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Author: Fujita, Harumi

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EARLY HOLOCENE PEARL OYSTER CIRCULAR FISHHOOKS AND ORNAMENTS ON ESPÍRITU SANTO ISLAND, BAJA CALIFORNIA SUR

Harumi Fujita¹

ABSTRACT.—Discovery and analysis of 43 pearl oyster (*Pinctada mazatlanica*) artifacts and associated shell-processing tools from middle and basal levels of Covacha Babisuri, a rock shelter on Espíritu Santo Island, Baja California Sur, provide evidence of Early and Middle Holocene fishhook production along the southern Gulf of California coast. AMS ¹⁴C analysis of a fishhook preform recovered from the lowest stratum of the rock shelter returned a date of 8380 ± 50 RCYBP (Beta-236254), or 8750–8500 cal BP with a reservoir effect of 250 ± 20 years, making this artifact one of the earliest known examples of a shell fishhook in the world. An additional pearl oyster artifact was found in a deeper level dating closer to 10,000 RCYBP, suggesting that this type of fishhook may date to this earlier period.

RESUMEN.—El descubrimiento y el análisis de 43 artefactos hechos de ostras períferas (*Pinctada mazatlanica*) y de herramientas asociadas al procesamiento de las conchas provenientes de niveles medios y de la base de Covacha Babisuri, un abrigo rocoso que se encuentra en la Isla Espíritu Santo, Baja California Sur, proporcionan pruebas de la producción de anzuelos en el Holoceno temprano y medio, a lo largo de la costa sur del Golfo de California. A partir del análisis de Carbono 14 con espectrometría de masas con acelerador (AMS ¹⁴C, por sus siglas en inglés) de una preforma de un anzuelo que se recuperó del estrato más bajo del abrigo rocoso, se obtuvo una fecha de 8380 ± 50 años de carbono radiactivo antes del presente (RCYBP por sus siglas en inglés) (Beta-236254), o 8750–8500 años calibrados antes del presente, con un efecto reservorio de 250 ± 20 años, lo que convierte a este artefacto en uno de los primeros ejemplos que se conocen de un anzuelo de concha en el mundo. Se halló un artefacto adicional hecho de ostra períferas en un nivel más profundo con datación cercana a los 10,000 RCYBP, lo que sugiere que es posible que este tipo de anzuelo provenga de este período temprano.

GLOBAL PREHISTORY OF SHELL FISHHOOKS

Fishhooks have been employed in diverse aquatic habitats throughout prehistory (Goto 1983). They have been fashioned from wood, bone, shell, turtle shell, and cactus spines. Shell fishhooks have been reported from many coastal sites around the globe, including Akab and Shimal in the United Arab Emirates (Beech 2003, Méry et al. 2008); Valdivia in Ecuador (Zevallos and Holm 1962, Meggers et al. 1965); Bahía de Quiani in Chile (Bird 1943); the northeast coast and islands off Australia (Roth 1904, Rowland 1982, Attenbrow 2010); various Pacific Islands; and Alta California and the Channel Islands (Moratto 1984, Rick et al. 2002, Breschini and Haversat 2008).

The pearl oyster fishhooks and some of the associated tools from Espíritu Santo Island, in the southern Gulf of California in Mexico, are similar to those found in Australia, along the Arabian Sea (Roth 1904, Allen 1996, Beech

2003, Méry et al. 2008), and in Valdivia (Meggers et al. 1965:147).

Shell fishhooks have also been recovered elsewhere in Mexico: at Ensenada de los Muertos in Baja California Sur (Alfonso Rosales personal communication) and Punta de Mita in Nayarit (Beltrán Medina 2001). J-shaped fishhooks manufactured from mussel shell (*Mytilus* sp.) on Cedros Island are situated between 9970 ± 25 and 10,415 ± 25 RCYBP and are the oldest reported in the world (Des Lauriers 2010). These hooks are strong, and their iridescent nacre may have helped attract fish.

