



CONCRETIONS AND OTHER ARTIFACTS

by

David McIntosh

Michael D. Flecker

- * Concretion B1161 Disassembly
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CONCRETE B1161 DISASSEMBLY

Artifact B1161 is an iron-based concretion with maximum dimensions of 78 x 39.5 x 14cm and a mass exceeding 30 kilograms (Figure 1). The conglomerate was found cemented to bedrock at the seaward end of a shallow ravine in 8m of water on the seaward side of the elevated portion of the reef, approximately 60m from shore. The concretion was raised in six separate sections which were reassembled prior to undergoing dismantling in a laboratory environment.

and then cast with the polysulfide rubber compound Smooth-On FMC-100. These casts were removed during dismantling after their positions and full dimensions were recorded. The concretion was excavated with the aid of two tools. The primary disassembly tool was a small pneumatic scribe fitted with a custom chisel-like blade. Especially stubborn inclusions were removed with a small hammer and chisel. These tools proved to be effective for removing the thin

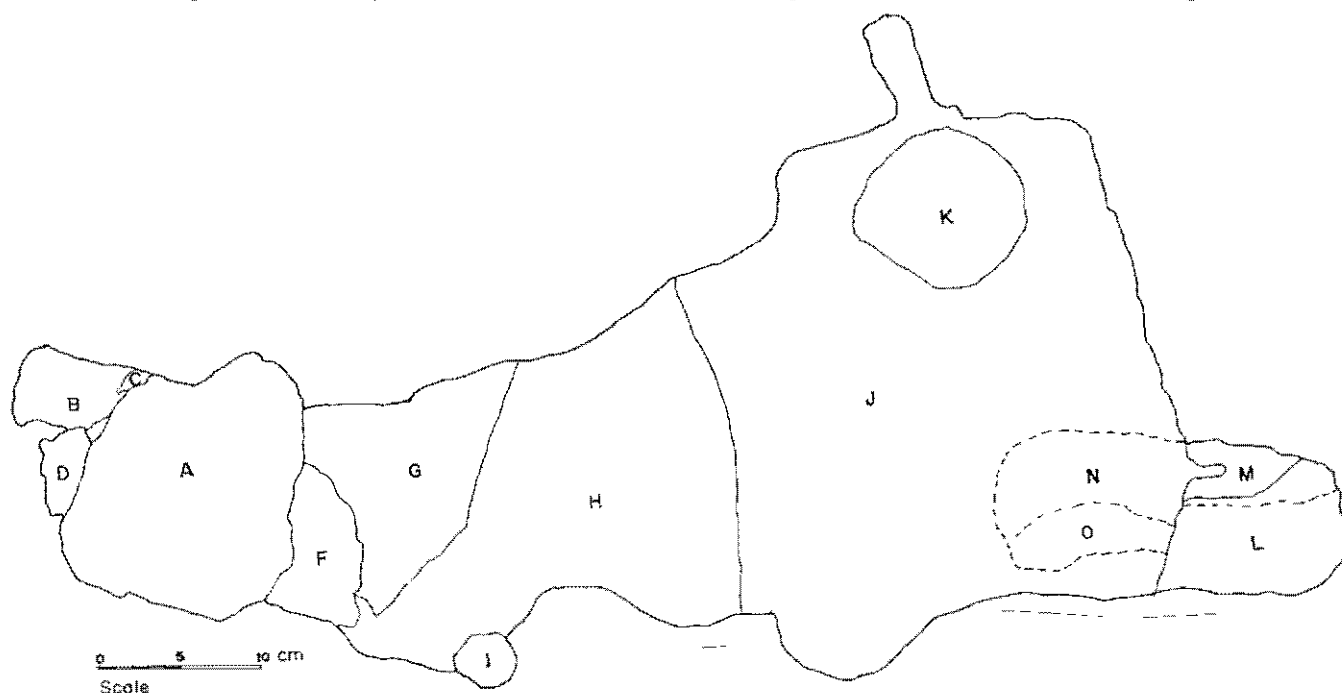


Figure 1

Initial documentation consisted of recording the outline of the concretion and investigating its contents through radiography. The radiographs revealed the presence of a wide range of material contained within the encrustation and iron corrosion product. This information was integral to the decision to proceed with careful disassembly of the artifact-laden concretion. Tracings were made of the radiographs for use as guides during this process. Any artifacts not revealed by the radiographs were added to the guides as encountered. Such artifacts escaped x-ray detection through two means; nature of material (ceramics and organics), or by being located beneath a piece of lead sheathing, for example.

The final step before actual disassembly was the casting of degraded iron artifacts exposed to the exterior of the concretion. Eight natural molds were cleaned through mechanical means

layer of marine encrustation (3-10mm) and the thicker and harder interior matrix of iron corrosion mixed with pockets of calcareous material.

The 581 artifacts which were removed from the encrusted conglomerate were made of twelve different materials and comprised more than twenty-four specific artifact types (Table 1). There were no readily apparent relationships between the position of the artifacts. In general, the dimensions of the concretion were dictated by the location of the iron fasteners.

The two most abundant materials in the concretion, copper alloys and glass, tend to suffer from extreme corrosion and degradation during these 350 years in an unstable and oxygen rich marine environment. Therefore, it is not surprising that relatively few objects of these materials were located loose among the bottom sediment.

Table 1. Artifact Breakdown by Material Type

<u>Material Type</u>	<u>Total Count</u>	<u>Artifact Type</u>	<u>Individual Count</u>
Brass	409	Tac1	48
		Tac2	153
		Tac3	178
		Tac4	13
		Dome Tacks	4
		Finials	4
		Misc.	9
Glass	59	Beads	37
		Other	4
		Fragments	18
Gold	32	Buttons	30
		Chain	1
		Other	1
Lead	23	Sheathing	17
		Shot	5
		Weight	1
Iron	10	Iron	10
Rubber	8	Rubber	8
Silver	2	Sword Pommels	2
Other	38	Bronze Coin	18
		Porcelain	10
		Stoneware	3
		Hemp	5
		Wood	2

Alternatively, when brass and glass objects are quickly encased in a protective coating like this concretion, they can be preserved for centuries on end. The brass pieces were cathodically protected, as they formed a portion of the negative terminal in the electrochemical circuit formed between the iron artifacts (anode), the other metals, and the sea water. The glass

beads were protected from the potential erosion, the other metals, and the sea water. The glass beads were protected from the potential erosion, abrasion, and salt impregnation by their surrounding encrustation. Without this protection they would exhibit the damage and flaking generally associated with glass objects recovered from marine sites.

By far the most abundant material type found was brass. Many different artifact types made of this copper alloy were located, but they were primarily represented in the form of four types of ornate furniture or upholstery tacks designated as TAC1, TAC2, TAC3, and TAC4.

TAC1's are characterized by their symmetric flower like design and prominent center hole (Figure 2).

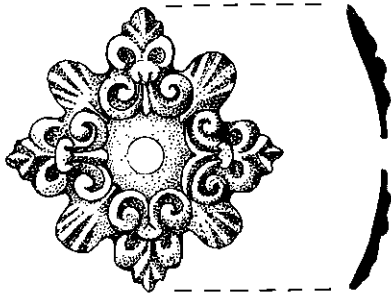


Figure 2

What have been designated as TAC2 and TAC3 were found in large numbers and in mint condition (Figures 3 and 4). These tacks were scattered fairly randomly throughout the concretion and were often found in close contact with one another.

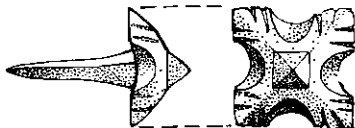


Figure 3



Figure 4

TAC2 has a decorated square head with concave sides and a pyramid top; TAC3 has a tiered dome head with a petal like decoration around the base.

The TAC4's are recognized by their scalloped, hemispheric shape with a square, wedge depression for the shank which was probably iron and has long since disappeared (Figure 5). Alternatively, TAC4 may be a clothing decoration, possibly the clasp for a cloak (personal communication, M. Stanbury). The weak-looking shank connection supports the clothing theory, however, very similar tacks can be found on the doors inside the Augustinian Church in Intramuros, Manila.

Small fragments of gold leaf were found on the surface of TAC2, 3, and 4 indicating that the exposed surface was gold plated.

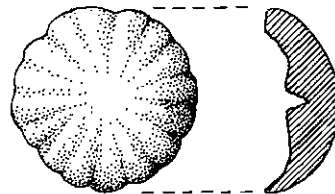


Figure 5

In addition to the previously mentioned tacks, four other tacks, called dome tacks, were found inside the concretion. These dome tacks have simple, domed heads (8mm diameter, 4mm height) and in general are 24mm long with 2mm square shanks (Figure 6).

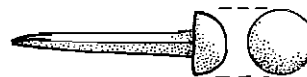
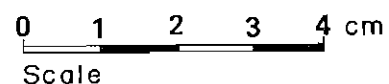


Figure 6

Four brass finials in two different sizes were uncovered Figure 7 represents the larger finial. These two larger finials were found within 20mm of each other on the same horizontal plane.

The two smaller finials were discovered randomly in the concretion. The design on the smaller finials is similar to Artifact B431 (Figure 8) which is radially ribbed and hemispheric with a rectangular protrusion and a spiral like top.



