equipment, and figurines, as well as coins from Greco-Roman to medieval times. To our great joy, we also discovered 771 beads.

BEADS IN ANCIENT EGYPT

Beads are known in Egypt since the Epipaleolithic period (ca. 10,000-5500 BC) (Bard 1999:751; Lucas and Harris 1962:41; Petrie 1923:80). At first they were made of natural products, namely shells, animal teeth, bone, horn, river pebbles, and seeds (Krah 1982:939). Only later did beads made of artificial materials evolve, which became extremely popular as can be seen by the high number of beads in a great variety of materials throughout all periods. It is also noteworthy that the ancient Egyptians used beads in a wide variety of ornaments including necklaces, collars, bracelets, anklets, pectorals, and earrings. They were also used to adorn garments, mummy nets, belts, and textiles, even sandals and footstools (Harris and Lucas 1962:41-42; Krah 1982:939).

Numerous reliefs on Pharaonic and Greco-Roman temples show the gods of ancient Egypt regularly wearing

jewelry, mostly collars consisting of several rows of beads. One example from the temple in Athribis shows the goddess Repit with such a collar: two rows of long and rectangular elements representing tubular beads, followed by a row of globular beads and a row of drop-shaped beads on the outer edge (Figure 3).

In Ancient Egypt, those involved with the production of jewelry and its components were divided into three groups (Lacovara and Markowitz 2020:86). Goldsmiths, the so-called *nuby*, held the highest rank, followed by those working with precious stones (*neshdy*) (Figure 5), and then the *iru weshbed*, beadmakers who worked only with faience and glass.

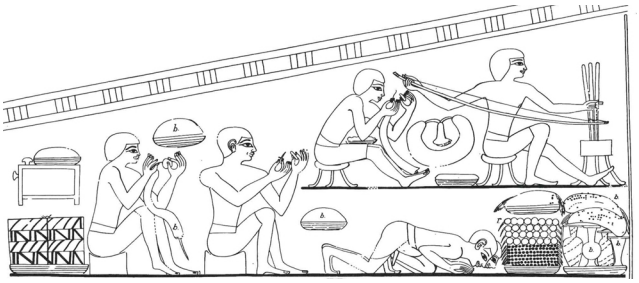

Figure 5. Mural of a jewelry workshop in the tomb of Rechmire, Thebes; 18th dynasty (de Garis Davies 1943:Figure 54).

After the beads were finished, they were strung on flax thread composed of three or more strands twisted together. Unfortunately, threaded beads are rare at Athribis; we only found one example that combines dark and bright: a dark blue bead with a very light green one (Figure 6 left). This is fairly common, e.g., at the Red Sea port of Berenike (Then-Obłuska 2018a:211-212). There was, however, also an agate bead with a twisted copper-alloy wire in the hole (Figure 6 right).

Figure 6. Threaded faience and glass beads (19-36-61/131) and an agate bead with the copper-alloy wire found in its perforation (16-0/8).

THE ATHRIBIS BEAD ASSEMBLAGE

Of the 771 recovered beads, all but 21 belong to seven basic shapes (Figure 7; Table 1). The rest have unique forms. Some are irregularly shaped due to their crystalline structure (e.g., amazonite beads). Others are star shaped (Figure 8 left), semi-triangular, or rectangular (Figure 8 right).

The beads of Athribis may be grouped into two categories: natural materials (stone, wood, bone, horn, clay, and metal) and man-made substances (faience and glass). The vast majority are made of artificial materials: glass (53.2%) and faience (33.9%). With the exception of five beads whose composition could not be determined, the remaining 13% represent natural materials, of which carnelian (n = 58, 7.5%) is the most prevalent.

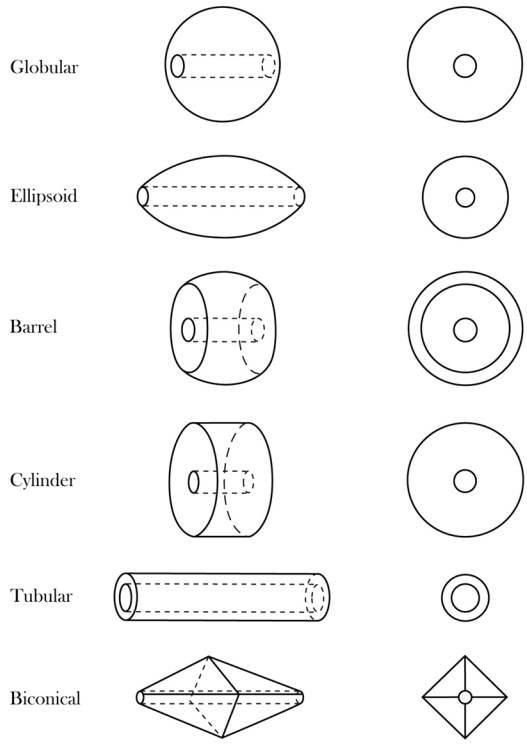

Figure 7. Athribis bead forms.

Stone Beads

At Athribis, stone beads are represented by six materials: carnelian, agate, amethyst, amazonite, quartz diorite, and calcite alabaster.

Carnelian

Of the 58 carnelian beads, most (n = 32) are globular (Figure 9 upper left), but seven other forms are also present

Table 1. The Frequency of Beads at Athribis Based on Shape and Material.

Material	Globular	Ellipsoid	Barrel	Cylinder	Tubular	Biconical	Polygonal	Unique	TOTAL
Carnelian	32	4	4	1	1	10	5	1	58
Agate		5		1					6
Amethyst	1	2	1			1	1		6
Amazonite			1		1		4	4	10
Quartz diorite	1								1
Calcite alabaster	2		3						5
Wood			2						2
Horn			1						1
Bone			2						2
Clay	1		2					1	4
Undetermined			2			2		1	5
Faience	1	1	45	45	165	1		3	261
Glass	1	11	169	193	15	9	1	11	410
TOTAL	**39**	**23**	**232**	**240**	**182**	**23**	**11**	**21**	**771**

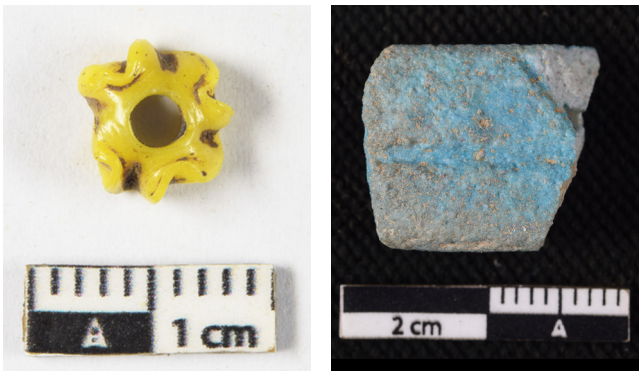

Figure 8. Examples of bead forms: left, wound glass, star-shaped (11-4-20/3); right, rectangular faience bead as used in collars (18-36-1/18).

with bicones (n = 10) predominating (Figure 9 upper right). The remaining forms are only present in single-digit quantities, e.g., five polygonal beads, including heptagonal bicones (Figure 9 center and lower left). The holes of carnelian beads are normally straight and of a consistent diameter. There are, however, strikingly narrow holes, sometimes off-center (Figure 9 lower left), as well as ones that are curved (Figure 9 lower right). Most globular carnelian beads show only rudimentary finishing (Swift, Stoner, and Pudsey 2022:73, 113), a feature also detected at Athribis. The beads we found are well shaped, but their dull surfaces reveal that they were not intensively polished.