Typical shell species used for fishhook production are pearl oyster, abalone (*Haliotis* sp.), mussel (*Trochus* sp. and *Mytilus* sp.), and turban snail (*Turbo* sp.). Pearl oyster was used for fishhook manufacture at various sites dated between 5500 and 3500 BC in the United Arab Emirates (Uerpmann 1992, Beech 2003, Méry et al. 2008); at Marquesas and Cook Islands and sites in Polynesia and Micronesia

¹Centro Baja California Sur, Instituto Nacional de Antropología e Historia Legaspy 1637, Col. Los Olivos, La Paz, B.C.S., 23040, Mexico. E-mail: harumifuj@gmail.com

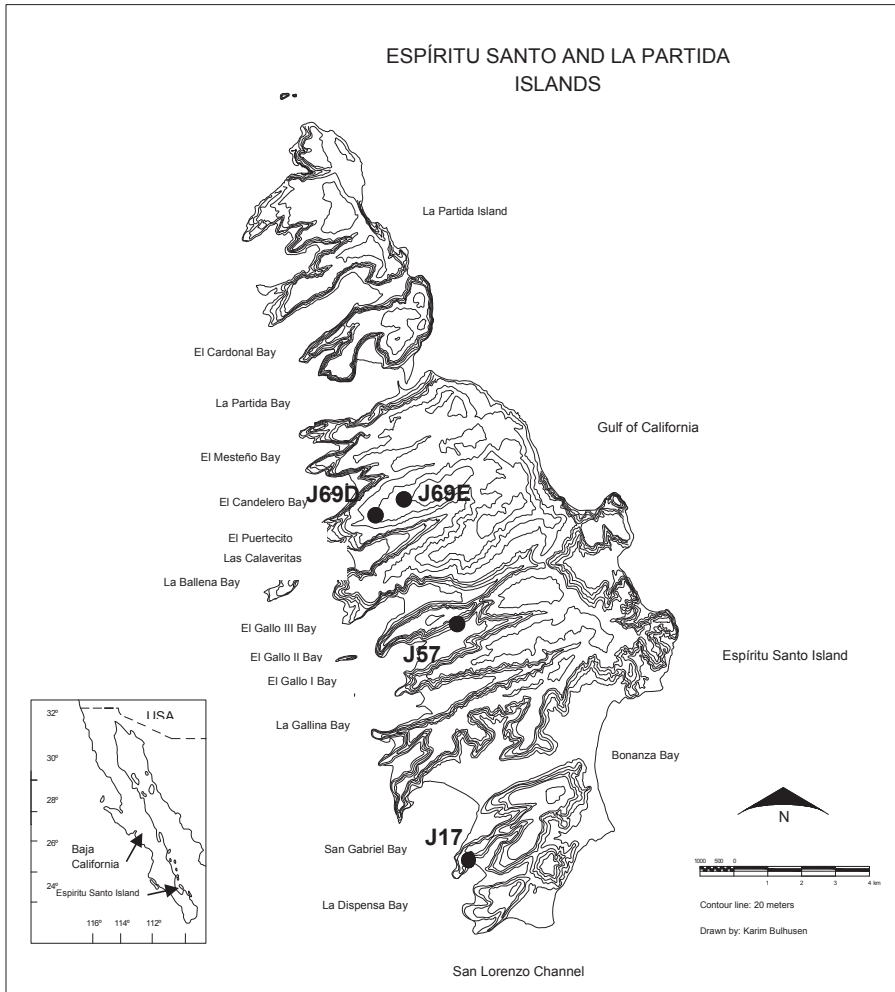


Fig. 1. Espiritu Santo Island, Baja California Sur, Mexico. Sites mentioned in the text: J17, Covacha Babisuri; J57, El Gallo I-8; J69D, Ballena #3D; J69E, Ballena #3E.

during the Late Prehistoric period; at Valdivia in Ecuador between 5000 and 3400 RCYBP (Meggers et al. 1965); and at Covacha Babisuri and some other sites on Espiritu Santo Island. Abalone was frequently used for fishhook manufacture at cold water coastal sites such as California (Moratto 1984, McKenzie 2007, Rick et al. 2002). Mussel shell was used for the Cedros Island fishhooks (Des Lauriers 2010) and was also used at Quiani Bay in Chile (Bird 1943). Fishhooks made of mussel (*Trochus* sp.) were used to capture large fish on the southeast Australian coast, and fishhooks of turban snail shell have also been recovered in those areas (Anell 1995 in Beech 2003:292).

BACKGROUND

Fifteen years of archaeological research on Espiritu Santo Island (1994–2008) confirm the antiquity of human occupation at Covacha Babisuri (Figs. 1, 2). AMS ^{14}C analysis of an unmodified shell sample (*Turbo fluctuosus*) recovered from bedrock at the base of the lowest stratum of the rock shelter was dated to $10,970 \pm 60$ RCYBP, or 12,350–11,930 cal BP, with a reservoir effect of 250 ± 20 years (Beta-236259; Reimer et al. 2009, Fujita 2010).