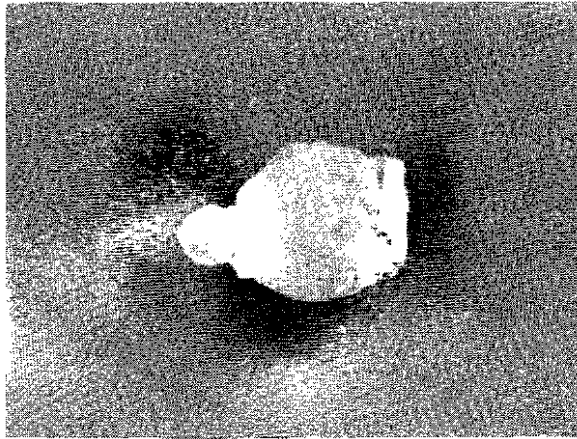


Figure 7

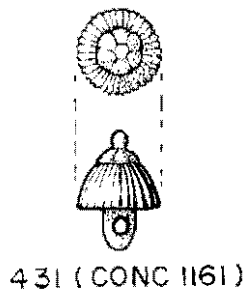
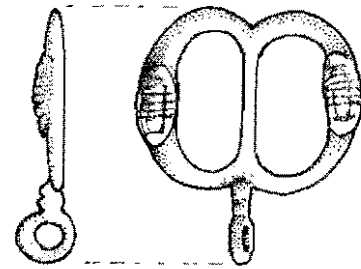


Figure 8

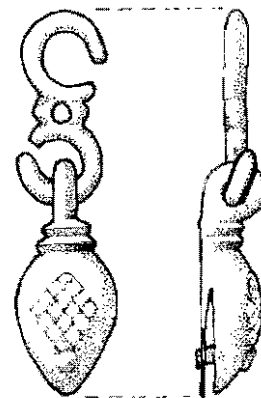
Nine miscellaneous brass objects were also recovered. Two magnificently preserved brass artifacts provide the means of attaching a sword or dagger scabbard to a belt. Artifact B87 (Figure 9) is a chape, that is, a sliding loop on a belt, with stylized, pineapple decorations on each side. It is very similar in design to that located on the Padre Island wreck site 41 KN 10. Artifact 294 (Figure 10) is in two connected parts, a belt end and an "S" clasp. The belt end has a gap between the domed top and flat back into which the belt fits and is held in place by a rivet. The "S" clasp connects the belt to the chape. Figure 11 shows how the artifacts were possibly used together.

Similar pieces, in both silver and brass, were found on the *Batavia* (1629) and are documented by Baart, Jan et al, (177). These items are well represented in 16th and 17th century paintings.



87 (CONC 1161)

Figure 9



294 (CONC 1161)

Figure 10

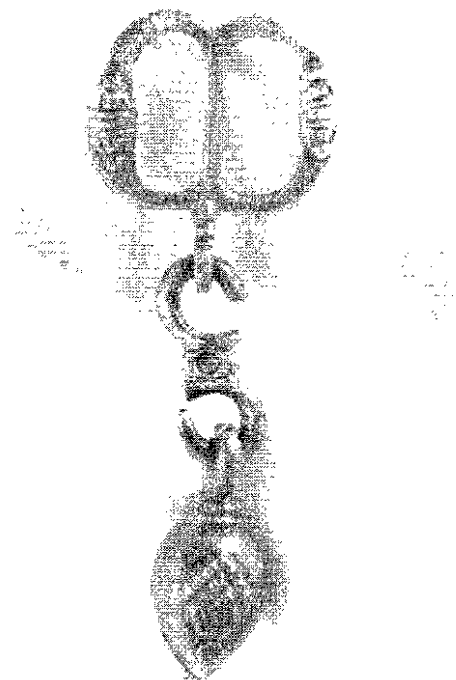
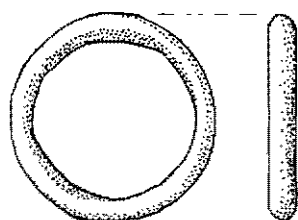


Figure 11

Two brass rings, again nearly identical to one found on the Texas site 41 KN 10, were also found. Artifact B254 (*Figure 12*) is an example of one.

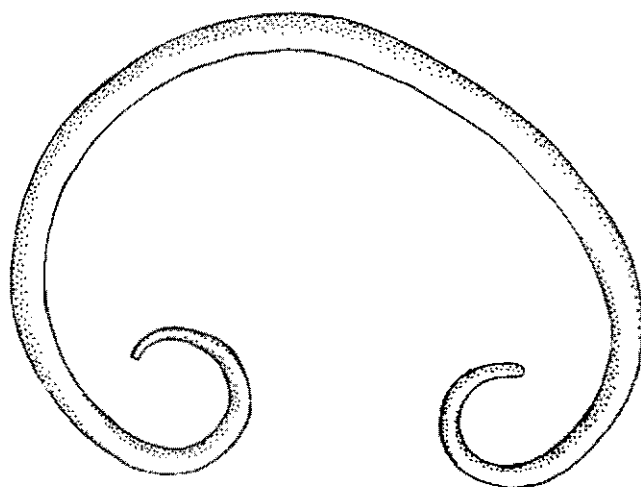


254 (CONC 1161)

Figure 12

Three small brass buttons were found inside the concretion. These hemispherical, scalloped buttons are hollow with a flat back. Similar buttons were found on the *Lastdrager* (1653) and the *Vergulde Draeck* (1656) and were worn by lesser members of the ship's complement.

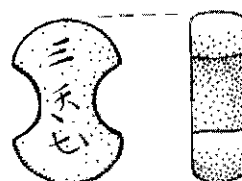
Another artifact B194 (*Figure 13*), is thought to be a cloak fastening (personal communication, M. Stanbury). It is a brass piece (5mm in diameter), shaped like a "C" with ends looped back. Material could be bunched together through the fastening without being pierced.



194 (CONC 1161)

Figure 13

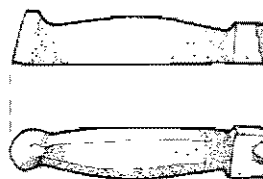
Artifact B112 is a Chinese weight (*Figure 14*) which was found in excellent condition. It measures 21mm long and 14mm wide with a measured mass of 13.15g and has the profile of an apple core. Three Chinese characters are etched into the upper surface, "Sun, Chian, Qi" which translates to "Three, Point, Seven." The original meaning of "Chian" was a unit of weight and it was placed in the middle to denote a decimal point of similar division of units. A small weight like this would have been used to weigh precious metals and can still be found in use today in some Chinese goldsmith shops (personal communication, Prof. Lu Lauw).



112 (CONC 1161)

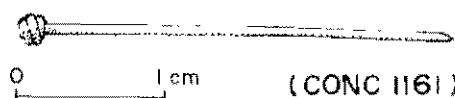
Figure 14

Other miscellaneous artifacts include what may be a handle (*Figure 15*), a 29mm long pin with a spirally wound head (*Figure 16*), a chain link and pendant, two small shafts, and other items as shown in *Figure 17*, all of which require further study.



(CONC 1161)

Figure 15



(CONC 1161)

Figure 16



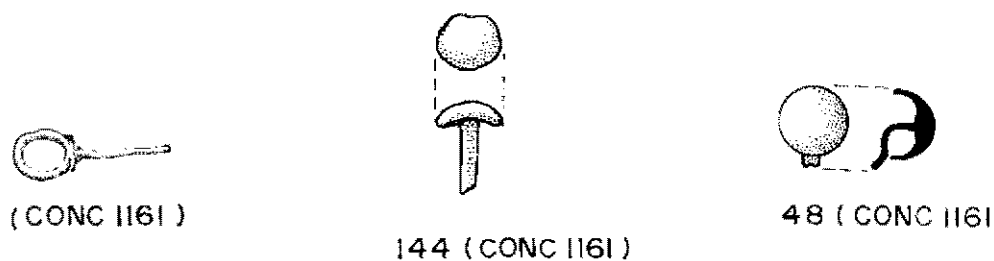


Figure 17

Glass was the second most prevalent material type, consisting primarily of single color beads. Thirty-seven beads were found in ten different shapes and five different colors along with numerous fragments and four miscellaneous glass objects. The beads range in size from maximum dimensions of 13.5mm to 3mm and shape from 14 faceted sides to mere elliptical cylinders. These beads were protected from the elements, but a few well-worn examples also survived beneath the rubble. Four different types are represented: in *Figure 18*, a small, ovoid red bead 9.5mm long; *Figure 19*, a small, hexagonal section red bead 4mm long; *Figure 20*, a medium size red or blue cornerless cube 8mm and *Figure 21*, a larger, clear to pink, cornerless cube 10mm. The unique forms and sizes are summarized in Table 2. There were sufficient numbers in the concretion to indicate that they were part of the cargo bound for Acapulco.

According to Peter Francis, Center for Bead Research in New York, the beads are probably of Chinese origin due to their high lead content (in excess of 5 percent) a good, although not infallible, indication. There is mounting evidence that the Chinese exported beads heavily into South East Asia beginning in the 13th century. This is an early example of trade, although indirect, with the new World.

The beads are wound, the glass having been wrapped around a mandrel and then pressed into shape. The blue color is probably from cobalt and the red from copper. The fracture pattern of the pinkish cornerless cube is not like that of glass. It may, therefore, be carnelian which obtains its red color by baking in a reducing atmosphere. De Morga (1609) said the Chinese exported carnelian to the Philippines, however, India was the main stone bead maker.

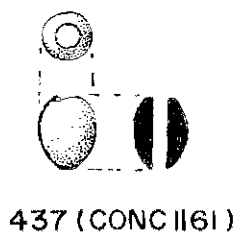


Figure 18

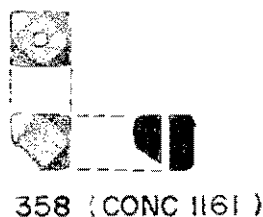


Figure 20

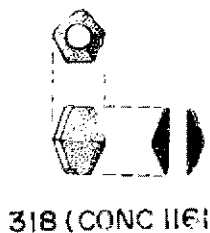


Figure 19

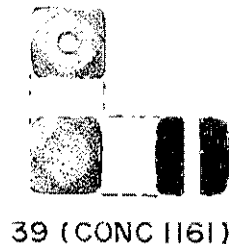


Figure 21

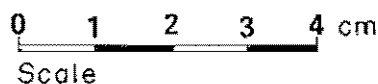
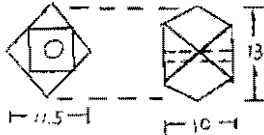
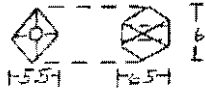
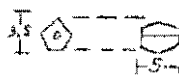
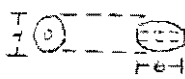
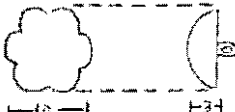
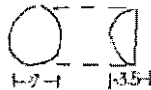
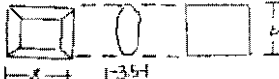


Table 2. Glass Artifact Types

Type	Artifact Number	Dimensions (mm)	Illustration	Count
A. Bead	58	13 x 10 x 11.5		9
B. Bead	121	7 x 6.5 x 6		1
C. Bead	130	6.5 x 6 x 5.5		3
D. Bead	131	5 x 3.5		14
E. Bead	136	9.5 x 9.5 x 7.5		7
F. Bead	399	6 x 4		3
G. Rod	265	42 x 1		1
H. Button	333	10 x 3		1
I. Pellet	335	7 x 3.5		1
J. Rectangle	440	8 x 6 x 3.5		1

Thirty-two gold artifacts were found encased in the conglomerate. Thirty of these gold artifacts are buttons which were also well represented outside the context of this concretion. See Jewelry Catalog No. 104 for more information on this type of gold button.