Beads made of carnelian are found all over Egypt including Berenike on the Red Sea (Then-Obłuska 2018a:207) and south to Nubia as far as the 4th cataract, so they are part of the material culture of many regions (Then-Obłuska 2014:1071). The beads from Athribis were discovered in layers of early medieval times (8th-early 11th centuries). Carnelian beads of various forms are well circulated in Late Roman times (Then-Obłuska 2015:747, 749). Since globular, roughly dressed carnelian beads became particularly popular in the 6th-7th centuries (Swift, Stoner, and Pudsey 2022:73, 113), the relatively high number of carnelian beads at Athribis fits the pattern, although several of the beads derive from slightly later layers. The fashion of utilizing such beads continued over centuries, showing temporal endurance. They were likely considered valuable and kept for a long time. Eventually, some of them fell out of favor and ended up in the dump layers where we discovered them.

The ancient Egyptians were already using carnelian in the Nagada II culture (ca. 3600-3200 BC), at first for beads and amulets and later also for inlays for their jewelry (Bard 1999:376, 385-386, 851; Krah 1982:939; Lucas and Harris 1962:391). This material was already attractive to rulers before Egypt's unification under one pharaoh; the king buried in tomb U-j in Abydos had disc-shaped beads made of carnelian as a grave good (Dreyer 1998:167). Its color reminded them of blood, thus it was a symbol for life

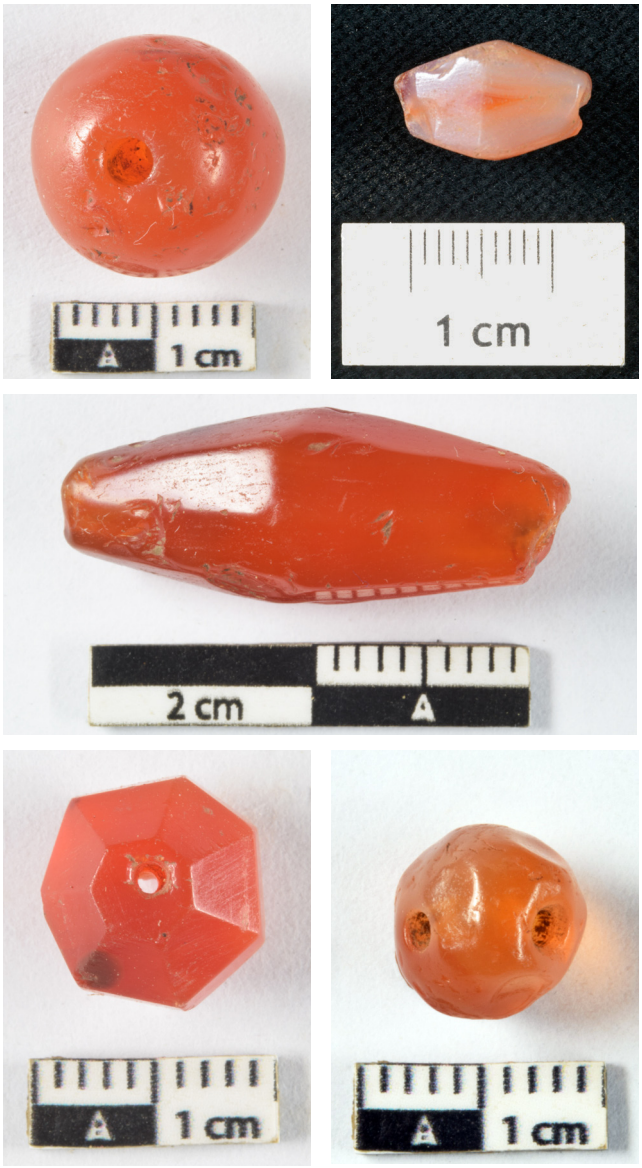

Figure 9. Carnelian beads: upper left, globular (11-4-20/1); upper right, biconical (14-27-84/18); center, large heptagonal bicone (11-4-26/007); lower left, heptagonal bicone with an off-center hole (11-4-18/47); lower right, globular with a curved hole (14-27-96/141).

and popular during the whole Pharaonic period. Carnelian is therefore mentioned in the Ancient Egyptian *Book of the Dead*. Such a religious connotation is also traceable in a hieroglyphic text in the Repit temple which mentions that carnelian is ideal for sanctifying the temple and is an integral part of its function (Leitz, Mendel, and El-Masry 2010:XVII).

Carnelian occurs in the Eastern Desert (Wadi Abu Gerida) in Egypt and in Nubia along the Nile near Wadi Halfa (Then-Obłuska 2015:745) and at Gebel el-Asr, 65 km northwest of Abu Simbel (Lucas and Harris 1962:391; Nicholson and Shaw 2000:27).

Agate

The six banded-agate beads found at Athribis vary in color from brown-beige-grey to reddish-brown with white inclusions and variations in translucency. All are very large in comparison to the other beads. Five are ellipsoidal (Figure 10 top), the remaining specimen is cylindrical (Figure 10 lower left). They derive from layers of the 9th to mid-11th centuries. Agate beads usually have very narrow holes (Figure 10 lower right).

Figure 10. Banded-agate beads: top, ellipsoid (14-26-36/3); lower left, cylindrical (14-29-4/8); lower right, typical narrow drill hole in the illustrated ellipsoid.

In ancient Egypt, agate beads appear as early as the Predynastic period, i.e., at least by the 4th millennium BC (Bard 1999:376, 751; Krah 1982:939; Lucas and Harris 1962:387; Nicholson and Shaw 2000:26), but were more popular during the Greek and Roman epochs than in pharaonic times (Lucas and Harris 1962:387). Agate quarries exist in Egypt in the Eastern Desert, mainly at Abu Gerida (Nicholson and Shaw 2000:26) and the oasis of Fayoum, and also in Nubia.