A diverse assortment of fish remains and lithic shell-working tools were recovered along with the artifacts. The tools include utilized flakes, knives, abraders, drills, and polished

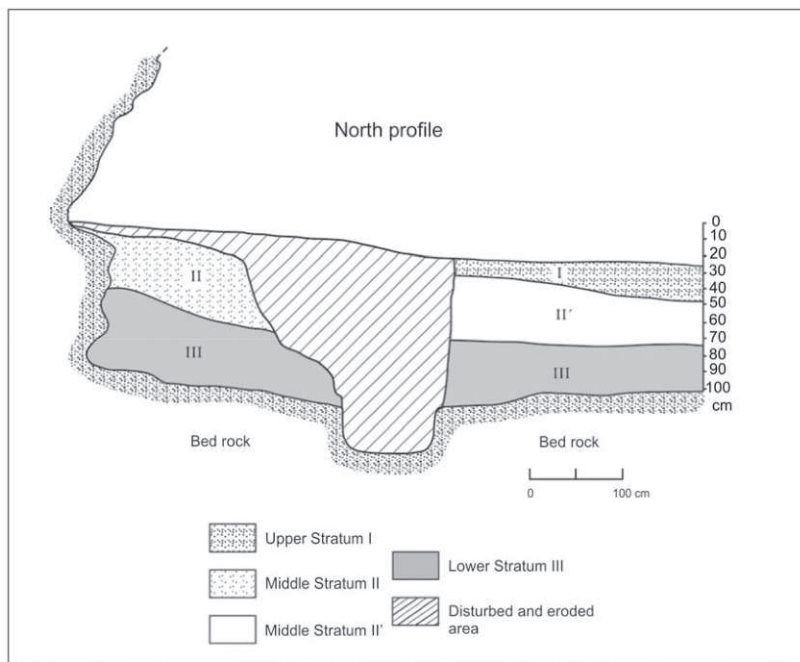


Fig. 2. Stratigraphy of Covacha Babisuri in north profile.

stones. A coral reamer and drill, as well as pearl oyster debitage, preforms, and fragments, indicate that manufacture of the fishhooks and ornaments took place within the rock shelter. Fossilized shell was also present and may have been used as side and end scrapers, drills, and containers (Fujita and Melgar 2014).

The artifacts include complete and fragmented pieces of both circular shell fishhooks and ornaments. Some are retouched and others are abraded (Fig. 3). Though it is assumed that the circular shell artifacts are fishhooks, an 18th-century drawing by an English pirate George Shelvocke shows a native Pericú fisherman in Cabo San Lucas wearing a circular shell fishhook as an earring (Andrews 1979). Thus the Covacha Babisuri artifacts may have served both as fishhooks and as circular ornaments.

THE ARTIFACTS

Of the 43 shell artifacts, 14 were recovered from a stratum dated to between 11,000 and 8000 RCYBP, and 29 artifacts were recovered from the middle stratum dating between 8000 and 3000 RCYBP. The complete and nearly complete Covacha Babisuri artifacts are almost circular, with small openings and sharp pointed

ends. They vary in size and lack barbs, holes, or grooves through which line could have been tied. Of the 41 samples that could be measured, exterior diameters ranged from 2.1 cm to more than 6.2 cm, with a median of 3.4 cm. Thickness varied from 1 to 5 mm for complete pieces and from 2 to 11 mm for incomplete pieces.

Covacha Babisuri's occupants used a variety of shell ornaments, including spire-lopped *Olivella* sp. beads and worked pearls. Pearls with incisions or grooves were recovered in the middle and lower strata corresponding to the Middle and Early Holocene. As recorded by Jesuit fathers and the first European visitors to the region, pearls were used in necklaces and bracelets, along with seeds, marine snails, and cut shells (Del Barco 1973:186).