Twenty-three lead artifacts were also located. Seventeen are scraps of sheathing ranging in size from 59 x 27.5 x 5mm to 21 x 12 x 1mm. Five are individual pieces of spherical shot, consisting of 11, 12, 13 and 16 caliber. The final lead artifact is what may be a fishing weight Artifact B32 (*Figure 22*). It has a block-like shape with a hole running longitudinally through its center.

0 1 2 cm
Scale



32 (CONC 1161)

Figure 22

Ten incomplete iron spikes were extracted in varying degrees of decay. *Figure 23* is an example of the four types of spikes found. The spikes with the greatest volume were located closer toward the center of the concretion therefore, were better preserved. Associated with these fasteners were four pieces of caulking found surrounding spike molds just below the original position of the head. These pieces of hemp were found in excellent condition because of their location in the concretion's interior (*Figure 24*). They served as seals for relatively small spikes; the largest being eleven square millimeters Artifact A441 (*Figure 25*). Logically included with these artifacts are the eight rubber casts made prior to disassembly. Six of these are portions of square-shanked spikes while the remaining two have yet to be identified.

IRON SPIKE

0 1 2 3 4 cm
Scale

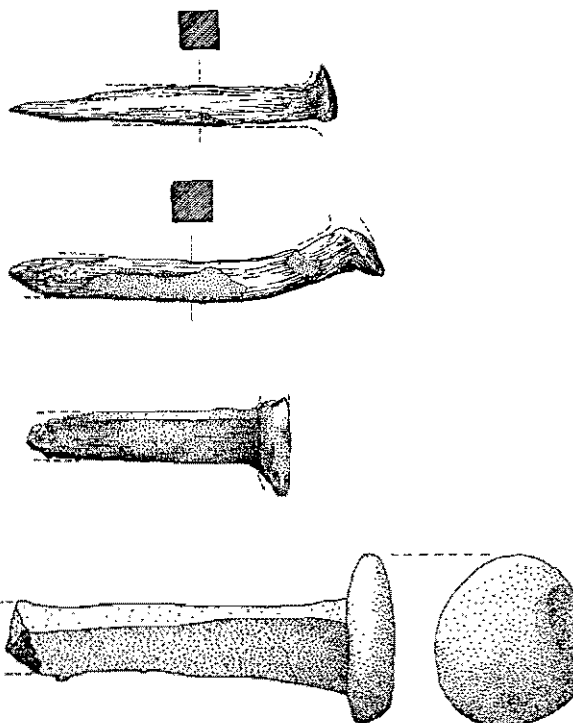


Figure 23

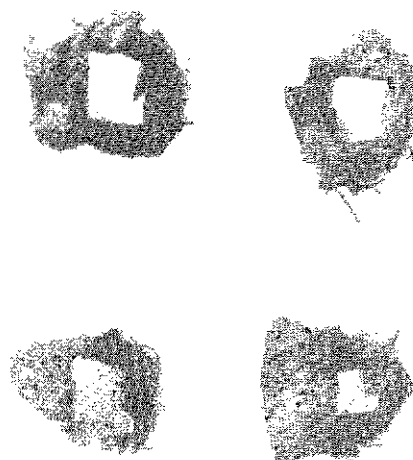


Figure 24

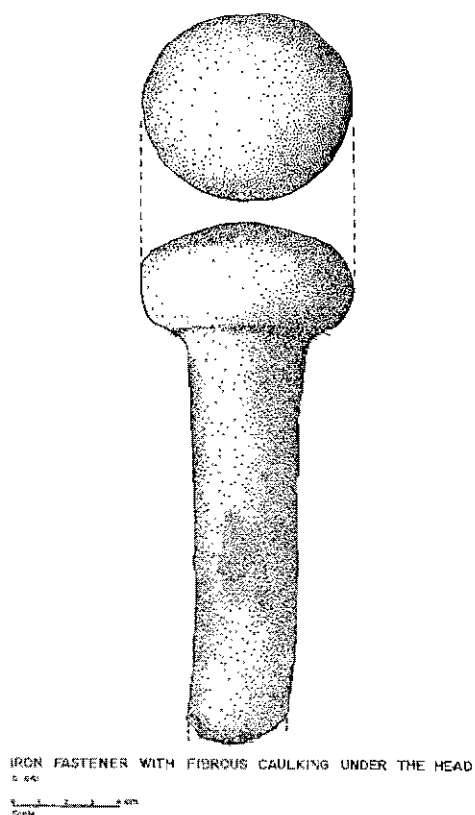


Figure 25

Two sword pommels were recovered from inside the concretion (Figure 26 and 27). They were made of silver and are of the same shape but vary in size and proportion. Several slightly larger pommels with decorations were found on the *Atocha*, some still attached to swords.

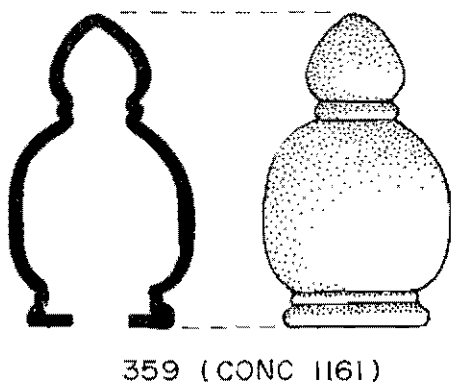


Figure 26

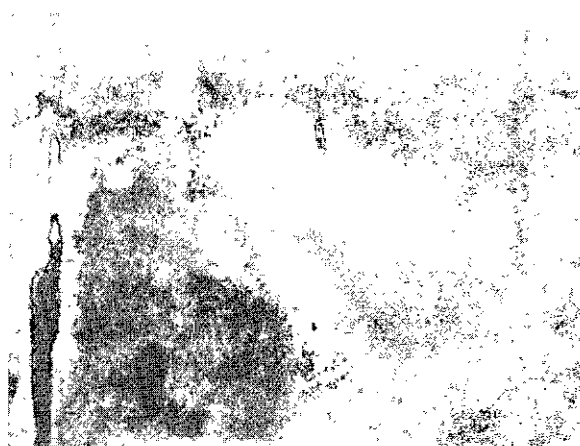
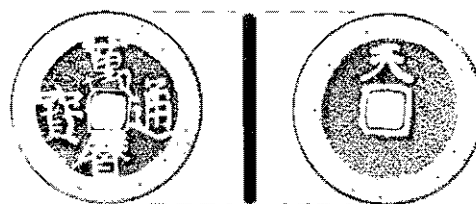


Figure 27

Eighteen Chinese coins were found all of which were in reasonable condition due to the cathodic protection with in the concretion Artifact B76 (Figure 28). These coins were issued during the Wanli Period in the Late Ming Dynasty which covers the years 1575 to 1620.



76 (CONC 1161)

Figure 28

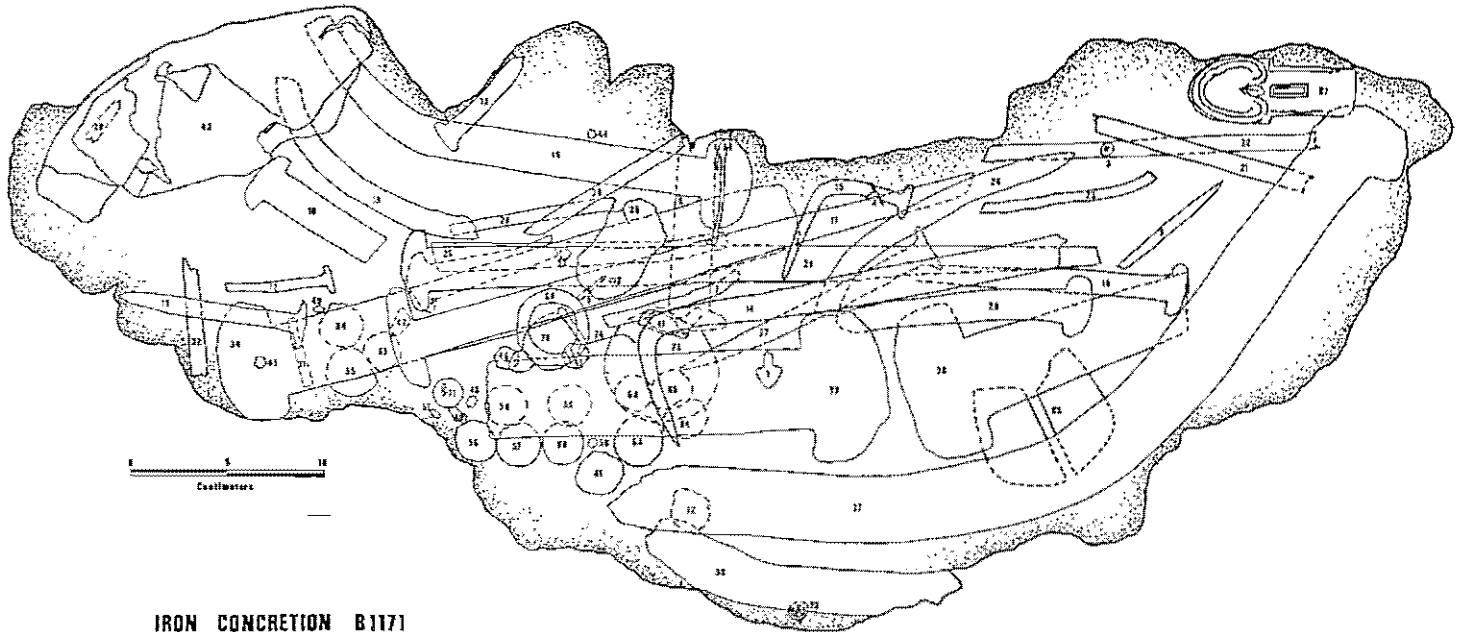
Completing the artifact collection from this concretion are ten porcelain shards (max. 67 x 40 x 5mm), three stoneware shards (max. 72 x 61 x 14mm), and portions of two small twigs.



