

The loss of the  
*Verenigde Oostindische Compagnie*  
*retourschip BATAVIA,*  
Western Australia 1629  
An excavation report and  
catalogue of artefacts



Jeremy N. Green,  
Head of Department of Maritime Archaeology  
and director of the excavation,  
Western Australian Maritime Museum, Fremantle, Western Australia

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## GENERAL EDITORS

A.R. Hands, B.Sc., M.A., D.Phil.  
D.R. Walker, M.A.

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## PREFACE

This book has been many years in the making. The excavation which I directed from 1971–1975 was followed by a long period of research and documentation. In 1987, I decided not to delay publishing the excavation report and catalogue of artefacts any longer, but to combine these sections together with their archaeological interpretation in a book, leaving the ship's structure report until a later publication. The decision to publish the *Batavia* report in two parts was influenced by the fact that the reconstruction of the *Batavia* was unlikely to be finished before 1989. As the section dealing with the ship's structure could not be finalized until the completion of this project, it seemed expedient to press ahead with that part of the work which was ready for publication, to produce this book. After the completion of the reconstruction and research on the hull structure, a further volume will include a report on this as well as the coinage, the human skeletal material and the land-based archaeology, together with a historical review of the shipwreck, and other small matters that may have been missed in the first volume.

The present book is divided into three parts: the excavation, the artefacts and the interpretation. The first part is straightforward, being an account of the excavation and the techniques used for documenting and recording. Some of this work has been reported elsewhere (Green (1974, 1975 and 1980ii), Green and Baker (1976), Green and Pearson (1975) and Ingleman-Sundberg (1977)), but the section here describes the excavation in detail.

The artefact catalogue is a more complex problem. For the purposes of classification, I have attempted to group artefacts together which would have had a natural association on board the ship. The merits and the drawbacks of this approach are discussed fully in the final section 'Archaeological significance of the artefacts'. I should point out, however, that where an item may have a number of different functions or purposes on board the ship, and thus belong to several different groups, I have tried to place it in the most obvious or relevant group. Readers are referred to the 'Contents' pages for a detailed listing of the groups and the placing of artefacts within them and to the 'Archaeological significance of the artefacts' chapter for an explanation of these placings.

In most cases the objects recorded in the catalogue are illustrated either by a line drawing or by a photograph. All the drawings are at a scale of 1:2 unless otherwise stated. The registration numbers prefixed with the letters 'BAT' refer to the object's registration number recorded on the object and on the master register in the Department of Maritime Archaeology at the Western Australian Maritime Museum. A few groups of material have not been illustrated because they are unsuitable or inappropriate as illustrations, the bricks, for example; in other cases (the bearded man masks and medallions) the complete collection has been illustrated to show the range and diversity.

The chapter 'Archaeological significance of the artefacts' discusses the complexity of classifying material from a wreck site that has a large historical documentation. An account is given of the lists that were used by the administration of the V.O.C. to specify the materials loaded on board their ships, examining their relevance to maritime archaeological excavation work. The items that have special significance to the documentary evidence are discussed and, finally, some conclusions are drawn about the research in general.

I have found Henrietta Drake-Brockman's book *Voyage to Disaster* (Drake-Brockman, 1966) extremely useful in the course of this work, especially the translations of Pelsaert's Journal by E.D. Drok, which appear in it. However, all the translations have been examined and compared against an original copy of the manuscript of Pelsaert's Journal.

I have typeset this book myself using a Macintosh SE computer and a Laser Writer Plus. The original text was typed using Microsoft Word 1.03 and then typeset using Page Maker 3. Statistical work utilized Stats View 512+™ and Microsoft Excel and charts from these applications were pasted, via the clipboard, directly into the typeset text.

The views and opinions are those of the author, except where others are cited.

Institute of Archaeology, Oxford  
March 1989



# THE EXCAVATION OF THE BATAVIA

## The site

### Introduction

In the early hours of the morning of the fourth of June 1629, the V.O.C. *retourschip Batavia*, founded on a reef of the treacherous Houtman Abrolhos, about 65 km off the coast of Western Australia. Although no lives were lost in the wreckage itself, the shipwreck was a prelude to an extraordinary tragedy. Shortly after the disaster, the commander, Francisco Pelsaert, made a critical decision. Abandoning the 70 people who still remained on the vessel — by this time breaking up in thunderous surf — Pelsaert took the ship's longboat and departed, ostensibly in search of water. He was accompanied by all the senior ranking officers, some crew and passengers — a party of 48 in all. Left behind were 198 survivors who'd struggled to two waterless islands close by, as well as the unfortunates still on board. Pelsaert's group made a fruitless search for water as they sailed north along the mainland coast, finally making their way to Batavia, to obtain help. Their voyage lasted 33 days. On arrival, the high boatswain was executed, on Pelsaert's indictment, for outrageous behaviour prior to the loss of the ship. The skipper, Adrien Jacobsz was arrested, again on Pelsaert's word, for negligence. Seven days after he'd reached Batavia, Pelsaert was dispatched in the yacht *Sardam*, by Governor General Coen, to effect a rescue. They met with extraordinary bad luck, and it took 63 days to return to the wreck site, almost double the period of the voyage by the ship's boat to Batavia. Arriving back at the islands he'd deserted, Pelsaert discovered that mutiny and a terrible massacre had taken place. Led by the undermerchant, Jeronimus Cornelisz, a group of mutineers had massacred 125 men, women and children. After arresting the ringleaders, Pelsaert set up a court on the islands where the mutineers were tried and some of them executed. Whilst the lengthy trials were taking place, Pelsaert diligently set about recovering the chests of specie and other valuable items from the wreck, using divers from Gujarat.

When the *Sardam* finally returned to Batavia, some of the other offenders, who already for their deeds had been flogged, keelhauled and dropped from the yard-arm, were then executed. Of 316 people who had sailed from Amsterdam aboard the *Batavia*, only 116 survived.

For the V.O.C., the shipwreck of the *Batavia* only compounded what had already proven to be a financially disastrous year. The cargo was valued at fl. 259888.11.4, of which fl. 40000 – 45000 was lost. However, this new *retourschip* was the third loss of the 1628 fleet. The *'s Gravenhage* had been disabled just after leaving the Netherlands and was forced to unload for repairs and a major refit. The *Wapen van Enckhuisen* blew up off Sierra Leone with only 57 survivors. They were picked up by the *Leiden*, which itself lost over 170 through sickness on the outward voyage. In this cloud of misfortune, the wreck of the *Batavia* thus soon passed into obscurity. Tasman was instructed in 1644 to locate the wreck site and recover the bronze cannon, but he did not reach the Abrolhos.

In 1647, an account of the disaster was published by Jan Jansz, entitled *Ongeluckige Voyagie van't Schip Bata-*

*via*. This ran to a number of reprints as well as to pirated editions. Even in the 18th century, the events of the *Batavia* incident were not completely forgotten: van Dam (in 1701) recounts the story, as does Valentijn in 1724-26. There was even an English account of the loss, albeit the author was somewhat confused and put the wreck in the Brazilian Abrolhos.

In 1840, Lieutenant Lort Stokes and Commander J. Wickham visited the Abrolhos in H.M.S. *Beagle*, as part of an early survey of the Western Australian coast. During the expedition, they identified, correctly, the site of the loss of the V.O.C. ship *Zeewijk* which was wrecked in the Southern Abrolhos in 1727. However, they erroneously identified the very southern end of the Abrolhos, as the site where the *Batavia* was lost. In the early 1960s, Henrietta Drake-Brockman, a Western Australian historian, who had studied a translation of Pelsaert's Journal, suggested that the wreck site lay further to the north, in the Wallabi Group of the Abrolhos. In 1963, the wreck site was located on Morning Reef, in the Wallabi Group.

Since the discovery of the wreck site, a number of expeditions have been made to the *Batavia*. In 1963, the first major expedition recovered three bronze and one composite cannon, two astrolabes, some coins and ceramic material. In 1964, the State Government enacted legislation to protect this and other historic wrecks on the coast. This legislation was amended twice, its final form being the *Maritime Archaeology Act, 1973*. In 1972, the Australian Netherlands Agreement on Old Dutch Shipwrecks was signed, whereby the Netherlands Government, as successors to the V.O.C., transferred any rights that they might claim, to the Australian Government. The Western Australian Museum was recognized in the Acts, as the body responsible for the archaeological excavation and study of these sites. The first major *Batavia* excavation mounted by the Museum, commenced in 1972. From that beginning, the *Batavia* programme has developed into one of the largest and most ambitious maritime archaeological projects undertaken by the Western Australian Museum. In four seasons of field-work, the stern section of the ship was completely excavated, leaving a small section of the bow area of the site unexcavated, for study at some point in the future.

This report describes the excavation and the methods used. It should be emphasized that this was one of the first excavations undertaken by the Department of Maritime Archaeology and many of the techniques used were pioneered on this site. Additionally, it should be noted that the site is far from ideal for carrying out detailed and exacting archaeological recording. It is extremely exposed and often dangerous to work. The weather and sea conditions are impossible to predict with certainty. Therefore, there was never any guarantee that on the following day one would be able to work on the site. The ratio of days one could dive to days when it was impossible to dive was quite low (1:3). A considerable amount of archaeology was achieved in spite of these difficulties.

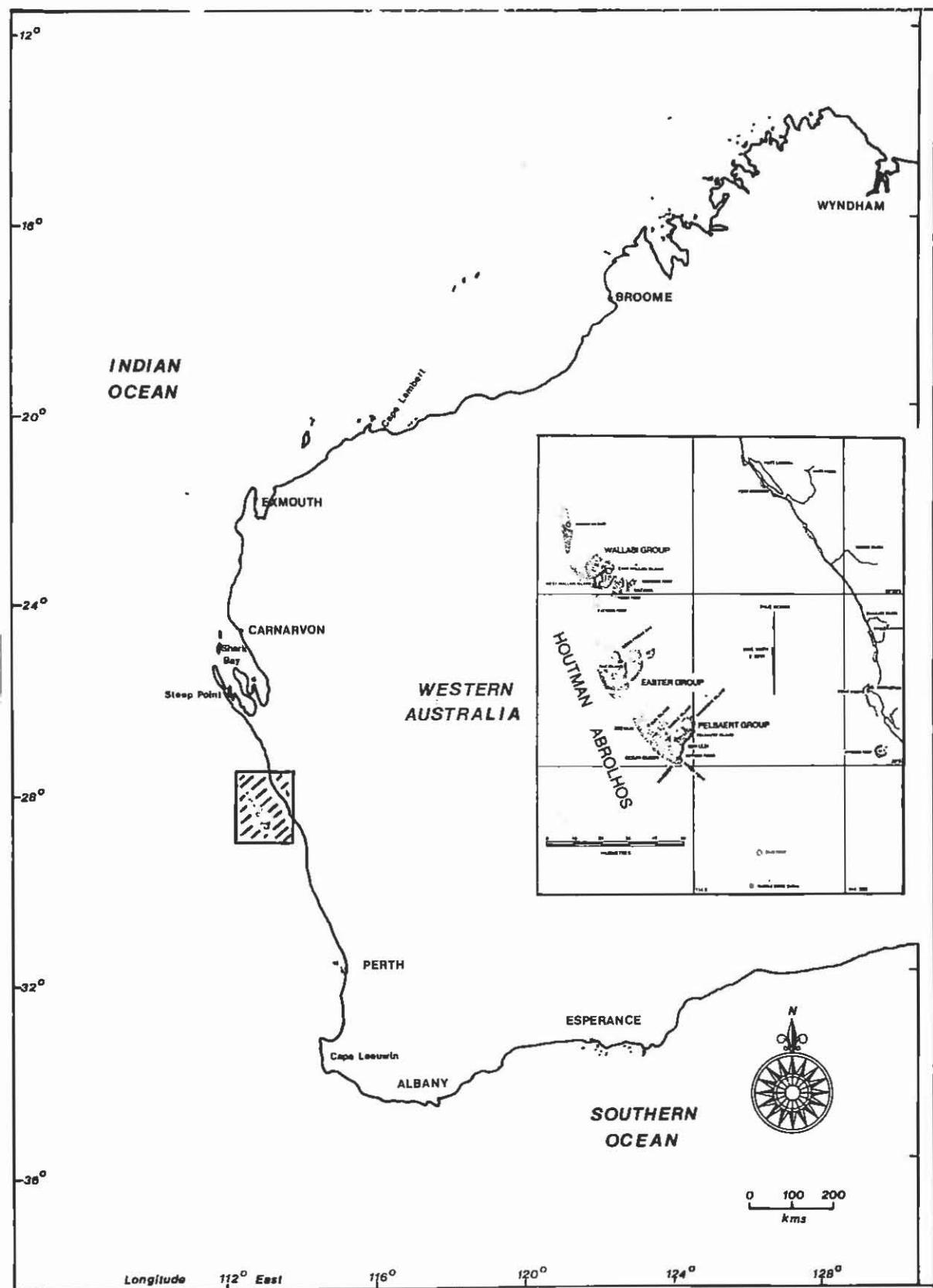


Figure 1. Map of Western Australia with an insert showing the Houtman Abrolhos.

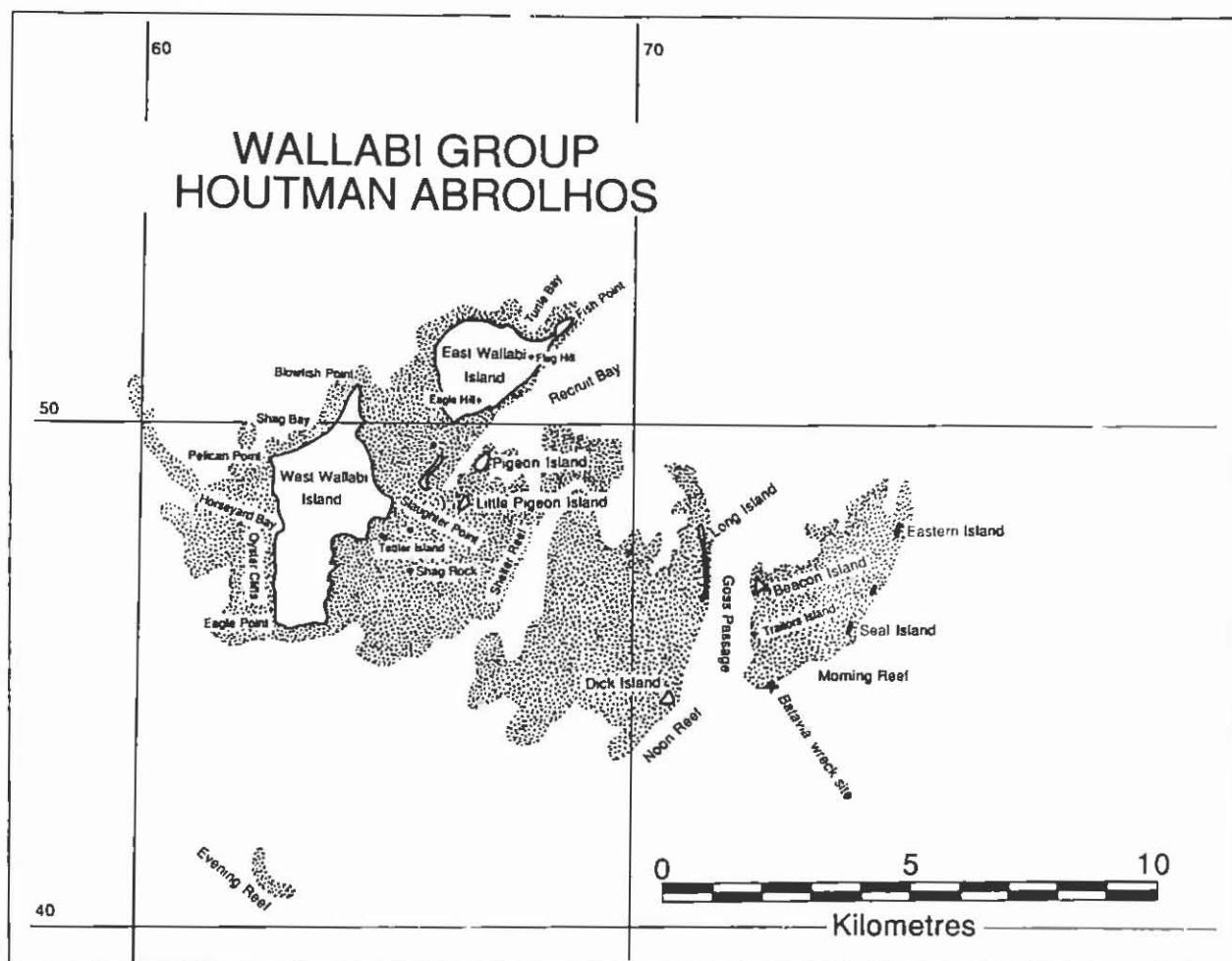


Figure 2. Map of the Wallabi Group of the Houtman Abrolhos showing the *Batavia* wreck site.

### The wreck site

The *Batavia* wreck site is located on Morning Reef in the Wallabi Group of the Houtman Abrolhos (Fig. 1), a series of islets and reefs lying between latitudes 28°14' S and 29° 00' S and longitudes 113° 35' E and 114° 04' E, about 65 km from the mainland of Western Australia. There are four groups of islands within the Abrolhos: (starting from the north) North Island, Wallabi Group, Easter Group and Pelsaert Group. They represent the southern-most, well-developed coral reef in the Indian Ocean. The islands were formed on reef, coral shingle or lagoonal limestones laid down in the sea-level highs of the Pleistocene Inter-glacial (Beard and Burns, 1976). The Abrolhos were first sighted by Frederik de Houtman (whose name they bear) in 1619 in the ship *Dordrecht*: '...at night about three hours before day-break, we again unexpectedly came upon a low-lying coast, a level broken country with reefs all around it. We saw no high land or mainland, so that this shoal is to be carefully avoided as very dangerous to ships that wish to touch this coast. It is fully ten mijlen in length, lying in 28° 46' latitude' (Heeres, 1899). As mentioned previously, the Houtman Abrolhos was extensively surveyed by Lieutenant Lort Stokes and Commander Wickham in H.M.S. *Beagle* in 1840, when most of the islands and features were named.

There is a systematic, annual weather pattern. In summer, the predominant wind is southerly, with a 40% frequency of Beaufort Force 5-6. Winter is characterized by variable winds with a small number (2%) of Beaufort Force 8-12 gales. Spring is also variable with mild winds, see *Australian Pilot Vol. 5* (Hydrographer of the Navy, 1972). The tidal range in the Abrolhos is about 0.8 m, and is strongly affected by wind and barometric pressure. Thus, a 34 millibar atmospheric pressure change can cause a difference in the sea-level of about 0.3 m (Australian Government Publishing Service, 1976). Cyclones are commonly expected in this area between January and March. Three cyclones were experienced during the four seasons of work on the site, none of which caused serious damage, the only difficulty was to secure a mooring for the workboat.

The greatest problem posed by working on the *Batavia* site or, for that matter, any wreck on the exposed reefs of Western Australia, is that of the swell. The dominant and consistent seasonal movement of swell is from the southwest. These swells are generated far out in the Indian Ocean by the movement of frontal troughs, and by high pressure systems moving east in lower latitudes. The swell is comprised of a series of sharp waves with a distance between the peaks of about 100 m. The amplitude of the wave is slight

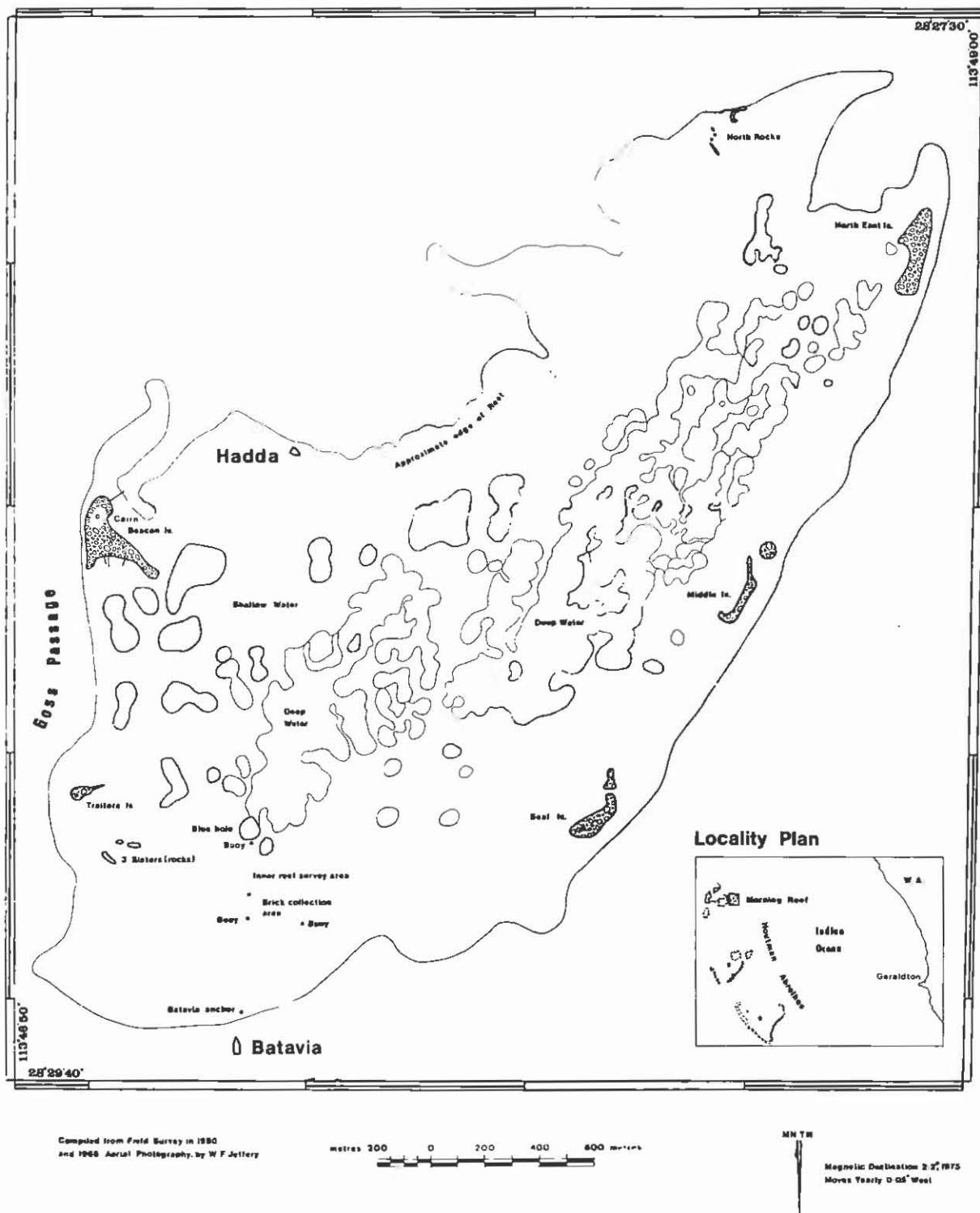


Figure 3. Map of the Morning Reef area of the Wallabi Group, showing the *Batavia* wreck site, the inside reef area where wreckage has been washed over the reef and Beacon Island, formerly known as Batavia's Graveyard.



Figure 4. Beacon Island showing the Western Australian Museum field station in the foreground and various fishermen's houses, in the background is Morning Reef and the wreck site.

(c. 1-2 m), but as they approach the rising seabed, the amplitude increases until, in shallow water, the crest starts to break. It tends to build up over a number of days, from flat calm and almost imperceptible swell, to swells more than 10 m in height with breaking crests. As the swell builds up, the breaking of the wave occurs progressively further away from the reef. Thus, the danger for the workboat of being swamped on its mooring, gradually increases. There, also, appears to be a short-term periodic increase in wave amplitude. Thus, in a few hours, a group of three or four 'larger than normal' waves are often experienced. The use of two mooring points, 50 m and 75 m from the site, enabled the workboat to operate on the site in both rough and calm conditions. If the swell was greater than 6 m in height or if it was breaking close to the vessel, diving operations were terminated. Curiously, there was little danger to the divers on the seabed, even when the sea was breaking overhead. At all times, the diver's air supply hoses acted as a safety line. Even in the event of a free diver being driven onto the reef, the depth over the reef was such that one could swim into calmer water on top of the reef, where the waves would have dissipated.

The wreck site lies about 800 m east from the southwest corner of Morning Reef, some 100 m from the top of the reef. Access to the site from Beacon Island was either by the workboat, through Goss Passage, or in small boats across the inside reef, lagoon area and through the break in the reef to the east of the site (Fig. 3).

Beyond the main site, in the lagoon shallows on the inside of the reef, is an area about 500 m long by about 200 m wide where material from the wreck has been driven by storms. For the purposes of this text, this area will be referred to as the 'inside reef site'. Depths here range from 0.5 to 2 m and artefacts consist of large numbers of fragments of stoneware, bricks, some remnants of chain plates and occasional coins.

The main site, outside the reef, is about 50 m long and 15 m wide. At the north end of the site, closest to the reef, are three large anchors, and a fourth lies 78 m further north in the shallows on top of the reef.

Along the western side of the site, twenty-one iron, five bronze and two composite cannons were located when the site was first discovered in 1963. Prior to the start of the Museum's first excavation season, three iron, one composite and all five of the bronze cannon had been raised. A group of four anchors were located about the mid-point, on the east side of the wreck site. Slightly to the south of these anchors, across the site, was a pile of distinctively shaped building blocks.

The site lies in a shallow depression in the reef, at the south end of which there was a noticeable drop, some 1-2 m from the seabed-level. At the north end, there is no noticeable depression. On the initial site inspection, at the beginning of the first season, there were no small artefacts apart from a few bricks. The only obvious signs of wreck were the cannon, anchors and building blocks.

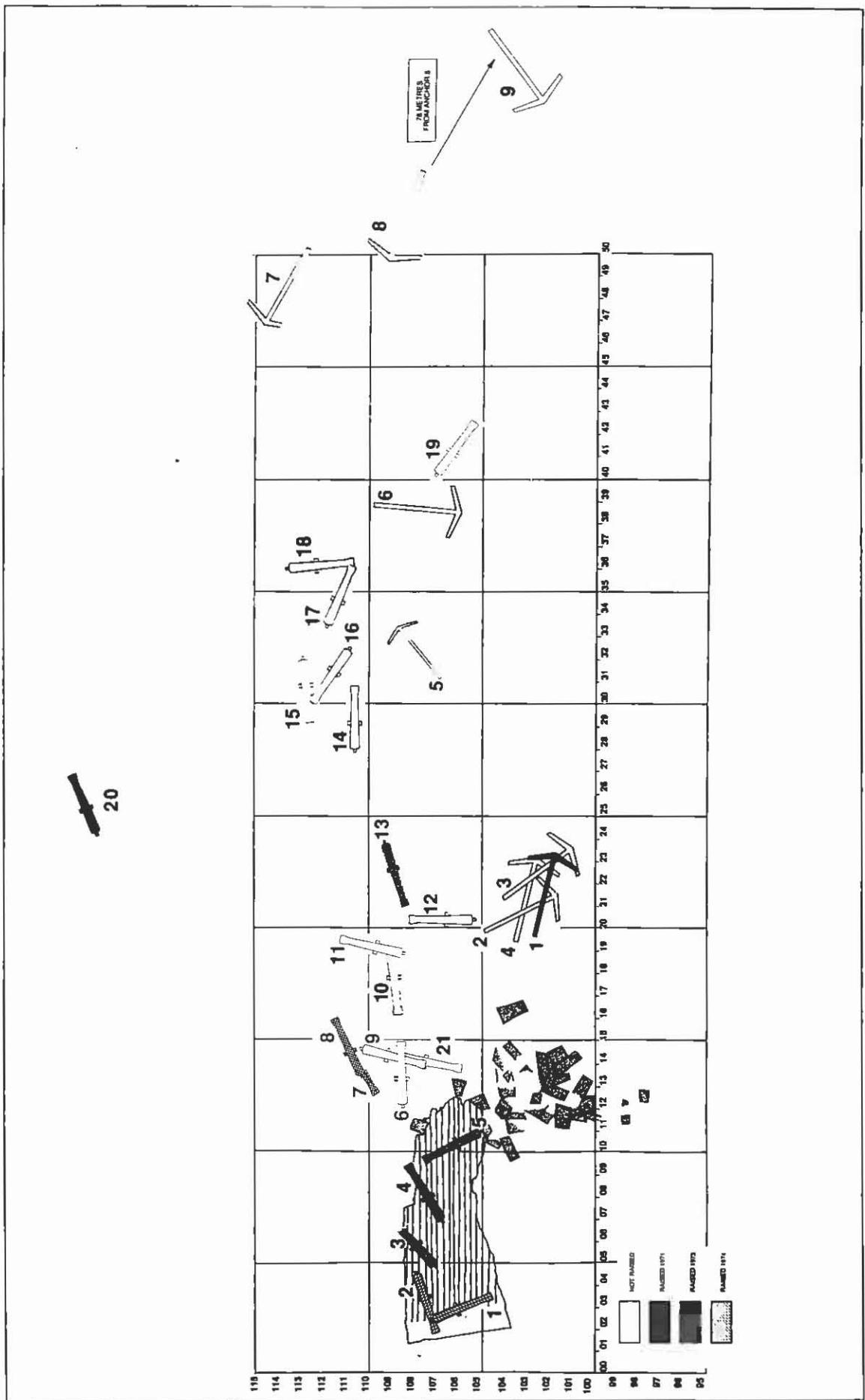


Figure 5. Plan of the *Batavia* wreck site showing the cannon and anchors existing on the site in 1971.