Amethyst

The six amethyst beads represent five shapes, so there does not seem to have been a preferred one for this stone (Figure 11). This applies also to the color because the beads from Athribis range from deep purple to nearly colorless which encompass all five categories of Pliny the Elder's classification (Drauschke 2010:225).

Figure 11. Amethyst beads: left, globular (15-5-300/9); right, pentagonal (14-28-3/2).

One of the beads is angular drop-shaped, a type that was exported widely to the eastern and western Mediterranean, especially in the 6th and 7th centuries (Swift, Stoner, and Pudsey 2022:71, 75, 85, 110). The context of the bead is probably the 9th century, indicating that this type was in circulation for several centuries. This assumption is supported by another amethyst bead found in an early medieval layer, perhaps 9th or 10th century. Of the six amethyst beads, another two can be attributed to the Byzantine era (5th-6th centuries).

The amethyst beads from Athribis are all finely polished which is typical for beads of this material (Swift, Stoner, and Pudsey 2022:113). Drop-shaped amethyst beads became popular in status display across the eastern Mediterranean (Swift, Stoner, and Pudsey 2022:339). Thus, the beads at Athribis show that this village, with its monastic complex and civil polity, was well integrated into the trade network and social traditions of the Byzantine period.

Amethyst was almost entirely used for jewelry, with beads being produced from the Nagada II culture (ca. 3600-3200 BC) until Late Roman times (Bard 1999:385, 851; Drauschke 2010:225-228; Nicholson and Shaw 2000:51), e.g., at a workshop in Alexandria where the raw material was excavated (Drauschke 2010:227). They reached their peak of popularity in the 12th dynasty (1974-1781 BC) (Nicholson and Shaw 2000:51).

Amethyst occurs in Egypt's Eastern Desert, especially in the Wadi-el-Hudi region (Bard 1999:51, 871; Lucas and Harris 1962:389; Nicholson and Shaw 2000:51) and near Gebel Abu Diyeiba (near Safaga), as well as at Gebel el-Asr near Abu Simbel (Lucas and Harris 1962:389; Nicholson and Shaw 2000:51; Then-Obłuska 2015:745) and in nearby areas of the Western Desert (Bard 1999:560), e.g., at Toshka (Zibelius-Chen 1997:145).

Amazonite

There are only 10 examples of amazonite beads, unfortunately all from disturbed layers. Four each are classified as polygonal (Figure 12 left) and irregular (Figure 12 right), whereas there is only one barrel-shaped bead and one tubular example. The polygonal cylinders are especially common during the Roman period (Xia 2013:139) and are favored for the crystalline structure of the material. The perforations are usually narrow, sometimes irregular and off-center.

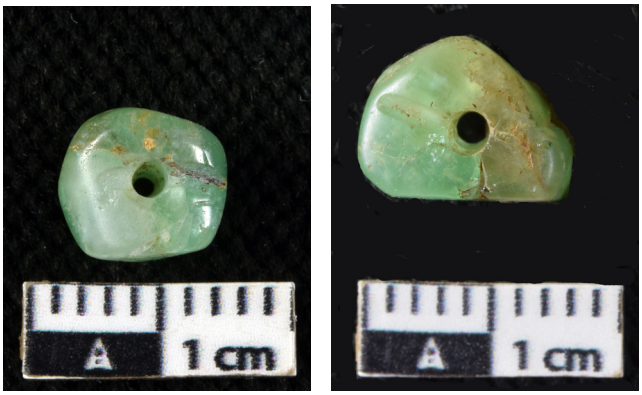

Figure 12. Amazonite beads: left, polygonal (19-36-61/50); right, irregular (17-36-5/275).

Amazonite, one of the most precious stones in ancient Egypt, was generally employed on a small scale but was already in use for beadmaking in Neolithic times (Fayum-A culture, ca. 4500-3500 BC; Nagada II culture, ca. 3600-3200 BC), slightly more often in the 12th dynasty (1974-1781 BC), and later in the New Kingdom (ca. 1550-1070 BC) (Bard 1999:229, 376,385; Lucas and Harris 1962:394). It was used to make a variety of beads, amulets, and inlays from the Middle Kingdom (ca. 2045-1781 BC) to much later times, such as the finds at Athribis that date to the Roman and medieval periods (30 BC-12th century AD).

In Egypt, amazonite can be found in the Eastern Desert (Gebel Migif, Wadi Abu Rusheid, Wadi Higelig, Hafafit range) and at Tibesti in the Libyan Mountains (Bard 1999:560; Lucas and Harris 1962:394; Nicholson and Shaw 2000:46). Without microscopic or chemical analysis, however, it is sometimes difficult to distinguish amazonite

from beryl which was mined at Mons Smaragdus (Sikait-Zabara mining district) (Then-Obłuska 2015:745). In Late Roman times it was, at least partly, traded by the Blemmyes as we know from Olympiodoros of Thebes (Then-Obłuska 2015:765).

Quartz Diorite

There is only one bead of this material, a globular bead with a straight hole (Figure 13 left), found in a context heavily disturbed by modern mudbrick robbers. Egyptian mining areas are located at the Roman quarries at Mons Claudianus (Nicholson and Shaw 2000:34), in the Eastern Desert (Wadi Umm Balad, Wadi Barud, Wadi Fatiri al-Bayada) (Nicholson and Shaw 2000:30), and at Aswan (Klemm and Klemm 1993:6, 352, 408, 435). The raw material of the Athribis specimen most likely derives from Mons Claudianus due to its proximity to Athribis and the higher ratio of the whitish component in the stone in comparison to material from the Aswan deposit.

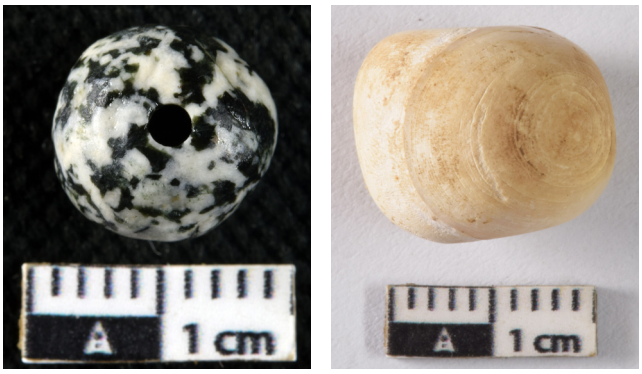

Figure 13. Globular quartz diorite bead (19-36-30/140), left; barrel-shaped calcite alabaster bead (11-4-33/11), right.