Fish remains dating to the Terminal Pleistocene and Early Holocene were found with the artifacts, suggesting that the fishhooks were used locally to capture large- and mid-sized fish, such as tuna (*Thunnus* sp.), skipjack (*Euthynnus* sp.), croaker (Sciaenidae), jack (*Caranx caninus*), parrotfish (*Scarus ghobban*), triggerfish (*Balistes polylepis*), bull shark (*Carcharhinus leucas*), and angel shark (*Squatina californica*; Noah 2002, Guía 2008, Gerardo

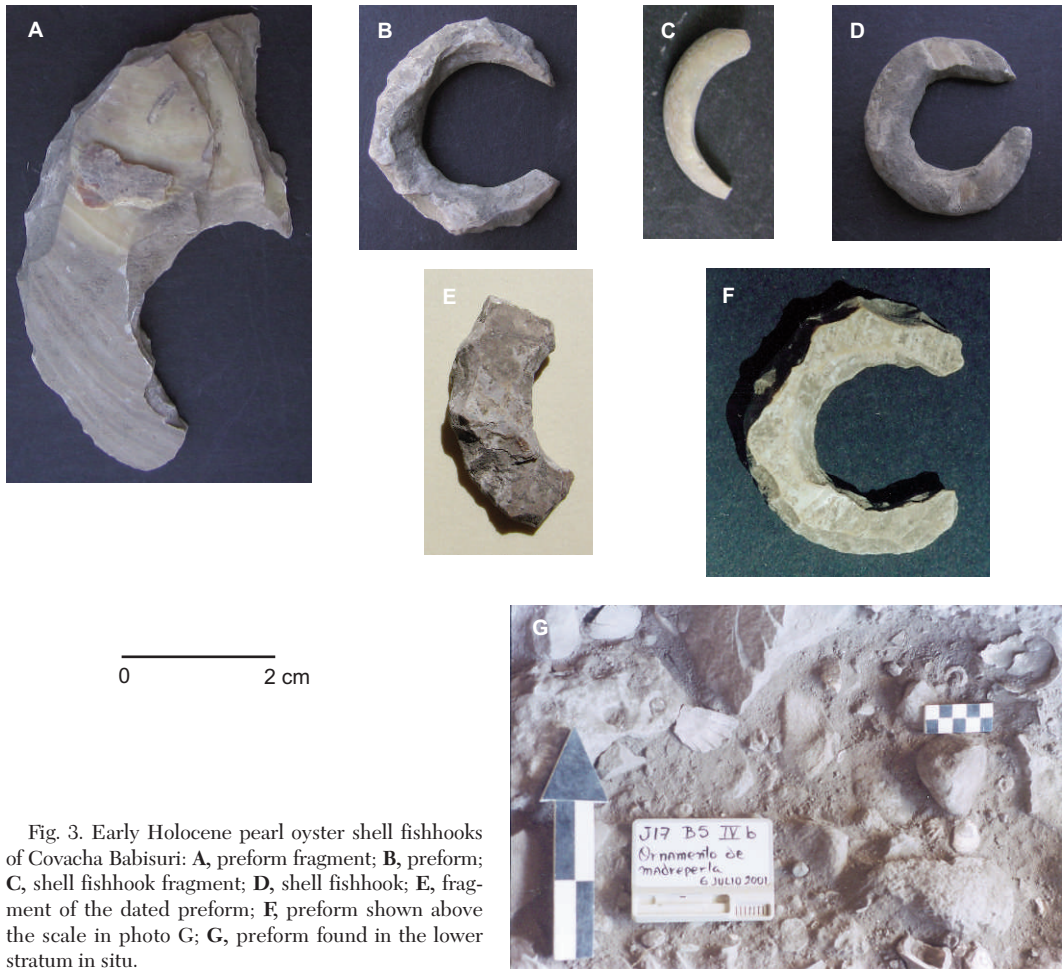


Fig. 3. Early Holocene pearl oyster shell fishhooks of Covacha Babisuri: **A**, preform fragment; **B**, preform; **C**, shell fishhook fragment; **D**, shell fishhook; **E**, fragment of the dated preform; **F**, preform shown above the scale in photo **G**; **G**, preform found in the lower stratum in situ.

González Barba personal communication). In early prehistory, these species were likely captured with hooks and lines, as well as lances or spears with projectile points. Lacking barbs, circular fishhooks have the advantages of being easy to remove from fish and not snagging easily on rocks or reefs. Fishing methodology may have changed once wooden spears and harpoons became more important (Del Barco 1973, Mathes 1970, 1980).