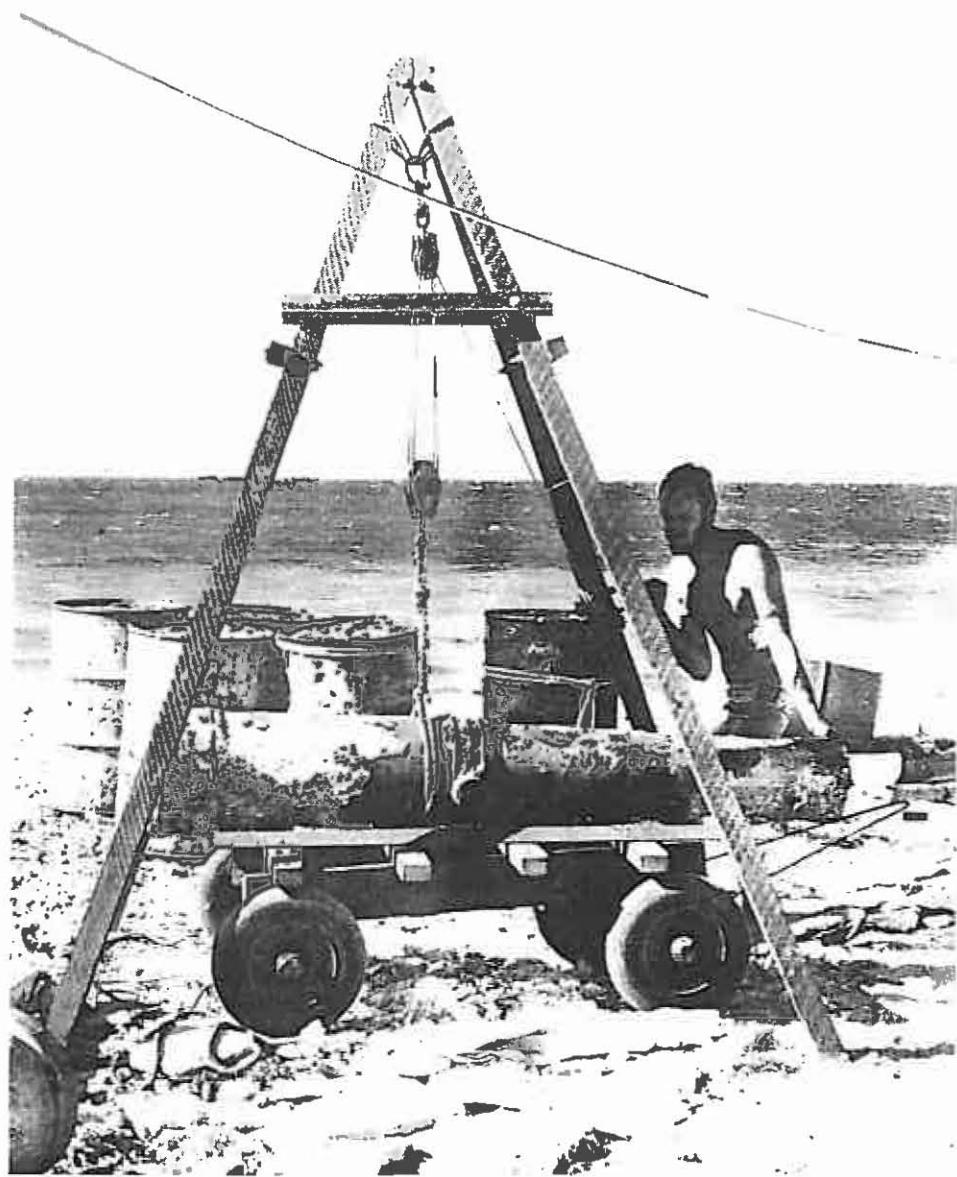


Figure 6. A lifting sheerlegs on Beacon Island being used to lift the composite cannon off the portable trolley.

#### The facilities

Beacon Island was to be the base for the excavation, and here a small house was constructed to accommodate six people, with a workshop, storage shed and a small darkroom built nearby. A 1.5 kw diesel generator was used to provide lighting, and to operate power tools, an arc welder and a freezer. A stand-by 0.75 kw petrol generator was available in case of breakdown of the main unit. As there was no fresh water available on the island, three large catchment tanks with a total capacity of 10,000 litres were used to collect rainwater from the roofs of the buildings in the winter rainy season. Since the excavation seasons took place in the rainless summer, water restrictions were necessary.

A jetty was built from the north-east end of the island, next to the field station, out to a deep-water passage. This allowed the large workboat to unload directly onto the island, and enabled the island supply boat and other big vessels to come alongside to be loaded with heavy material. To this end, a davit with a lifting capacity of about 0.5 tonne was constructed on the end of the jetty for loading and unloading from the boats. Radio communications were established with the mainland coastal radio stations, and messages could be sent either as telegrams on the small ships' frequencies or via a radio telephone frequency link with Perth.



Figure 7. The Department of Maritime Archaeology workboat *Henrietta*.

### Staffing

Perhaps one of the most underrated aspects of excavation work is ensuring the well-being of personnel. This was particularly important on the *Batavia* excavation due to the remoteness of the site, and the long periods of field-work. If staff are expected to work efficiently for up to 150 days in the field, it is essential to ensure that good living and work facilities are provided, in convivial surroundings. The size of the team usually numbered about seven, comprised mainly of staff from the Department of Maritime Archaeology, with one or two volunteers. This was an ideal number, both from the point of view of carrying out the excavation work and the ability of the group to function as a team. During diving operations, 3-4 persons worked on the site, with 1-2 tending on the workboat, and one person looking after the camp. Since the nature of the excavation work on this site was periodic, with a few days intensive diving followed by a period of non-diving due to bad weather, there was not the usual cumulative exhaustion often associated with long diving periods. During the bad weather periods, it was possible to work on the material that had been raised, photographing, cataloguing and recording, and there was time also to maintain equipment and to relax.

During the period from August to February, the Abrolhos are uninhabited, and during these times, fresh fruit and vegetables were flown out by sea-plane once a fortnight, together with mail and newspapers. The aircraft also served to change-over staff, and was available for emergencies. The period from February to August is the Abrolhos crayfishing season, at which time several hundred fishermen, with their families, live in huts on the islands. A supply boat visited Beacon Island every two days during this period, bringing provisions for our team and the four families there who were involved in fishing. A freezer was used to store meat, bread and milk, and a well-balanced diet was ensured at all times.

### Boats

The main excavation work was carried out from *Henrietta*, a steel workboat, 11 m long, 4.5 m beam and 1.2 m draught. This vessel was specially designed to the specifications of the Department of Maritime Archaeology for this type of work. The vessel had a top speed of about 16 km/h provided by twin turbo-charged diesel engines. Twin engines were chosen for manoeuvrability and safety. Should one engine break down, there was always the possibility of steaming to port without assistance. The dropping transom provided access onto a flat, reinforced stern deck 7 m long. A hydraulic 'A' frame enabled loads to be swung in-board onto the deck. Lifting was provided by a 4 tonne hydraulic winch, operated from the wheel-house and housed below in the engine room. The wheel-house was open to the stern, with a hatch leading to the fore-peak which had sleeping accommodation for four people, a small galley, refrigerator and the ship's radio. A hatch in the roof of the fore-peak provided a through draft.

Two hookah units were mounted on the bow, feeding low pressure (8 kPa) air to the air-supply lines. For convenience, these lines were wound on reels mounted on the roof of the cabin. The hookahs consisted of a small 2 kw (2.7 hp) petrol engine driving on the low-pressure air compressor. This system provided air at a rate of 250 l/min. As diving on the site took place in depths of less than 6 m, this system was preferable to scuba. At times, 27 diver-hours were achieved in a single day. The great advantage of the hookah system was that air was available from a simple, cheap unit, and was adequate to supply three divers working hard. The air was purified with a 50 µ filter, oil-trap and activated charcoal filter. The hoses, which were attached to the diver's weight belt, acted as a safety line and reserve air-supply. Should the hookah unit fail, there was enough air in the hoses to give the divers at least 3 minutes air-supply.



Figure 8. A pair of photographs showing the effect of a very large and unexpected swell breaking over the *Henrietta*.

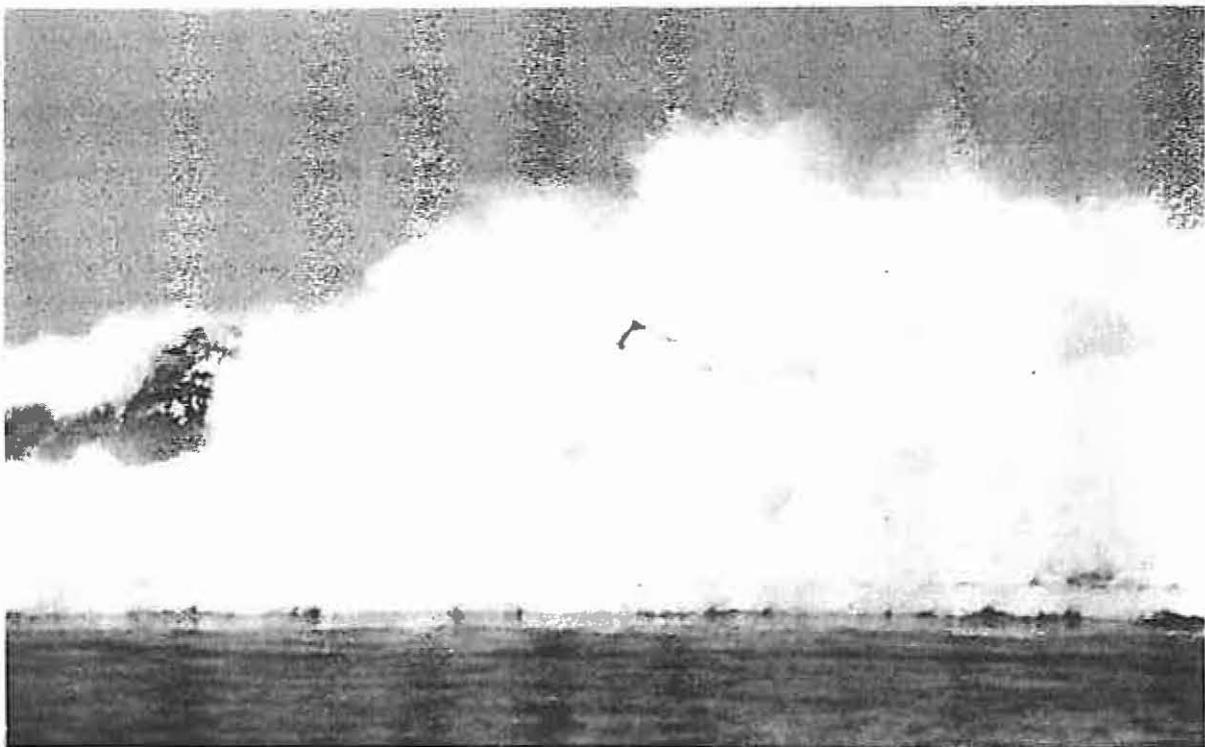


Figure 9. The wave has broken over the vessel, the A-frame can just be seen protruding from the wave. This incident took place nearly 100 m further out to sea than normal while observing the swell behaviour. The vessel was not at anchor and was able to head towards the breaking wave and thus avoid an almost certain disaster.



Figure 10. A diver inspecting the exposed hull timbers below cannon No. 5.

A large-capacity, road-drill compressor was used to operate air-lifts and air-powered tools. Two different units were used during the various seasons; a small 2500 l/min unit and a larger one, 4000 l/min. The small unit was a Volkswagen engine, in which the two left-hand cylinders of the horizontally opposed engine had been converted to a compressor. This provided a very compact unit occupying a small deck space. The larger unit was a Rota-Vane compressor driven by a diesel engine. This occupied a large area on the deck and proved to be unsuitable for free-flow running, since it was difficult to get the adequate back pressure that rotary compressors require. The air-supply hoses for these units were mounted on the cabin roof.

Two small 5 m aluminium dinghies were used for running around the islands and working on the inside reef. For safety, the main 18 kw (25 HP) outboard engines were supplemented with stand-by 7 kw (9.5 HP) outboards. Emergency equipment was housed in a water-tight container, providing the basic tools to repair the engines, a survival kit to last several days, and all standard boat emergency requirements (flares, fire extinguisher, torch, first-aid kit etc.).

During diving operations on the wreck site, the workboat was made fast to a specially constructed mooring. Two 200 kg stocked anchors were attached in a V configuration to 100 m of heavy-link chain; 250 m of high-tensile chain was run from the mid-point of the heavy chain back to the wreck site. A 50 kg anchor was laid slightly to one side of the middle of the wreck site. Two chain risers, connected to the high-tensile chain at 50 m and 75 m from the wreck site, were attached to dan buoys so that the ends could be picked up from the boat. Thus, on fine days, the workboat was moored on the 50 m riser and, should the vessel need to lift heavy objects, it could be let back over the site on an additional hawser. In the rare cases where the wind was not blowing in the same direction as the prevailing swell, a stern rope attached to the wreck site anchor was used to draw the vessel into a bows-on configuration to the swell. In heavy swell conditions, the vessel was moored on the outer mooring. In all cases, the greatest danger was always related to the workboat, necessitating that, at all times, the vessel be securely chained to the mooring. Diving was invariably terminated not because of any danger to the divers, but rather the danger posed to the workboat due to increasing swell.



Figure 11. An airlift being used to remove sand overburden on the wreck site, note the lifting tray (left) and the hull timbers (right)

## The excavation

### The first excavation season

The excavation needed to be carefully planned, to take into account the prevailing direction of the swell and surge which was along the axis of the site, north towards the reef. It was in this direction that loose material tended to be driven. The site, in its undisturbed state, before the excavation started, appeared to be in a stable state. The surface of the site was loosely concreted together with coraline algae to form a crust. Once this crust was broken there would be a tendency for the loose material below to be scoured out during storms. The stern area was selected as the starting point for the excavation, because it was the easiest area to work; the bow area was more turbulent and less often suitable for diving. The complex of anchors and cannon 10, 11 and 12, in the middle of the site, formed a barrier to scouring, so it was decided that this would be the northern-most limit of excavation. The initial excavation objective was to run a trench across the site, in order to get some idea of the stratigraphy and to determine if there was any surviving hull structure. The building blocks area seemed to be the most obvious place to start, as it was thought that any surviving ship's structure would almost certainly have been trapped under the weight of the blocks. However, after most of the building blocks had been

removed and a test hole dug at co-ordinate 130100 to a depth of 1.2 m, there was still no sign of structure to be found. Also, the concept of digging a trench on this site was shown by experience to be out of the question, since any resemblance to trench walls were rapidly scoured out. It was, however, quite feasible to clear an area systematically, gradually lowering the level by removing the coral lumps and building blocks in the area. During this initial phase of the excavation, there was an extreme paucity of artefacts. As the cleaning operations progressed westwards across the site, the artefacts increased in number, and several complete stoneware jugs were found around cannon 5. Work then started on cleaning around cannon 7 and 8 in preparation to their removal from the site. Following a prolonged bad weather period, timbers were found to have been exposed by the scouring action occurring around cannon 5. Three frames running east-west across the site were resting on what appeared to be outer planking running north-south. Exploratory excavation showed that this represented the northern extremity of a section of the side of the ship, three metres wide, lying between the eastings 105 and 108 of the co-ordinate system. How far back this structure extended was not clear, but it seemed unlikely to extend beyond 110 or further west than easting 099.



Figure 12. Removing a frame from the wreck site, prior to raising onto the workboat.

The frames were loosely attached to the strakes, and, as a temporary measure, they were held in place with bags of coral. Excavation progressed aft, exposing more ribs, and east, to try and find the keelson. The latter was not found, the structure terminating quite abruptly along the line of the strakes. As the excavation progressed aft, the number and quality of the artefacts increased. Cannon 5 was removed, from on top of the timber, which then showed the structure sloped downhill quite noticeably towards the aft area of the wreck site.

At this point, it was decided to dismantle the structure and raise it, because of the danger of storms destroying the uncovered timbers. Thirty ribs were removed and raised in the lifting tray, after they had been tagged and recorded (see recording techniques). The strakes were then tagged and photographed. Small strakes, that had scarf joints close to the northern extremity of the timber, were removed. Strakes which were too long to handle with the existing facilities were cut into two sections, 2.5 m in length, with the chain-saw. It was found that the outer planking consisted of two layers of strakes, with a further outer layer of thin, pine sheathing.

Towards the end of the first season, the area around cannon 1 and 2 was cleared of coral, and cannon 3 was raised. At this point, 5.5 m of timber had been recovered and excavation of this had reached northing 070. The rest of the timber was covered with plastic sheeting and several hundred bags of coral, and the excavation was wound up for the winter.

#### The second excavation season

The first phase of this season was to clear the concretion overlying the timbers aft of northing 070. This proved to be extremely difficult because the concretion contained a large number of iron cannon balls and, as they were cleared further aft, the concretion became thicker. It quickly became obvious that the hammer-and-pick technique was unsatisfactory. A series of experiments showed that the use of small explosive charges (*circa* 10 grams) was the most satisfactory technique for proceeding in this area (for more details see techniques). Following each charge, the loose cannon balls were excavated and the broken concretion spoil was airlifted off the site. Many delicate, iron artefacts were recovered from this concretion, including bar-shot and iron spoons. A 1.5 m section of timber was cleared. The ceiling planking was sawn through, and raised. The ribs were then removed, and finally the outer strakes were cut through with the chain-saw and raised.

The excavation then proceeded further aft, and cannon 1 and 2 were raised. Once these were clear, five large lodging knees were uncovered, running at a slight angle to the strakes. The cannon ball concretion lay over and in between these knees, which made extraction difficult. The western-most knee and thus the highest on the side of the ship, lay directly under cannon 2. The cannon ball concretion started east of the next knee, and was assumed that this was part of some sort of stern shot locker. Complex decking in this area was noted, presumably the floor of the gun deck. The cannon balls had, therefore, spilled across the side of the ship when it rolled over on its port side. The deck acted as a barrier, preventing the cannon balls rolling further west.

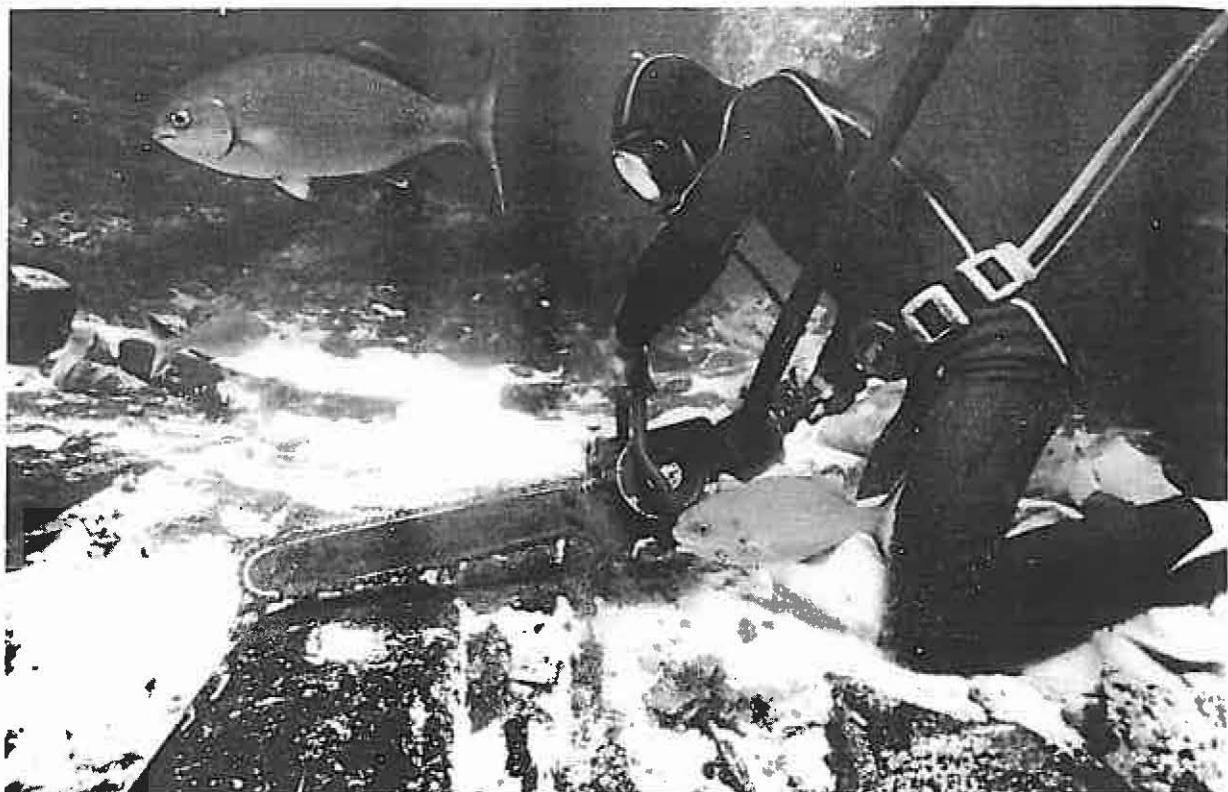


Figure 13. Cutting the timbers with a pneumatic chain-saw.

Photographic recording was being carried out at all stages of the excavation, and coral was being cleared from around the timber. Still, no sign of a keelson was found, even though the width of the timber was now almost 6 m. After the cannon had been cleared, it appeared that the extent of the structure aft of the last saw cut of the first season was about 4 m.

Progress during this season was very slow, mainly due to the enormous quantity of coral and concretion that had to be cleared in the stern section. Much of the work was in preparation for the third season when it was hoped to recover the remaining timber. A systematic programme of collecting pottery and bricks on the inside reef site was started and quite a large collection of mainly stoneware was made from this area. This work was carried out during times when it was not possible to dive on the main site.

#### The third season

After removing the protective cover from the stern timber area at the start of the season, the remains of the stern-post was discovered. The post, which was carefully recorded and raised, had water-line markings. Work continued on removal of the transom lodging knees. This aspect continued to give rise to problems as the cannon ball concretion extended down the narrow gaps between the knees, firmly wedging the knees in place. Work proceeded slowly as this concretion was carefully chipped out, following the use of small explosive charges. The ceiling planking on the side of the ship was recorded and removed as the lodging knees were raised, thus exposing the frames.

Finally, when all the knees were freed and raised, it was possible to raise all the remaining ceiling planking and ribs. As the outer planking ran behind the fashion-piece, it was necessary first to remove the wing-transom, and transom beams before removing the fashion-piece. After removing the transom beams, the diagonal transom planking on the stern was exposed. The fashion-piece was freed and raised. This was the largest single timber item recovered, measuring more than 4 m from end to end, and with an estimated weight of about one tonne. After removal of the fashion-piece, the outer planking was found to be arranged around the transom in a curious way. The inner layer of the strakes was butted up against the inner transom planking, under the fashion-piece. However, the outer planking was bent around the transom in a continuous stroke. These were removed and the excavation of the ship's structure was finally completed.

The excavation work then moved into the area to the north of the old building block area, between northing 150 and 200, bounded to the east by the group of anchors (easting 100) and to the west by cannon 10 (easting 109). In the process of clearing coral in this area, large numbers of coins were found, particularly to the west side in and around the cannon complex. The excavation proceeded forward to about northing 230, concentrating in the gully running along easting 108. A large concretion containing iron and coins was raised from grid reference 160107. This was brought to the field station, at Beacon Island, to be examined. On breaking it up at the field station, an astrolabe was discovered in a fine state of preservation.



Figure 14. The lifting tray filled with coral rubble about to be removed from the site.

The excavation proceeded around a lump in the centre of the site about 1 m high centred about 280105. The lump extended about 5 m north-south and 3 m east-west. The outer layers were comprised of coralline algae, about 250 mm thick; below this was a harder layer of concreted coral fragments. The southern extremity of the lump consisted mainly of cannon balls, bricks and some animal bones. Further to the north, coins and miscellaneous finds were noted, together with a large number of bricks. Before this area could be cleared, the excavation had to be terminated for the year.

#### The fourth season

This season was started in September and proved to be a very bad period for weather. During the season, only 10 days work was possible on the main site when excavation was continued around the central lump. More cannon balls and some other miscellaneous artefacts were raised. Due to the bad weather, about 200 diving hours were spent on the inside reef collecting pottery and searching for new areas of wreck material.

### Recording Methods

#### General recording

The record of the progress of the excavation, wind, weather, sea state, diving-log and other associated matters were recorded in a daily diary. This gave an excellent record of the day-to-day events during the excavation seasons, and was made by one person in a foolscap logbook. Archaeological notes were kept on the page opposite the record of the day, together with photographic data, survey information and technical notes.

The artefacts were recorded in finds books. Because of the diversity and complexity of the finds, they were recorded chronologically with an arbitrary prefix number to identify material types, thus: 1. Stone; 2. Ceramic; 3. Non-ferrous; 4. Miscellaneous; 5. Coin; 6. Timber; 8. Ferrous. At the end of each day, the small artefacts were registered with a number, the prefix or first figure identifying material type, followed by the three or four figures of the catalogue number. The nature of the artefact was entered against its registration numbers in the relevant material list. The location of the find and the date of recovery, together with any other relevant information was also recorded. A dymo tag with the registration number was attached to or included with the artefact. This tag remained with the artefact through the conservation process. Following conservation, the number was inked onto the object. The system proved to be very practical. It is inevitable that at times particular objects need to be traced to find their registration numbers. A random list of tens of thousands of artefacts, make this type of search well-nigh impossible, whereas if the material type is known, the search is already much simplified. Also, in storage, artefacts are kept together in material types, so that the storage system tends to be compatible with the recording technique.

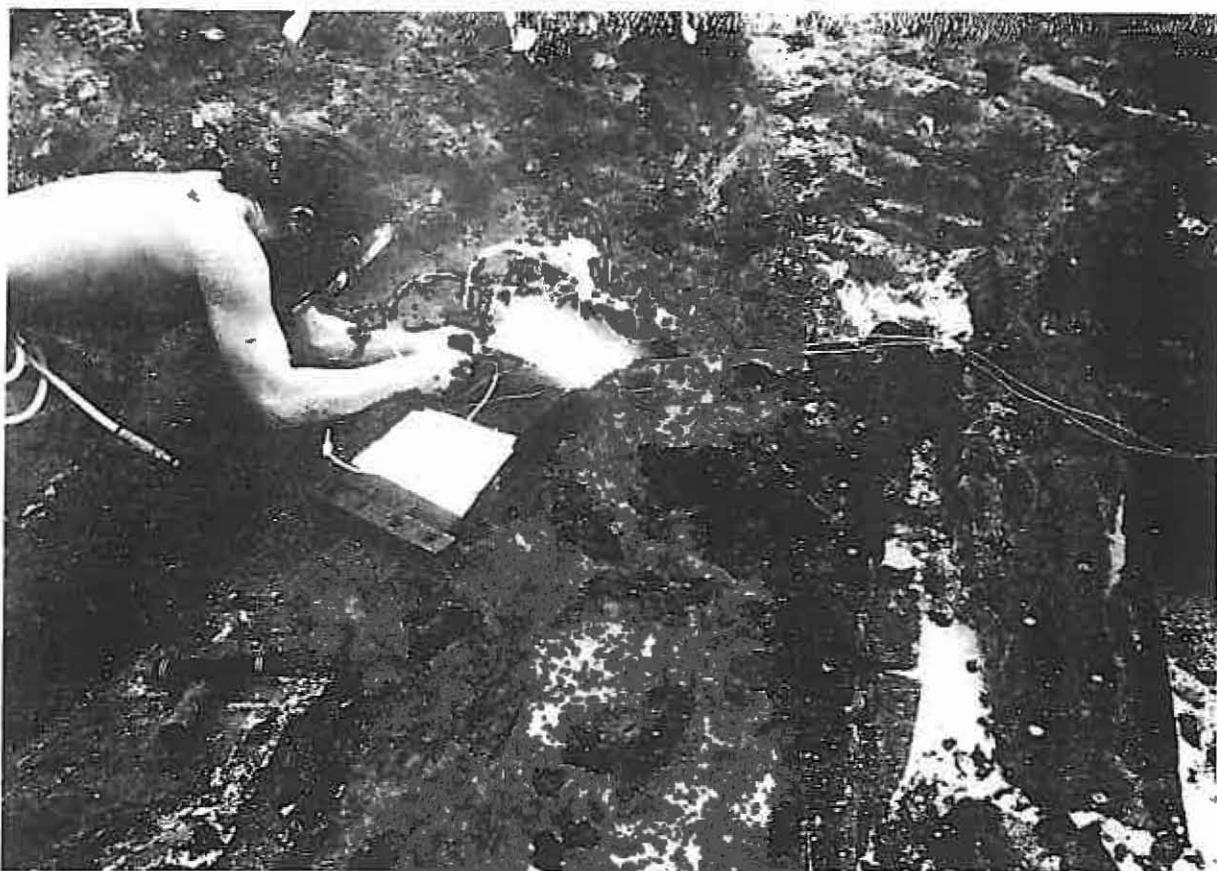


Figure 15. Placing a small explosive charge on the cannon ball concretion. The diver is placing an electrical detonator in the cordtex train, which will set off the two small charges on the rubber mat.