CONCRETION B1171 DISASSEMBLY

Concretion number B1171 measured approximately 740 x 240mm (*Figure 29*). A few porcelain shards and some lead sheathing visible on the surface were all that distinguished this mass from the surrounding coral.

the concretion. These were in a very good state of preservation as had been noted before on the wreck of the *Witte Leeuw* which sunk in 1613 off St. Helena (Stenuit, 1978) where iron cannons were recovered totally encrusted in a pepper



IRON CONCRETION B1171

1 - 5	Iron tacks	68	Iron washer
6 - 32	Iron spikes	69	Twin mirrors
33 - 37	Iron bolts	70	Hollow brass knob
38 - 43	Lead sheathing	71	Spherical gold button
44 - 52	Glass beads	72	Fragment of gold complex chain
53 - 66	Musket shot	73	Porcelain spacer disc
67	Imprint of Jiyu symbol from engraved metal	74	Copper alloy wire

Figure 29

Before disassembly the concretion was x-rayed to reveal the main constituents. Objects that showed up distinctly on the x-ray included iron bolts, lead shot, a gold button, lead sheathing and what appeared to be the end of a sword hilt.

The concretion was tackled from the bottom by first removing up to 5cm of hard coral using an air chisel. Where the black iron oxide appeared the air chisel was replaced by a pneumatic engraving tool and a small hammer and chisel.

The calcarious iron oxide material between the artifacts was quite heterogeneous being very hard in some places, typically near the coralline crust, and very soft in others. The softness can be mainly attributed to the matrix of pepper seeds (*Figure 30*) which made up a large part of

concretion. Cereal grains, probably rice, were also present although in small concentrations and in bad condition.



Figure 30

Iron ship's fittings in the form of tacks, spikes, and bolts were the first objects to appear. The tacks and some of the spikes left only a mold. Other spikes and the bolts were still present and in fact, sound metal still remained in some cases under a corrosion layer that was often little more than dust. One other object that left a mold was an iron ring, not quite joined, which could well have been a washer, placed over a bolt before swaging. Casts were taken of highly corroded or non-existent objects using FMC-200 Polysulfide Flexible Mould Compound. In some cases a rubber replica was made by making a mold with KE-17 Silicone and then taking an FMC-200 cast.

A total of 5 tacks, 27 spikes and 5 bolts were identified. Only fragments of the tacks remained (*Figure 31*). They are described in Table 3.

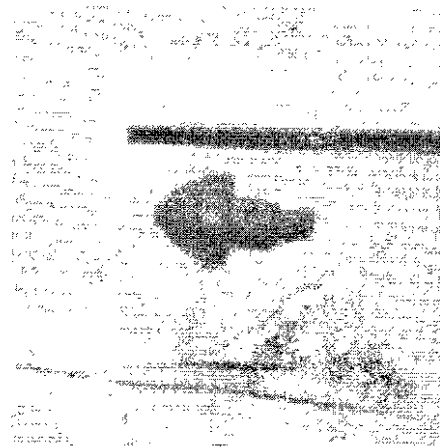


Figure 31

Table 3. Iron Tack Distribution

No.	X-Section	Diam. or width	Head width	Head depth	Description
1.	round	7	16	14	Dome head with spiral pattern
2.	square	3	--	--	Shank fragment
3.	square	3	16	--	Shank with section of rounded head
4.	square	4	19	1	Very flat wide head
5.	square	3	--	--	Shank fragment

The spikes (*Figure 32*) are many and varied. They all have either caulking material, wood or both under their rounded heads where heads existed. They are all of square section and the width has been measured by the head (Table 4).

The five bolts were all roughly the same diameter and are either bent or broken. Where the bolt heads exist they are surrounded by a black fibrous caulking material but no wood remains (*Figure 33* and Table 5).

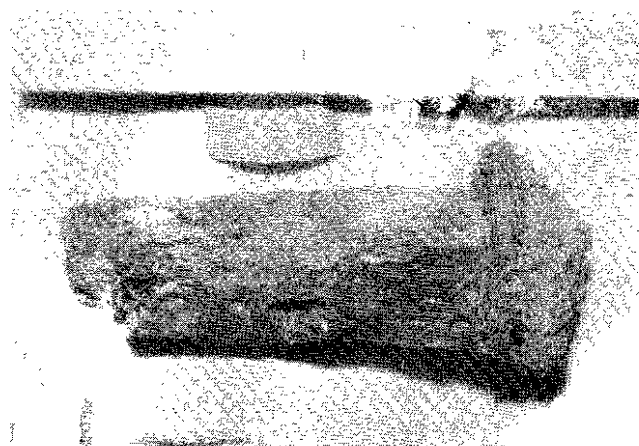


Figure 32

Table 4. Iron Spike Description

No.	Width	Length	Head Width	Head Depth	Description
6.	8	--	--	--	Shank fragment
7.	7	64	--	--	No head
8.	20	85	40	10	Broken
9.	22	90	35	18	Broken
10.	20	70	40	15	Broken
11.	12	100	25	6	Intact
12.	5	53	16	3	Intact
13.	12	80	32	6	Broken
14.	18	230	--	--	No head
15.	12	110	26	9	Intact
16.	22	260	50	23	Broken
17.	19	320	45	15	Broken
18.	22	70	42	14	Intact
19.	16	140	--	--	No head
20.	7	--	--	--	Shank fragment
21.	10	115	--	--	No head
22.	7	175	--	--	No head
23.	7	95	--	--	No head
24.	12	160	--	--	No head
25.	16	130	32	15	Broken
26.	16	210	--	--	No head
27.	14	160	22	3	Broken
28.	22	350	30	12	Intact
29.	8	85	--	--	No head
30.	7	90	--	--	No head
31.	5	35	--	--	No head
32.	8	70	--	--	No head



Figure 33

Table 5. Iron Bolt Description

No.	Width	Length	Head Width	Head Depth	Description
33.	33	250	--	--	No head
34.	35	270	65	36	Broken
35.	39	180	68	40	Broken
36.	36	150	64	35	Broken
37.	36	450	64	35	Bent

There were 14 lead musket shot all of 20mm caliber except for one of 18mm and one of 24mm. Strangely they were all in the top layer of the concretion rather than at the bottom where one would expect material of that density. As they were all in one area measuring only 220 x 70m it is possible that they were in a pouch which only rotted away after initial consolidation (*Figure 34*).

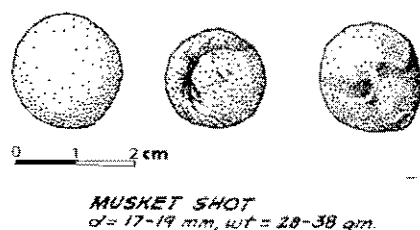


Figure 34

Many glass beads showed up on the x-ray, however, the glass tended to bond with the concretion material as strongly as it bonded with itself which made removal very difficult. Nine beads classified as either type A or B (*Figure 35*), and each having a hole through the center, were recovered intact (see Table 6 for Glass Bead Descriptions).

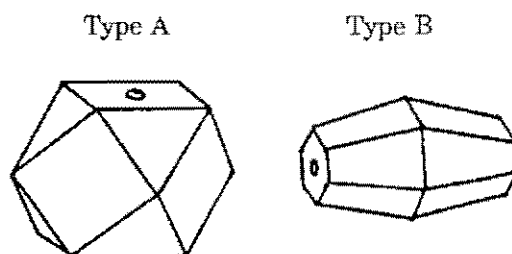


Figure 35

Table 6. Glass Bead Description

No.	Dimensions	Color	Shape
44.	4	Clear	A
45.	10	Clear	A
46.	10	Clear	A
47.	10	Clear	A
48.	6	Red	A
49.	5 x 3	Purple	B
50.	6	Red	A
51.	6	Red	A
52.	7 x 4	Red	B

Porcelain and stoneware shards were found throughout the concretion, in greater concentrations in some places than in others (*Figure 36*). Some 1.1kg of porcelain were recovered most in very small pieces as would be expected among a mass of iron ships fittings. One unusual piece remained complete. This was a very crudely made white disc of 52mm diameter with a textile imprint on one surface (*Figures 37 and 38*). It is thought to be a spacer or stand used to support a piece of porcelain in the kiln during firing. This

theory is enhanced by an incomplete ring of glaze on the imprinted surface. Similar pieces have been noted before, still stuck to the underside of bowls (personal communication, M. Rinaldi). This may explain its presence in the concretion. The rest of the porcelain has been identified as Kraak ware and is generally very fine. Most shards are from bowls or plates and some base shards exhibit chatter-marks. One unique shard is either from a box or mug, if the latter design had indeed been introduced as early as 1638.