Other sites on Espiritu Santo Island have produced pearl oyster fishhooks (Fujita 2010). Two fragments of circular fishhooks or ornaments were recovered in the rock shelter J-57 El Gallo I-8, and a large fishhook or ornament preform was found at the La Ballena mesa site (J-69D). Although these fishhooks have not been directly dated, a shell sample below one of the fragmented shell fishhooks from the J-57 site was dated to the Early Holocene

(8320 ± 50 RCYBP, or 8630 to 8420 cal BP; Beta-236265), and a shell sample below the preform from J-69D dates to 8770 ± 60 RCYBP, or 9320 to 9000 cal BP (Beta-233678), suggesting the preform also dates to the Early Holocene. Another open campsite on the La Ballena mesa (J-69E) has yielded various Early and Middle Holocene shell fishhooks and associated lithic and coral tools related to the manufacture of fishhooks (Davis 2013). In addition, 6 shell samples recovered at this site have been dated to between $11,284 \pm 121$ RCYBP and 6610 ± 75 RCYBP, or 12,700 to 12,235 cal BP and 7009 to 6653 cal BP, respectively (Fujita 2010). Thus it is possible that the manufacture and use of shell fishhooks on Espiritu Santo Island might be as early as or contemporary with similar artifacts reported from Cedros Island (Des Lauriers 2010).

MANUFACTURE PROCESS

As described by others (Attenbrow 2010; Best 1929 in Beech 2003:293; Charpentier and Méry 1997 in Beech 2003:293; Méry et al. 2008; Roth 1904), the production process of shell fishhooks on Espíritu Santo Island in southern Baja California is as follows:

1. The thickest part of the shell is perforated with a punch or drill made of rock, shell, or coral. The perforation is enlarged progressively until the desired diameter (typically between 10 and 35 mm) is achieved. This is accomplished by abrading the shell with a polished stone and with coral previously soaked in water.

2. The edges of the preform are retouched to a circular form by using a thin abrader/hammerstone of porous rock or coral.

3. Abraders or coral are used to form the C-shaped opening.

4. The surfaces of the hook are abraded with abrading stones to obtain the desired form and uniform thickness.

Some of the Covacha Babisuri preforms suggest manufacture of circular fishhooks with wide openings. The alternative production process for such fishhooks involves perforating the preform after it had been formed into an oval as follows:

- A. The pearl oyster shell is retouched into an oval form with a coral abrader/hammerstone.

- B. In the thick central margin of the oval-shaped shell, a half circle is perforated with a reamer, hammerstone, and thin rock or coral drill. Some are retouched to obtain slightly curved extremities to form the narrower openings.

- C. The edges of the preform are retouched to obtain the desired form by using a long, thin coral abrader/hammerstone.

- D. The surfaces of the hook are polished with a rock or coral reamer to obtain the desired form and uniform thickness.

DISCUSSION AND CONCLUSIONS

Evidence for manufacture and usage of pearl oyster circular fishhooks and/or ornaments at Covacha Babisuri dates to the beginning of the Early Holocene, about 10,000 years ago, and possibly extends earlier into the Terminal Pleistocene. Although the dietary contribution of terrestrial fauna found at the

cave has not yet been determined, it is clear that the Espíritu Santo islanders focused on exploiting marine resources, primarily mollusks and a wide variety of fish species. Similarly, archaeology at Cedros Island in the Pacific Ocean of northern Baja California has produced Early Holocene shell fishhooks (Des Lauriers 2010). However, Cedros Island is approximately 900 km across land and more than 1200 km by sea from Espíritu Santo Island in the Gulf of California. Thus there is not sufficient archaeological evidence to establish a social interaction between these 2 islands. Discovery of shell fishhooks at early sites on both islands, as well as the similar marine-focused subsistence orientations, contribute to the growing body of data supporting significant early New World coastal adaptations (see Erlandson et al. 2009). Interestingly, the earliest evidence for circular shell fishhooks (*Mytilus californianus* and *Haliotis rufescens*) in Alta California and the Channel Islands is around 2500 cal BP, considerably later than the fishhooks from Baja California. The reasons for this difference between the 2 regions is unclear and warrants additional research. Future research will also investigate similarities or differences in lithic technology and subsistence patterns in the early sites on the peninsula of Baja California and how these may relate to fishhook production and maritime foraging. For now, the discovery of circular pearl oyster fishhooks in at least 4 regions of the globe—United Arab Emirates, northeastern Australia, Ecuador on the South American Pacific coast, and southern Baja California—is a testament to the importance of this technology as part of the maritime toolkit for some early New World coastal peoples.

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