Calcite Alabaster

Beads made of calcite alabaster are rare at Athribis with only five recovered to date, an expected result as they are rare already in Roman times (Xia 2013:144). The stratigraphic contexts date the beads to the 10th and 11th centuries. Three are barrel shaped (Figure 13 right) while the other two are globular.

In Ptolemaic times (306-30 BC), the area between the Middle Egyptian cities of Minya and Assiut received the designation *Alabastrites* which, in turn, gave its name to the stone that was the most typical for this region: alabaster (Klemm and Klemm 1993:199; Nicholson and Shaw 2000:60). Egyptian alabaster, however, is an incorrect term since true alabaster is composed of gypsum whereas Egyptian alabaster is actually travertine, i.e., a variety of limestone consisting largely of calcite or aragonite (Nicholson and Shaw 2000:21-22, 59). The term calcite alabaster, mostly used and extremely common in Egyptology, is an uneasy compromise because it is not recognized by geologists (Nicholson and Shaw 2000:59).

Calcite alabaster beads have been made since the Predynastic period (Krah 1982:939). The raw material can be found in the entire Egyptian limestone desert, but the most prominent mining regions were restricted to the region between Cairo and Sohag, especially Wadi Gerawi and Wadi Hof (both east of Cairo) (Bard 1999:367), Wadi Sannur (east of Minya), Wadi Assiuti in Assiut, and Hatnub near Amarna, which was the capital of Pharaoh Akhenaten and Nefertiti (Bard 1999:560; Klemm and Klemm 1993:199, 434; Nicholson and Shaw 2000:59). It also occurs in some of the oases and depressions of the Western Desert (Nicholson and Shaw 2000:22).

Clay

Only four beads are made of fired clay, all of which were found in heavily disturbed contexts with material from Byzantine to early medieval times. Two are barrel shaped, though slightly deformed, and belong to the collared-bead group. Another bead is globular (Figure 14 upper left) while the fourth is non-geometric. Thus, no shape preference can be deduced due to the low number of finds, though clay beads found at other sites, including Early Roman Berenike (Then-Obłuska 2015:747, 749) and the Nubian Kingdom of Makuria (Then-Obłuska 2013:683, 691), suggest that the globular shape was preferred. Only more clay-bead finds will establish whether this is also the case at Athribis.

Wood, Horn, and Bone

Beads made of organic material are particularly rare at Athribis. There are two wooden beads (Figure 14 upper right), one horn (Figure 14 lower left), and two carved from bone (Figure 14 lower right). All are barrel shaped. The thick shape of the wooden bead is typical for Roman times (Xia 2013:144). While one of the wood beads was found in a heavily disturbed layer, the other was in a layer that can be dated to the reign of al-Mustansir (AD 1036-1094). A 9th-10th-century date can be postulated for the horn bead. One bone bead was a surface find, whereas the other came from a layer that is later than a slightly lower stratum containing a coin weight of al-Mustansir. A later layer is also dated by a coin weight of al-Mustansir, proving that this bead was in use during his reign or, theoretically, slightly later.

Figure 14. Beads of clay and organic materials: upper left, globular clay (19-0/92); upper right, barrel-shaped wood (11-4-35/10); lower left, horn (14-26-7/6); lower right, bone (11-428/2).

Faience

In order to distinguish it from the related Italian faience made in Faenza, the material produced in Egypt should be called "Egyptian faience," which is a glassy material made of silica (crushed quartz or sand) with small amounts of lime and an alkali (plant ash or natron) (Bard 1999:297; Nicholson and Shaw 2000:186-187). It is interesting to note that the ancient Egyptian name for this material is *thnt*, or more rarely *hsbd*, which was also used for lapis lazuli and can be translated as shimmering, gleaming, or shining (Nicholson and Shaw 2000:178). Its original color is blue, but with the addition of iron-oxide colorants, it can exhibit a range of hues while the core remains whitish (Figure 15 top row left). The characteristic feature of the Athribis faience beads is their porosity, a feature that is typical for both Egyptian and Nubian (Then-Obłuska 2014:1070) cultures over a long period of time.

In terms of quantity, faience beads are the second most prevalent (n = 261, 33.8%). This evidence is contrary to Nubia where faience is not only *generally* the most common, but *especially* prevalent in post-Meroitic times (Then-Obłuska 2014:1073), i.e., contemporary to many layers at Athribis. Tubular beads (n = 165) were clearly favored (Figure 15 top row) which is also the case in post-Meroitic Nubia (Then-Obłuska 2014:1070). Thus, the Athribis beads fit this cross-cultural pattern not only in terms of quantity, but also as regards shape. Since the tradition of making faience beads ended in Egypt in the 3rd century AD (Then-Obłuska 2014:1070, 2018a:227, 2018b:590), it seems likely that the faience beads found in early medieval layers were handed down over the generations. Their cross-sections are sometimes slightly compressed. This is sometimes intentional, as can be seen in a Late Roman example from Berenike (Then-Obłuska 2015:749-750), but may also be the result of an accident during the firing process. Some beads fused to the pottery vessel in which they were apparently fired (Figure 15 top row).

Barrel-shaped and cylindrical beads are also fairly numerous with 45 specimens each. Some of the barrel-shaped beads are exceptionally large (Figure 15 middle row). A few of these are fluted melon shaped (Figure 15 middle row). Common in Roman times and widespread throughout the empire (Xia 2013:141, 143), they could have been in use for a very long time since they are usually dated to the early Roman period with a possible earlier invention (Then-Obłuska 2018a:218-219, 230). Unfortunately, all but one of the melon beads derive from disturbed contexts; the dated one comes from a layer of the 9th-10th centuries. It is noteworthy that the fluted beads are part of a long tradition that ranges as far as the 4th cataract (Then-Obłuska 2014:1070). Other beads are collared (Figure 15 bottom left). The cylindrical beads were apparently manufactured in a row with constrictions between each segment to facilitate their separation (Figure 15 bottom row). Other forms are rare: three non-geometric, one globular, and one ellipsoid. Some extremely large beads are decorated with impressed concentric circles around a dot (Figure 15 bottom row). This type is present in the whole Nile Valley and the Red Sea area from Ptolemaic, through Roman, to post-Meroitic times (Then-Obłuska 2018a:221). Thus, they are common in the region, but not numerous, befitting what we found at Athribis: only 16 specimens and all, unfortunately, from disturbed contexts. One bead exhibits diagonal grooves (Figure 15 bottom right), others have small grooves, a decorative pattern that is known from the Nile Delta to Meroe in Ptolemaic and Roman times (Then-Obłuska 2015:749, 750).