On the main site, divers who were excavating placed their small finds in a bag. On return to the workboat at the end of the day, each bag of artefacts was kept intact. Since each diver worked in one particular area (rarely more than 2 m square), it was possible to identify the location of the artefacts on a large-scale plan of the site to within 0.5 to 1.0 m. Back at the field station, at the end of the work-day, each person sorted their finds out and indicated their location on a large-scale plan of the site. This plan was gridded into one metre squares; the grid lines running north-south and east-west and numbered systematically.

The location of a find was then recorded in the same way as a map reference, with a six-figure number. The first three figures referred to the northing and the last three the easting. Space was provided in the registers for further information, such as photograph numbers, weights, dimensions etc. The exact location of loose finds from the inside reef site was not recorded, since the material had traveled more than 1 km from the main site, and was distributed in a random fashion over an area 100 m long by 50 m wide. Wherever possible, identifiable objects were photographed (see photographic record) and drawn on plastic drafting film with Indian ink at a 1:1 scale (where practicable). In as far as circumstances allowed, artefacts were studied at the field station.

This close examination of material while in the field was found to be most rewarding, particularly with ceramic material, where it was still possible to return to the find spot to search for missing pieces.

#### Underwater recording

Various types of site recording were carried out from time to time as the need arose. The original survey of the site was carried out in 1971 by a Museum expedition. However, there appeared to be some minor discrepancies in the plan when it was compared with the site. Trilateration was used to plot the position of major artefacts during the first survey, but because of the undulating nature of the site, it is likely that these discrepancies are due to variations in the vertical component. On the *Batavia* site, it was difficult to make accurate measurements with tapes because of the strong surge. This technique was abandoned because of these problems. Instead, a simpler and cruder system was adopted to obtain a reasonably accurate survey in a short period of time. This system consisted of a taut wire base-line run out over the long axis of the site from position 000108 to 460108. A sliding right-angle frame was constructed to run through the base-line. Objects were co-ordinated by sighting along the arm of the frame at right angles to the wire. By adjusting the position of the frame on the wire, it was possible to get an exact sighting on an object, so that the object lay in line with the right-angle arm of the frame. Thus, by measuring the distance along the wire and the distance from the wire along the right-angle arm to the object, it was possible to determine its position. No attempt was made to correct for the height of the object, relative to the base-line wire. Objects on either side of the base-line could be recorded by simply rotating the frame to the appropriate side of the wire. Some care was required to ensure that the base-line wire was not displaced by pushing or pulling on the right-angle frame.



Figure 16. Breaking up concretion using a geological hammer and a short-handled sledge hammer.

Additionally, a contour map of the wreck site was made by running a series of seven parallel lines 3 m apart, along the long axis of the site. Depth measurements were made at 1 m intervals along each line with a Bourdon-type depth gauge. The results were transferred to the plan of the wreck site, from which contours at 1 m intervals were constructed.

During the recording of the ship's structure, underwater profiles across the timbers were made. These were used to check the accuracy of, and for comparison purposes with, the profile recording results produced from the profiles of the curvature of the ribs (see below). The underwater system consisted of driving two metal stakes into the seabed on either side of the timbers. The strakes were arranged so that a wire stretched between them at right angles to the line of the strakes. The wire was levelled using a carpenter's spirit level. The vertical distance from the wire to the joint between two strakes was measured using a carpenter's level to obtain the vertical. Horizontal and vertical distances were recorded, and the results plotted to give the curvature of the hull. This technique was extremely difficult to use underwater because of the surge. The results were not as accurate as the profiles taken from the curvature of the ribs, which were recorded on land.

#### Timber recording

Each individual piece of the ship's structure was tagged *in situ*. The tagging system used a coded number, with a prefix letter to identify the type of component (i.e. frame, stave, etc.) A rather crude system which was used during the initial stages of the recovery work was rationalized, as the structure became more complex, into a coded system based on the layer within the structure. Six basic layers were distinguished in the side of the ship and these were coded alphabetically from the top to bottom, corresponding to the inside (top) to the outside (bottom). The numbers differentiated timbers, in particular layers. Thus:

- A. Knees, decking, deck beams and everything on top of the ceiling
- B<sub>1</sub>. Thin skin on top of B
- B. Ceiling
- C. Frames
- D<sub>1</sub>. Thin skin on top of D
- D. Inner layer of strakes
- E. Second layer of strakes, lying below or on the outside of D
- F. Sheathing
- T. Stern structure

As the work progressed towards the stern, the size and complexity of the structure increased, resulting in some problems in identification. For example, the decking was not immediately recognized and was simply given an A prefix. This occurred with several other components at the stern, resulting in the A numbers being rather muddled. Ceiling was discovered towards the stern and was numbered BO to B11. The frames which were encountered at the north end of structure were numbered consecutively from C1 to C46 which was next to the fashion-piece. The buttocks of the frames were not scarfed together so that, in some cases, frames had three separate buttocks. These were denoted by C-East, C, and C-west.

The first layer of strakes encountered was given a D code, and this applied to all strakes attached to frames. At the north end of the site, the strakes were numbered D0 to D6. As the excavation progressed towards the stern, strakes further to the east and west were encountered. Strakes to the east were given negative numbers; at the widest point the strakes ranged from D-8 through D0 to D12.

The second layer of strakes which started directly under D5 ran to the E.

Underlying the D and E layers was a thin layer of pine sheathing which was coded F. It was not clear how the sheathing was made up, as it was in quite poor condition.

We used tags of white, 2 mm-thick PVC sheet 100 x 50 mm square. Code numbers were written on them with a black, water-proof ink, felt-tipped marker. The tags were attached to the timbers with galvanized roofing nails.

As each layer of timber was uncovered, it was tagged according to the above system, photographically recorded (see below), raised and returned to the base camp. There, each individual piece of timber was given a registration number, identified and then stored in sea-water holding



Figure 17. Tagging the hull timbers prior to photography and raising.

tanks. During bad weather periods, the timbers were removed from the tanks, drawn, photographed again (see below), and then wrapped in polythene tubing for storage.

The drawings of the timbers were made by tracing the surface shape and features directly onto thin-gauge, polythene sheeting. There were several major drawbacks to this system. Due to the opaqueness of the sheeting, it was hard to trace surface features. As well, irregularities such as concretion caused distortions in the tracing. The tracing had to be done outside and, as a result, wind also caused problems. There was a danger that the tracing sheet could slip on the timber without being noticed, thus causing errors. Often the heat of the sun caused condensation on the inside of the sheeting, obscuring the underlying timber. With care and patience, most of these problems could be overcome, but the bulk of these drawings needed to be supplemented by photographs. It would have been more useful to trace on clear regular film, but the cost involved was prohibitive. The speed with which the timbers could be recorded was a major factor in favour of the system. Furthermore, the need here for recording information immediately after raising cannot be over emphasized. Not only was there a danger that the timber might warp or crack, but also there was a risk of unavoidable damage during the lengthy handling process of their 500 km trip to the Conservation Laboratory.

#### Underwater photographic recording

All underwater record photographs were taken with a standard 35 mm Nikonos camera, fitted with either the 28 mm or 15 mm Nikonos water-corrected lenses. This camera system is perfectly suited for work such as this, as it is compact, rugged, and produces excellent distortion-free results. Initially, during the first two seasons, the 28 mm lenses were used, but subsequently these were replaced with the superior 15 mm lens. The effective focal lengths of the lenses, in water, are 37.5 mm for the 28 mm lens and 20 mm for the 15 mm lens, giving angular views of  $51^\circ \times 35^\circ$  and  $84^\circ \times 62^\circ$  respectively. The 28 mm lens needs almost twice the camera-subject distance to cover the same area as the 15 mm lens, and as a result, the quality and sharpness of photographs taken with the 28 mm lens tended to be poor when compared with photographs taken of the same subject with the 15 mm lens. All underwater record photographs were taken on Ilford FP4 film rated at 125ASA and developed in the normal way with a fine-grain developer. The normal exposure range for the wreck site was F/4 to F/8 at 1/125 sec. Three types of photographic recording were carried out on this site: site photomosaic, timber photomosaic, and stereo-recording.

A photomosaic of the whole wreck site was made at the start of the first season, to supplement the site plan. The ground control consisted of seven taut parallel lines 1 m apart and 46 m long, laid along the long axis of the wreck



Figure 18. Timbers in the lifting tray on board the workboat en-route to the field station at Beacon Island.

site. The lines were made of plaited, low-stretch, polyester rope, 5 mm in diameter; these were taped with black PVC tape at 1/2 m intervals to give a scale. The long axis of the camera format was set at right angles to the control lines, with an exposure height of 2.5 m, and the camera held vertically above a grid line, gave a lateral field of view of 2.38 m and included the two control lines on either side of the grid line. The forward field of view (1.59 m), included at least three 1/2 m marks. The camera operator judged the flying height and levelled the camera by eye, using the framing attachment as a guide. Photographs were taken at 1 m intervals along each of the lines. A second diver placed a 2 m rod, graduated in 1/2 m intervals, at right angles to the three lines at a 1 m mark on the centre line. This indicated where the centre of the photograph should be. After orientating the camera and taking the photographs, the rod-operator moved 1 m along and repositioned the rod. This system was essential as the camera operator, who would be fully engaged with the camera work and working in a surge, could easily misplace the position on the lines.

After development of the film, the photographs were

printed in an enlarger at 1:10 scale. The processing of prints was greatly facilitated by an Ilford process printer which produces semi-dry and partially fixed prints in a matter of seconds. The prints were batch fixed, washed in sea-water, and then given two freshwater rinses.

During the printing process in the enlarger, it was possible to rectify the photographs not only for differences in flying height but also for camera tilt. This can be carried out manually by trial, using a tilting, printing paper easel, or theoretically, by calculating the tilt angles and subsequently setting them on the easel. This technique has been described by this author elsewhere (Green, 1980).

The rectified prints were laid up in runs, each run corresponding to the series of photographs along one grid line. A base-board was prepared on which grid lines were drawn to scale, corresponding to the grid lines on the site. The centre print of the central line was selected, and trimmed of any white borders. A narrow strip around the print was removed using the feather-edge technique. The print, having been feather-edged on all four sides, was stuck down in the centre of the base-board, the central line



Figure 19. A scaled photograph of the sheathing or *verdubbling* from the stern-post. Note the waterline markings and the sheathing nail pattern.

stuck down in the centre of the base-board, the central line on the photograph being arranged to correspond to the central line on the base-board. A water-soluble PVA glue was found suitable as an adhesive.

The next print in the series was then selected and feather-edged in a similar manner, but trimmed so that where the print overlapped the previous one, approximately half its overlap was discarded. The print was laid down with the image of the grid line on the base-board line and its position arranged to give the best coincidence of images on the two photographs along the common edge. The process was repeated along the whole strip in both directions, until the run was completed.

The centre print of an adjacent run was then selected, and trimmed so that half the side-overlap was trimmed to merge with the centre print of the previous run. This was then laid down, with the image of the central line in the photograph corresponding to its grid line on the base-board. Subsequent prints were then laid down, matching images both forward on the run, and laterally on the adjacent run whilst maintaining correspondence of the grid line.

#### Photographic recording on land

After the timbers had been raised and taken to the base camp on Beacon Island, they were stored in sea-water tanks. During the bad weather periods, each individual timber was brought out of the tanks for drawing and photography. It was found that indirect light was the most effective for photographic recording of surface details of the almost-black timber. Careful adjustment of camera and subject was required so that accurate plans could be obtained from the photographs.

An open-ended shed was constructed which provided shade from direct sunlight. In the roof of the shed, 2 m above the ground, a Nikon F reflex camera was mounted and levelled with a spirit level. The timbers were wheeled in a trolley and positioned directly below the camera. Flat timbers were then levelled, also using a builder's spirit level so that it lay in the same plane as the camera. In this way, the scale over the plane of the timber was uniform over the whole object.

With large or long timbers, the field of view of the 55 mm Micro-Nikkor P lens did not cover the whole object. In these cases, a series of overlapping photographs was taken by moving the trolley under the camera. A thin, white thread was stretched along the timber to aid the alignment of prints when making up the composite photograph of the object. A blackboard was included in each photograph, giving the registration number of the object, its identification and thickness. This was found later to be invaluable, in sorting out thousands of photographs of different pieces of timber.

If the timber was large and completely flat, a 24 mm Nikkor N lens was used. With this lens, it was possible to photograph the timber in one frame. Great care was required, however, to ensure that the timber and camera planes were levelled, as tilt with such a wide-angle lens would cause severe scale distortions. In all cases, a 1 m scale graduated in 20 mm squares in a checked pattern was used. The scale was arranged so that it lay in exactly the same plane as the flat surface of the timber.



Figure 20. Recording the stern-post sheathing on transparent drawing film, note this is done at the same time as the photography.

Although Ilfo print paper was generally used for printing, it has been found that the new Ilfo speed paper is better for this type of work. The latter has better dimensional stability, and appears to suffer less from shrinkage than the Ilfo print material.

#### Underwater timber photomosaics

As each area of the ship's structure was uncovered, photomosaics were made to provide a record of the structure. After all individual timbers had been labelled, a series of photographs were made of the area. Included in each photograph was a 1 m square or a 1 x 2 m rectangular grid frame, graduated in 0.1 m intervals. The grid frame was laid flat on the surface of the timber and a hand-held, semi-vertical photograph was taken at a height of 2.5 m, using the 28 mm lens, or at a height of 1.4 m, using the 15 mm lens. The grid frame was then turned over on one edge so that the next metre square of timber was covered with the grid frame. This was then photographed and the process repeated. By starting at one edge of the timber, a strip, 1 m wide, was photographed from one side to the other. The grid was then rotated laterally once and the process repeated back across the structure, to give a strip of the next adjacent metre. This process was continued until all the exposed area was photographed.

The surface layer of timber was then removed and the underlying layer was re-tagged where necessary and a second mosaic was made. This process of photography (removal of a layer, re-tagging and photography) was repeated until all the timber in that particular area was cleared. The excavation then progressed to a new area adjacent and the process was repeated. In this way, a series of photomosaics of each layer of the structure was obtained, and these could be fitted together to give an overall mosaic of each layer over the whole area.

The prints were rectified, as described in Green (1980). In this case, the rectification was quite straightforward, due to the use of a regular metre square. However, owing to the fact that the structure was curved in one plane, and almost straight in the other, the mosaic, although not suffering from serious matching errors, represented the surface of the timber, flattened into two dimensions.

Later, when the 15 mm lens was available, it was found that, in good conditions, it was possible to photograph the timber in one single (or stereo pair) photograph. Thus photomosaics were abandoned as unnecessary and vertical or semi-verticals of structure were taken using a 1 x 2 m grid frame, in either stereo or mono, with the 15 mm wide-angle lens.



Figure 21. Photographing the transom of the *Batavia* during the progress of the dismantling of the hull structure.

#### Stereo-photographic recording

With the growing complexity of the site in the stern area of the site, some difficulty was experienced in interpreting the photographs of the structure. It was decided, therefore, to obtain stereo-photographs to help in this work. Initially, the stereo-photographs were made purely for visual record purposes. Later, however, grid frames were always included so that some dimensions could be determined.

Two Nikons cameras with 28 mm lenses were mounted 0.6 m apart on a bar with their camera axes approximately parallel. The cameras were fired simultaneously by hand. A number of problems were encountered with this system, particularly where close-up photographs were required. The pressure of excavation work did not enable the development of a comprehensive stereo-photogrammetric system, and we were limited to simple recording. With the introduction of the 15 mm lens, stereo-pairs were taken simply by taking one photograph and then quickly moving the camera laterally about 0.2 to 0.3 m and taking another. This simple system produced excellent record stereo photographs and the complex stereo-bar system was abandoned.

The prints were processed in the normal way and viewed under a Topcon mirror stereoscope. The additional dimension elicited by this means, added considerably to interpretive work. For example, an apparently featureless area of seaweed and concretion, when viewed in stereoscopy, immediately enabled identification of the position of cannon balls under concretion and other three-dimensional features.

#### Excavation methods

##### The diving

During the four seasons of work on the *Batavia*, a total of 447 days were spent in the field. Due to bad weather, it was possible to dive on the main site on 173 of these days, during which time a total of 1916 diving-hours was logged. An additional 500 hours was logged working on the inside reef site. Thus, 11 diving-hours per diving-day were spent on the main site, and this occurred on an average of one day in three. The breakdown of the four seasons of work is given in the table below:-

Season	1st.	2nd.	3rd.	4th.
No. days in the field	148	108	150	41
No. diving days on main site	59	45	59	10
Total diving hours	543	449	641	283
Main site diving hours	477	360	528	86
Ratio of diving to total days	1:2.5	1:2.4	1:2.5	1:4.1
Average diving hours per day	8.08	8.00	8.95	8.60

This shows the distribution of diving-hours each day for the four seasons. It may be noted that the days when it was possible to dive on the main site, occurred in a group periodically, corresponding to periods of good weather. In general, diving occurred for about three or four days with a subsequent break of about 10 days. The monthly diving-day ratio was as follows: September, 1:3.4; October 1:6.2; December 1:3.0; January 1:3.3; February 1:3.4; March 1:2.1; April 1:1.8; May 1:2.5.

### Excavation tools

A number of quite simple, but ingenious tools or aids were used to assist in the excavation. Removal from the site of large quantities of coral was one of the biggest problems. The whole site was covered with a thick layer of dead coral, often up to 2 m deep. The coral was generally too large to be air-lifted; the largest lumps were plates about 1 m in diameter, and 0.5 m thick, ranging in size down to small nodules 100 mm in diameter. The surface layers of coral were lightly concreted together with coralline algae which could be easily broken with a crowbar. With more stubborn concretion, a geological hammer was used as a hand-held chisel and this was struck with a short-handled sledge-hammer. The "hammer and pick" technique was found to be the most efficient way of dealing with concretion, apart from the special case of the use of explosives.

Various methods were used to remove the coral lumps that had been broken free from the binding concretion, and the loosely packed coral below this. During rough weather, when the workboat could not be positioned over the site, the coral was bagged and man-handled off the site. The full sacks weighed about 50 kg (in water), and were piled, 10 m away to either side and well clear of the site. In good weather, these sacks were raised with the workboat winch using an 'octopus' system: twenty or thirty light lines were attached to the shackle on the end of the wire. This was then dropped onto the site, and the sacks attached to the lines with quick release knots. The whole was then raised behind the boat, and the vessel manoeuvred, under power but still attached to the mooring, so that the vessel was off the site. The quick release knots were then pulled and the sacks dumped. For large coral lumps, a steel-mesh lifting tray 3 x 1.2 x 0.8 m was constructed (Fig. 14). This was left on the site to be filled by the divers; the boat was then brought in and the tray lifted by a four-point strop attached to the corners of the tray. A similar strop, attached to the lower part of the tray, was tied to the boat, after the tray was lifted. The vessel was then steered off the site and the tray lowered, putting the strain on the lower strop. As a result the tray tipped upside down, dumping its load. With this system, it was possible to dump 1.5 tonnes per load, the whole operation taking a few minutes. Using these methods, about 150 cubic metres of coral was removed from the site during the four seasons.

The soft sandstone building blocks were raised using rope strops and the boat winch, using the hydraulic A-frame to swing the blocks on-board. This type of operation could be carried out only in relatively good weather conditions, as the boat had to be dropped back from the mooring so that it was over the site and the vessel needed to be reasonably stable to prevent the blocks being damaged when lifted on-board. A maximum of about 1.5 tonnes of blocks could be loaded onto the vessel at one time for transport to the Beacon Island field station. Initially, the unloading from the vessel onto the jetty created some problems. These were partially resolved by the construction of a davit on the end of the jetty. Then, a half-tonne capacity trolley was made to run the blocks ashore along the cat-walk, and a portable sheerlegs (Fig. 6) was used to unload them from the trolley. A total of 128 blocks

weighing 27 tonnes were recovered, transported to the island, and unloaded in twelve days.

Eight cannon were recovered from the site. Initially, cannon were raised with 200 kg-capacity lifting balloons. These balloons were tied to the cannon, filled with air until the cannon floated and then towed back to the island. Later when the lifting capacity of the boat winch was increased, the cannon were raised behind the boat (in some cases loaded on-board) and then motored back to the island. Great care was required in handling the iron cannon so as not to damage the protective concretion covering the gun. If this were broken, the soft graphitized surface of the gun was exposed, and the markings and mouldings could be easily and irreparably damaged. The best system devised to protect this concretion during lifting was to use 100 m diameter hawsers, racked and seized into a figure-of-eight strop. The cannon was supported by two of these strops which were chained together, above the gun, and onto the lifting wire, thus providing a soft support for the gun.

Large concretions were raised in a cargo net and brought back to the field station for examination and extraction of artefacts.

During the timber-raising operations, flat planks were loaded into the tray used for raising coral. When this was full, the whole was lashed down and the tray raised onto the workboat, for the brief trip back to Beacon Island. Large, curved ribs that would not fit into the lifting tray, were strapped using flat material straps to prevent chafing or scoring of the soft timber surface. The timbers were usually hauled onto the workboat by hand.

To remove sand, gravel and small coral spoil, two types of airlifts were used. One was a continuous 10 m length of Heliflex reinforced plastic tubing, 120 mm in diameter. A securing point was located about 3 m from the working end, and this was attached to a small concrete sinker about 20 kg in weight. The discharge end was tied off so that the spoil was deposited about halfway up the site towards the reef. It was found that this spoil was then driven off the site and over the reef by the surge. Air was fed to the airlift via a 30 mm supply pipe which was run up the working end of the airlift and securely attached to it. The other airlift was a rigid P.V.C. pipe, 5 m long and 150 mm in diameter, with a further 4 m of Heliflex tubing attached to the working end. The airlift was anchored at the junction of the two pipes, and the air supply and discharge were arranged in the same way as the flexible airlift. The air supply was emulsified to improve efficiency, and under normal operating conditions, with a 2500 litres per minute air supply, it was possible to run both units and remove material up to slightly less than the diameter of the airlift tube.

Problems were experienced with spoil blocking the airlift pipe at some distance up the pipe. This was often a result of an operator allowing a large object to enter the airlift, which, turning in the pipe, then jammed it. To prevent this, a restriction was made in the mouth of the airlift. The airlifts were found to be reasonably manageable, even in strong surge conditions and, provided that they were securely anchored, they could be left on the wreck site throughout the season. At the end of the working day, the air supply pipes were disconnected and brought on-board the workboat.

BATAVIA SITE - 'A' TIMBER LEVEL

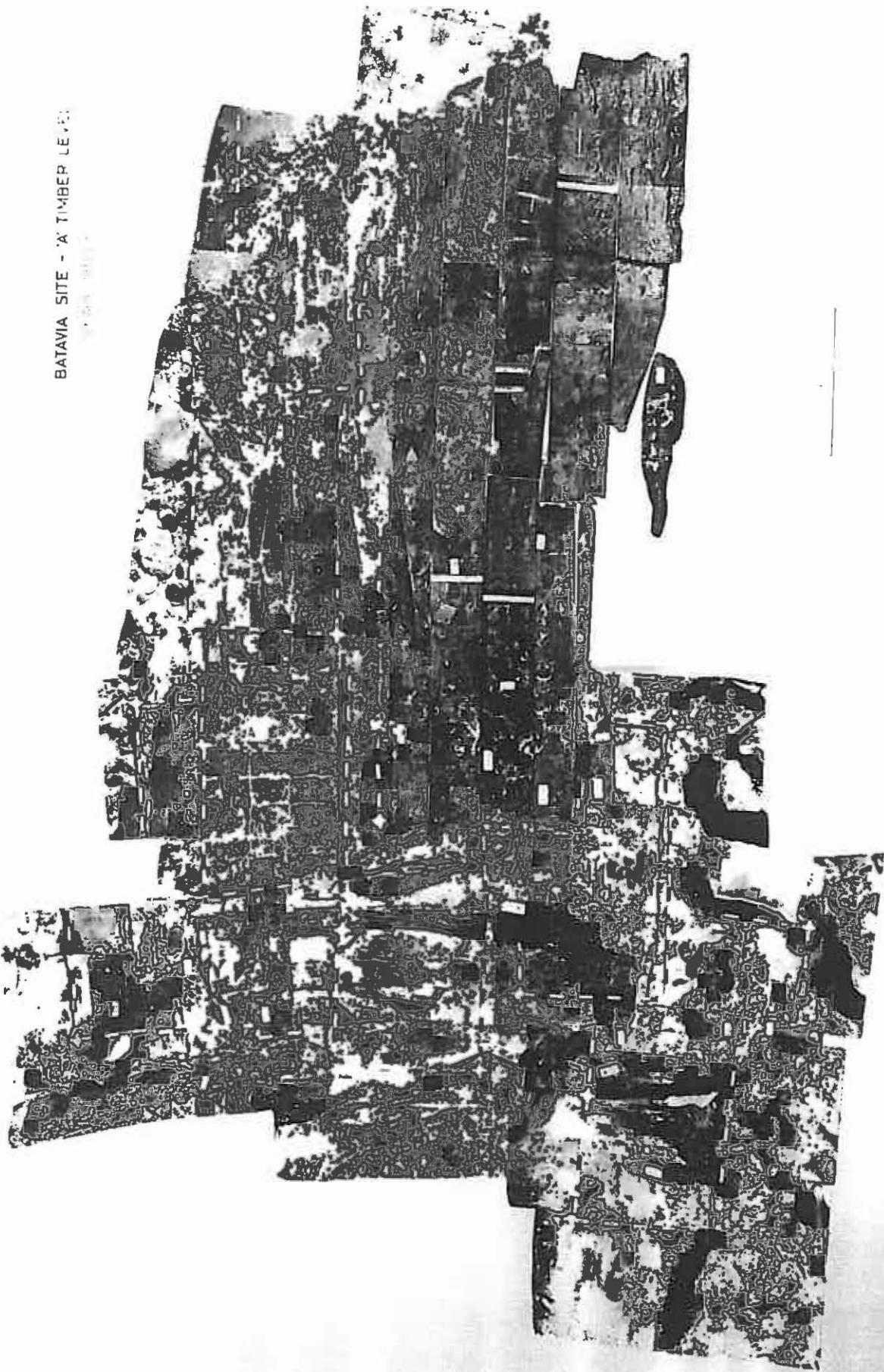


Figure 22. Composite photomosaic of the hull timbers at the north end of the site. Note that the grid frames have been cropped out of most of the photographs in order to make the mosaic clearer.

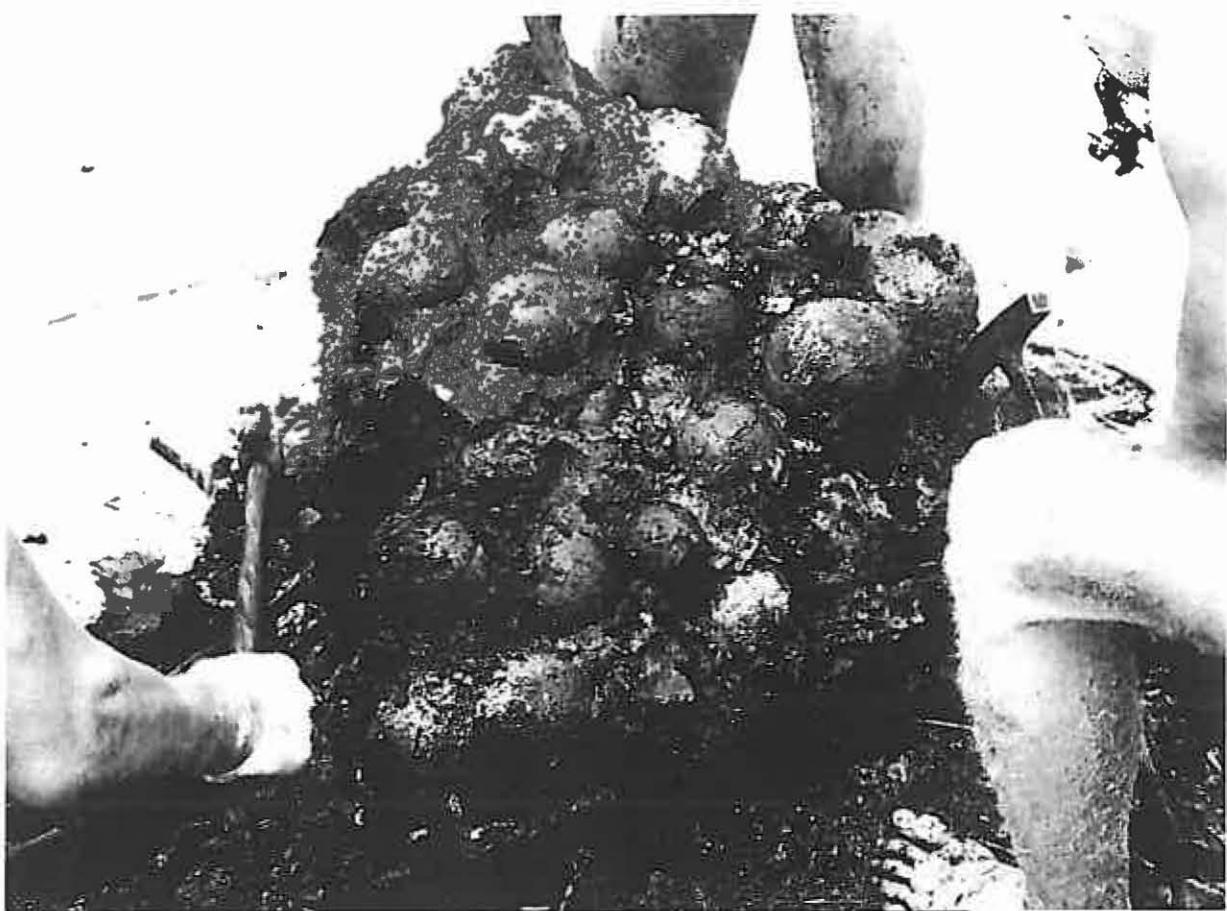


Figure 23. Breaking open a cannon ball concretion at the base camp.