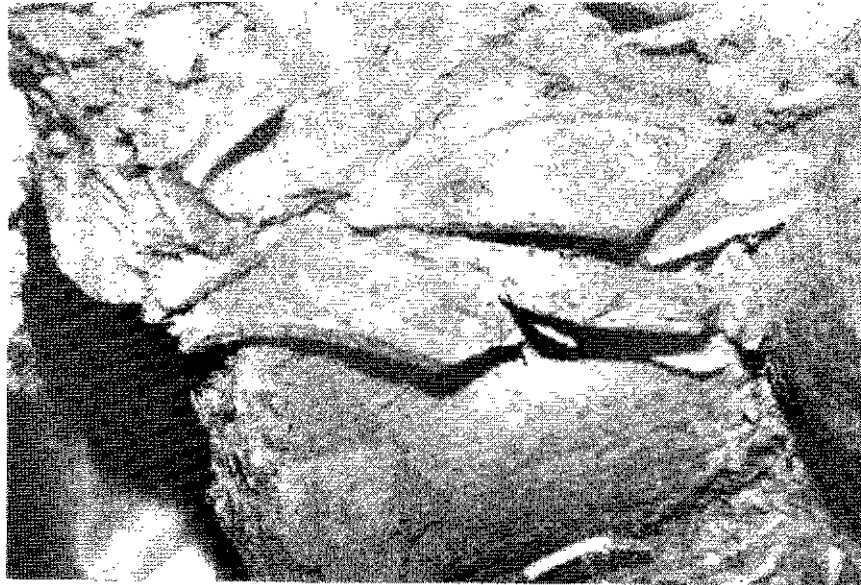


Figure 36

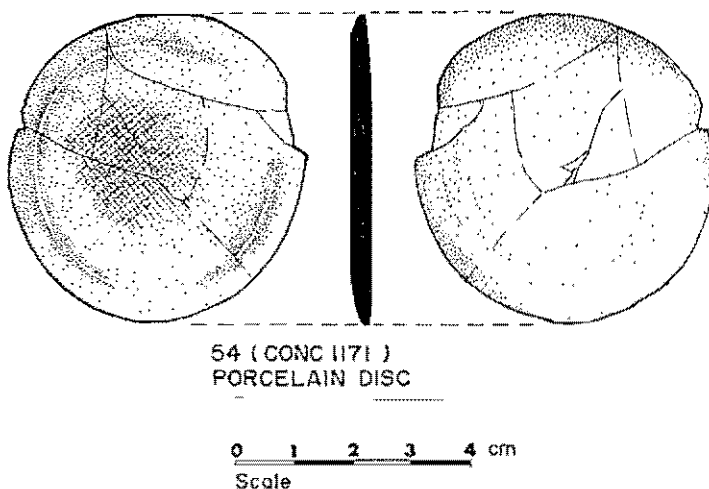


Figure 37

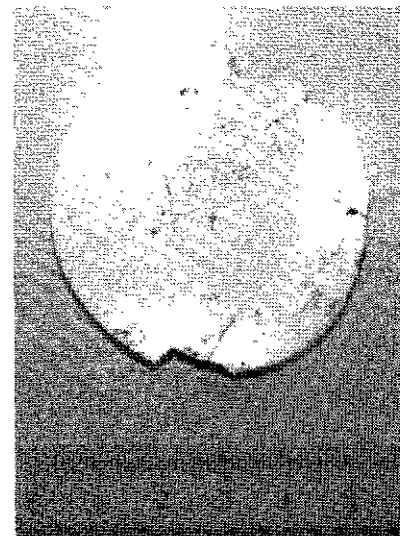


Figure 38

Several pieces of lead sheathing were revealed, the largest measuring 150 x 150mm when unfolded. There was no evidence of tack marks on any of the pieces.

A number of unique artifacts were recovered, some visible on the x-ray and others totally unexpected. One of these remained only as an imprint within the concretion (*Figures 39 and 40*). It is in the shape of a scabbard and measures 77 x 50mm. The surface is smooth, apart from the decoration which appears as a raised line of triangular section under the

microscope. This implies that the mold was most likely formed by a piece of metal with the decoration scratched into its surface with a sharp instrument. Professor Lu Yauw, a Chinese art historian has described the shape as a Jiyu (Riyu) symbol; traditionally used as a decorative motif on ceramics, the shape of some porcelain pillows, and often carved from wood and elaborately painted. It signifies "as you wish" or rather goodwill or good luck. Because the head is similar to a conventionalized form of lingzi, Chinese for "plant of immortality," it is also the emblem of longevity.

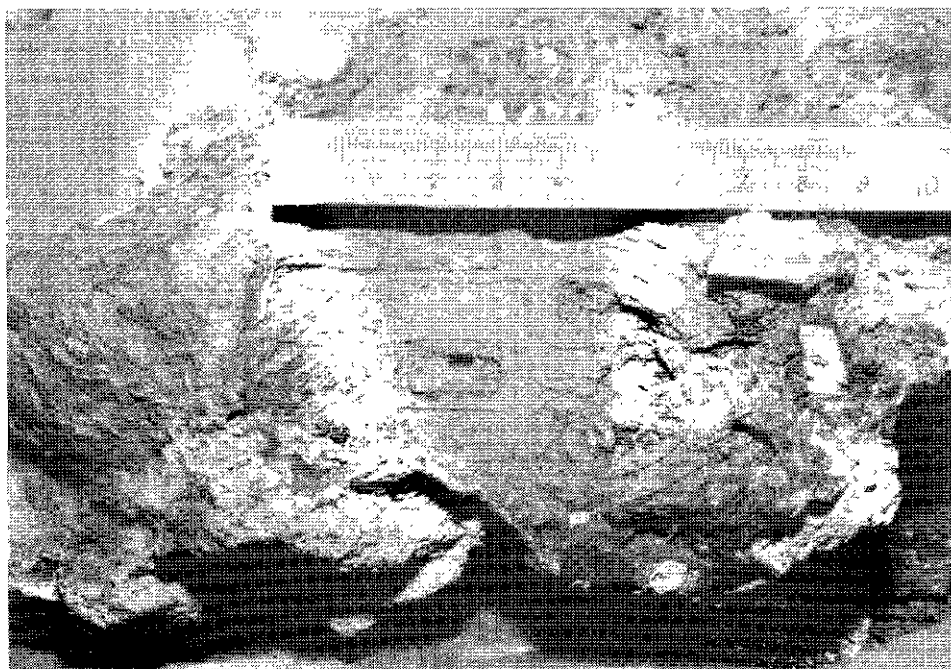
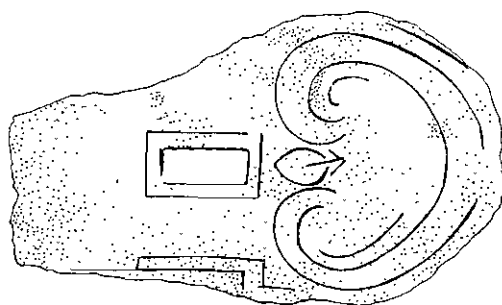


Figure 39



6 (CONC 1171)
IMPRINT IN CONCRETION

Figure 40

Another very unusual find, not so much because of the material but because of the setting, was a two piece mirror (*Figure 41*). The glass was shattered but it retained its shape of two symmetrical wings with a uniform 4mm gap between them. This would suggest a mounting, probably wood, but no trace remained. The glass was stained on its surface by the iron but was clear within and was backed on one side with a silvery substance which appeared as tiny droplets under the microscope, indicative of mercury.

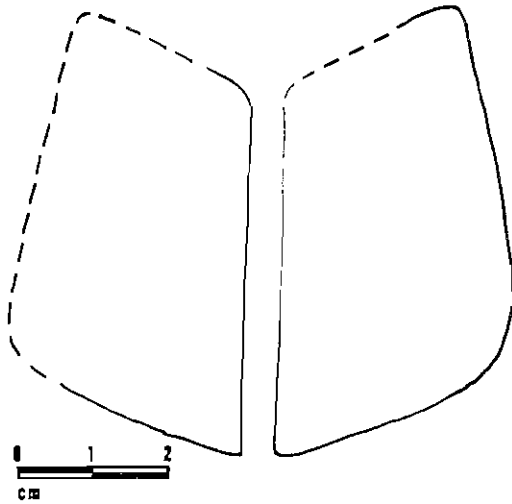


Figure 41

Twin copper alloy objects were found. One is a length of wire 37mm long and tapering from 1mm at one end to 0.4mm at the other (74). The second is what showed up on the x-ray as the possible end of a sword hilt (70). It is in fact a hollow knob, presumably of brass, dented on one side, and measuring 41mm high and 29mm across (*Figure 42*).

The last two artifacts of note were a gold button and a piece of complex gold chain. The button is a hollow spherical type with horizontal corrugations and is 13mm in diameter (Type D) (*Figure 43*). It has a loop on the top and a flower design with a solid gold sphere in the center of the bottom. There is a small hole that has been purposely left near the top of the button presumably to allow the escape of gases during soldering. The piece from the chain is one panel of a large spherical link. It is a ring of 8mm

diameter with a flower inside it. Both gold pieces were lodged in the top layer of the concretion, unusual for material of such density, and suggests that they came to rest there some time after the initial deposit.

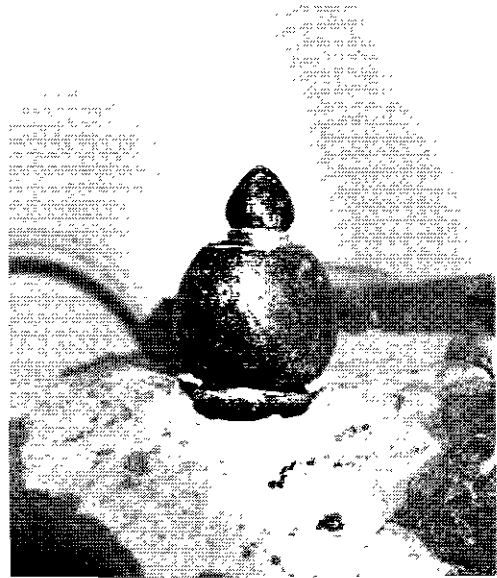


Figure 42



Figure 43

OTHER ARTIFACTS

Many other unique artifacts were found in varying states of decay. Following is a discussion of some of these artifacts. (Artifacts found in the iron concretions B1171 and B1161 have the concretion number in parenthesis after the artifact number.)

Bobbins

Eight copper alloy objects assumed to be bobbins (*Figure 44*), used for lace making, were excavated from the gullies in the reef. Bobbins are essentially weights around which threads are wound and kept taught whilst making lace. (This assumption is supported by the fact that a piece of string was found wound around a section of the best preserved piece, Artifact B944, (*Figure 45*).

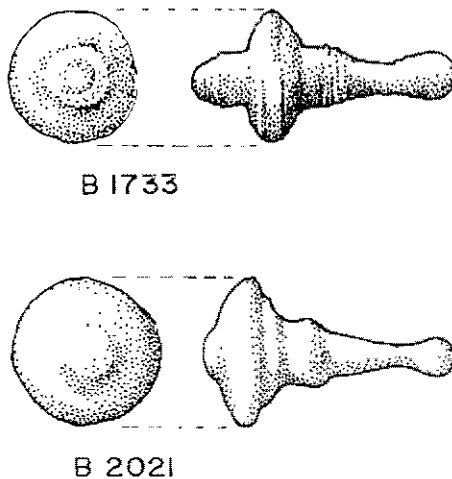


Figure 44

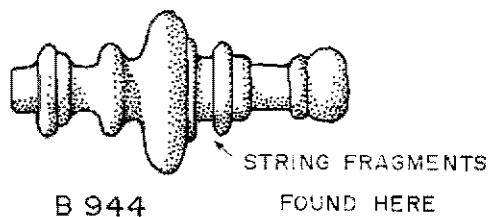


Figure 45

Candlesticks

There are three artifacts of two different materials that appear to be parts of candlesticks. Artifacts B5477 (*Figure 46*), the upper stem and part of the candle holder, and A709 (*Figure 47*), part of the candle holder only, are of brass and badly eroded.