The earliest Egyptian faience beads date to the Badari Culture (ca. 4500-4000 BC) (Schlick-Nolte 1977:141). At first, only green glazed faience appears in Naqada I (ca. 4000-3600 BC), to be succeeded by faience beads of various types in Naqada II (ca. 3600-3200 BC), but faience

Figure 15. Faience beads: top row, left to right, split bead showing the whitish core (17-36-5/414), tubular (mixed), misfired beads (19-36-30/136, 17-36-5/304); middle row, left to right, fragment of a large bead (17-36-5/92), long bead with circle-and-dot decoration (17-36-5/414), fragmentary melon beads (17-36-4/97, 19-36-30/20); bottom row, left to right, bead with collar (19-0/108), segmented bead (16-32-2/2), bead fragments decorated with circle-and-dot designs (17-36-4/2106), bead with diagonal grooves (19-0/73).

only becomes common from early dynastic times onwards (Stone and Thomas 1957:40, 44). Faience was one of the most popular materials in Egyptian history, especially for beads; the ca. 70,000 faience beads from the Ulu Burun shipwreck being a striking example (Pulak 2005:82). Moreover, faience not only has a visual effect and meaning, it is also the symbol of magnificence as indicated by a hymn to the king of gods, Amun-Re, which proclaims "the sky is faience for your sake" (Assmann and Kucharek 2018:444).

Glass

Glass, as a mixture of silica, alkali, and lime, appears in Pharaonic Egypt slightly after the advent of the New Kingdom, i.e., around 1500 BC (Bard 1999:357; Lankton, Diamanti, and Kenoyer 2003:43; Nicholson and Shaw 2000:195). Earlier glass is still a matter of discussion because these rare examples are not securely dated and thus uncertain for the most part (Bard [1999:357] and Lucas and Harris

[1962:46, 179-181] mention early glass in the 5th dynasty). Most likely, it was probably a fortuitous product resulting from accidents in faience production (Nicholson and Shaw 2000:195). Despite the fact that faience was already in use for much more than one millennium, it seems likely that the idea and perhaps the know-how for glass originated outside Egypt (Petrie 1926:229). This is supported by the fact that the Egyptians used the foreign terms *mekku* and *ehlipakku* for glass (Bard 1999:357; Nicholson and Shaw 2000:195).

While glass bead production has a tradition in Egypt from the 18th dynasty onwards (Petrie 1923:80), they appear in Nubia only in the Late Meroitic period (Then-Obłuska 2014:1072, 1073). Moreover, they constitute very small numbers in Post-Meroitic Nubia, although they predominate in Athribis (n = 410 of 771). We can therefore observe a distinct difference in glass bead culture in Middle Egypt and Upper Nubia at this time. In Ptolemaic and Roman times, Alexandria became a center of glass working and trading (Bard 1999:358), as did Wadi Natrun in Late Roman times (Then-Obłuska 2015:750). Alexandria remained in this position even after the Arab conquest in 642 (Lankton, Diamanti, and Kenoyer 2013:76).

The majority of the glass beads are cylindrical (n = 193) (Figure 16 top row left) and barrel shaped (n = 169) (Figure 16 top row). These shapes constitute 47% of all the beads and 86.4% of the glass bead assemblage. The remainder of the Athribis beads belong to other forms, so that glass is the only material at Athribis that was used for all attested bead shapes. A special form is the wound star bead that may have been intended to represent a plant blossom (Figure 8). There are also drawn, collared, segmented beads (Figure 16 top row right).

Most of the drawn rounded beads (e.g., Figure 16 second top row) are Late Roman types (Then-Obłuska 2018a:220, 226, 228). The drawn green bead in Figure 16 (middle row left) can be dated to the late 10th-early 11th centuries, according to stratigraphy, pottery, and coin weights. Such beads seem to have a very long temporal range, probably until at least the 16th century (Then-Obłuska 2016:581, 588, 604-606). They constitute about half of the glass bead assemblages at Late Roman Berenike (Then-Obłuska 2018b:592).

Among the monochrome glass beads, blue specimens predominate (n = 198), followed by green (n = 79) and yellow (n = 28). Red, brown, black, white, and transparent examples comprise the rest (n = 19). Green and blue glass beads appear to be the most widespread in Roman times (Xia 2003:139), so the strong presence of blue beads at Athribis is unusual. Green and blue glass beads were particularly popular from the end of the 4th to the early 6th century, whereas in the 6th and 7th centuries, dark yellow, purple, and brown (Figure 16 top row) beads were more common. The purple and brown examples were probably intended to imitate purple amethyst beads (Swift, Stoner, and Pudsey 2022:72).

The stratigraphic context of a segmented green bead (Figure 16 top row right), combined with associated coin weights, wooden artifacts, and pottery, proves that this bead was in circulation during the reign of al-Mustansir (AD 1036-1094) or perhaps slightly later. Opaque yellow glass barrels and cylinders, also present at Athribis, are common in the whole Nile Valley south to Lower Nubia until at least the 16th century (Then-Obłuska 2016:581, 589, 603-607). Yellow-striped beads are rare at Athribis (n = 5) but seem to be a typical Egyptian product as only a few of them have been found outside Egypt. Thus, this type is evidence for a possible local or regional custom or fashion with such culturally distinctive and provincially restricted items (Swift, Stoner, and Pudsey 2022:337).

A considerable number of the glass beads are polychrome, some of them with stripes or bands of different colors. The pattern on a wound cylindrical bead (Figure 16 second middle row) seems to be typical of the Early Islamic period (Lankton, Diamanti, and Kenoyer 2013:78, Figure 8.4, no. 661). In fact, this bead was found in a layer attributed to late Early Islamic times. A drawn oblate bead with yellow and white stripes on a black body (Figure 16 middle row) derives from a layer of the early 11th century. The striped and bichrome beads are known not only in Egypt but all over the ancient world (Then-Obłuska 2015:752, 755). Parallels are present in the late phase of Berenike (4th-early 6th centuries) (Then-Obłuska 2015:753).

The wound glass beads include examples with monochrome (Figure 16 middle row right) and polychrome (Figure 16 bottom row left) eyes set into the translucent body. They became popular in the Late Period and lasted until early Roman times, also into the Meroitic period in Nubia, and were traded over vast territories (Then-Obłuska 2015:757). The bead with the monochrome eyes dates to Byzantine times, whereas the polychrome example comes from a heavily disturbed context.

A combed trail-decorated bead (Figure 16 second bottom row) most likely dates to the early 10th century based on the associated pottery assemblage and the stratigraphy. This fits well with the distribution of trail-decorated beads of various colors in the whole Middle East, all the way upstream into Nubian Makuria where they seem to date to the 10th-12th centuries with a concentration in the 11th century (Then-Obłuska 2013:683-684, 696).