The air supply was also used to power a pneumatic chain-saw. This was used to cut the long staves of the ship's timbers into manageable lengths. This system was the only practical way of cutting the very hard timbers. It proved to be quick and highly efficient.

A pneumatic jack-hammer was used on a few occasions to try and break up concretion, but it proved to be very difficult to operate and caused too much damage to be practicable.

## THE ARTEFACTS

### Equipment and materials related to use on board the *Batavia*

#### The armaments and military equipment

##### The location of the guns on the site

The original disposition of the guns on the site at the time of discovery, in 1963, is known only from a survey carried out by Lieutenant Commander H. Donohue, R.A.N. A sketch plan of this survey was published by Edwards (1966), (see Fig. 24) and is referred to below as the Edwards Plan. Over a period of years, a number of guns have been raised from the site, and there has been some confusion as to where the guns came from. The Edwards Plan, used in conjunction with information gained from subsequent surveys of the site, has made it possible to relocate all the guns, and identify those that have been raised, some of them conclusively and, others, at least, tentatively.

Examination of the Edwards Plan (Fig. 24) and the present day plan (Fig. 25) reveals, firstly, obvious discrepancies in the number of guns, and their disposition. The Edwards Plan shows a total of 25 guns (A to Y) whereas the later plan shows the position of 28 guns (1 to 28), including the seven guns known to have been raised in 1963.

The discrepancy in number can be explained because the initial survey missed three guns. This is not surprising, since the last gun to be discovered (No. 21) was found in 1977, four years after the start of the main excavation work. During this excavation (1973 - 1977), 20 iron and one composite gun were plotted still remaining on the site. It is clear that the initial survey in 1963 had missed the iron guns Nos 9, 11 and 21, which were deeply buried in the coral, and difficult to identify as guns.

Although these guns which were missing from the initial Edwards survey, accounted for the numbers, there were still obvious anomalies in the disposition of some of the bronze and iron guns. In particular, some iron guns on the site were shown on the Edwards Plan as bronze and some bronze guns were recorded on the plan as iron. Inspection of the two plans showed that there must have been a transposition of some of the bronze and iron guns. Thus on the Edwards Plan, bronze gun H had been transposed with iron gun G (since bronze H was clearly iron No.

6) and bronze gun W had been transposed with iron gun V (since bronze W was clearly iron No. 19). If these corrections were made to the Edwards Plan and the disposition of the recently discovered iron guns added to it, the result made it possible to sketch the locations of the five bronze guns (Nos 24, 25, 26, 27 and 28), one iron (No. 23) and one composite (No. 22) which had all been raised or removed in 1963. This gives the final plan shown in Fig. 25.

Identification of the corresponding site location for each bronze gun was more difficult, since no records identifying the guns were made at the time of their recovery in 1963. By deduction, it is possible to identify some of the guns from the notes on the Edwards Plan. Firstly, gun No. 28 (marked W on the Edwards Plan) is noted 'Bronze tailing gun'. It is assumed to be the long bronze gun BAT 3637 (the other four being shorter and of a similar size).

No. 24 (marked F on the Edwards Plan) has noted against it 'dropped in 1964'. The date is clearly a misprint since the expedition was in 1963. At that time, the last gun to be raised was accidentally dropped and not recovered. It was retrieved by a Museum diving team (G. Kimpton and C. Powell) in 1970 and can be certainly identified as the Rotterdam Admiralty gun BAT 3640 No. 25 (on the Edwards Plan mistakenly G iron).

The other bronze gun in this general area (H on the Edwards Plan) has the note 'capsized', indicating that it was found upside down. This area of the site is noted for the heavy sand abrasion which can be seen, for example, on gun No. 24, BAT 3640. The only other abraded gun was BAT 3627 and, therefore, it would be reasonable to assume that these two badly-abraded guns came from within the same vicinity, and that the three relatively unabraded guns came from the bow section of the ship. Thus one may reasonably attribute BAT 3627 as gun No. 25. Consequently, the location of all the bronze guns can be identified except for Nos 26 and 27 or W and X, which are either BAT 3638 or BAT 3639. It is helpful, however, to know that they were a matched pair.

#### THE BRONZE GUNS

The five bronze guns described here are as follows:

##### BAT 3637

Length 3.525 m. Bore 120 mm. Dated 1603(5?). Admiralty of Rotterdam. Gun founder Conraet Antonisz. Present location: Western Australian Maritime Museum, Fremantle.

##### BAT 3627

Length 3.20 m. Bore 150 mm. Dated 1616. Admiralty of Rotterdam. Gun founder Arent van der Put. Present location: outside Country Women's Association Building, Geraldton.

##### BAT 3640

Length 3.20 m. Bore 150 mm. Dated 1616. Admiralty of Rotterdam. Gun founder Arent van der Put. Present location: Geraldton Maritime Museum.

##### BAT 3638

Length 3.30 m. Bore 150 mm. Dated 1615. Admiralty of Amsterdam. Gun founder Henricus Meurs. Present location: Geraldton Civic Centre.

##### BAT 3639

Length 3.30 m. Bore 150 mm. Dated 1615. Admiralty of Amsterdam. Gun founder Henricus Meurs. Present location: H.M.A.S. *Stirling*, Garden Island, Western Australia.

The guns appear on the site plan (Fig. 25) numbered 24, 25, 26, 27 and 28.

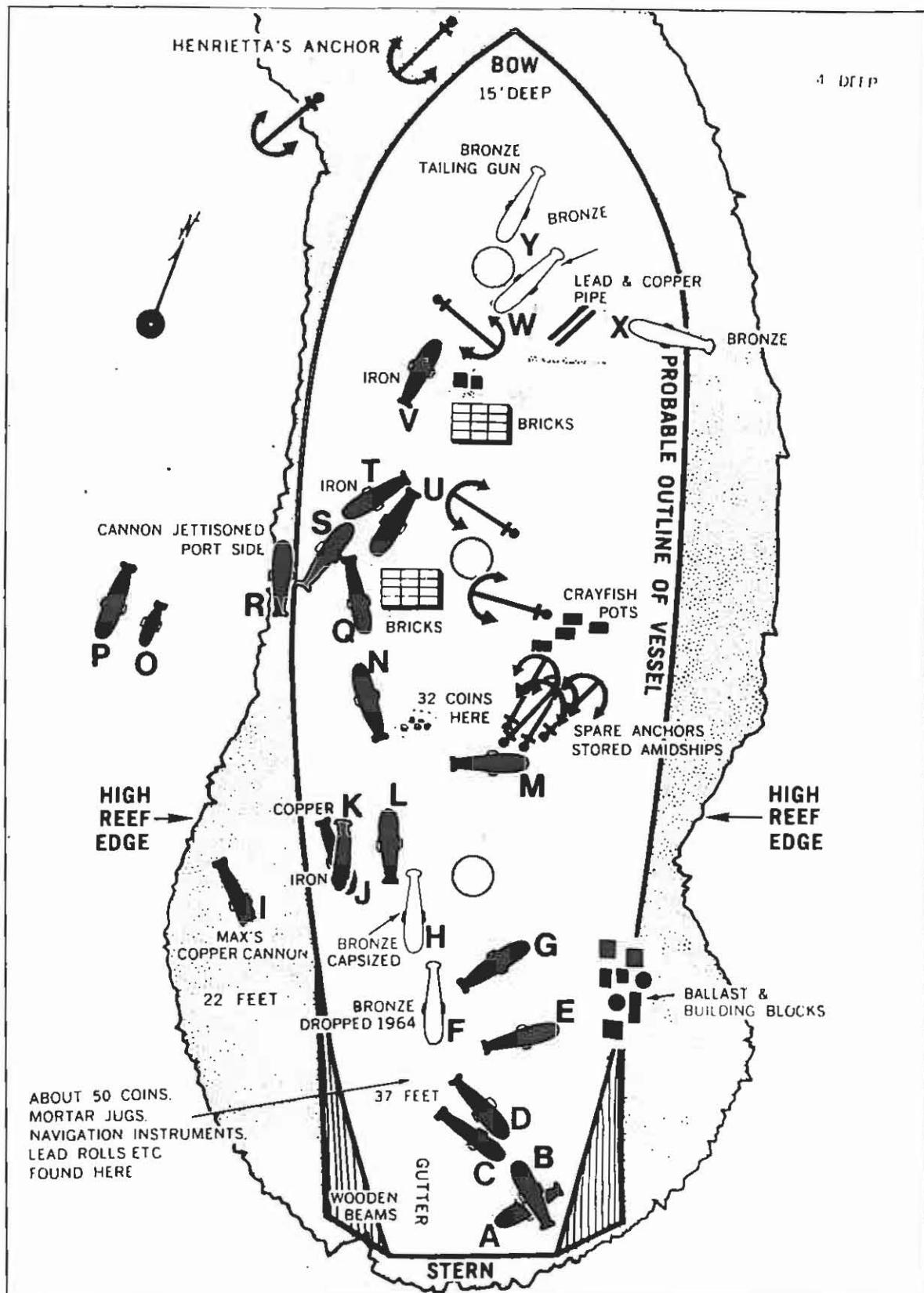


Figure 24. Plan of the wreck site made in 1963, showing the disposition of the guns recorded during the initial exploration of the site, published in Edwards (1966) and known as the Edwards Plan. Guns marked A to Y, five bronze, two 'copper' or composite and eighteen iron. Compare with Figure 25 opposite, which shows the actual disposition of the guns, the guns that are missing and the guns that have been transposed.

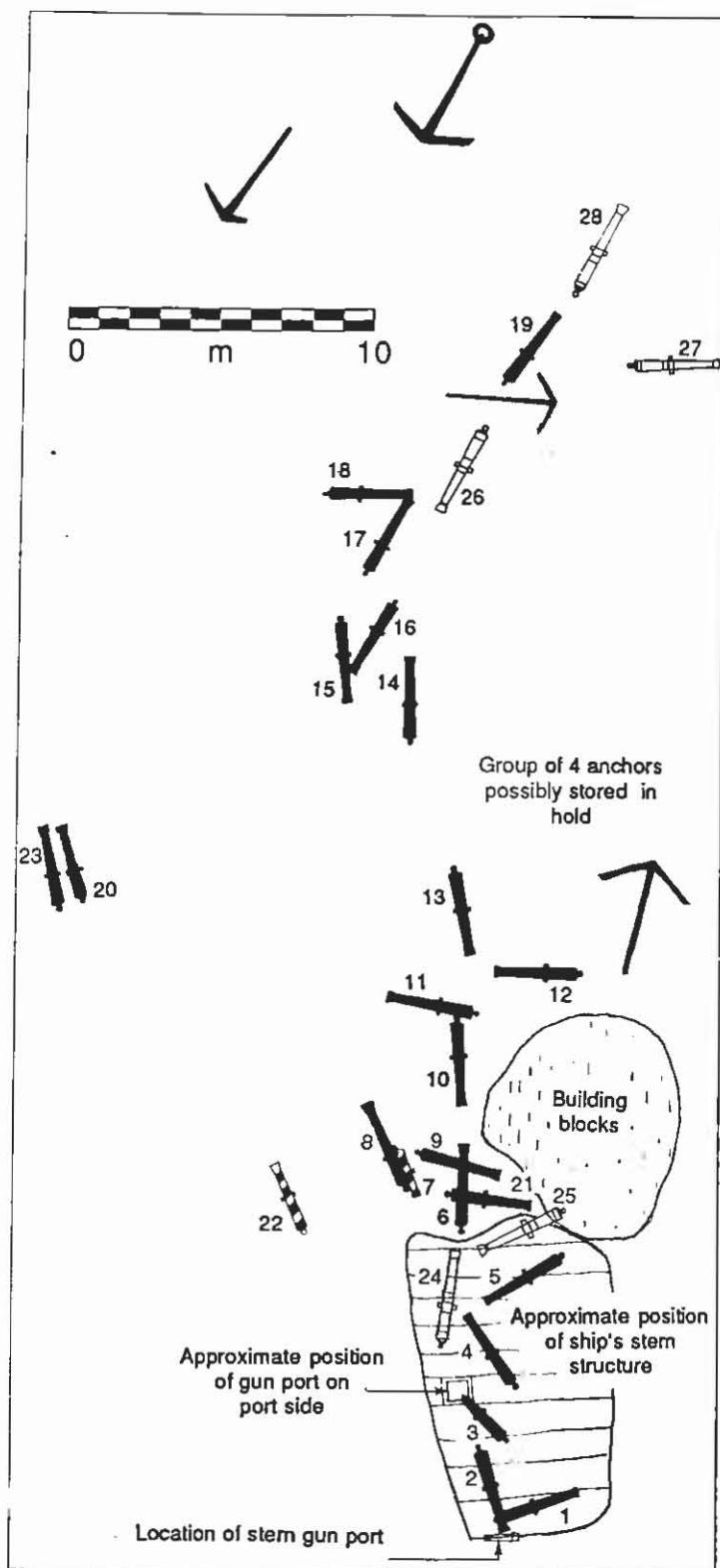


Figure 25. Plan of the wreck site showing the position of the guns that were surveyed on the site after the initial survey, together with the hypothetical positions of the guns that were removed during the 1963 expedition, taken from the plan opposite. There was a total of twenty-eight guns on the site when it was discovered, five bronze, two composite and twenty-one iron.

#### BAT 3637 No. 24.

This gun has patches of abrasion on the muzzle, trunnions and base ring. In general, the abrasion is confined to the lower surface. Casting flaws are evident on the chase and around the muzzle. There is a narrow frieze behind the muzzle fillets and astragal. There is a decorative field in front of the second reinforce ring and ogee which consists of an ornate vase with scrolled vegetal tendrils. A pair of dolphins are set on the second reinforce. The first reinforce has a large medallion which consists of the lion of the United Provinces, rampant, holding a sword and a bundle of arrows, and surrounded by a wreath set against the framework of a pair of crossed anchors. This is the badge of the Admiralty of Rotterdam. Below is the date 1603 or 1605 – it is not clear if the number is a 3 or a 5. Beneath the date is a plaque with the inscription:

ADMERALITEIT. RESEDER.  
ENDE. TOT. ROTTERDAM.

In the area of the plaque are the holes which were once the chaplets (the chaplets will be discussed below). Behind, is the vent field, with a square vent and two upright vent-cap lugs. On the base-ring is the inscription:

CONRAET ANTONISZ. ME. FECIT.

There is no evidence of a VOC stamp or the weight, although the latter may have been worn away.

#### BAT 3627 and BAT 3640

These two Rotterdam Admiralty guns are both badly-abraded: one is missing both its dolphins and most of the decoration; the other is missing one dolphin. The guns have a simple decorative frieze around the muzzle astragals. The decorative frieze in front of the second reinforce has an axial decoration resembling a *fleur-de-lis* flanked on either side by tritons brandishing a yataghan and buckler. Interestingly, the monster is not a true triton or merman (half man, half fish) as it has the front legs of a horse. The frieze appears to be part of a longer design, since part of the buckler of another Triton appears on the other side of Aphrodite who is arising from her shell. The scene is taken from the classic Botticelli painting of Aphrodite arising from the sea. Two well-formed dolphins are mounted on the second reinforce. The badge or emblem of the Admiralty of Rotterdam lies above the plaque bearing the following:

ADMIRALITEIT. RESIDERENDE  
.TOT. ROTTERDAM. A. 1616.

The four chaplet holes appear off-centre: whereas on the Meurs guns, one of the holes appeared on the centre-line, these ones appear to be rotated by 45°. The touch-hole on the vent field is square, with the typical pair of locating lugs. The touch-hole has been cut out leaving a cubic space as a void. This must originally have been filled with an iron cube, no doubt, a repair to the hole. On the base-ring is the inscription:

AREN'T VANDER PUT MEFECIT ROTTERDAM A. 1616

Remains of the weight 4450 A stamped on the ring indicate the gun was measured in Amsterdam(?) *ponts* (2197 kg).

#### BAT 3638 and BAT 3639

These two guns are the best-preserved of the bronze guns, BAT 3638 being almost totally undamaged. The guns have a muzzle frieze enclosed by a pair of astragals and fillets. The frieze consists of scrolls supporting floral or vegetal pendants. Another frieze is set in front of the second reinforce. This consists of a bird (possibly an eagle) flanked by floral and vegetal wreaths and ribbons. On the ogee of the second reinforce is a square hole located on the top surface. The purpose of this hole is obscure; while it may be for an additional chaplet, the hole does not penetrate the bore. It is assumed that the hole was originally filled with iron, which has disappeared due to the electrolytic corrosion effects in sea-water, of the dissimilar metals. This will be discussed below. A pair of dolphins are mounted on the second reinforce. A medallion on the first reinforce consists of crossed anchors with triton supporters. Below, in two friezes made up of three sets of astragals and fillets is the inscription:

ADMIRALITEIT. RESIDERENDE.  
T. AMSTELREDAM

A chaplet hole lies directly over the second row of the inscription. This is one of four holes, but, interestingly, only two are visible. The other two show up as swellings on the outer surface, but can be confirmed by probing the surface, the hole lying just a few millimetres below. An incised AVOC mark lies slightly to the right of the centre-line below the inscription. In the vent field is a simple round touch-hole, with a pair of lugs for locating the vent patch. On the base-ring is the inscription:

HENRICUS MEURS ME FECIT 1616

There is no evidence for the weight inscription which is usually found on the base-ring.

#### Discussion

A similar gun to BAT 3627 and 3640, made by van der Put, is located in the Nederlands Scheepvaart Museum in Amsterdam. This gun has an overall length of 3.84 m and a bore of 125 mm and is thus a lighter and longer gun, more on the style of BAT 3637. The gun is illustrated in Puype (1976), Fig. 2. Calculation of the bore of these guns in duim gives values of 5.8 and 4.9 Amsterdam *duim* for the 150 and 125 mm bores. Witsen (1671:501) gives a table of weight of shot against radius of bore in *duim* x 100. This indicates that the guns were probably 24 and 14 *pont* guns. The exact figures are 25 *ponden* for 150 mm and 14 *ponden* for 125 mm (12.5 *ponden* for 120 mm). As such, these represent the heaviest class of gun on the *Batavia*.

### The chaplets

All three types of bronze guns have different methods of construction of the chaplet or crown piece. The function of the chaplet is to support the bore plug or kernel in the mould before and during the casting of the gun. The complex process of making a mould for a gun required, first, that a model of the gun be made. Around this was cast a mould and the original model was then destroyed and removed, leaving the mould into which was poured the molten bronze. In the 17th century, guns were cast with a plug running down the centre of the mould to form the bore of the gun. Later, in the 18th century, for various reasons, it was found easier to cast guns solid, and then drill out the bore. To support the bore plug, a chaplet was used at the bottom (vent) end of the bore. This usually consisted of a round iron ring which held the cylindrical bore plug. Projecting from the ring were three or more pins which were attached to the wall of the mould. Thus, when the gun was cast, the bronze filled up the cavity and surrounded the chaplet; the plug would then be broken-up and removed leaving the cylindrical bore with the iron chaplet cast into the bronze. There is an excellent series of engravings in Diderot (1763); Fig. 79 of Plate 14 shows the completed mould (see also Gillispie, 1959); Fig. 80 shows the bore plug with the caption:

*Le noyau de l'ame des pieces, ainsi que l'on les fendoit toutes percées à l'ancienne maniere, abrogée par l'ordonnance rapportée ci-dessus. Le noyau étoit composé d'une barre de fer cylindrique, entourée de fil de fer, & revêtu de terre & potée'; Fig. 82 shows the chaplet with caption: 'Chapelet qui servoit à soutenir le noyau lorsque l'on fendoit les pieces creuses.*

Norton (1628) also describes the chaplet, although he does not mention it by name: 'There must also bee a smooth and equall Cillinder, whose Dyametre must be just the height of the Bore, and made of the same earth moulded upon a strong Iron square Barre, and upon a cord woulded about the same, therewith to make the soule or concave hollow Cillinder of the Peece, by placing it (by helpe of the Base and Muzzle-ring) exactly in the midst of the vacuity of the outermost Colume, which when the Patterne or Model shall bee taken out, will remaine hollow to receive the metall that must make the body of the Peece.' Wignall (1973) discusses chaplets and suggests that English gun-founders did not use chaplets.

Each type of bronze gun found on the *Batavia* shows minor differences in the mounting of the chaplets. Evidence from the van der Put guns (BAT 3627 & 3640) suggests that the chaplets of these guns did not pierce the wall of the mould, because two of the four arms of the chaplet do not penetrate the outer bronze surface of the gun. At these points, there is a thin layer of bronze (1-3 mm) between the outer surface of the gun and the hollow end of what was once the end of the iron chaplet arm. This suggests that the arms of the chaplet rested loosely in the mould, inevitably touching the walls of the mould in only two places (the points at which the chaplet appears to pierce the mould). It is, thus, possible to deduce how the

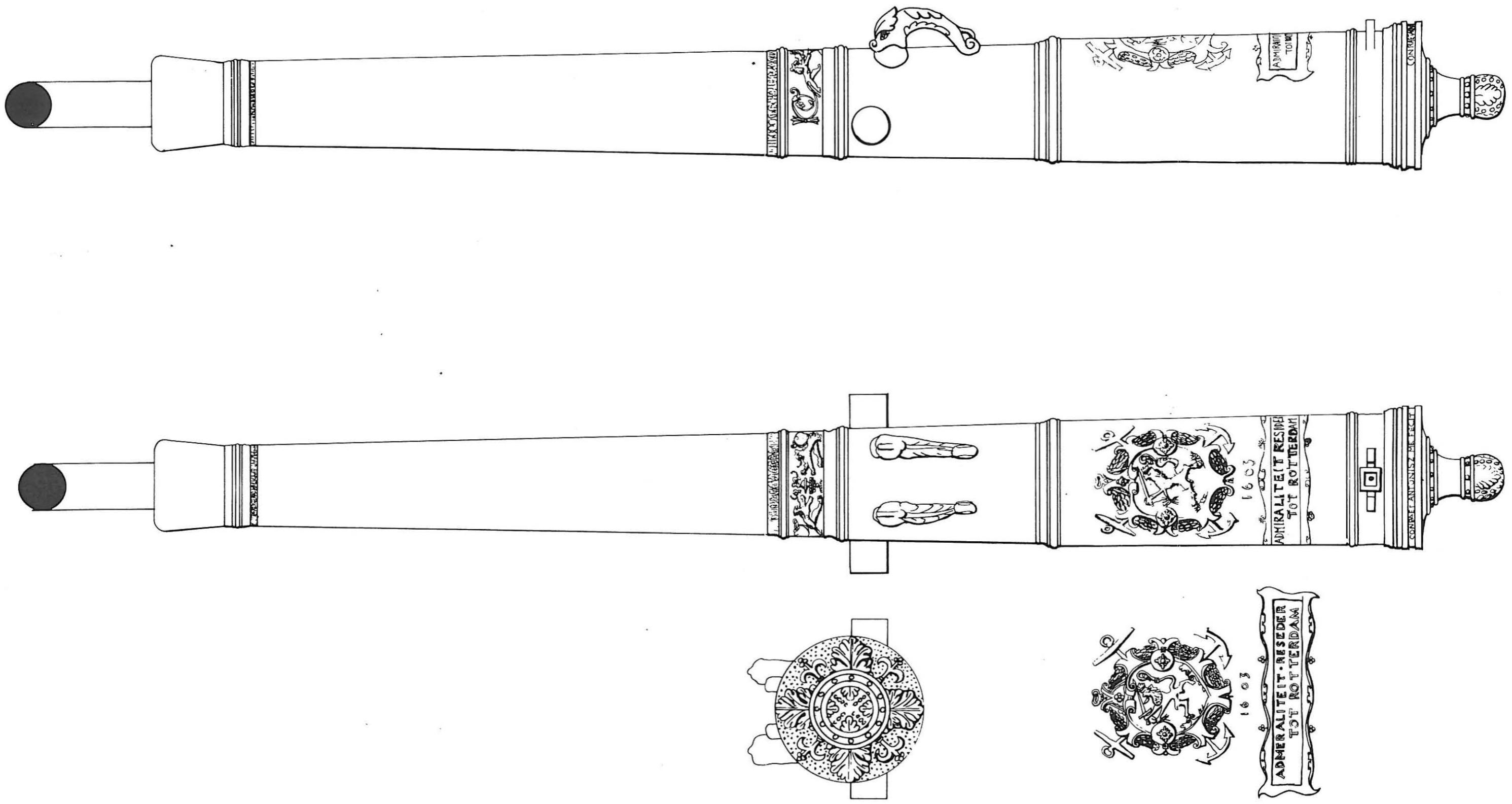
mould was arranged. Firstly, if the chaplet was mounted loosely in the mould, it could only be set in place if the cascabel end of the mould was open. It would be impossible to insert the chaplet through the muzzle end of the mould, as the diameter of the muzzle at that point would be too small to allow the entry of the chaplet which would have a diameter equal to the breech. Thus, the bore plug or kernel bar was put in place and the chaplet slipped over the end to locate the plug in place. The cascabel of the mould was then set in place on the mould and the muzzle end of the bore plug fixed in some way. Presumably, the upper attachments for the plug would have been set in the head of the mould (the part to be removed after casting) which would explain why they do not survive.

The pair of guns made by Meurs (BAT 3638 and 3639) were made using a different construction. The chaplet appears to penetrate the mould; there is a clear indication of four holes, and the edges of these holes are sharp and pronounced. In this case, it is not clear how the chaplet was set in place, although this may have been done at the time of making the original positive and, subsequently, incorporated in the mould.

The purpose of the unusual square hole just forward of the dolphins on the Henricus Meurs guns is not clear. It is unlikely that it is a chaplet or has any function related to the support of the kernel. It is possible that it is a fitting for a sighting or leveling instrument. Norton (1628):94 illustrates a gunner's level which could sit on top of the gun. It is feasible that such an instrument could be located using an iron attachment lug, cast into the body of the gun. Other known Meurs guns also have this feature.