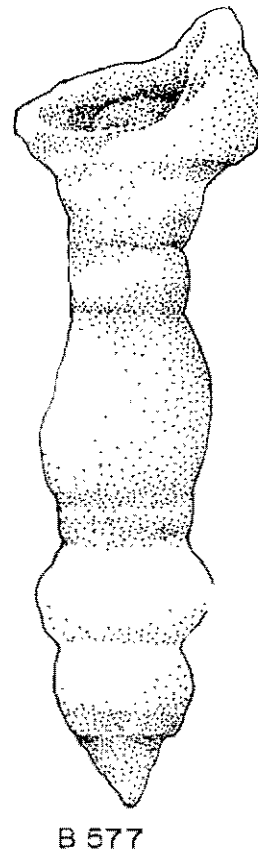


Figure 46

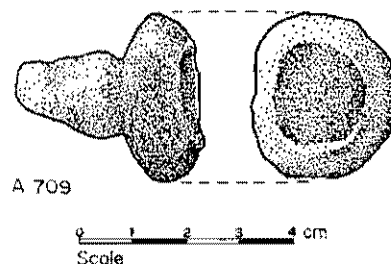
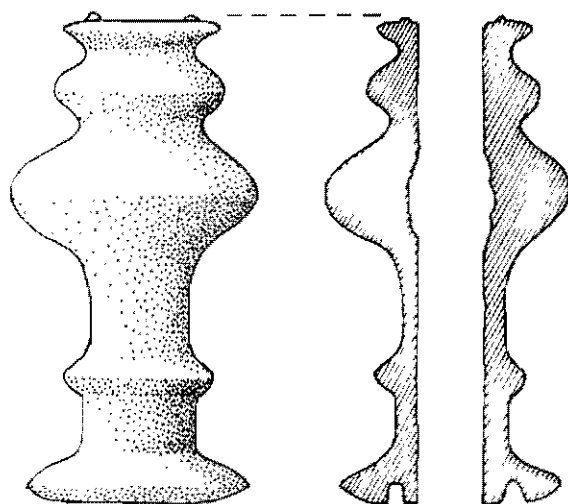


Figure 47



Although made of pewter, Artifact B1921 (Figure 48) is very similar to the lower stem of brass candlesticks found on the Dutch vessel, *Vergulde Draeck* (1656). These candlesticks are made in four parts, the base, the lower stem, the wax tray, and the upper stem and candle holder. A long rod on the upper stem runs through the other three parts and is swaged over the base to hold the whole together. On B1921 there are two small lugs on the top and two small holes in the bottom to receive similar lugs to prevent it from turning. The Dutch candlesticks have a square section on the lower stem which keys into the base to achieve the same result.



B 1921

Figure 48

Cannon Parts

As has been discussed previously, all but one of the cannons were salvaged by the Spaniards 46 years after the wrecking. The strains, or movement caused by typhoon waves, imposed on the lifting points of some of the cannons proved to be too great and consequently several dolphins and two cascabels were left on site.

Two large copper alloy dolphins of the same shape and size (220 x 60mm) in an advanced state of decay, A199 (Figure 49) and A232 (Figure 50) may be from the same cannon. Despite the erosion a ribbed pattern can still be discerned. A cascabel, A233 (Figure 51), corresponding in size (130mm in diameter) to the dolphins, was found adjacent to A232. This is in a better state of preservation but it is devoid of decoration.

COPPER ALLOY LIFTING DOLPHIN FROM A CANNON

A 199

Scale 0 1 2 3 4 cm

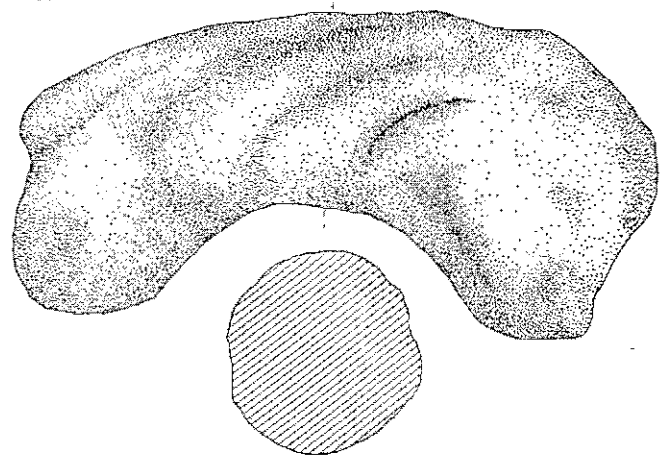


Figure 49

COPPER ALLOY LIFTING DOLPHIN FROM A CANNON

A 232

Scale 0 1 2 3 4 cm

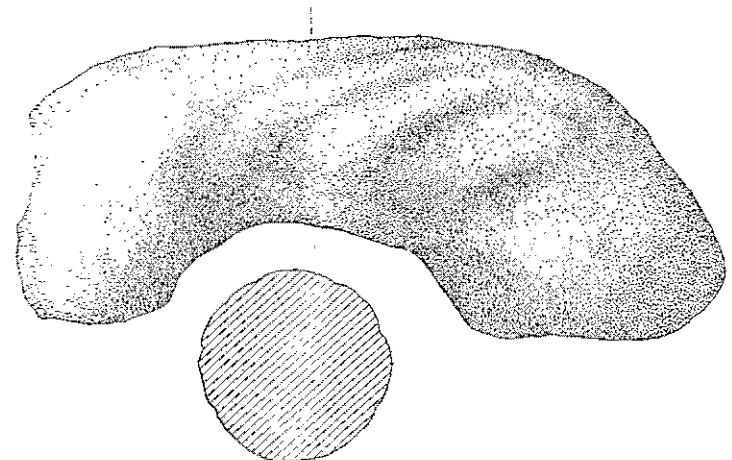


Figure 50

COPPER ALLOY CASCABEL FROM A CANNON

A 233

Scale 0 1 2 3 4 cm

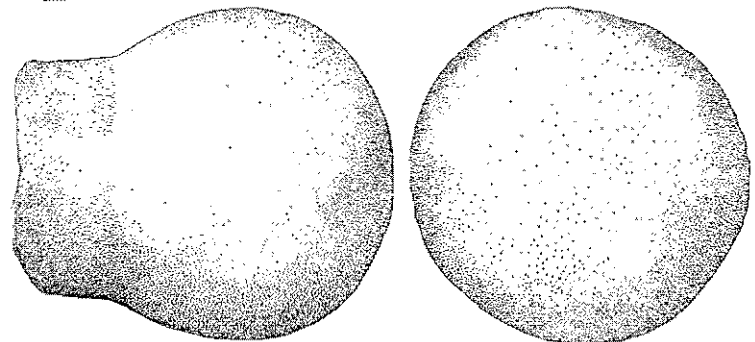


Figure 51

0 1 2 3 4 cm

Scale

Four other dolphins were recovered although they are much smaller (25mm at the smallest section); they probably broke off the swivel guns. Decorative ribbing is visible on one Artifact A225 although they are all highly eroded (*Figure 52*). One broken piece resembles a sponge. A smaller copper alloy sphere (37mm diameter) may be the cascabel from one of these small guns.

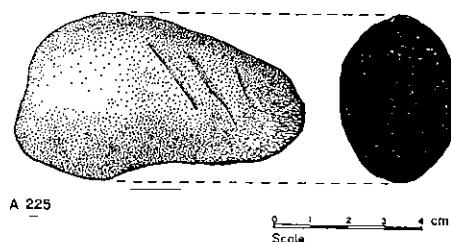


Figure 52

Cutlery

Three of the artifacts appear to be parts of knife or spoon handles although it is hard to tell. Artifact B405 (*Figure 53*) is a small copper alloy fragment resembling the end of a spoon handle. It may well be modern. B2203 (*Figure 54*) is also a part of a spoon handle and is definitely contemporary. It is made of silver and, despite being badly eroded, an etched decoration can be seen on the upper surface. The style of decoration is similar to that appearing on some silver plate fragments from the *Girona* (1588). The third piece, copper alloy artifact B867 (*Figure 55*) has a fair resemblance to the handle of a mid 17th century English knife in the Victoria and Albert museum, although it has an unusual raised ridge running part of the way down one side.

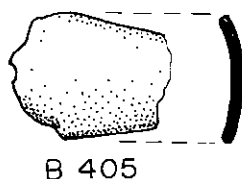
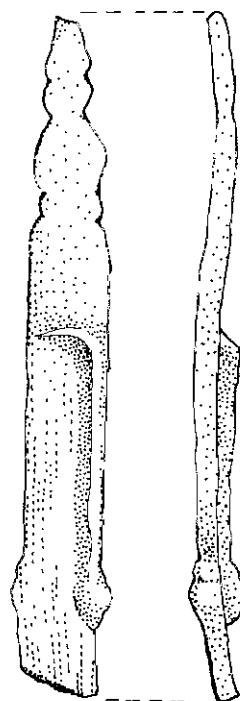


Figure 53



Figure 54

B 2203



B 867

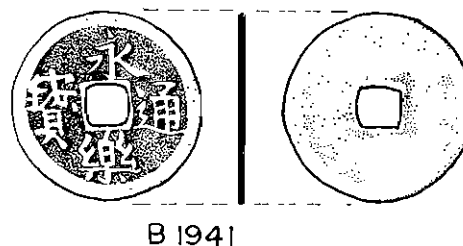
Figure 55

Chinese Bronze Artifacts

Apart from the porcelain and the bulk of the storage jars there are very few surviving artifacts of Chinese origin. Among these are coins, lock and key, and two weights.

Eighteen Chinese coins were found in reasonable condition, and these are of two types. The first is represented by Artifact 76 (Conc. B1161) (see Concretion B1161 Report).

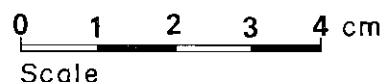
The second was issued during the Yun Le Period of the Early Ming Dynasty which fell between 1403 and 1424. This type is represented by Artifact B1941 (*Figure 56*) which is also in good condition.



B 1941

Figure 56

These coins are not rare and the fact that some of them date to over 200 years before the wreck is not unusual as they were often kept in



circulation for much longer periods. The coins were found in a relatively small area suggesting a small quantity kept in one place on the vessel, possibly by one of the passengers or crew as a curio. They were usually stacked with bamboo strips or string running through the square hole in the center and some were actually found concreted together in stacks although there was no evidence of the wooden stick. A few of these stacks would account for all of the coins discovered.

B2019 (Figure 57) is believed to be the key to a Chinese lock. It is no more than a flat shaft with a notch in one end which engages the lock mechanism and frees the pin. What appears to be a Chinese lock, B2425 (Figure 58) was also found, but in very bad condition.