Green beads with opaque yellow glass at one end (Figure 16 bottom row) belong to the folded-glass group. They

Figure 16. Glass beads: top row, left to right, cylindrical (19-0-125), drawn barrel-shaped (19-36-30/104), barrel shaped (19-36-30/107), drawn segmented (11-4-6/644); middle row, left to right, drawn compressed cylinder (14-27-70/49), wound with encircling stripes (17-12-192/3), drawn with stripes (14-27-38/14), wound eye bead (13-18-91/3); bottom row, left to right, wound eye bead (19-36-30/81), wound with combed design (11-4-36/23), wrapped bicolored (17-12-54/13), drawn gold-in-glass (17-36-4/2039).

can also be labeled as drop-shaped "date" beads, although they could represent fruits or seeds (Xia 2013:141) or lotus blossoms (Lankton, Diamanti, and Kenoyer 2013:59). This type is common in Egypt and Nubia (Then-Obłuska 2015:760). The illustrated bead was found in a layer that probably dates to the 9th century. Another was found in a context attributable to the late 10th-11th centuries. These beads commonly occur in assemblages in smaller numbers than other beads (Swift, Stoner, and Pudsey 2022:81; Xia 2013:141). This is also the case at Athribis (n = 8). Examples have been found at Berenike, part of the Mediterranean-Red Sea trade network (Then-Obłuska 2018a:220), indicating the participation of Athribis in a greater network. Whether the beads were really used to actively communicate aspects of cultural identity as considered by Swift, Stoner, and Pudsey (2022:81) is questionable and not verifiable in Athribis.

Metal-in-glass beads, invented in the late 3rd century BC (Lankton, Diamanti, and Kenoyer 2013:54), belong to the drawn and segmented category (Then-Obłuska 2015:752-753). At Athribis the metal is gold foil. The example in Figure 16 (bottom right) is fluted and was found in a heavily disturbed context. While metal-in-glass beads

are very rare at this site, they are quite common in the Eastern Mediterranean up to the Nubian 4th cataract from the Hellenistic period until medieval times (Then-Obłuska 2014:1072, 2016:588; Xia 2013:137, 139).

Most of the Athribis glass beads were discovered in layers that belong to the Byzantine and early medieval periods. This is no surprise since glass bead necklaces were particularly common from the 4th-7th, and even the 8th, centuries (Swift, Stoner, and Pudsey 2022:36). Due to its favorable price and easy availability, glass was the most popular material for the beads at Athribis.

CONCLUSION

From 2012 until 2022, we uncovered 771 beads and more than a dozen pendants in the temple of Repit and a nearby trench. They all derive from strata that postdate Pharaonic and Ptolemaic times and can be attributed to Late Roman as well as Early and High Medieval Periods ending in the 13th century.

The vast majority of the beads are made of glass (n = 410) and faience (n = 261). Yet, ten more materials are represented: carnelian, agate, amethyst, amazonite, quartz diorite, calcite alabaster, clay, wood, bone, and horn. Of these materials, carnelian was clearly favored (n = 58). This fits well with its popularity in Roman times. Since wood shows a greater increase in Roman times (Xia 2013:139), its scarcity at Athribis is problematic. All the bead raw materials can be found in the Eastern and Western Deserts of Egypt.

The Athribis beads represent seven different shapes: globular (ball), ellipsoid (oval), barrel, cylindrical, tubular, biconical, and polygonal, as well as several unique forms. Cylinders (n = 240) and barrels (n = 232) clearly predominate, closely followed by tubular beads (n = 182). There is often a relationship between material and form, i.e., certain materials favor certain forms. Carnelian beads are most often globular, agate beads favor the ellipsoid form, wooden beads are always barrels, faience beads are most frequently tubular, while the vast majority of the glass beads are cylindrical and barrel-shaped. A perfect geometric shape was not always achieved, several imperfections in shape, surface, and drilling being noted.

Bead perforations vary considerably in size, depending on the material. Cylindrical glass beads quite often have a relatively wide perforation, with the hole's diameter comprising half of the bead's diameter. This is also characteristic of cylindrical faience beads. Conversely, agate beads regularly have tiny drill holes.

Monochrome glass beads, in most cases drawn and rounded, dominate the Athribis glass assemblage (n = 324 of 410). This is typical of the whole Nile Valley including Nubia, especially in Late Antiquity. Moreover, in Roman times, glass replaced faience as the most-used material for beads (Xia 2013:139, 143); faience bead production in Egypt ended after the 2nd century AD in favor of glass (Then-Obłuska 2014:1075). This is evident at Athribis in that glass beads constitute the majority and most of them were found in later layers. This contrasts with Upper Nubia where glass played a minor role at the time, while faience bead production clearly predominated. Local glass beadmaking seems to have declined after the Arab invasion because faience beads start to become more prominent in medieval times.

Single and multiple segmented glass beads belong to the Mediterranean tradition and were produced in Alexandria, including metal-in-glass beads (Then-Obłuska 2018b:592).

Monochrome drawn, cut, and rounded beads were the most common glass bead group during the late phase at Berenike (4th-early 6th centuries) with semi-translucent and translucent green, usually translucent light blue/green, semi-translucent yellow, and opaque yellow dominating the color palette (Then-Obłuska 2015:753). Generally speaking, this also applies to Athribis.

The bead assemblage at Athribis reveals short- and long-distance contacts during Roman and Byzantine times because many types belong to the Roman and Byzantine bead spectrum. Since the vast majority of the beads were found in layers of the 8th-12th centuries, even in disturbed layers, it is clear that they were in use for centuries. This is supported by the fact that the majority of the Athribis beads are of drawn manufacture, the prevalent method in Roman times, whereas the winding method was re-introduced and employed extensively in the medieval period (Xia 2013:140).

Many of the raw materials were sourced in the Eastern Desert, which is not far from Athribis, so the variety in materials is no surprise, especially due to the activity of Eastern Desert dwellers between the Nile Valley and the Red Sea coast in Late Roman times (Then-Obłuska 2015:765). The similarities between Athribis and other sites throughout the Nile Valley up to Nubia indicate that Athribis was part of a large trade network in beads from Roman to early medieval times.

The importance of color is indicated by the numerical prevalence of glass and faience because both materials imitate beads in precious materials in Roman and Byzantine times. Faience beads imitate turquoise, hexagonal cylinders mimic the crystal structure of amazonite or other green stones, and purple and brown drop-shaped beads copy

the angular drop-shaped amethyst beads that were so fashionable in Byzantine times (Swift, Stoner, and Pudsey 2022:81-82). This suggests that most inhabitants of Athribis were not wealthy enough to exclusively wear beads of semi-precious stones, and resorted to imitations made of glass and faience. This is why the numerical domination of glass and faience beads is so striking. Such a result, however, is normal for a small provincial settlement with the majority of inhabitants belonging to a lower social class.