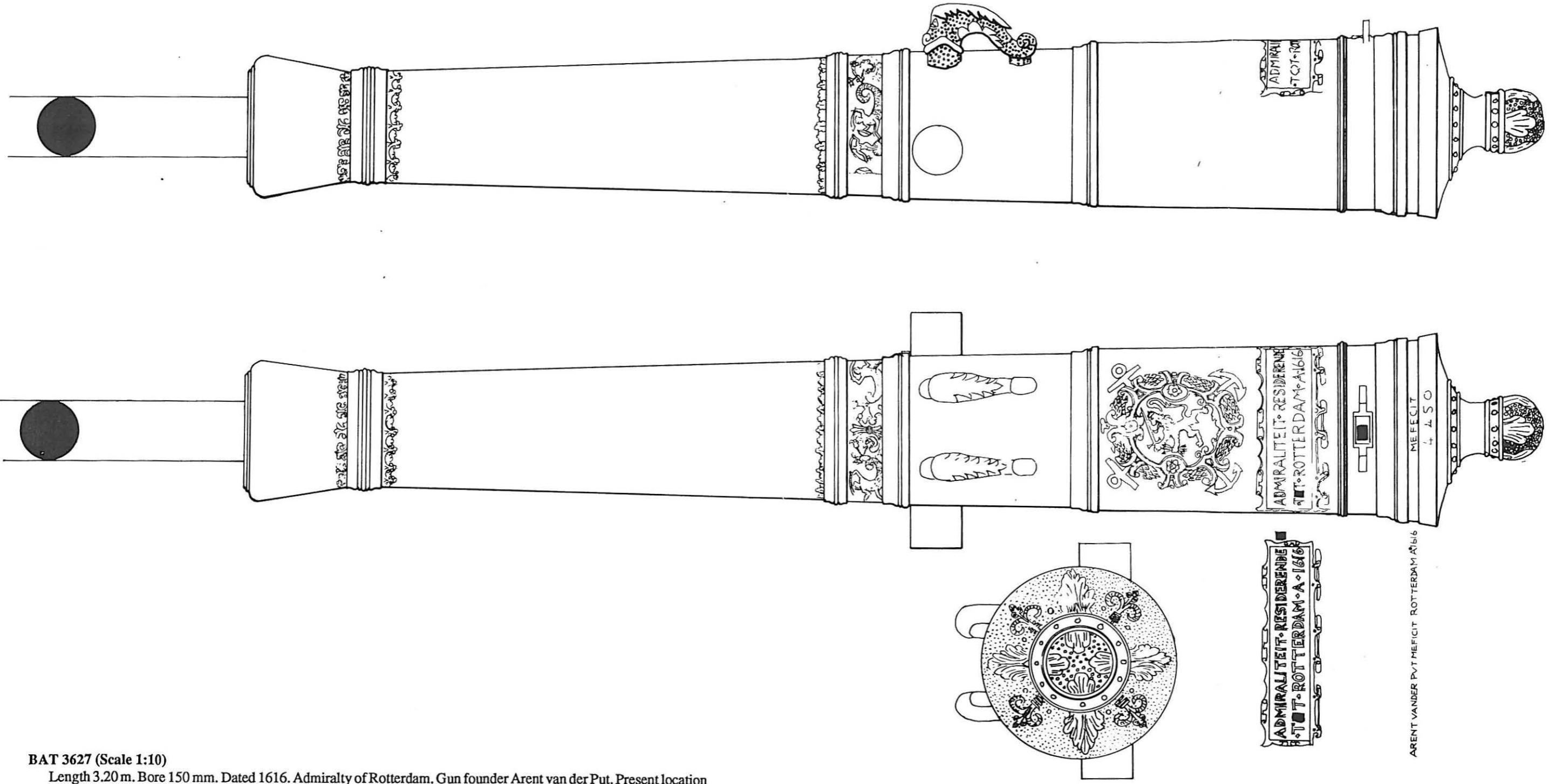
### Chemical analysis

Chemical analysis was carried out on the five bronze guns to determine the composition of the trace elements. The analysis was carried out by Dr Ian McLeod, of the Laboratory for Materials Conservation and Restoration, at the Western Australian Maritime Museum. The results (Table 1) show that the material is a bronze with little obvious variation in the trace elements. BAT 3637 has a much lower tin content than the other four guns, and while there may be good correlation between the three different types of guns in the tin content, there is no obvious correlation with the other elements. Some work has been carried out in Europe on the analysis of trace elements in bronze ordnance, in particular Riederer (1977) has examined the composition of 254 guns in various museums, mainly in Austria, Germany, Italy and France. Riederer groups the various guns in Fig. 8 by plotting the percentage lead against percentage silver; the only two examples of guns from the Netherlands in this analysis are both from the Hague, made by J. Maritz in 1773 and 1785 respectively. Their composition is unlike the *Batavia* guns, particularly in the lead/silver ratios (Maritz 0.30%/0.11%). Obviously, the tiny sample analysed by Riederer is hardly representative of all Netherlands guns, and more analyses are required.



BAT 3637 (Scale 1:10)

Length 3.525 m. Bore 120 mm. Dated 1603(5?). Admiralty of Rotterdam. Gun founder Conraet Antonisz. Present location Western Australian Maritime Museum, Fremantle.

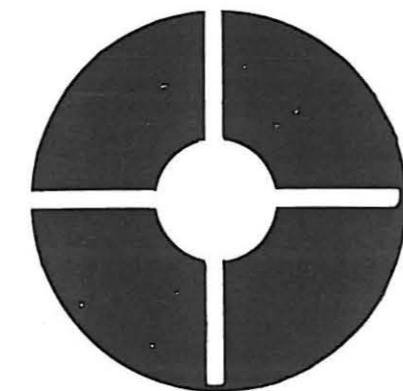
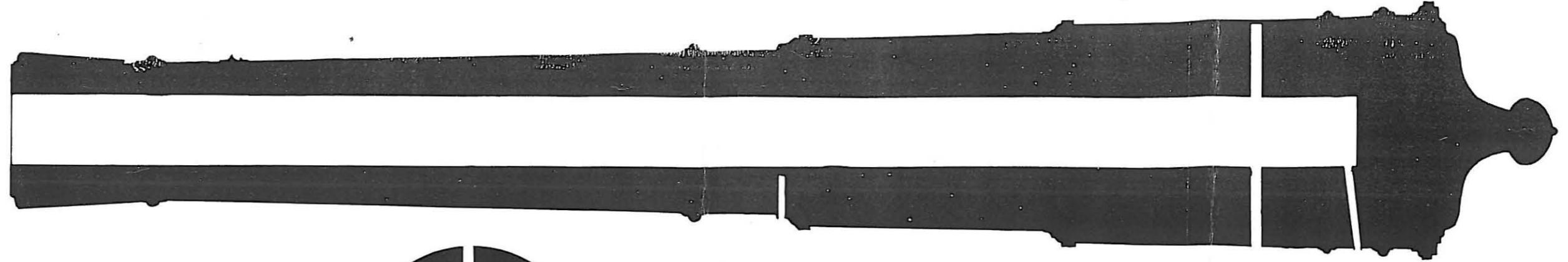


**BAT 3627 (Scale 1:10)**

Length 3.20 m. Bore 150 mm. Dated 1616. Admiralty of Rotterdam. Gun founder Arent van der Put. Present location outside Country Women's Association Building, Geraldton.

**BAT 3640 (Scale 1:10)**

Length 3.20 m. Bore 150 mm. Dated 1616. Admiralty of Rotterdam. Gun founder Arent van der Put. Present location Geraldton Maritime Museum.



BAT 3638

Length 3.30 m. Bore 150 mm. Dated 1615. Admiralty of Amsterdam. Gun founder Henricus Meurs. Present location Geraldton Civic Centre.

BAT 3639

Length 3.30 m. Bore 150 mm. Dated 1615. Admiralty of Amsterdam. Gun founder Henricus Meurs. Present location H.M.A.S. *Stirling*, Garden Island, Western Australia.

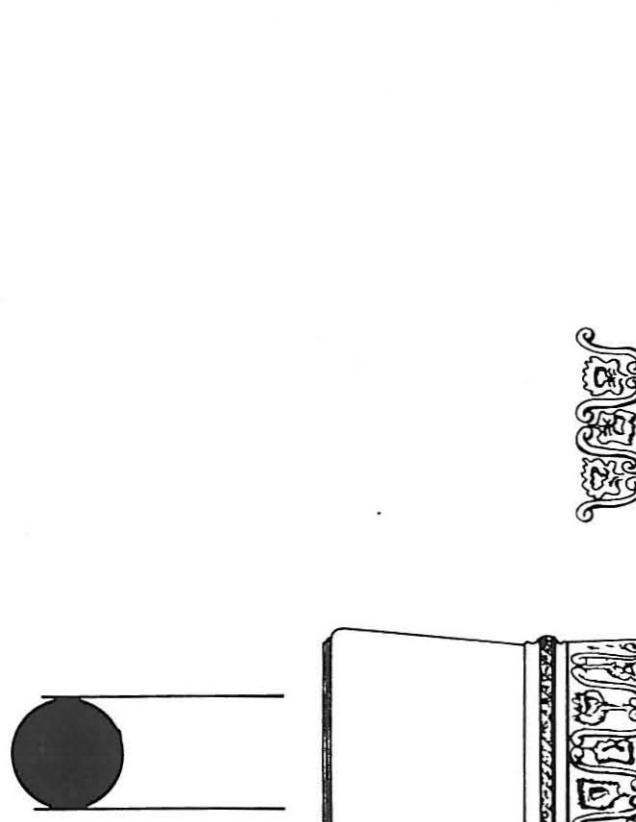
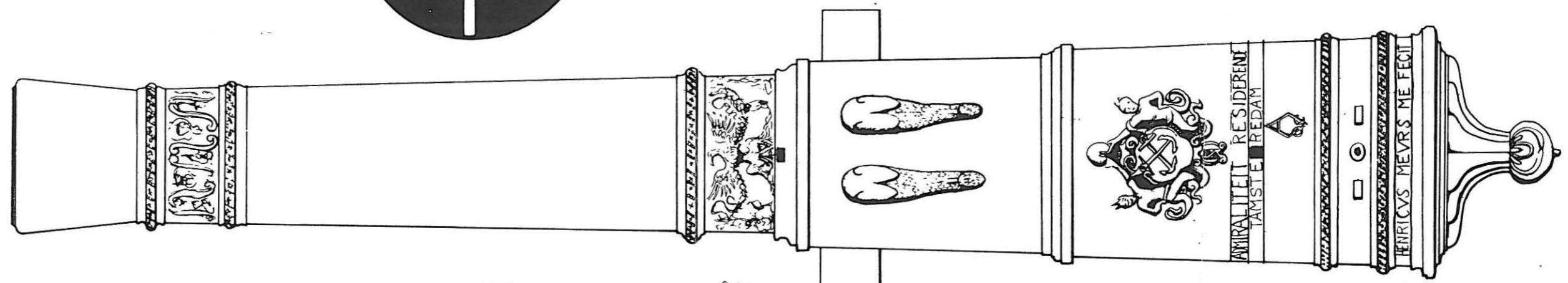




Figure 26. Wear marks on BAT 3627 caused by sand abrasion on the wreck site.

TABLE 1. Chemical Analysis of the bronze guns

REG. NO.	Cu	Sn	Pb	Zn	Fe	Ag	Ni	Bi	Sb	As
BAT3637	91.85	2.19	1.76	1.25	1.51	0.091	0.110	0.078	0.22	0.060
BAT3627	90.34	5.84	0.56	0.23	1.79	0.100	0.160	0.049	0.49	0.056
BAT3640	89.24	5.91	0.43	0.82	1.61	0.075	0.080	0.081	0.29	0.045
BAT3638	87.20	6.00	0.89	0.67	3.43	0.098	0.050	0.060	0.20	0.027
BAT3639	89.35	6.23	2.19	0.23	0.73	0.073	0.097	0.300	0.43	0.033

## THE COMPOSITE GUNS

The two composite guns, No. 7 BAT 3642, raised by the Western Australian Museum in 1973, and gun No. 22 BAT 3641, recovered in 1963, are of particular interest.

The guns seem to be identical and are remarkable in their external appearance, being 2.284 m long with a bore of 0.147 m, and a single reinforce. What makes these guns unusual, is the fact that they appeared, at first, to be made of rolled copper sheet, with the breech, chase-girdle, and muzzle made of copper mouldings. The trunnions are also copper and were attached to the chase-girdle. Three astragals on the chase-girdle and single astragals on the breech and muzzle, make up the simple mouldings. The AVOC monogram is inscribed on the first reinforce, together with the figures 1715A (its weight in Amsterdam pounds) on the base-ring of BAT 3642 and 1830A on BAT 3641. Two bronze, pommel-shaped objects were found on the wreck site near these guns. These were clearly part of the cascabel, the iron attachments having corroded away, causing them to drop off. The cascabel has a touch-hole, which explained its absence on the vent-field.

BAT 3642 had a hole torn in the copper sheeting, revealing lead sheeting underneath and, beneath this, iron bands. The iron bands appeared to be spaced with lead washers and more lead sheeting could be seen underneath. As it was far from clear exactly how the gun was constructed, an investigation of this was made.

Initially, a radioactive cobalt source was used to produce radiographs of the gun. These showed the structure to be exceedingly complex and difficult to interpret. It was finally decided to section the gun as the most effective means of discovering how the piece was constructed and of determining the extent of the corrosion under the copper sheeting and, thus, the conservation requirements. The other option would have been to dismantle the gun by removing the copper sheeting, and working through the gun, layer by layer, but it was thought this might cause irreparable damage. The sectioning approach seemed more flexible, for one could study the section and then display it or replace it, with a repair to the gun. Accordingly, a wedge-shaped slice, including the damaged section of the chase, was cut out. It took 80 hours with an angle-grinder to cut through and remove the wedge. The sections were then ground smooth and polished (Fig. 28).

Examination of the walls of the cut section showed the extremely unusual construction quite clearly. Beneath the copper outer skin were a series of 30 iron bands or hoops shrunk onto a series of flat staves. The gun is, in fact, a wrought iron gun enclosed in a copper case with the spaces filled-in by pouring molten solder. The gun was chambered; the chamber being about 400 mm long with a complex construction. Corrosion had occurred in the chamber, so that its exact structure was not clearly defined. The cascabel was originally attached to an iron screw, it seems likely that this could be screwed out of the gun by inserting a bar into the hole in the cascabel. The cascabel was cast onto the iron screw, and a hole drilled down the centre to form the touch-hole channel. A vertical hole ran from the touch-hole pan on the top of the cascabel to this horizontal hole. A small screw thread at the very

end of the cascabel allowed the end to be sealed off.

By chance, the cutting revealed that what appeared to be an iron tube was, in fact, split. Comparison with the x-ray photographs indicated that this was part of a series of six iron bars or staves, forming a tube. Closer examination of the moulding around the trunnions, showed that the four circles on the x-ray corresponded to four copper patches, each covering a hole. These were repeated on both sides of the moulding and may represent some method of pinning.

A chemical analysis of the non-ferrous metal showed that copper sheeting was 98.85% Cu. The lead was, in fact, solder, with 69.8% Pb and 28.0% Sn. The cascabel was a bronze 71.9% Cu, 24.3% Pb, 3.05% Sn.

It seems, therefore, that the gun was constructed in the following manner. A copper sheet forming the bore was set onto a mandrel. Onto this were mounted six flat, iron staves, held in place with the wrought-iron bands or hoops which were probably heat-shrunk in place. The chamber was fitted into the end of the piece, and the staves hammered over to lock it into place. Iron pins were mounted around the trunnions, and the trunnions fitted on in an (at present) unknown way. The outer copper sheathing was moulded around the gun, using the pins to locate and centre the ironwork. Presumably, the whole was covered in clay, up-ended (breech up) and heated. The molten solder was then poured into the top until the interior was filled up. The cascabel-disk was then soldered into place, and the clay and mandrel removed.

These guns have a calibre capable of firing 24 *pont* balls, (if, indeed, they ever fired solid shot). This is an enormous calibre for the weight of the piece (1715 Amsterdam *pont*).

Van Dam (1701) records that on the 22 August 1630, the VOC specified two *mignons* as part of the armament of a *retourschip* (Staple, 1927:507), so it is possible that these two composite guns were *mignons*. They do not, however, correspond to the specification for *mignons* given by 17th-century writers on artillery. In particular, Norton (1628) describes a *mignon* weighing 1200 lbs, with a bore of 3.25 (83 mm) inches and firing a 3.75 lb (1.70 kg) shot. Staple (1927), suggests that the *mignons* mentioned by van Dam are the smallest type of ships' cannon. The composite guns from the *Batavia* have a bore equal to the four large bronze guns from the site although they are almost half the weight.

Since the composite guns had a chamber, they may possibly have been a type of *perior*. The *perior* (*perrier* or *pierrier*) was originally a breech-loader, firing stone shot; later, they became muzzle-loaders and eventually they fired iron shot. In the later periods, they seem to be characterized by the chamber at the breech, which was required to increase the strength of the gun since it was usually lightly-metalled. Norton, one of the few 17th-century English writers to describe *perior* in this period, states: 'most foreign Cannon Periors are chambered, being eyther taper or belbored in their chambers'. Since the chambers of the *Batavia* guns were tapered it is possible that they were *periors* firing *murthering* (Norton) shot, no stone shot having been found on the wreck site. This would also explain their light weight in comparison with ordnance of a similar calibre. Norton (1628) states that 'for

the Cannon Perior, 80 pound of Mettall for every pound weight of their Stone shot'. I think here, Norton may have been confused, since the stone shot corresponding to an 18 lb iron shot is 5 lb, giving a total weight of 400 lbs for the piece. He may have meant 80 lbs of metal for every pound of iron shot giving 1440 lbs, which would seem more realistic.

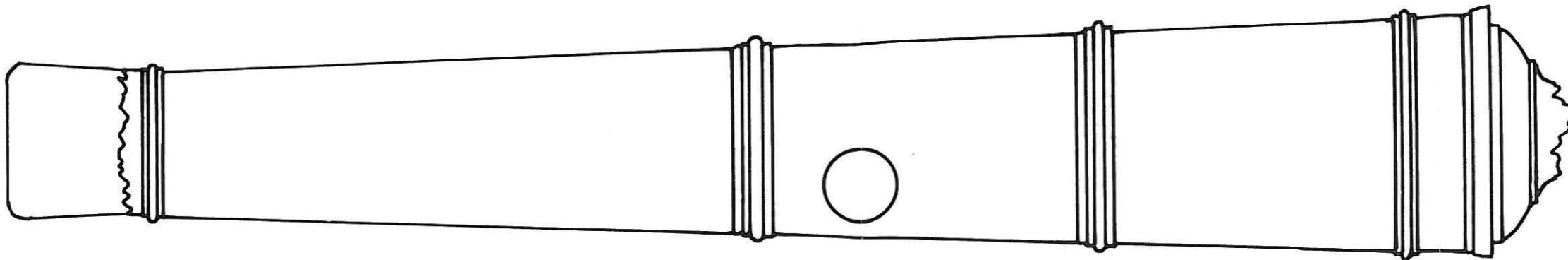
The curious method of construction of these guns may be similar to guns described in a patent issued in Amsterdam in 1627 to Jan de Rycker and also in 1633 to Bartlet Cornelis Smidt. The latter patent describes the founding of a gun, '...made of various metals, of which the chase and the chamber (which is made in the manner of a *steenstucken (perior)*) is made of iron welded together by heating and hammering (forging) and thus united into one piece of iron, and subsequently covered with copper and other metals and ornated and the chase is (like cast guns) bored smooth, so it can easily be handled both aboard and ashore, but is still powerful and resistant and can be used with sharp projectiles without any danger of exploding or fraying, although these guns are only about half the weight of ordinary guns and hence were manoeuvrable' (Doorman, 1940: G 348:192). However, the piece in question was only four feet long, weighing 230 lbs and, unfortunately, there is no mention of the calibre. The patent also specifies that Smidt would have to make two more guns firing a six-pound iron shot, and two of three-pound iron shot, before he would be allowed the patent. There was also the earlier patent in 1627 for a gun made of various unspecified metals. This patent mentions that guns of 6, 12 and 24 lbs iron shot were to be made. Van Dillen (1974) also mentions a number of references to this type of gun, in the notarial records of the City of Amsterdam relating to a company making wrought-iron guns of various metals (*geslaegen geschut van verschyeden metalen*). These records, in 1633 and 1634, describe various contracts made by the company, which operated the original patent of de Rycker, and affirm that the guns were especially designed for shipboard use on merchant ships. There is mention of the company supplying guns to the East India Company wharf and also to the West India Company. The guns mentioned include a twelve-pounder that was to weigh no more than 2200 *pont*, but when produced, it weighed 2600 *pont*. Also, there is mention of a challenge to the patent and that the guns were made with both iron and copper barrels.

These composite guns, therefore, are extremely unusual, appearing to be *periors*, constructed partially in the manner of the old 16th-century wrought-iron gun, but cast into a lead-solder matrix with a copper sheath. They may bear some relation to the leather guns which originated at about the same time. The leather gun was produced as a result of the efforts of King Gustavus Adolphus of Sweden who was seeking to provide his armies with light, mobile

artillery. The use of these guns was said to have been discontinued by the 1630s (Stevenson & Caldwell, 1977; Lewendon, 1984; & Neuville, 1984).

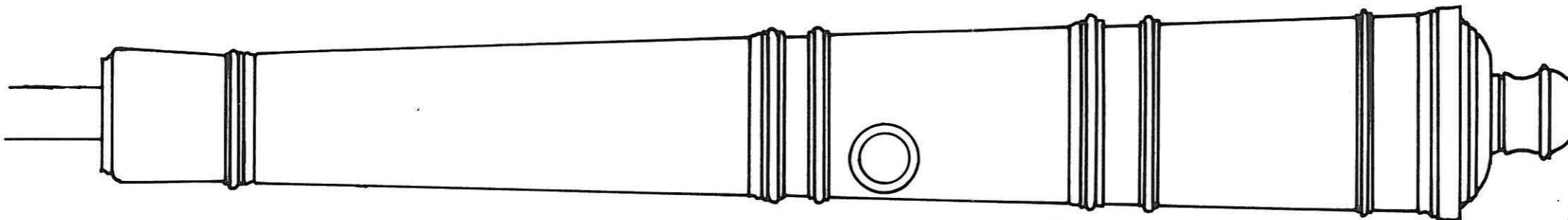
Only two other examples of similar guns are known, although it is, at present, not certain if the guns are constructed in precisely the same manner. The first example is in the Museum of Artillery in the Rotunda at Woolwich (Kaestlin, 1963:No.209), and is described as: 'A brass gun, attributed in a former catalogue to the time of Charles II, but which is rather Oriental than English. It appears to consist of an inner cylinder of copper cased in iron, and the whole enveloped in a thin sheet of copper, over which has been subsequently placed a cylinder of some very soft alloy at the muzzle, trunnions, and breech. It has no date or inscription, but there is a cypher on the underside GVE. The dolphins have been broken off. Length, 4 ft. 9 in.(1.45 m); calibre, 3.25 in (83 mm)'. This gun was measured and drawn by the author and is shown below. It is obvious that the gun is of similar construction, although smaller, and with a number of different details such as dolphins, a standard touch-hole, decorations, etc. The cypher is very unusual, and was originally thought to be the cypher for the GWC, the Geocroyerde Westindische Compagnie. However, after inspection, this seems unlikely as the letters are clearly G V and E and these have been put on the underside of the gun. It is possible that it may be the cypher or house-mark of the maker.

The other parallel comes from a report to the Nederlands Scheepvaart Museum from Expeditions Unlimited, of a gun found off the Little Bahama Bank, about 20 miles north of West End, Grand Bahama. Unfortunately, only a few measurements and seven photographs (five appear in Fig. 27) are available. From this information, a drawing has been made of the gun (see below), but it should be treated with some caution. The gun is stamped GWCA (the Amsterdam Chamber of the Geocroyerde Westindische Compagnie), the weight 598, and it is generally very similar to the Rotunda gun, with dolphins and identical impressed friezes around the reinforces. It has been suggested by Robert Marx that it came from a wreck *Sinte Domingo* (sic), supposedly a Dutch ship of 1668. (I am grateful to Mr J.P. Puype of the Nederlands Scheepvaart Museum for this information.) It is almost certain that the Little Bahama Bank gun and the Rotunda gun were made by the same gunfounder, the only real difference being the lengths. However, it is not certain that the *Batavia* composite guns were made by this gunfounder. The reasons for this are that the *Batavia* guns have the touch-hole in the cascabel, they have neither dolphins nor stamped decorations and the guns are much heavier. However, their general appearance is similar to the two smaller examples, in particular, the astragals around the reinforces and the treatment of the cascabel are the same.



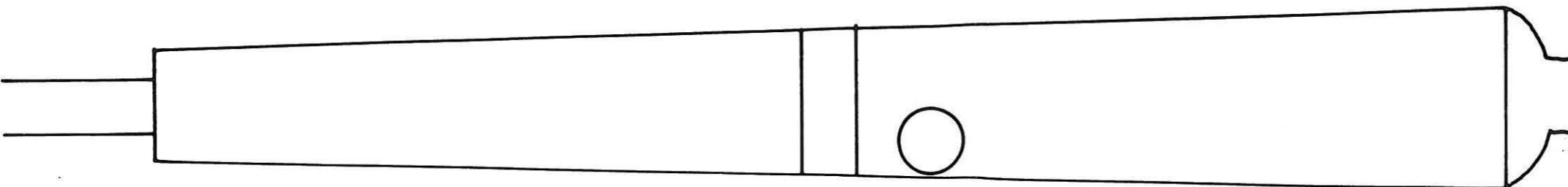
**BAT 8731 No. 13**

This gun has a broken muzzle but has a length to the base ring of 2.78 m. The muzzle mouldings are obscure, though it has the common muzzle astragal and fillets. The second and first reinforces have O-F-A-F, with the ogee facing the muzzle. Standard vent field astragal and fillets and multiple mouldings in the cascabel.



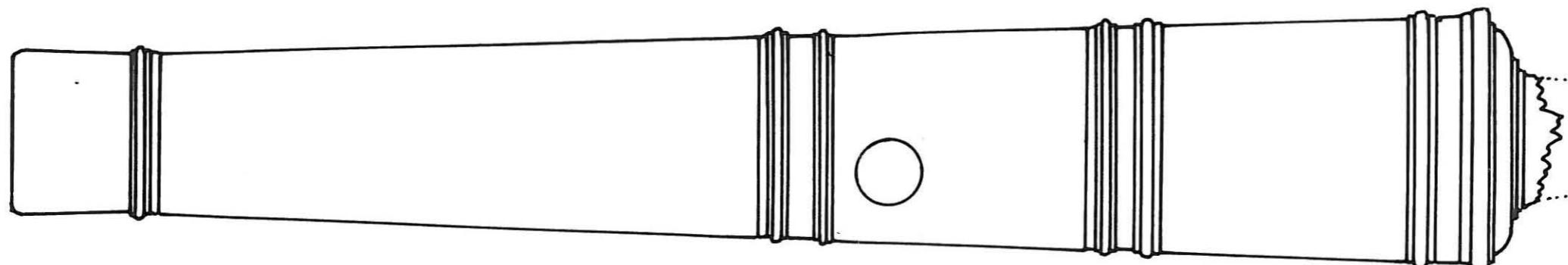
**BAT 80309 No. 20**

This and No. 23 are the only examples to date of a smaller class of gun, the length to the base ring is 2.43 m and bore 95 mm. It has a simple muzzle moulding; the muzzle has the arrangement F-A-F-O with the ogee facing towards the breech. The second and first reinforces have O-F-A-F-Sp-F-A-F with the ogee facing the muzzle. The trunnions, which are well preserved, are tapered and the cascabel button has a single moulding on it.



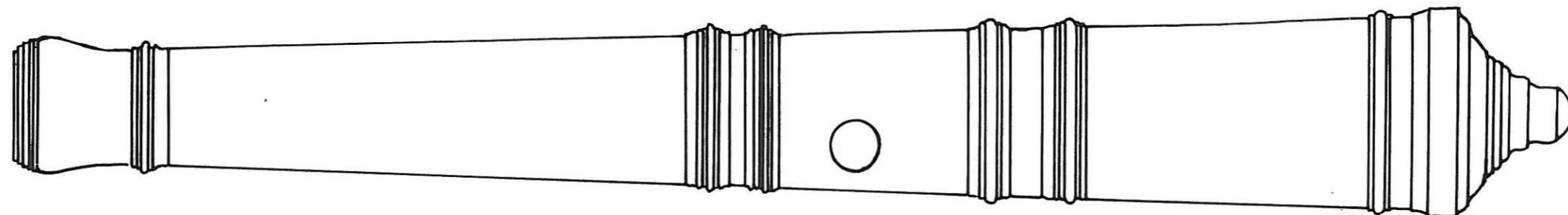
**BAT 8735 No. 23**

This is the iron gun that was raised in 1963 during the first expedition and has been kept in the shallows at Beacon Island ever since. The gun is in very poor condition and the mouldings are almost impossible to see. However, the length of the gun from the muzzle to the edge of the breech ring is identical to No. 20 as are many of the other major dimensions, indicating that it is almost certainly part of a matching pair.



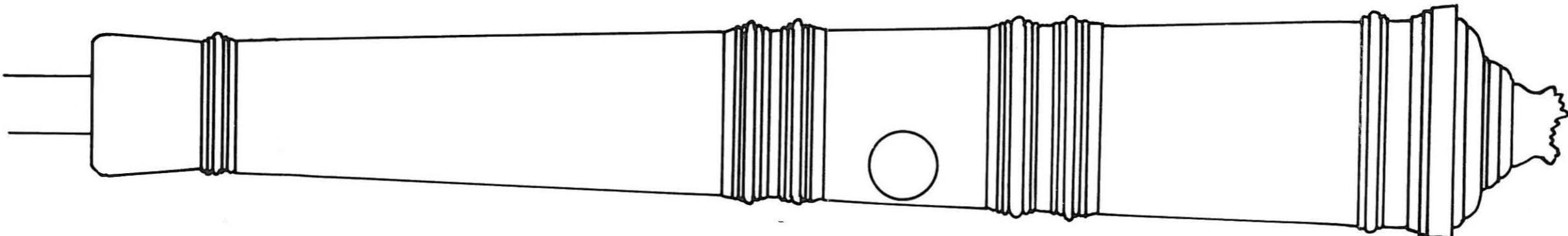
**BAT 8723 No. 4**

This gun has a length to the base ring of 2.57 m and the bore is uncertain. The muzzle mouldings are obscure in both this gun and its twin. The muzzle has F-A-F-O mouldings. The second and first reinforces consist of two sets of mouldings separated by about 40 mm. Starting from the muzzle end, the mouldings are as follows: O-F-A-F-Sp-F-A-F. The vent field has the standard astragal and fillets, and the cascabel has multiple mouldings.