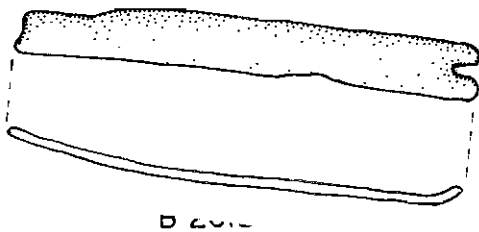


Figure 57

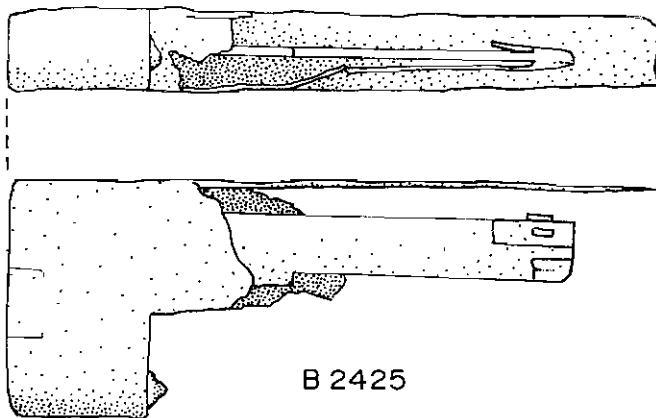


Figure 58

Two Chinese weights were found, one (112) in excellent condition inside concretion B1161 (see Concretion B1161 Report) and the other, B622, in poor condition. B622 is slightly larger (Figure 59).

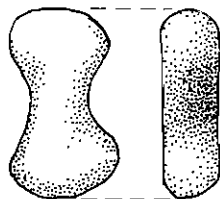
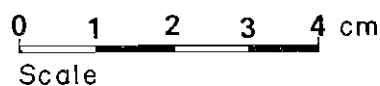


Figure 59



Handles

Three small silver handles (40-50mm) were found. Two of them are like tiny cannon dolphins with a swirl pattern at the large end, B473 (Figure 60). The other, B2308 (Figure 61), is less eroded and has two points of attachment below the decorative swirl top. A silver two-handled bowl found on the *Nuestra Señora de la Atocha* (1622) has very similar handles which also have the same raised decoration along the spine, and a silver ewer, also from the *Atocha*, has a similar, although larger, handle. A 17th century Spanish silver candlestick on display in the Philippine National Museum has four ears soldered to the stem which bear a close resemblance to B2308, suggesting an alternate use. Similar silver pieces have been found on the *Girona* (1588), and the *Batavia* (1629). Artifact B1886 (Figure 62) shows yet another silver handle found.

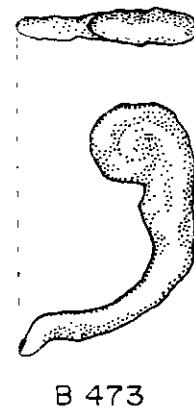


Figure 60

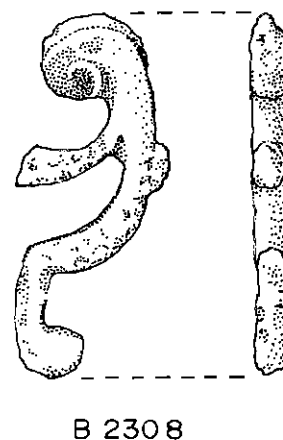
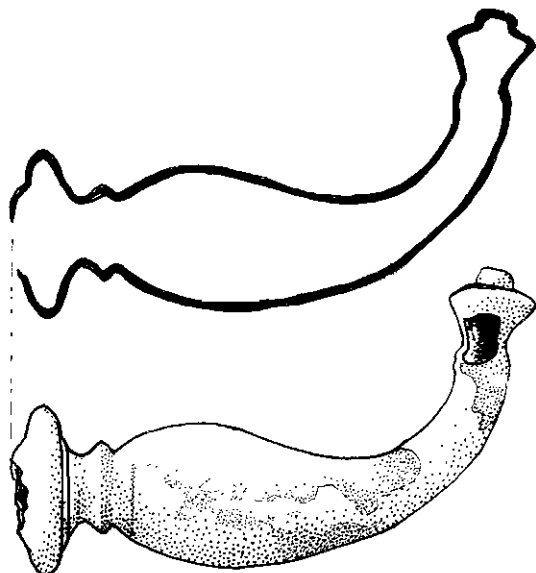


Figure 61

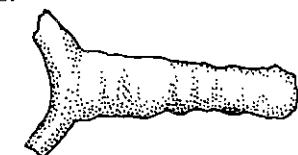


B 1886

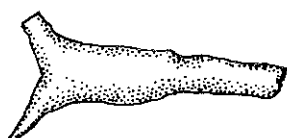
Figure 62

Keys

In all, eight copper alloy keys were found, unfortunately none intact. These eight pieces, however, seem to represent six different key types. B543, B1117 and B2491 (Figure 63) are all of the same types and, strangely enough, have all corroded in the same manner, with the head and most of the ring missing. The shanks are tiered, thicker near the ring and narrowing half way along their length. The break on the shank is clean, suggesting that they may not have been cast whole.



B 543



B 1117



B 2491

Figure 63

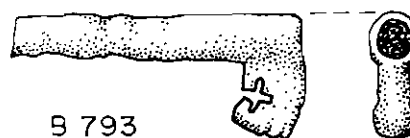
The only surviving ring is on B1291 (Figure 64). Here the shank is the same length as the three previously mentioned, but it is of uniform section. The break is also clean.



B 1291

Figure 64

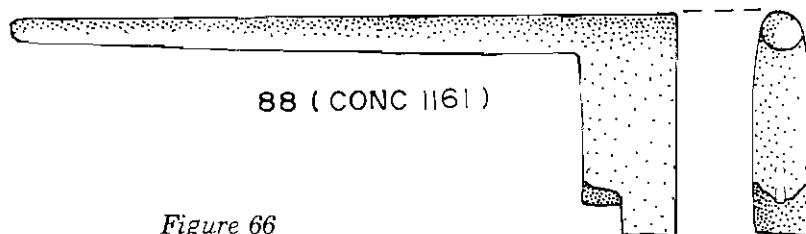
Artifact B793 (Figure 65) is the head and shank of a key. The head has a "t" cut on its inner face and also appears to be notched on the bottom. The shank is similar in design to B543, however it is hollow for a little over half its length.



B 793

Figure 65

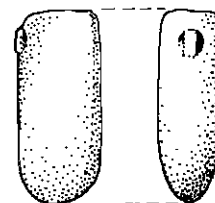
Artifact 88 (Conc. B1161) (Figure 66) is the shank and head of a large key. It is interesting in that there is a small copper alloy plate of different composition keyed into the wearing surface of the head. The end of the shank is smooth and rounded, suggesting that this key, also, was not cast whole.



88 (CONC B1161)

Figure 66

The very badly corroded Artifact B1257 (Figure 67) is also bimetallic. This may or may not be the head of a key, but there is a small plate keyed into a hole suitable for a shaft.



B 1257

Figure 67



LEAD SHOT

Lead shot is one of the most plentiful artifact types. Hundreds of pieces were found, representing four main groups. Musket balls (Figure 68) have a typical 18mm calibre, varying 1mm either way. Spring shot are the same size but have a hole where the iron coil was attached before corroding away long ago. Arquebus (Figure 69) or pistol shots have a mean calibre of 13mm, varying 1mm up and 2mm down. Tiny lead cubes (Figure 70) 3mm across make up the fourth group. These were fired in canisters from swivel guns as anti-personnel shot, best used at close range.

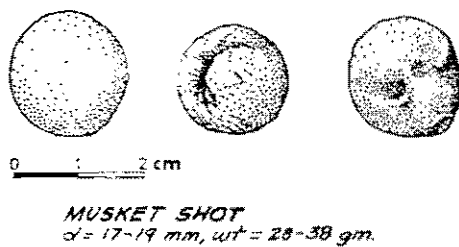


Figure 68

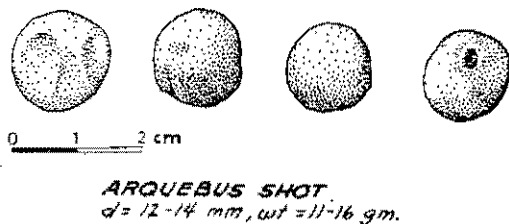


Figure 69

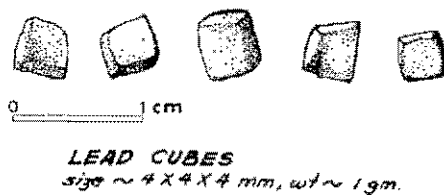


Figure 70

Cannon Balls

Figure 71 shows the various sizes of cannon balls found on the *Concepción*.