Throughout the millennia, blue and green hues were the dominant colors of faience beads and other objects such as amulets. The reason for this preference is likely color symbolism: green is the color of regeneration (Germer and von Grumbkow 1997:26) and was considered as being calming and appeasing (Quirke 2015:106). This is why it is often found in the jewelry of mummies. Color can also have a magical aspect. Precious materials, particularly those with distinctive colors or appearance, were widely believed to have apotropaic or healing qualities in Ancient Egyptian and Roman cultures. Consequently, the high number of glass and faience beads at Athribis may also derive from a wish to imitate apotropaic qualities of semi-precious stones because even imitations could have been believed to have the same properties as the materials they copied (*see* Swift 2021).

Thus, one reason for the relative popularity of expensive carnelian beads is their natural reddish color because red was an apotropaic color (Grimm and Schoske 1999:32). Red also symbolized combativeness in a positive sense (Quack 2022:33). It was, therefore, selected for use in objects of personal, often bodily, use (Swift, Stoner, and Pudsey 2022:113). Moreover, red is also connected with the sun, the omnipresent source of life, because red symbolizes the cardinal direction "south" due to the fireball of the sun (Spalinger 2008:242-243). Perhaps this is one reason why carnelian beads are most often given a globular shape. If so, beads with a magical connotation were considered as apotropaic media in their own right (beads in primary function), whereas beads as part of amulets would serve in a secondary function.

The wide variety of beads at Athribis in terms of material, production technology, shape, and color, clearly indicates that this settlement – even though far from the political and economic centers of Egypt – was connected to the wider world of the Roman empire's eastern territories including the Mediterranean and the harbors on the Red Sea, and even beyond. The materials and shapes of the Athribis beads are part of a common "bead culture" that ranged deep into Nubia, all the way up to the 4th cataract. This seems to have continued in the early medieval period, given the long duration of many bead types.

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ENDNOTES

1. For an overview and comprehensive list of the publications by the project, *see* Athribis-Projekt (DFG) | Universität Tübingen (uni-tuebingen.de).

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Patricia Elsner
Athribis Project
Eberhard Karls-Universität Tübingen
Germany
PMElsner@aol.com

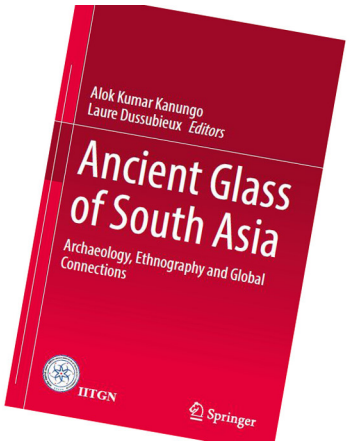
Marcus Müller
Athribis Project
Eberhard Karls-Universität Tübingen
Germany
Marcu.Mueller@Uni-Tuebingen.de

BOOK REVIEW

Ancient Glass of South Asia: Archaeology, Ethnography and Global Connections.

Alok Kumar Kanungo and Laure Dussubieux (eds.). Springer Nature Singapore. 2021. 558 pp., 368 figs. $119.00 (eBook); $159.99 (paper).

Ancient Glass of South Asia is based on papers presented during a five-day conference on the "History, Science, and Technologies of Ancient Indian Glass" organized by the Archaeological Sciences Center at the Indian Institute of Technology, Gandhinagar, in January 2019. The 22 chapters are organized into five sections. The first section, **Glass Origin and Evolution**, begins with Thilo Rehren's review of "The Origin of Glass and the First Glass Industries" in Mesopotamia and Egypt, followed by a discussion of "Glass



in the Middle East and Western Europe at the End of the First Millennium CE, Transition from Natron to Plant Ash Soda or Forest Glasses" by Bernard Gratuze, Nadine Schibille, and Inès Pactat. While neither of these chapters are directly related to bead study, both are fundamental in understanding the early history of glass production and exchange. In the third chapter, "Glazed Steatite and Faience Technology at Harappa, Pakistan (>3700-1900 BCE): Technological and Experimental Studies of Production and Variation," Jonathan Mark Kenoyer presents a detailed review of glazed steatite and faience technology, along with the results of replication experiments, some done at the conference itself. In the fourth and final chapter in this section, co-editor Alok Kumar Kanungo's review of "Traditional Bead and Bangle Crafts in India" includes many excellent photographs from his own fieldwork. Taken together, these four chapters provide a strong background to glass study in general and to glassworking in India in particular.

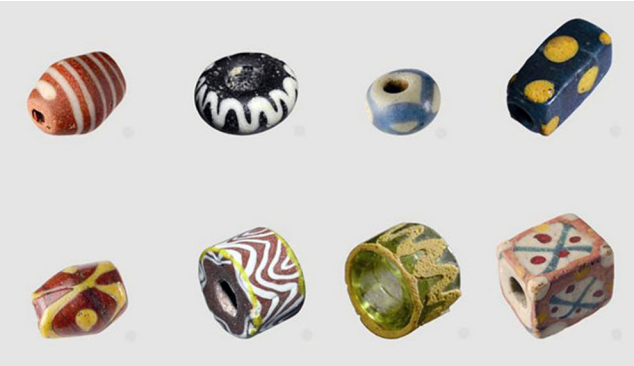
Kanungo (p. 117).

The second section, **Scientific Study and Care of Glass**, begins with co-editor Laure Dussubieux's excellent review of glass elemental compositions and recipes, showing how the various techniques of chemical analysis may help answer archaeological and technical questions where visual examination alone is not sufficient. The next chapter, "Isotope Analysis and its Applications to the Study of Ancient Indian Glass," by Dussubieux, Christope Cloquet, and T.O. Pryce, is clearly presented and shows how the isotopes of strontium, neodymium, and lead enhance and sometimes contradict observed similarities in chemical composition. Stephen P. Koob's useful chapter on "The Conservation of Glass" answers many questions on how best to preserve and repair glass artifacts. The section ends with Joanna Then-Obłuska's "Typology of Glass Beads: Techniques, Shapes, Colours and Dimensions." Even more than the previous chapters, this one is must-reading for anyone interested in glass beads and how they are made, and could easily serve as a stand-alone primer for bead study.

Then-Obłuska (p. 214).