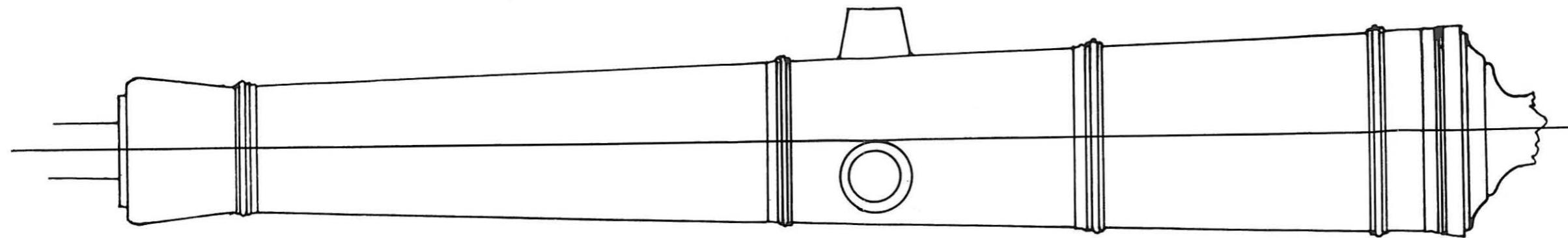
**BAT 8724 No. 5**

This gun has a length to the base ring of 2.78 m and the bore diameter is obscure. The condition of the gun is poor, so that it is difficult to determine the moulding arrangement. What can be seen is as follows: muzzle F-F-A-F-F-O; second reinforce O-F-F-A-F-F-O-Sp-O-F-F-A-F-O; first reinforce O-F-A-F-O-Sp-O-F-F-A-F-F. It is possible that these mouldings are in fact: O-F-F-A-F-F-O-Sp-O-F-F-A-F-F-O and due to its poor condition this has been misinterpreted. There are the standard astragal and fillets at the vent field and the cascabel has multiple mouldings.



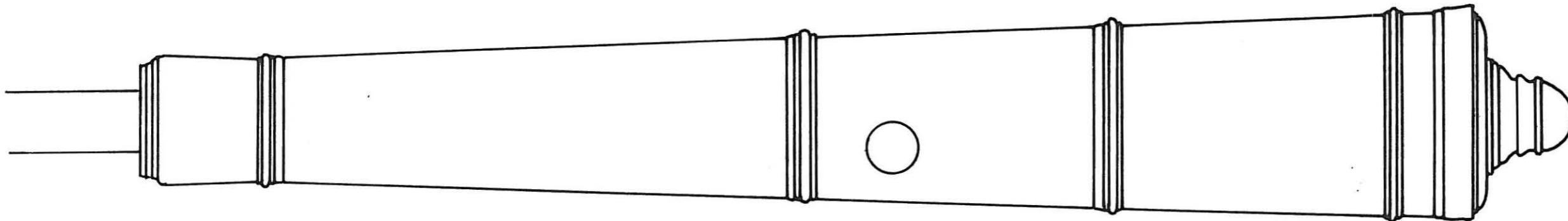
**BAT 8726 No. 8**

This gun has a length to the base ring of 2.78 m, bore diameter 120 mm (approximate). The gun has obscure mouldings around the muzzle, which consist of F-F-A-F-F. The second and first reinforce: O-F-F-A-F-F-Sp-F-F-A-F-F-O. Normal vent field astragal and fillets and multiple cascabel mouldings. It also has an unusual hole or dent near the breech, thought to be caused by the cascabel of gun No. 9 resting on it (Fig. 29).



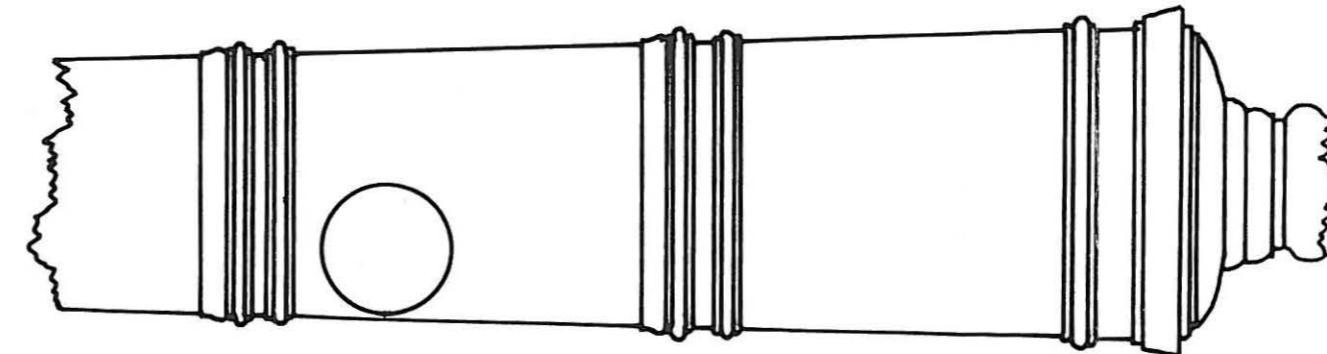
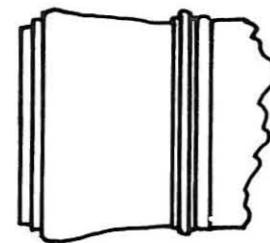
**BAT 8720 No. 1**

The length to the base ring is 2.74 m and the bore is 110 mm. The muzzle has a F-A-F-O arrangement. The second and first reinforcing rings have similar O-F-A-F mouldings. The vent field has plain F-A-F. The base-ring has an ogee and the cascabel has mouldings.



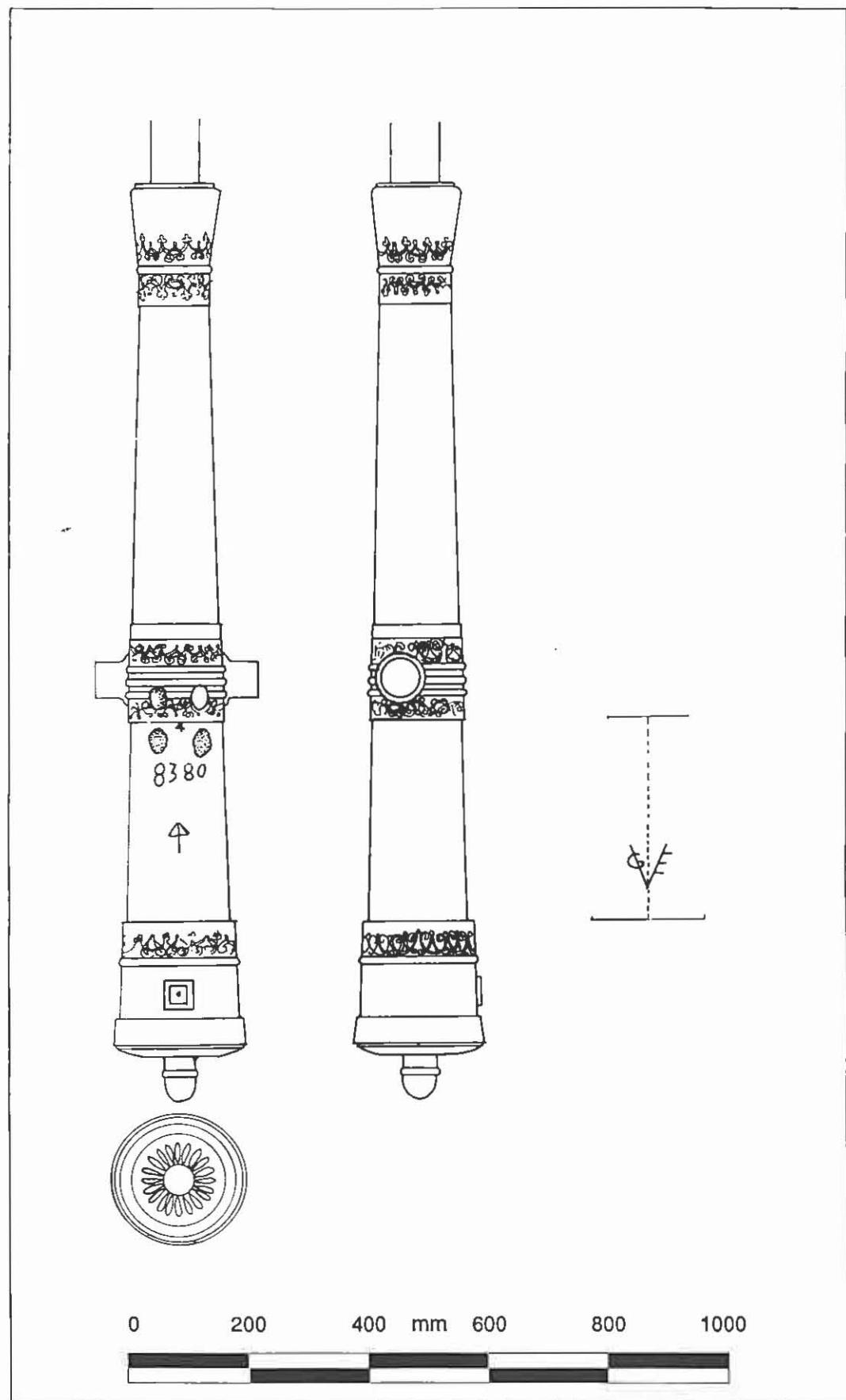
**BAT 8721 No. 2**

This gun has a length to the base ring of 2.78 m and a bore diameter of 125 mm. It has muzzle mouldings, a muzzle F-A-F-O. The second and first reinforcing rings have similar O-F-A-F mouldings. The vent field has plain F-A-F. The base-ring has an ogee and the cascabel has mouldings. See Fig. 32 for the contents of the bore.

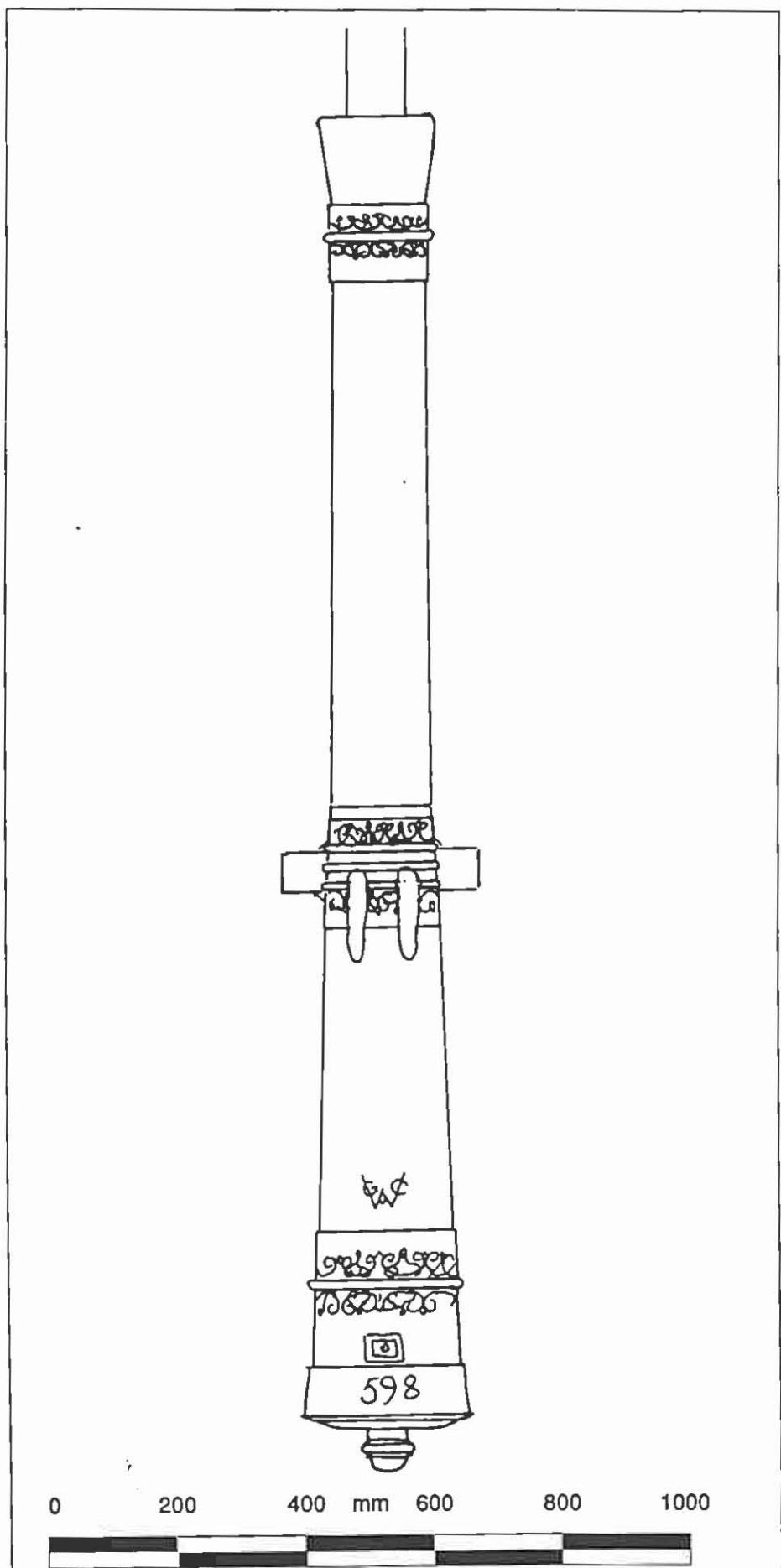


**BAT 8722 No. 3**

This gun is broken into three parts. In design, it is very similar to BAT 8723 No. 4 and almost certainly was one of an exact pair. The mouldings are the same as No. 4 and discussed below.



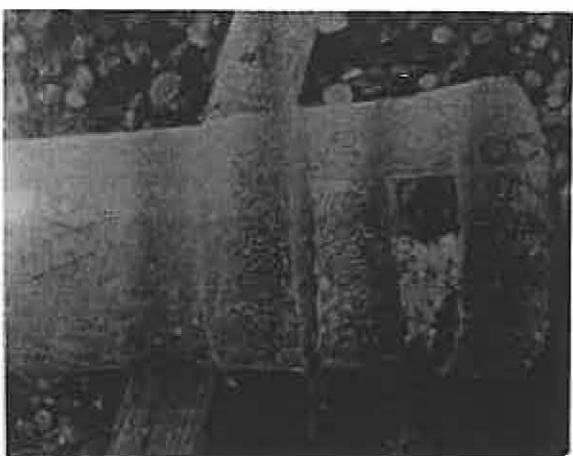
Gun from the Museum of Artillery, Rotunda, Woolwich No. 209



Gun from the Little Bahama Bank site



Figure 27. A series of photographs of the gun from the Little Bahama Bank site (black and white copies of colour prints kindly supplied by Mr J.P. Puhpe of the Nederlands Scheepvaart Museum).



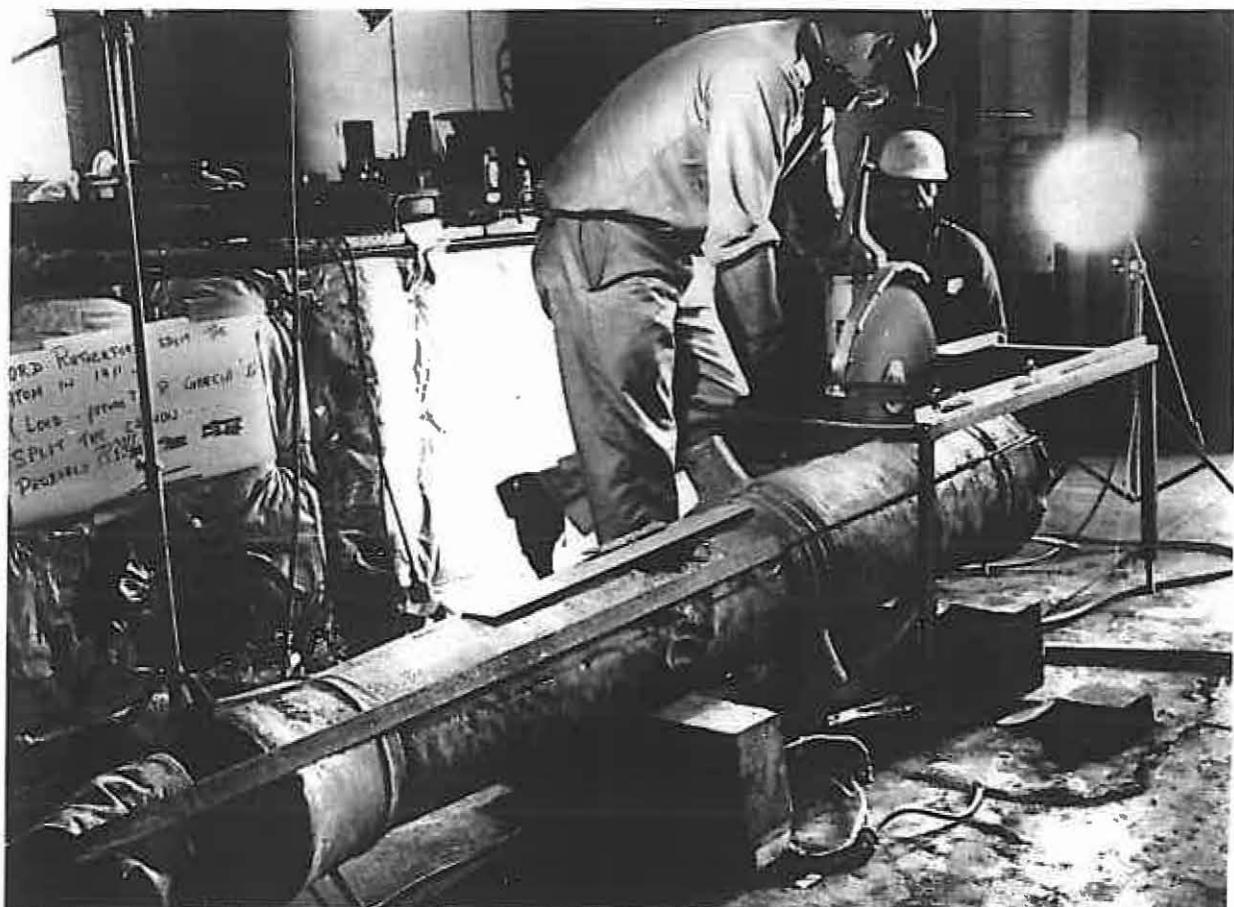


Figure 28. Sawing the composite cannon with an angle grinder mounted on an adjustable cutting stand.



Figure 29. Gun No. 8 showing the poor state of preservation of the surface after deconcretion, the hole is thought to be the result of the cascabel button of gun No. 9 resting against it and causing some form of electrolytic action.

## THE IRON GUNS

The design of the iron guns underlines the complexity of the style of early 17th-century guns. There are few parallels for these guns, either in the literature or in existence, mainly because iron guns from the sea rarely survive, and there is almost no published material that is useful for identification purposes. For example, the Tower of London has one example of a late 16th-century, English cast-iron gun, but no 17th-century iron guns and only a gradually increasing number of examples from the 18th century; by far the greatest number of guns in the Tower collection are bronze (Blackmore, 1976). Likewise, the Rotunda has 82 English bronze guns and 34 English cast-iron guns (Kaestlin, 1963).

Two of the guns (Nos 5 and 8) found on the site are of the type commonly called a *findbanker* (or *finbanker*) which were produced by the Finspong and other Swedish gun foundries for the Dutch in the 17th century. The issue of the import of iron guns into the Netherlands in the early 17th century is a complex matter. The Netherlands traditionally did not cast iron guns or, at least, in no great number. In the early 17th century, the English produced iron guns in the Weald and they were imported into the Netherlands in large numbers. The main importers were the family of Trip. Elias Trip was the principal importer having, for a time, a virtual monopoly of the trade. Interestingly, he was a *bewindhebber* of the V.O.C. By the 1620s, difficulties with the English had reduced the trade and it was not to recover until later that decade. As a result, Elias and Pieter Trip negotiated and secured the Swedish crown monopoly for gunfounding in 1628. It is not certain, therefore, whether the make of the *Batavia* guns would have been English, Swedish, German (the Trips had foundries in Waldeck and Westphalia), French or Netherlandish. The French guns of this period were of inferior quality, since of 300 to 400 *gotelingen* imported into the Netherlands in about 1626, 63 failed proof. In a single proofing of 11 French guns in 1627, only four passed (Klein, 1965).

Fig. 31 shows a number of iron guns in a drawing from a Danish manuscript called the *Søtøjhusbogen* (book of the Naval Arsenal), entitled *Tegninger af Sø-Estatens Skyts i Aaret 1771* (drawings of naval guns in the year 1771). It has been suggested that this book was made by the *Tøjmester* (chief of naval ordnance) and was published in 1779 rather than 1771. It is obvious that these guns resemble 17th century guns. However, there is a lot of confusion over the term *findbanker*; here it is used to describe guns that would not commonly be considered *findbankers* today. The Danish word *findbanker* was a special type of gun used in the Danish navy and the word was first used in a Danish manuscript about naval guns in 1722; it was possibly so-named because of the connection with the Swedish town of Finspong where these iron guns were made (see Frantzen, 1988, and Eriksen and Frantzen, 1988). Later the term became synonymous with 17th-century, non-Danish cast iron guns. Other illustrations of iron guns in the *Søtøjhusbogen* indicate a complex classification, which includes many types of *findbankers* as well as guns described as *fladblunder* and *hulblunder*. I am very grateful to Mr Ole Louis Frantzen of the Tøjhsmuseet, København, for in-

formation on *findbankers* and the *Søtøjhusbogen*. In his opinion, all the *Batavia* guns could be called *findbankers*, but Nos 5 and 8 are typical *findbankers*; additionally, he tentatively considers Nos 4 and 8 Dutch, Nos 5 and 20 English and Nos 1, 2 and 13 Swedish. Thus it is possible that the guns from the *Batavia* came from a number of sources, but until more is known of types of guns produced by foundries, their country of origin will remain uncertain.

Most extant examples of iron guns of this type date from the mid-17th century (*Vergulde Draeck* 1656, Green (1977) GT 1454 No. 12 and GT 1456 No. 13, *Kennemerland* 1664, Price & Muckelroy (1974), *Enigheden* 1679, Christensen (1971)). Boudriot (1968) illustrates some iron guns of the period 1680 to 1690 and is the only really useful work for the period. The recent publication by zu Mondfeld, Beyerlein and Klingeborn (1988) is regrettable for both its inaccuracy and its unreferenced sources, thus, for example, an illustration of the composite gun from the *Batavia* has been taken uncited from Stanbury (1974) and the authors have mistaken the weight 1602 stamped on the vent ring for the date!

A total of nine iron guns have been recovered from the site, and all have been drawn. The majority of the iron guns are very badly degraded. In many cases, the cascabels or trunnions are damaged or missing. A lot of the ornate mouldings are obscure or difficult to see. In most cases, the guns are highly graphitized and the surface is quite soft. Whilst every precaution was taken to preserve the guns during raising, transportation and deconcretion, their basic condition is poor. The drawings are, therefore, in many cases an interpretation.

To date, no decorative mouldings, trunnion marks or inscriptions have been noted. The existing mouldings have been described in the table shown in Fig. 30 and the following abbreviations have been adopted to simplify the description of the mouldings: (O = ogee; F = fillet; A = astragal; Sp = space).

An attempt was made to estimate the weight of the guns in Amsterdam *pont*, using the formula:

$$Wt = \pi L \rho k [(R_2^2 - R_1^2) - R_b^2]$$

Where:

- L is the length of the gun from the muzzle to the base ring
- $\rho$  is the density of cast iron (7.03 g/cm<sup>3</sup>)
- k is the conversion factor 493.73 g = 1 Amsterdam *pont*
- $R_2$  is the radius of the gun at the vent field
- $R_1$  is the radius at the muzzle rings
- $R_b$  is the radius of the bore of the gun

It should be noted that the formula is only an approximation and takes no account of the mouldings, trunnions or cascabel. The weight and the length of the guns are plotted in a scaled format in Fig. 30. The Y-axis is in metres for the value of the length and in Amsterdam *pont*  $\times 10^{-3}$  for the weight of the gun.

In the table and the chart, some clear groupings of the iron guns are evident. The most obvious pairs are Nos 20 and 23 which are small-bore, short guns. Unfortunately, because the mouldings on No. 23 have not survived, it

NO	Weight	L1	REG.N	BORE	L2	D1D	D2D	muz	2nd Reinf.	1st Reinf.	Vent
23	1.459	2.43	8735	95	2.60	23	34	?	?	?	?
20	1.518	2.43	80309	95	2.65	24	35	faf	ofafspfaf	ofafspfaf	faf
5	2.375	2.78	8724	110	2.98	22	37	ffaflo?	offafospoffaflo?	offafospoffaflo?	faf
3	2.469	2.57	8722	110	?	28	42	faf	ofafspfaf	ofafspfaf	faf
4	2.713	2.57	8723	110?	?	28	43	faf	ofafspfaf	ofafspfaf	faf
1	2.838	2.74	8720	110	2.78	27	43	faf	ofaf	ofaf	faf
8	2.889	2.77	8726	115	3.00	28	43	ffaf	offafspffaflo	offafspffaflo	faf
2	3.161	2.78	8721	125	2.98	26	43	faf	ofaf	ofaf	faf
13	3.269	2.78	8731	120	3.00?	27	44	faf	ofaf	ofaf	faf
G12	2.078	2.6	GT1454	125	?	27	40	faf	offaflo	offaflo	faf
G13	1.674	2.5	GT1456	95	?	20	33	ffaf	fffaflfspffafll	fffaflfspffafll	faf
K6	3.133	2.63	?	120	2.73	25	43	ffaf	fffaflfspffafll	fffaflfspffafll	faf

30 May 1988 10:30 PM

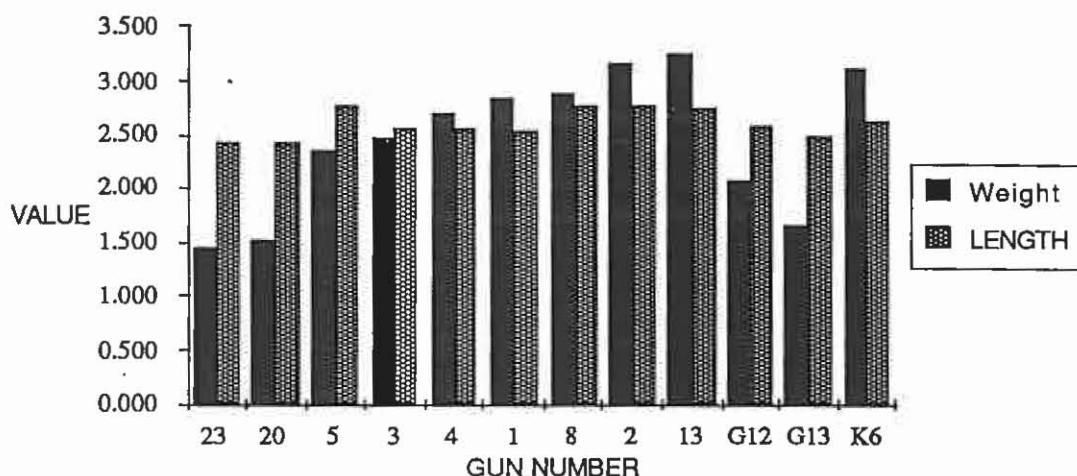


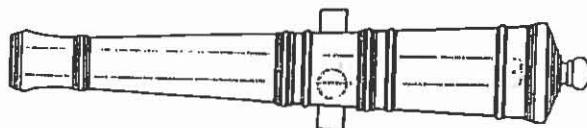
Figure 30. A bar chart of the length in metres and the approximate weight of the various guns mentioned in the table above.

is not certain if the guns exactly matched. Their location on the western side of the site, separate from the main concentration of guns, indicates that they may have been located on the upper deck or on the poop. Guns Nos 3 and 4 are a pair, having the same length and identical mouldings. However, their slightly different weights is possibly a reflection of the poor surface condition of No. 4, where a small error in the measurement of a diameter would give a large change in the weight approximation for the gun. Guns Nos 1, 2 and 13 also match, with same length, weight and mouldings. Nos 5 and 8 are very interesting, since they have similar mouldings and length, but No. 5 is a much lighter piece than No. 8.