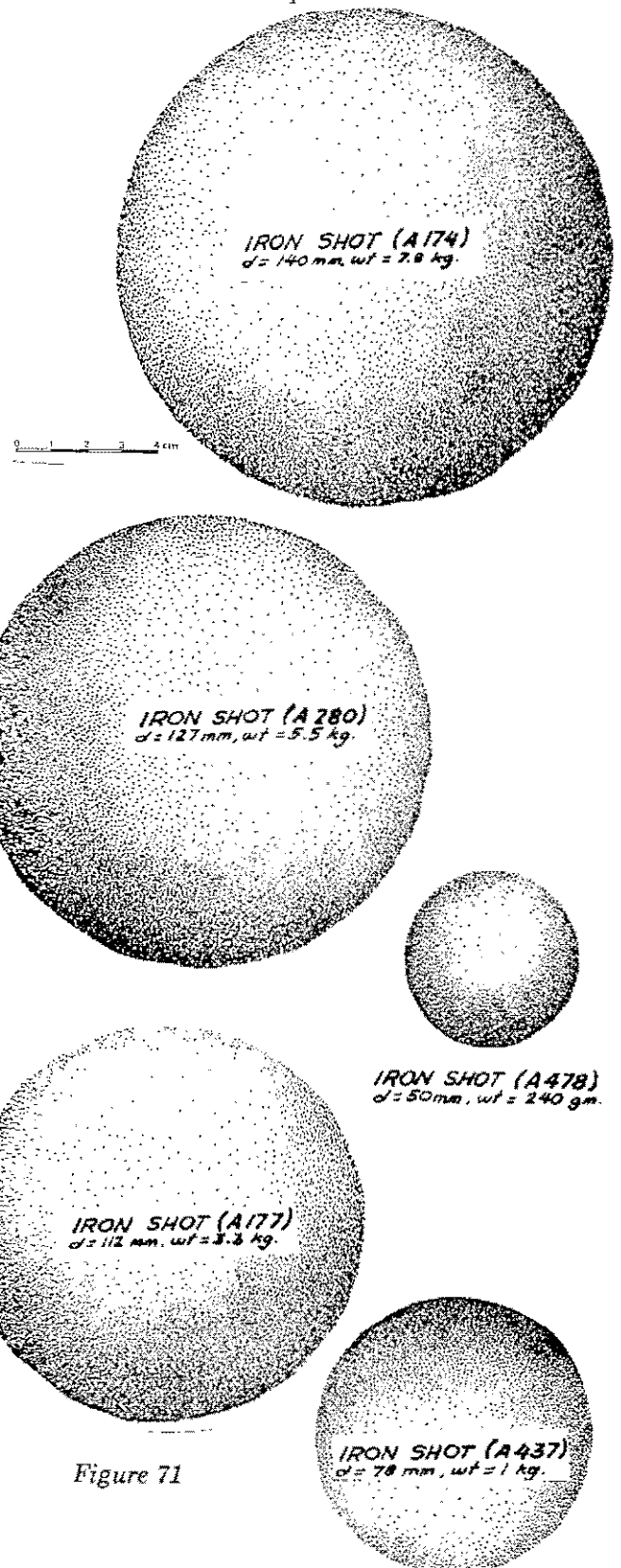


Figure 71

Pestles

Very few domestic items were found during the course of the excavations. Three pestles were, however, recovered in varying states of decay. Two of them are of the same size (197mm long, 17mm diameter) (*Figure 72*) although a raised ring occurs half way along the length of one (A231), and a third of the way and is smaller on the other (A8443). The third pestle is slightly longer (215mm) and has a barely discernable raised ring around the center.

COPPER ALLOY PESTLES
Scale

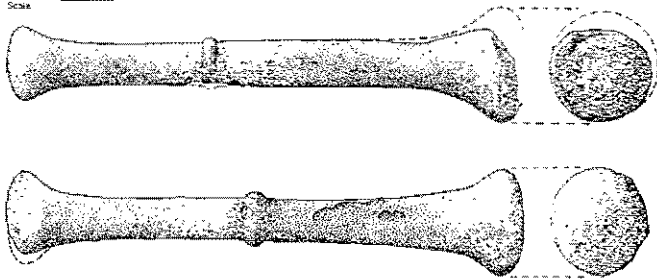


Figure 72

Silver Coin

Strangely, only one Spanish coin was recovered (*Figure 73*). It has been identified as a one or two real of the Mexico mint under the reign of Juana Y Carlos I, 1506-1516. Coins predating a wreck by some 100 years have been found on several Dutch wreck sites along the Western Australian coast, so this is not an unusual discrepancy. The coin is unusual, however, in that the Mexico mint mark is on the right side of the shield and not on the left. This is quite rare (personal communication, M. Stanbury).

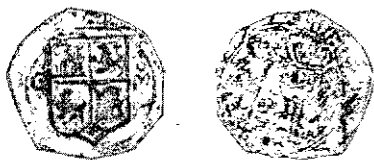


Figure 73

Tacks

Quite a variety of brass tacks were found, some structural and other decorative (see Concretion B1161 and B1171 Reports). One purely structural tack, or nail, is B1841 (*Figure 74*), with a small flat head and long thin shank (34mm). There are three types of dome headed tacks, all probably furniture or upholstery tacks from furniture onboard. Similar tacks have been found on other wreck sites including the *Campoens* (1627) and the *Zuytdorp* (1712), and they can still be found in use on modern leather upholstery.



B 1841

Figure 74

Artifact B307 (*Figure 75*) is a large version of TAC4 measuring 13cm across. This is thought to be a door ornament, possibly from the vessel as there was only one found (see Concretion B1161 Report).

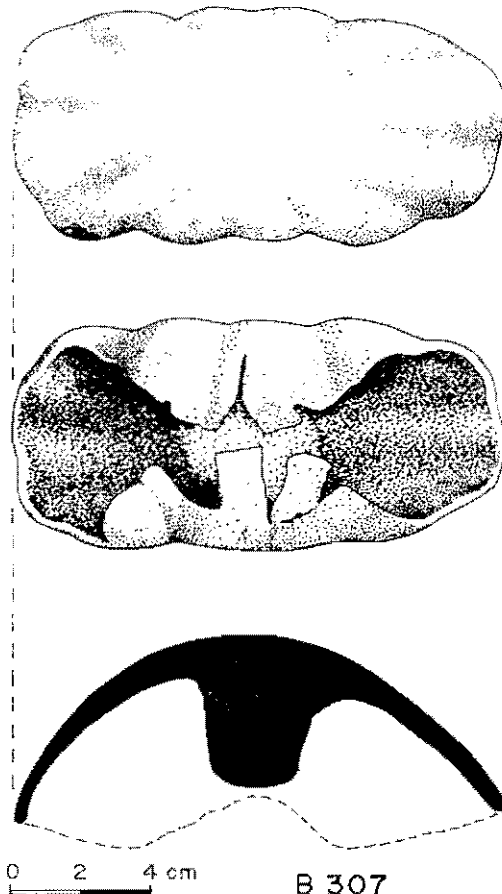


Figure 75

0 1 2 3 4 cm
Scale

Slingstones

In addition to their wooden spears and fighting sticks, the Chamorros shaped slingstones out of coral, limestones and whinstone (*Figure 76*). The slings, made of tough hibiscus or pandanus fibers, were effective weapons to thirty meters and beyond. Accounts of the loss of the *Concepción* mention that many of the survivors of the wreck were killed with spears and slingstones.

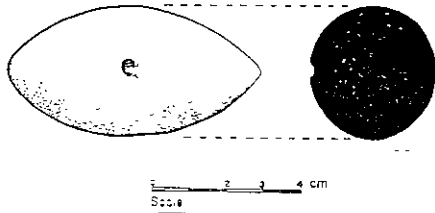


Figure 76

The Chamorros also used a variety of stone tools of different shapes and sizes. *Figure 77* shows examples of these.

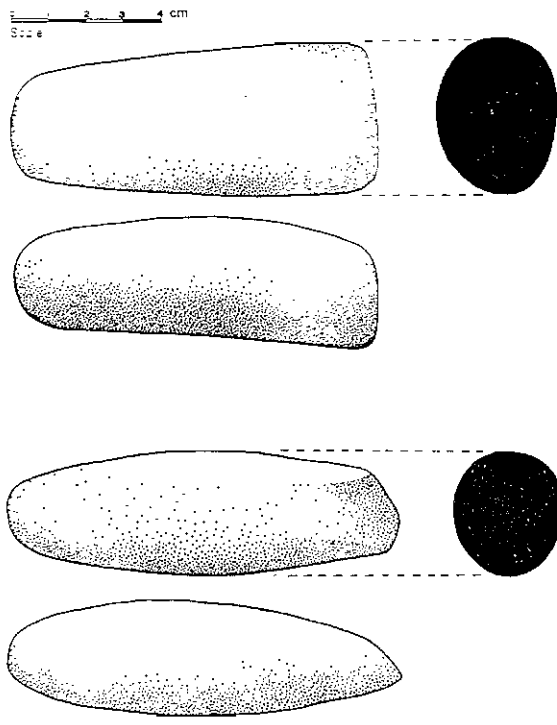
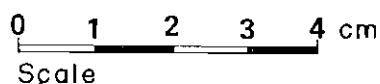
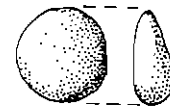


Figure 77

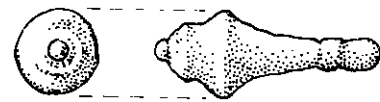


In addition to the artifacts described previously, various other artifacts, some made of silver and some of copper alloy were found. These artifacts' exact identity are unknown. They are grouped together by material type and listed below by artifact number.

Silver Artifacts



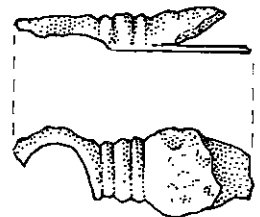
A 737



B 2198



B 1743

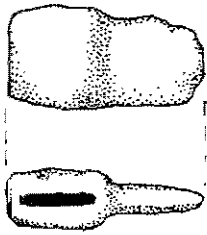


B 2264



B 1421

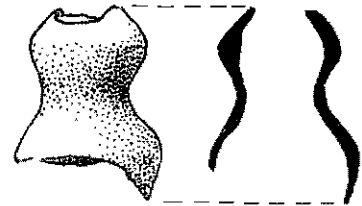
Copper Alloy Artifacts



B 2044



B 1733



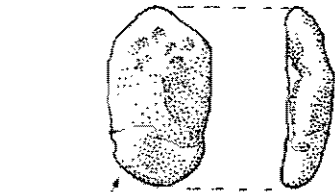
B 517



A 595

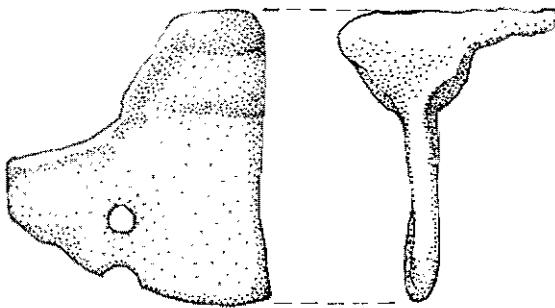


B 941

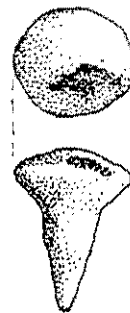


COPPER PLATING

B 1403



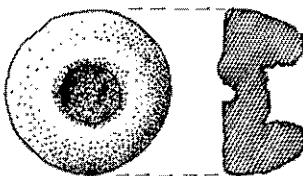
B 1573



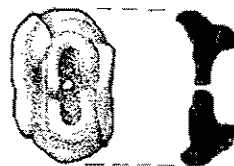
B 582



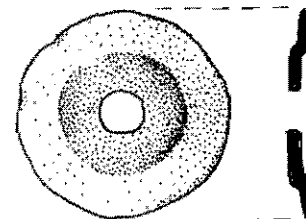
A 962



B 1749



B 329



B 1588