Section three, **Ethnography and Literature**, shifts the focus more directly to glass in India. It begins with Alok Kumar Kanungo's "Glass in Indian Archaeology, Ancient Literature, Historical Records, and Colonial Accounts." This valuable chapter presents the archaeological and historical background to the Indian glass industries discussed earlier by the same author, with detailed information on the evidence for glass and glass beads from the early Iron Age, ca. 1000 BCE, to the beginning of the 19th century CE. The second chapter in this section, Buhvan Vikrama's "Situating Harinagar Finds in Pre-Iron Age Glass Crafts," challenges our current understanding of the origins of glass in India by presenting photographic evidence for what appear to be layers of enamel or glazing on the surface of copper vessels from Harinagar that may date as early as 2300 BCE. If supported by further work, this early date could suggest that "Indian" glass developed in parallel with emerging glass technologies in Mesopotamia and Egypt. "The History of Glass Ornaments in Tamil Nadu, South India: Cultural Perspectives," by Veerasamy Selvakumar, reviews glass finds, mostly beads, from early sites like Arikamedu and Kudikkadu up to more recent times. The parts on glass bangle production and use are particularly interesting and well illustrated. The final chapter in this section, by Jan Kock and Torben Sode, reviews "Traditional Glass Mirror Making in Kapadvanj, Gujarat, India." The many color photographs provide rich illustrations of the processes, products and people involved in this craft that dates back to the 16th century.

The fourth section, **Glass Products in South Asia**, begins with "Glass Beads of Eastern India (Early Historic Period)," by Sharmi Chakraborty. This excellent summary of the bead evidence links bead color, shape, and chronology to inland and coastal sites in this less studied region of the Indian subcontinent. Next, in "A Review of Selected Glass Bead Types from the 2007-2009 Seasons of Excavation at Pattanam, India," Shinu Anna Abraham tells us about the more than 100,000 glass beads found at Pattanam, including excellent photographs of the types of beads found at the site thought to be the remains of Muziris, the major early port on India's southwestern coast. The chapter is greatly enhanced by photographs of not only the small drawn, monochrome beads called Indo-Pacific by Peter Francis, but also the lesser known varieties so richly represented at Pattanam. Along with the prior chapter by Then-Obłuska, Abraham's chapter on beads from Pattanam will be a particular delight for any student of beads and bead history. Mudit Trivedi's chapter "Glass Bangles in South Asia: Production, Variability, and Historicity" builds on the previous chapters by Kanungo and Selvakumar to provide detailed explanations of how both "seamless" and "seamed" Indian bangles were made, along with an archaeological history of the glass bangle in South Asia. "West Asian Glass in Early Medieval India as Seen from the Excavations of Sanjan," by Kurush F. Dalal and Rhea Mitra-Dalal, jumps us forward to Sanjan, Gujarat, in the 10th-12th centuries. There, at a community known for its large Zoroastrian population, local or regional glass beads contrast with imported West Asian glassware. While such Early Islamic period glass is relatively common in Malaysia and peninsular Thailand, glass vessels have been rare in India, perhaps, as the authors suggest, because of a taboo for using glass by the Hindu upper castes. The final chapter in this section is by Maninder Gill on "Interrelations in Glass and Glazing Technologies in Mughal Tilework." Applying art historical and laboratory investigation to the study of decorative tiles of the 16th-17th centuries, Gill uncovers two distinct techniques for glaze production, each linked to traditional glass manufacture. The chapter is enriched by clear explanations and beautiful photographs.



Gratuze, Pion, and Sode (p. 430).

The fifth and concluding section, **The Diffusion of South Asian Glass**, begins with a chapter by Bernard Gratuze, Constantin Pion, and Torben Sode on "Indian Glass Beads in Western and North Europe in Early Middle Age." The authors tell the surprising story of two groups of beads, one very small (less than 1.5 mm diameter), predominantly opaque green and found in Merovingian (mid-5th to 6th centuries) graves in western and northwestern Europe, and the other much larger (10-12 mm diameter), either red or orange, from early-7th-century graves in northern Germany, Denmark, and Sweden. While most European beads from these periods were made from recycled Roman glass, these two groups show strong links to glass produced in South Asia. Next, Sunil Gupta's chapter "Early Glass Trade Along the Maritime Silk Route (500 BCE-500 CE): An Archaeological Review" lays out the archaeological evidence for glass vessels and beads found from Arabia to China, Korea, and Japan, highlighting the expansion of trade during the first three centuries CE. In the third chapter, Laure Dussubieux summarizes current research on "Indian Glass in Southeast Asia." The clear explanations of the various types and excellent photographs are highlights of this chapter, which concludes with a reconsideration of Peter Francis' model for the expansion of South Asian glassmaking and beadmaking technology. One of the major advances in glass study in recent years has been our understanding of the early glass bead trade to eastern Africa. Laure Dussubieux and Marilee Wood have been key contributors to this knowledge, and in the next chapter, "Indian Glass: Chronology and Distribution in Eastern Africa," they review the current evidence, mostly from the second millennium CE and based on their own work plus that of others, for changes in both glass production in India and glass trade around the Indian Ocean. In the final chapter of the book, author Joanna Then-Obłuska returns to an earlier period to examine "Indian Glass Beads in Northeast Africa Between the First and Sixth Centuries CE." While some Indian glass beads have been found at Red Sea ports dating to the early Roman period, the bulk of the imports found along the Red Sea coast and the interior of Northeast Africa are from the 4th-6th centuries CE. Then-Obłuska's detailed review of beads from multiple sites, coupled with her characteristic excellent photographs, will interest most readers of *Beads*.

Ancient Glass of South Asia in an outstanding contribution to the study of glass in general and to the study of early glass beads in particular. The introductory chapters are superb reviews of the state of glass study today and will be valuable for any student of archaeology. I, for one, wish that such concise summaries had been available when I began to study archaeology 20 years ago. Likewise, the sections on the ethnography and archaeology of glass production and usage in India are excellent resources for understanding the sometimes-complex technologies involved. In addition, these chapters build on one another, so that what may not be completely clear in one chapter is filled out in another. Indian Ocean trade, the Maritime Silk Road, and proto-globalization are hot topics in archaeology today, and the several chapters on the diaspora of Indian glass beads to Southeast Asia, Europe, and Africa detail much of the evidence for early exchange, additionally highlighting the unexpected expansion of Indo-Mediterranean trade during the Late Antique period from the 4th-6th centuries. The many excellent photographs are a particular pleasure for the reader and fundamental to the value of the publication.

Congratulations to the organizers of the conference, the editors, and the individual authors for this excellent work that I'm sure will be enjoyed by many readers of *Beads*. The volume is up-to-date and should be a valuable resource for many years to come.

James W. Lankton
Independent Researcher
Foster City, CA
jamesyuri@gmail.com

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