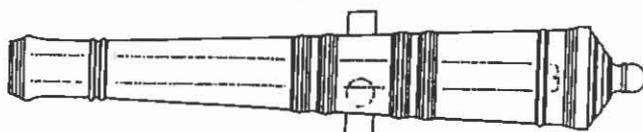
Additionally, two guns recovered from the *Vergulde Draeck* G12 and G13, and one gun from the *Kennemerland*

K6 (Price & Muckelroy, 1974) have been included in the table and the chart. It is known that the gun No. G13 (GT 1456) was inscribed 1700A and the gun No. G12 (GT 1454) was inscribed 3230A. The calculated weight of G13 (1634 Amsterdam *pont*) corresponds reasonably closely to the stated weight of 1700 Amsterdam *pont*. However, the gun G12 is quite different with a calculated weight of 2078 Amsterdam *pont* and a stated weight of 3230 Amsterdam *pont*. It is possible that the inscription 3230A has been misread. It is unlikely that either the breech or muzzle diameter has been incorrectly measured as it would require an increase of diameter of about 100 mm to give the indicated value. It does seem, however, that the *Vergulde Draeck* guns are longer and lighter than the *Batavia* guns. The *Kennemerland* gun (K6), however, seems to be similar in class to the *Batavia* guns Nos 2 and 13.

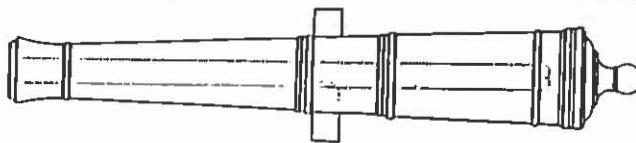
6 Hr. Jern Canon af d. Hollandske Find Banker Lilla A. Beret til Nyg. Tegl.



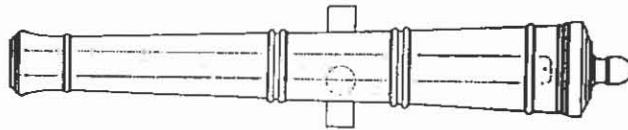
6 Hr. Jern Canon af d. Hollandske Find Banker Lilla B. Beret til Nyg. Tegl.



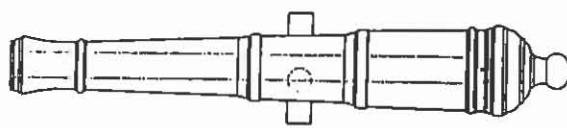
6 Hr. Jern Canon af d. Svendske Find Banker Lilla F. Beret til Gamle Tegl.



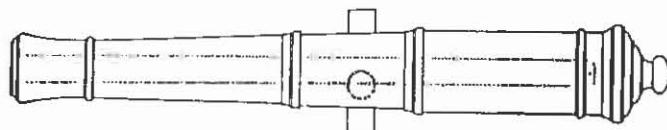
6 Hr. Jern Canon af d. Svendske Find Banker Lilla G. Beret til Nyg. Tegl



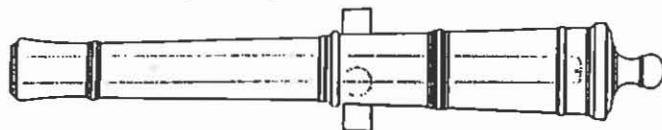
6 Hr. Jern Canon af d. Svendske Find Banker Lilla H. Beret til Gamle Tegl.



6 Hr. Jern Canon af d. Engelske Find Banker Lilla N. Beret til Gamle Tegl.



6 Hr. Jern Canon af d. Engelske Find Banker Lilla S. Beret til Gamle Tegl.



Pedometret som er til del af sin Reelle størrelse.



Figure 31. Illustration of various *findbanker* or iron guns from different countries, from a Danish manuscript from Søtøjhusbogen dated circa 1770. I am grateful to Mr J.P. Puype of the Nederlands Scheepvaart Museum, Amsterdam, for drawing my attention to this document.

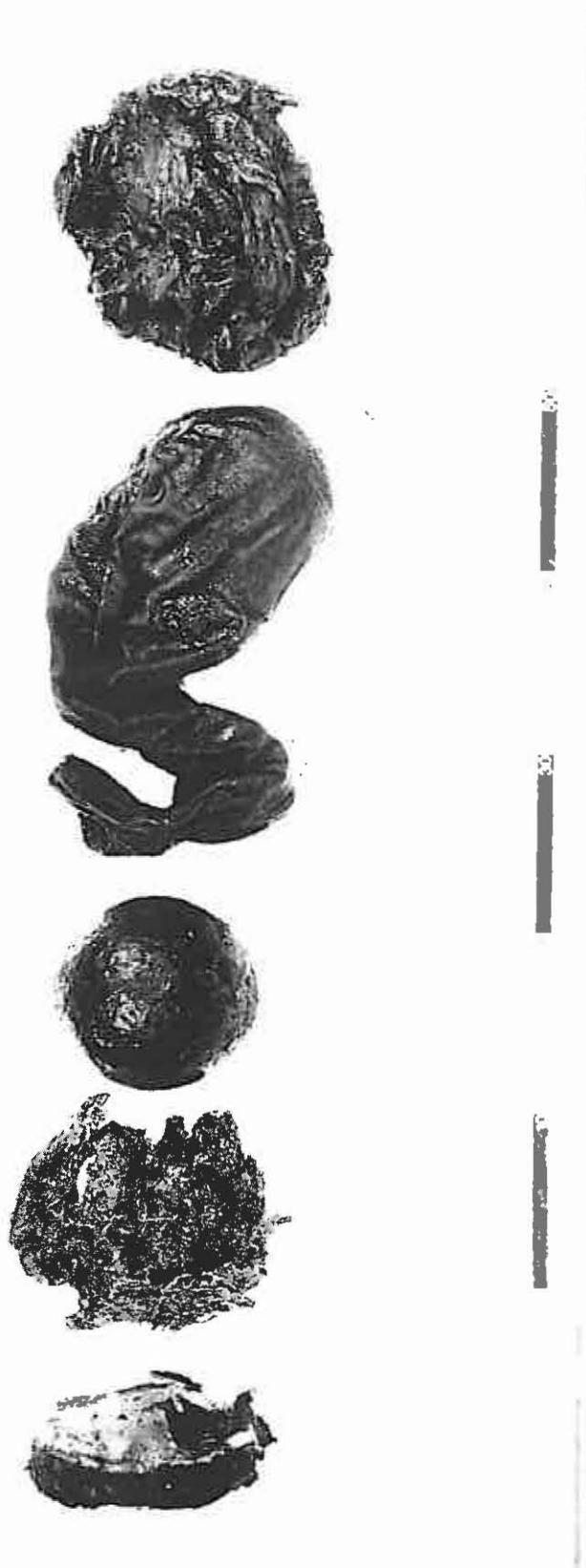


Figure 32. The contents of the iron gun No. 2 laid out in order of recovery from the barrel, showing the tampion, wadding, shot, powder bag and, unusually, another piece of wadding (scale 1:4).

PROJECTILES  
Round solid shot

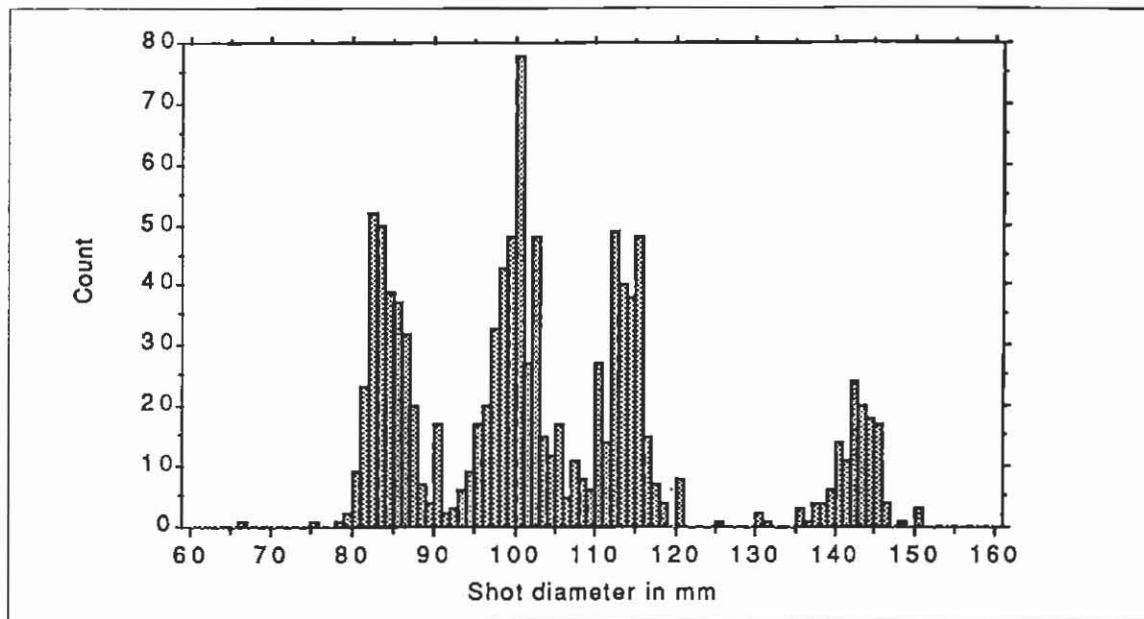


Figure 33. Histogram of the iron shot diameters for all the shot recovered from the *Batavia*.

A large collection of solid iron shot was found at the stern of the ship, lying up against the transom and, possibly, part of the stern shot-locker. The shot were removed from the site and, following registration, the diameter of each shot was measured. In all, the diameters of 1425 projectiles were measured; by plotting a histogram of the diameters (Fig. 33), an indication of the main shot sizes was obtained, with peaks at 82 mm, 100 mm, 113.5 mm and 143 mm. Witsen (1671):501, gives a table (Table I) for weight of shot in *pont* (Amsterdam) against radius in *duim*  $\times 100$ . By plotting the weight against radius cubed, a straight line is produced. The density of the iron of the shot was  $0.239 \text{ pont}/\text{duim}^3$  or  $6.93 \text{ grams/cm}^3$  (using the constants 1 Amsterdam *duim* = 25.73 mm and 1 Amsterdam *pont* = 493.73 grams) and was determined from the slope of the line. This value is reasonably close to the value for grey cast iron of  $7.03 \text{ grms/cm}^3$ . Given these values, the shot would therefore weigh 4.05, 7.35, 10.75 and 21.04 *pont* respectively. The actual class of gun would be reckoned from the height of the bore of the gun, which would be larger than the diameter of the shot, by the windage. Witsen (1671) gives another table (Table II) for this, which indicates that the shot represent projectiles for 5 *pont* guns (bore diameter 90 mm), 8 *pont* guns (bore diameter 103 mm), 12 *pont* guns (bore diameter 116 mm) and 24 *pont* guns (bore diameter 148 mm). It is interesting to note that the shot diameter histograms do not show any marked

skew, this may indicate that the shot were not gauged. If the shot were gauged, in other words passed through a ring to test if they were above a certain diameter, one would expect a skew in the plot, as all shot above a certain diameter would be rejected. This does not seem to be the case here. Two other items which will be discussed below, are of relevance. These are the tally-stick BAT 4497 and the shot-gauge BAT 3336.

It can be seen from the histogram of the shot that there is a maximum at 82 mm corresponding to 4 *pont*, the upper limit of that peak corresponds to 5 *pont*. The peak at 100 mm corresponds to a shot of 7 *pont* with an upper limit for that peak at about 108 mm for a shot of 9 *pont*. The peak at 113.5 mm corresponds to a shot of 11 *pont* with an upper limit for that peak at 118 mm giving a shot of 12 *pont*. The 11+ shot-gauge has a diameter of 113 mm, so the peak is reasonably close. Finally, the peak at 142 mm corresponds to a shot of 21 *pont* with an upper limit for that peak at about 146 mm corresponding to a shot of 23 *pont*. It should be noted that all these calculations were made using the *Batavia* tally-stick. This corresponds with the four different bore sizes noted on the bronze and iron guns, therefore we can see that the two smallest-class guns were iron, the third class was both bronze and iron, and the largest class was bronze. Van Dam (1701) records that the V.O.C. resolved in 1604 that ships should be armed with guns firing 24, 18, 9 and 3.5 lb balls, and by 1671 the guns were 24, 18, 8 and 4 lb (Staple, 1927), thus to some extent the *Batavia* findings contradict these records.

The tally-stick from the *Batavia* (BAT 4497, see below) is particularly interesting, since it gives the relationship between diameter in *duim* and weights of iron, stone and lead shot. The *duim* scale gives the average of 1 *duim* = 25.0 mm. This value does not correspond with any known European *duim*, and it was originally thought to be due to shrinkage of the wood. However, when the tally-stick was checked against the gauge, it was found to correspond exactly with the 11 *pont* mark. Since the gauge is marked "+11", we can reasonably assume that the tally-stick has undergone minimal shrinkage.

It should be noted, also, that the relationship between the *duim* and the weight scale would remain the same, even if the wood did shrink and, therefore, the relationship could still be determined. Using various sources, a number of calculations were made on a computer, using a statistical package, to calculate the density of the shot in *pont/duim*<sup>3</sup> (keeping in the original units initially to avoid conversion factors). The data was entered into a spread sheet and then plotted as density against weight (Fig. 34) and, in addition, the mean density and standard deviations were calculated. The *Batavia* tally-stick gives the following results:

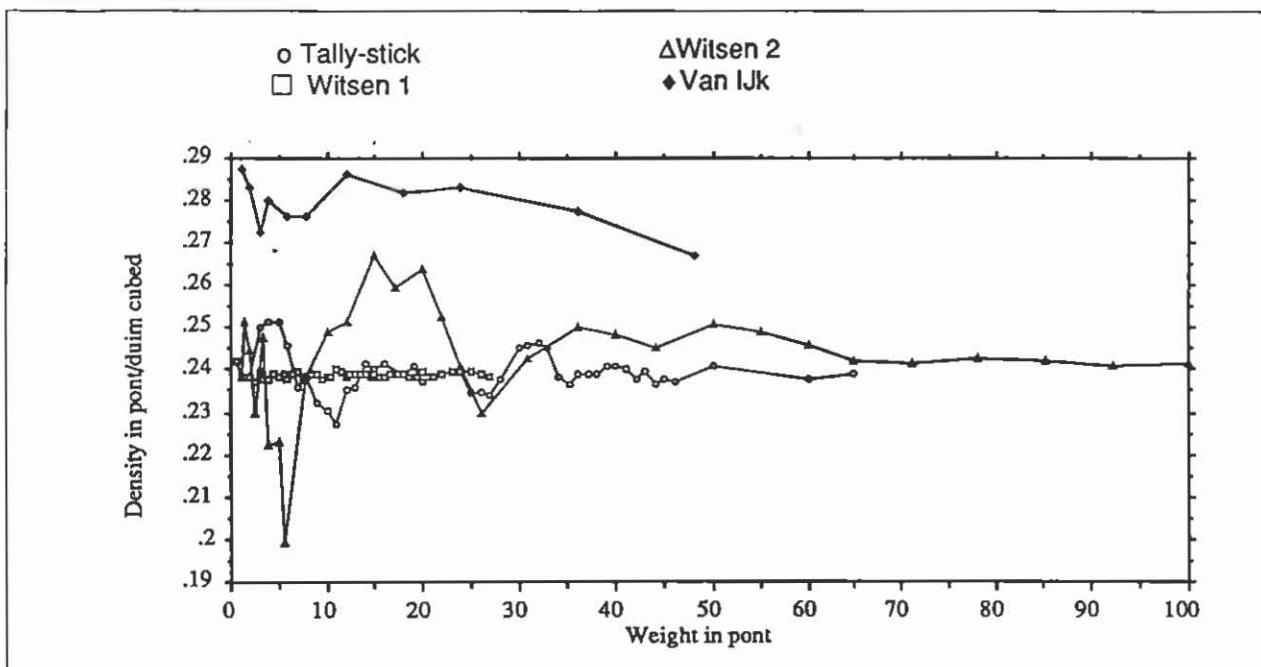


Figure 34. Graph of the relationship between the density of iron shot in *pont/duim*<sup>3</sup> and the weight of the shot in Amsterdam *pont* given by Witsen (1671), Van Ijk (1697) and the *Batavia* tally-stick.

**Batavia tally-stick**

Mean:	Std. Dev.:	Std. Error:	Variance:	Coef. Var.:	Count:
.24	4.797E-3	6.997E-4	2.3010E-5	2.003	47
Minimum:	Maximum:	Range:	Sum:	Sum Squared:	# Missing:
.227	.252	.024	11.258	2.698	0

The *Batavia* tally-stick has a mean density of  $0.24 \pm (4.8 \times 10^{-3})$  *pont/duim*<sup>3</sup>.

**Witsen table No. 1**

Mean:	Std. Dev.:	Std. Error:	Variance:	Coef. Var.:	Count:
.239	6.550E-4	7.3698E-5	4.2908E-7	.274	79
Minimum:	Maximum:	Range:	Sum:	Sum Squared:	# Missing:
.237	.242	4.837E-3	18.877	4.511	1

Witsen's table No. 1 covers a large number of diameters and gives a density of  $0.24 \pm (6.6 \times 10^{-4})$  *pont/duim*<sup>3</sup>, this figure being extremely close to the value of the *Batavia* tally-stick.

**Witsen table No. 2**

Mean:	Std. Dev.:	Std. Error:	Variance:	Coef. Var.:	Count:
.243	.013	2.384E-3	1.7050E-4	5.371	30
Minimum:	Maximum:	Range:	Sum:	Sum Squared:	# Missing:
.199	.267	.068	7.293	1.778	0

The Witsen table No. 2 is more varied than No. 1, especially at the smaller weights, reflecting the inaccuracies of the weighing systems. The density is  $0.243 \pm 0.013$  *pont/duim*<sup>3</sup>.

**Van IJk tally-stick illustration**

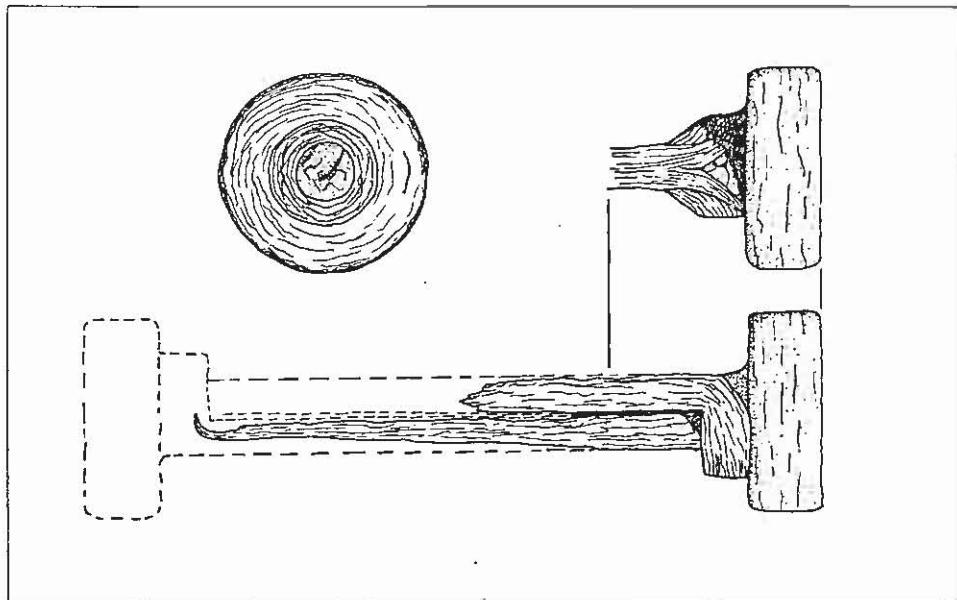
Mean:	Std. Dev.:	Std. Error:	Variance:	Coef. Var.:	Count:
.279	6.017E-3	1.814E-3	3.6203E-5	2.154	11
Minimum:	Maximum:	Range:	Sum:	Sum Squared:	# Missing:
.267	.287	.02	3.072	.858	0

It is interesting to note that van Ijk's density is notably larger, and may reflect that the type of *pont* or *duim* might be different, or that the illustration is fanciful. It may be concluded that the *Batavia* tally-stick was manufactured using a system almost identical to that given in Witsen (1671):501. It was hoped that a comparison between the lead and iron shot weights would give a more accurate assessment of the units used, however, the ratios between the two scales are not constant and therefore there are other factors to be considered.

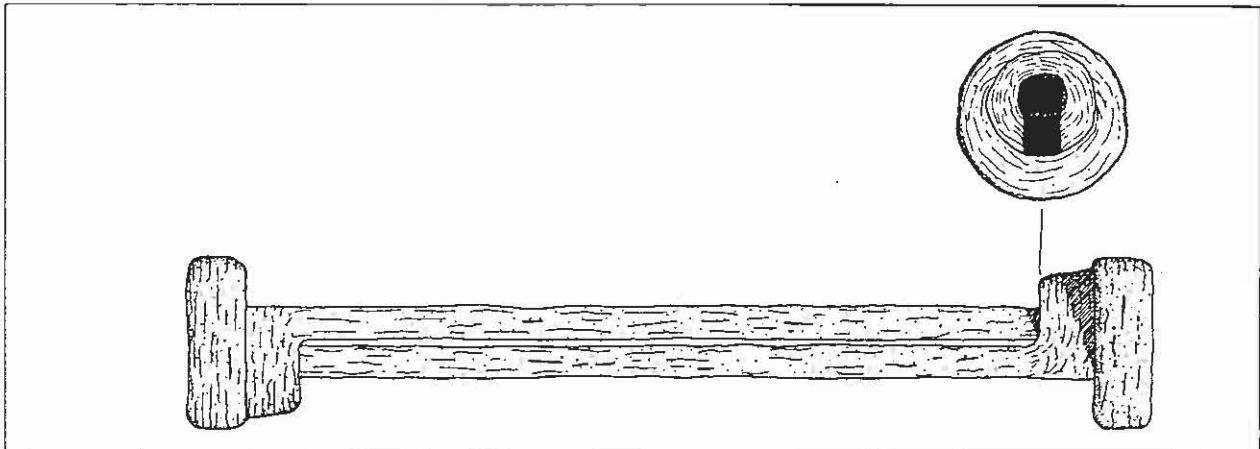
### Expanding bar shot

A number of examples of expanding bar shot were found on the site, however, in most cases these were fragmentary. Two examples show the construction details and sizes BAT 8479 and BAT 8480. BAT 8479 consists of two circular disks (31 mm thick, 92 mm diameter) mounted on a square section rod (15 mm) with a ring forged in the end. The two bars slide on each other, so that the overall length can expand from 510 mm to 930 mm. It should be noted that the bar shot is made of wrought-iron and, as a result, is rather corroded, so that some of the measurements may be a little short. The other expanding bar shot, BAT 8480 is fragmentary, but the overall dimensions can be reconstructed. The overall length is 390 mm and the unit would expand to a length of 680 mm. The disks are 110 mm in diameter and 40 mm thick.

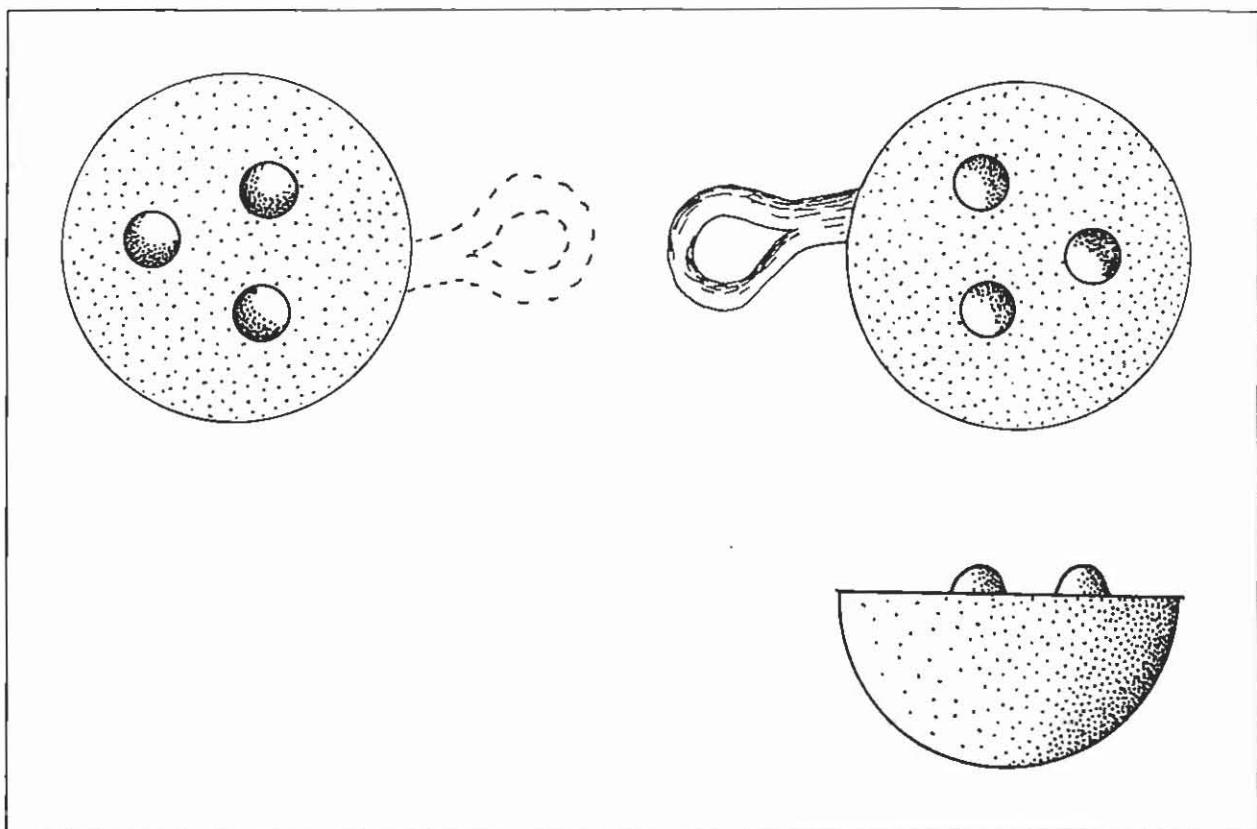
BAT 8480 (SCALE 1:4)



BAT 8479 (SCALE 1:4)

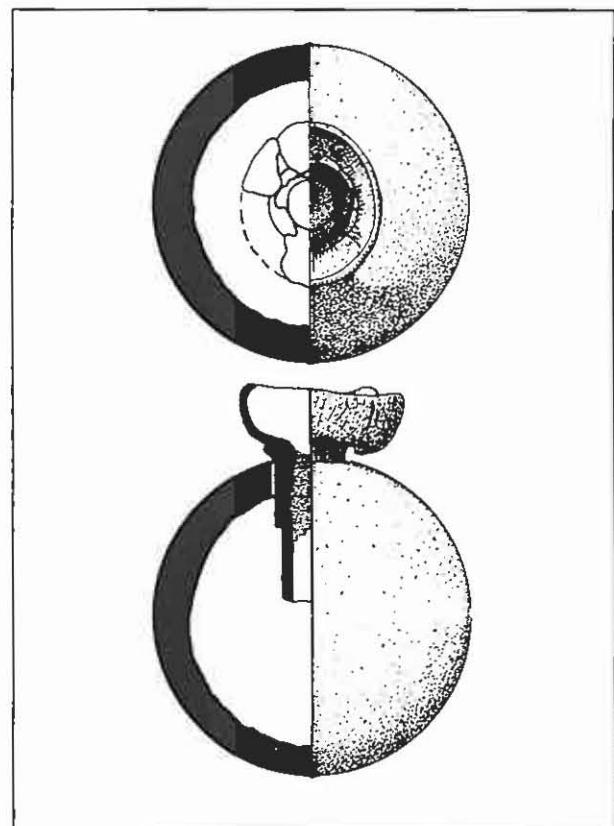


### Langrel shot



Embedded in the concretion in the stern area of the site were a number of langrel shot. These consisted of two hemispheres of cast iron; on one of the flat faces, there were three raised dimples, and on the corresponding half, three matching depressions. The hemispheres fitted together to form a sphere, and were attached to each other by a wrought-iron bar, hinged at the joint. In most cases the shot were in very poor condition, the bar usually completely corroded away and the cast iron shot, highly graphitized. Shot diameters were in the range 95 to 100 mm, with a single example of 125 mm.

BAT 8934



### Grenades

About 130 grenades were found in the stern shot-locker. They all came from a single localized area in the concretion, on the upper part at the rear. The average diameter was 83.5 mm, with a standard deviation of 2 mm. In most cases, the grenades were stored empty and unfused, but three examples were found with fuses in place.

### Bar shot

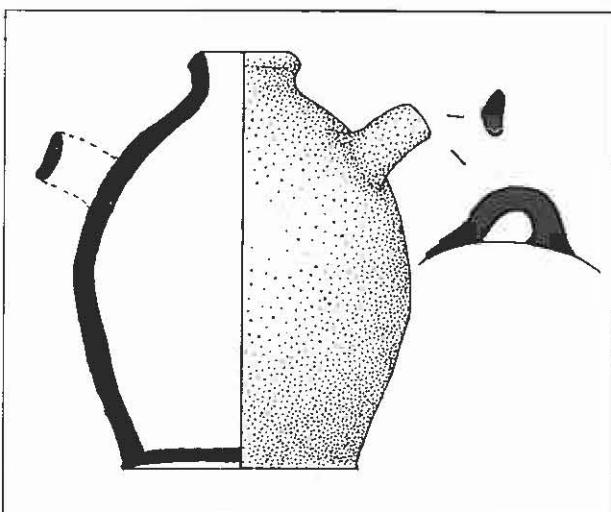
About 25 or so examples of shot were found with rectangular holes in them, usually two, sometimes one. It was thought that these were bar or spike shot. Possibly some of these shot were stored without the bar or spike, because a number were found densely packed at the bottom of the concretion where it would be impossible to be packed so closely with the spike in place. The author found one shot with the hole resting against the ceiling planking, thus the evidence favours that they were stored, in most cases, without their spike. The histogram of diameters shows a broad range, with examples centering around 95 to 115 mm. This group included shot with a singular rectangular hole, two rectangular holes and round holes, but excluding hollow shot from the latter class. The examples with round holes may, in fact, represent shot with flaws in the casting or a special class, possibly a type of chain shot. Unfortunately, because the wrought-iron had invariably corroded away, it is uncertain if this is a special class or not. The two remaining groups consist of shot with a single hole, presumably the normal bar shot formed by joining two shot with a square-section bar and resembling a dumb-bell, the other, sometimes called cross-bar shot and described by Smith (1627):67 as follows: 'Crosbar-shot is also a round shot, but hath a long spike of iron cast with it as if it did goe thorow the middle of it, the ends whereof are commonly armed for fear of bursting the Peece, which is to bind a little Okum in a little Canvasse at the end of each Pike'. The hole sizes on the *Batavia* range from 20 by 20 mm to 16 by 16 mm. Rarely were the holes identical; usually one hole was about 2 to 5 mm larger than the other.

### Canister shot

Some examples of canister shot were recovered. These appeared to be a type of thin, sheet-metal canister with iron concretion inside.

### Ceramic pyrotechnic device

BAT 2406

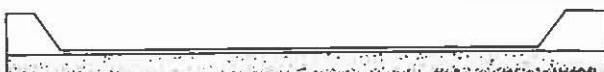


A stoneware jar was found on the site. This jar has two strap handles and is of ovoid shape. Only one such jar was found and similar types have not been found commonly on VOC ships. Puype (1976) Fig. 24 shows a *stink* or *stormpot* found in Vlissingen in the 19th century which is very similar, except that it has three handles, not two. Most contemporary texts refer to pyrotechnic devices. Simienowicz (1676) refers to:

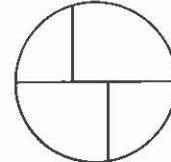
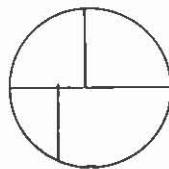
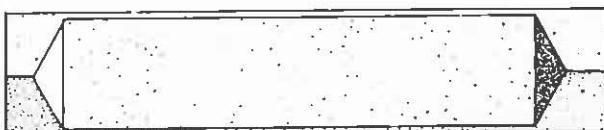
...several sorts of *Fire-Pots, Flasks, Bottles, and Chests*.... You are to tyeon Ends of Match to the Neck and ears or Handles of your *Pot*, if it be made of clay....and they may likewise serve in Sea Fights, with graet disadvantage to the Enemy and their ships; for as soon as these fall upon a Ship's Deck, or meet with any hard substance, they will never fail to break and fly in Pieces; upon which the *Powder* will be spilt, and scattered abroad, and the match falling amoungst it, it cannot avoid *Accension*; and will accordingly break out with so terrible a Flash, as must spoil and destroy many of the Enemy, and perhaps burn the ship itself.

### Case shot

BAT 4435 (SCALE 1:4)



BAT 6384 (SCALE 1:4)

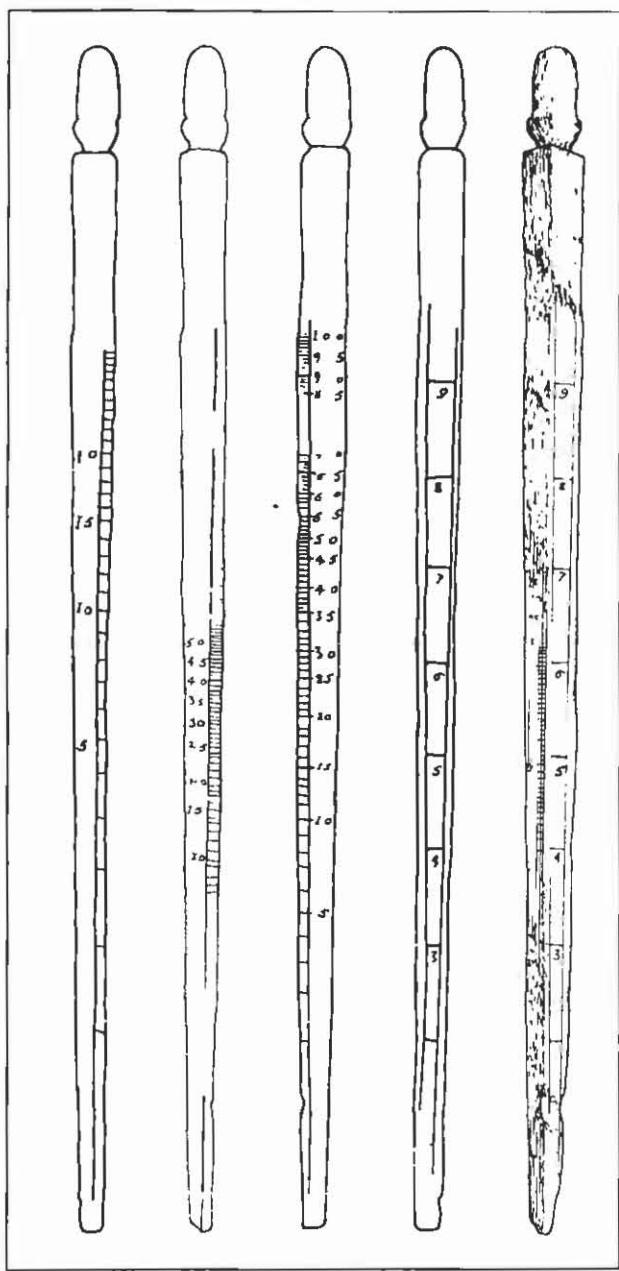


A number of examples of case shot were found. These consisted of four wooden sections which when fitted together formed a cylindrical case. The inside of the case was hollowed out and filled with iron scrap. The case was held together with two metal straps, about 10 mm wide, at either end of the case. The examples illustrated had a bore diameter of 85 mm.

## MISCELLANEOUS GUN ACCESSORIES AND ACCOUTREMENTS

## Gunner's tally-stick

BAT 4497

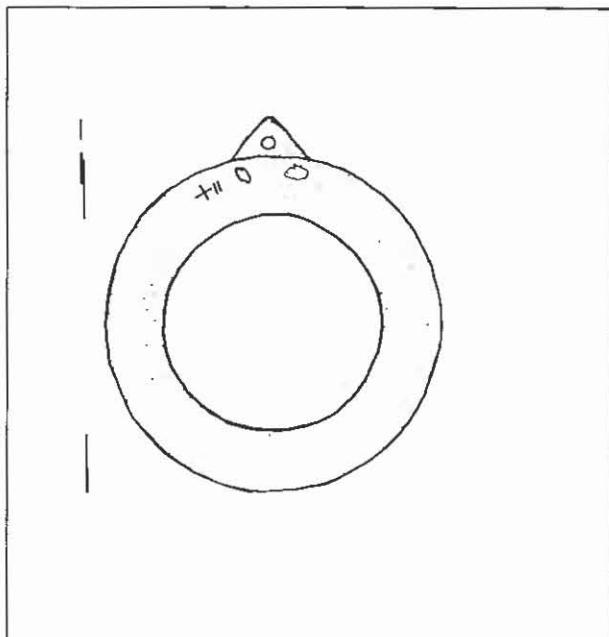


This wooden tally-stick, found during the first expedition to the *Batavia* site, was identified and briefly described by McGrail (1974). The discussion above has shown that the scales for iron are almost certainly taken from a similar source to the Table 1 in Witsen (1690:501). A plot of the different scales on the stick give densities (assuming the Amsterdam *pont* is being used) of 11.78 grms/cm<sup>3</sup>, 7.54 grm/cm<sup>3</sup> and 2.16 grm/cm<sup>3</sup>. It would seem that the densities are reasonable, if a little on the high side. For example, lead has a density of 11.0 grm/cm<sup>3</sup>. Likewise, iron, which normally would be grey cast iron, has a density of 7.03 to 7.13 grms/cm<sup>3</sup>. It is possible that there may be a systematic error in this analysis, possibly due to an incorrect value of the *pont*. The percentage error is about 6.5% too large for the lead and between 5.5 and 6.5% too large for the iron. The value of the *pont* obtained here was taken

from Witsen (1690):311, who measured the weight of a volume of rain water contained in a cube with sides 0.5 Amsterdam *voet*; this measurement gave a weight of 5 *pont* 24  $\frac{9}{24}$ , which, when converted, gives 1 Amsterdam *pont* equal to 0.49373 kg, assuming that 1 Amsterdam *voet* = 0.283 m and 32 *loot* = 1 *pont*. The actual value of the Amsterdam *pont* varies according to various authors, thus Simienowicz (1729) gives 0.486 kg whereas Galschut (c.1690) gives 0.496 kg (calculated from the ratio of the Amsterdam *pont* to the pound Avoirdupois). It is obvious that more research is required here to determine what values are being used and what errors, if any, were incorporated in the scale. It is beyond the scope of this present work to pursue the subject further.

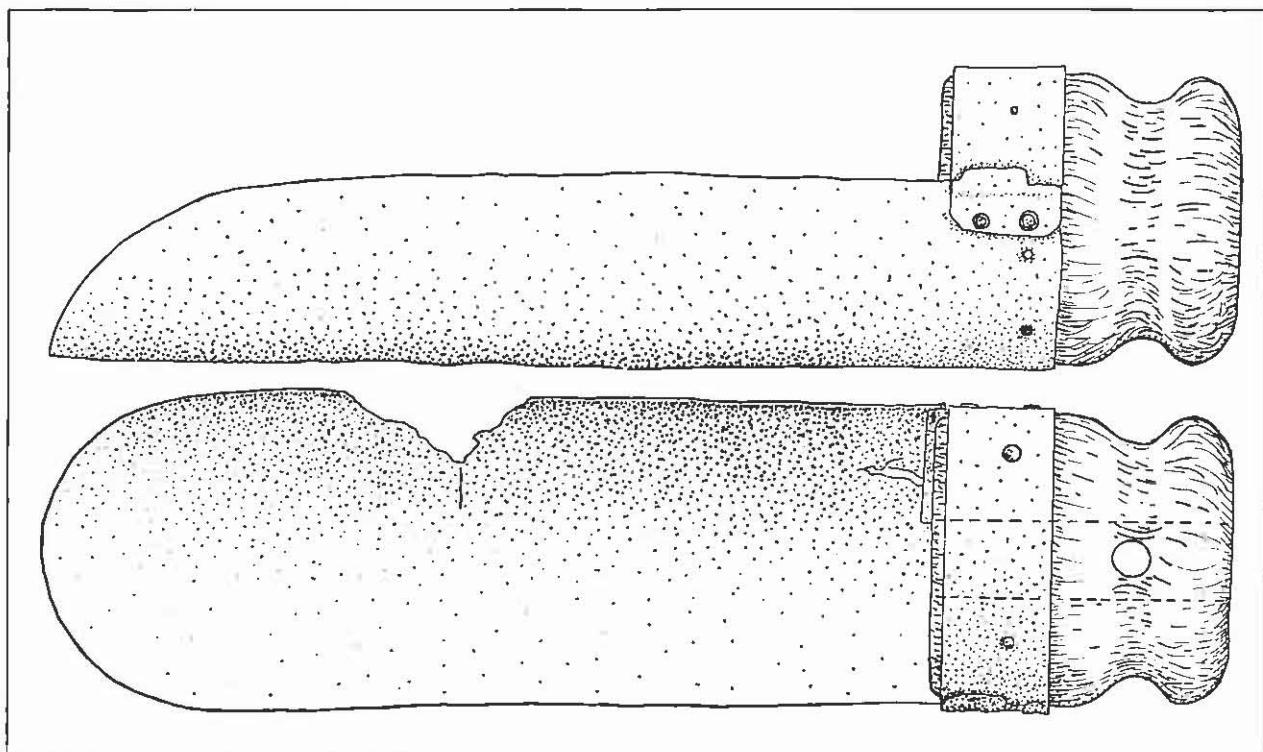
### **Shot-gauge**

BAT 3336 (SCALE 1:4)



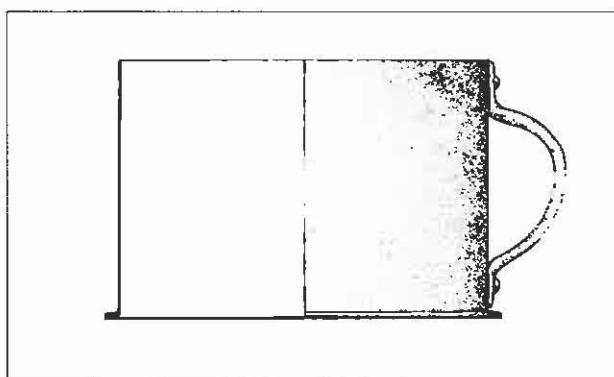
A copper shot-gauge was recovered, consisting of a round sheet of copper with a hole in the centre and a small hanging tag. On the upper, left-hand edge is stamped '+11'. The diameter, 113 mm, corresponds exactly with the '11' mark on the gunner's tally-stick. Obviously, this was used to gauge shot, those passing through were then less than 11 *pont* in weight.

**Powder ladle**  
**BAT 397**



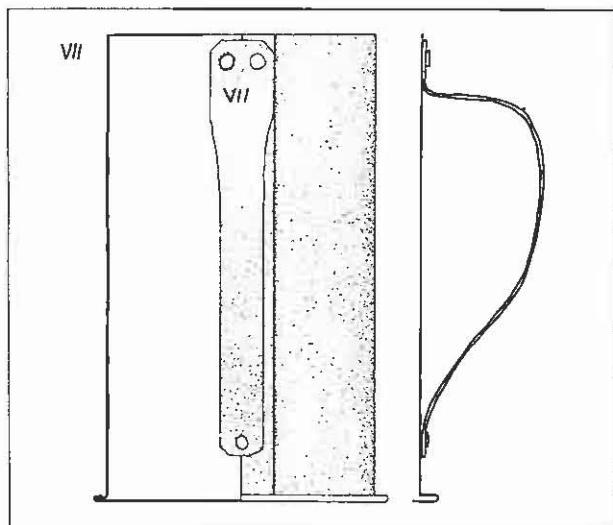
A complete powder ladle, with the wooden block and part of the handle still in place, was found on the site. The ladle has been reconstructed with a diameter of 160 mm, this being a larger bore diameter than any known guns on the *Batavia* and almost certainly is a mistake on the part of the person who reconstructed it.

**Powder measures**  
**BAT 3005 (SCALE 1:4)**



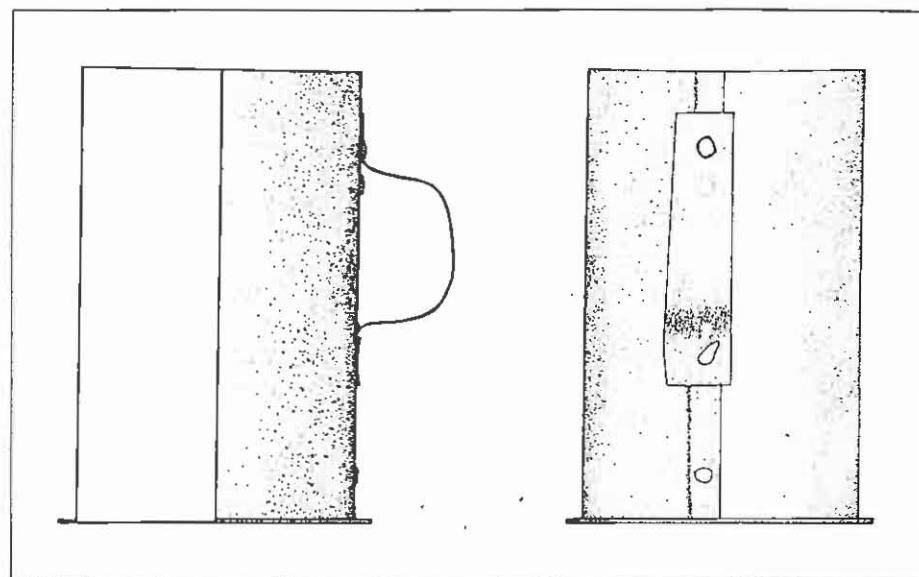
This measure is made of copper, and is rather squat, with a diameter of 190 mm and a height of 134 mm, giving a volume of 3.80 L. It is not absolutely certain that this is in fact a powder measure (as also BAT 688) but it is assumed so because of its similarity in construction and style to the other copper gunnery accoutrements.

**BAT 589 (SCALE 1:4)**



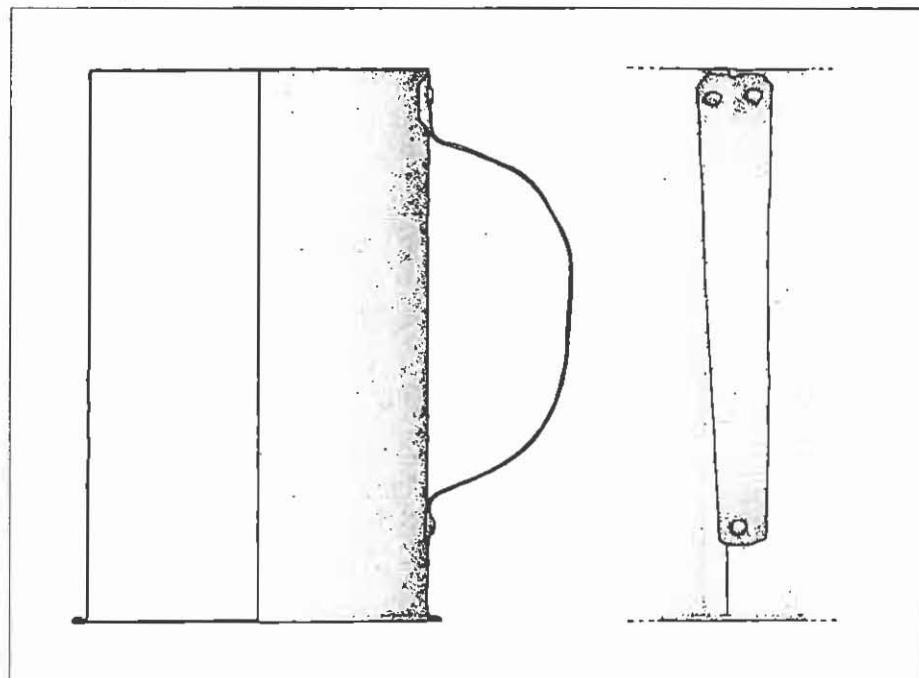
The measure BAT 589 has the Roman numerals VII scratched on the handle and on the front lip and has a volume of 3.85 L.

**BAT 3306 (SCALE 1:4)**



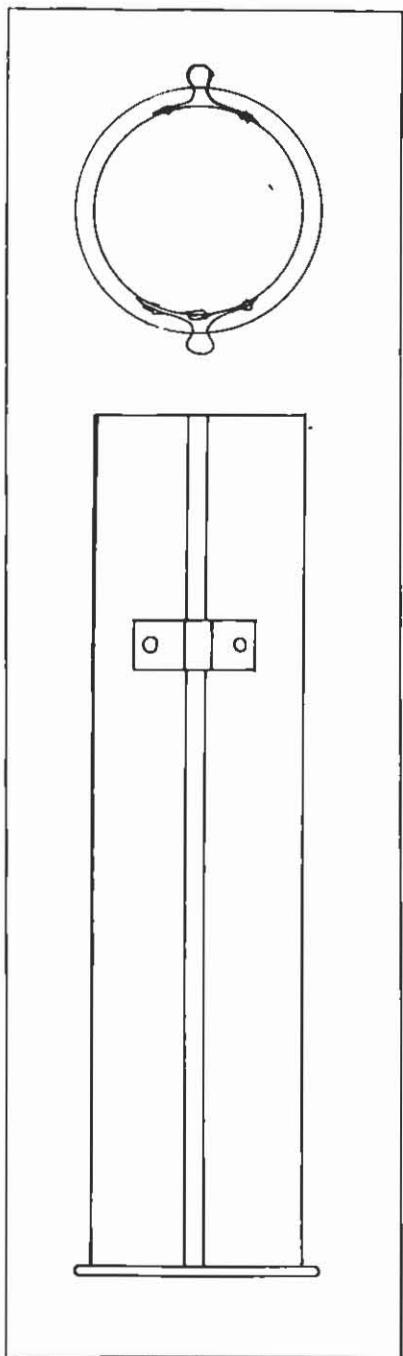
This measure has a volume of 4.01 L.

**BAT 688 (SCALE 1:4)**

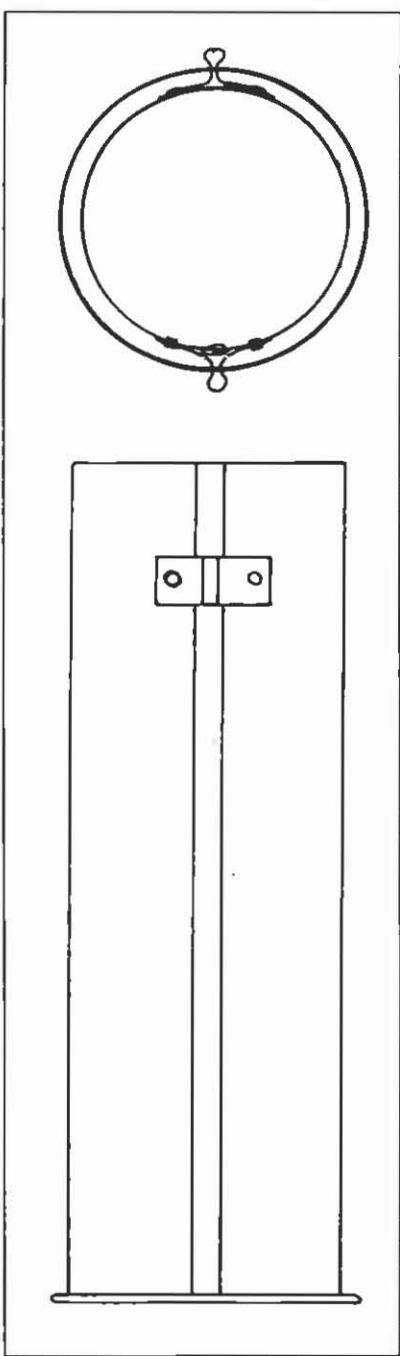


This powder measure (height 291 mm and diameter 176 mm) is longer and slightly narrower than BAT 3005. The volume is 7.1 L, thus slightly less than twice the volume of BAT 3005.

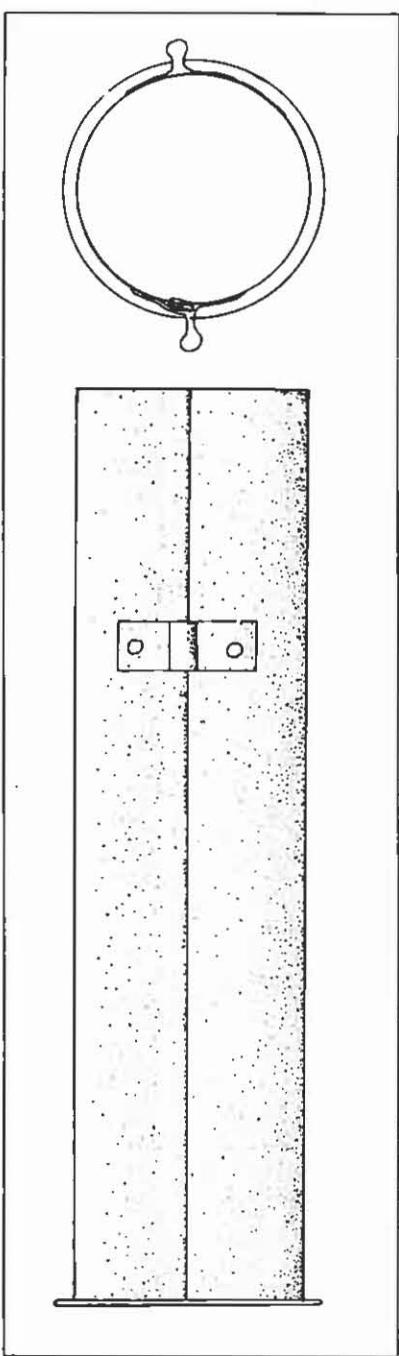
**Cartridge containers**  
**BAT 3630 (SCALE 1:4)**



**BAT 416 (SCALE 1:4)**

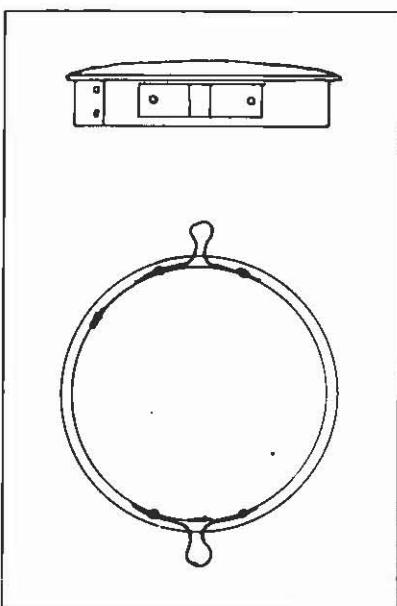


**BAT 405 (SCALE 1:4)**

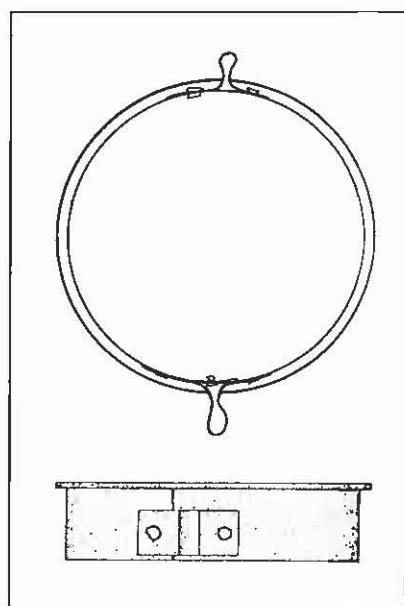


Several copper cartridge containers were found on the site. The containers consist of a rolled copper sheet forming a tube with a longitudinal fold-over seam and a circular base. A lid was fitted over the top of the long narrow can in some cases, the lid and the base were made of a type of brass. Both the container and lid have two fittings, on diametrically opposite sides of the lid and container. The fittings consist of a strip of copper riveted to the body and formed to make a tubular hole standing out from the body. Through this was threaded a thin rope or string, which was attached to the canister to form a shoulder-length loop. The string passed through the holes in the lid fittings and was knotted below the canister fittings. Thus the canister or container could be carried over the shoulder, with the lid in-place. This ensured that the lid could not be lost and, in most cases, would automatically drop into place on top of the container when carried.

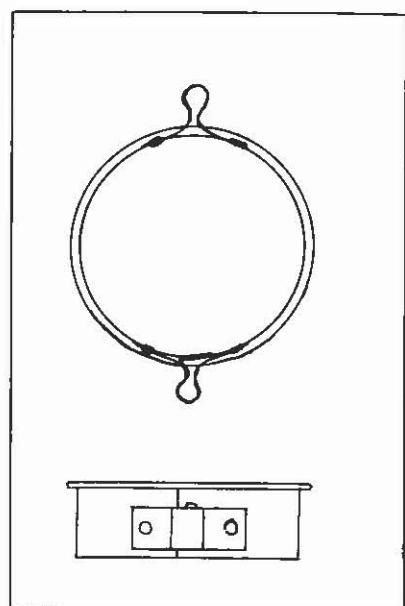
BAT 3324 (SCALE 1:4)



BAT 578 (SCALE 1:4)



BAT 3630 (SCALE 1:4)



This can be tabulated as follows:

REG NO.	Diam mm	Length mm	Shot size	Volume L
BAT 3630	110	454	10	4.5
BAT 405	123	488	16	5.8
BAT 3324	132		18	
BAT 416	142	446	24	7.1
BAT 578	155		32	

It is worth noting that the containers are of about the same length. All these diameters were compared with the *Batavia* tally-stick to give the shot size which correspond to the class of guns 32, 24, 18, 16 and 10 *pont*. The lids may be expected to have a larger diameter, because they have to fit over the container, though this is unlikely to be more than a few mm. These cartridge containers raise some interesting problems. The shot diameters indicate that they should be designed to fit four classes of guns: 5, 8, 12 and 24 *pont*; however the cartridge containers indicate that they fitted 16, 18 and 32 *pont* guns. Finally, the bore diameter of the bronze guns of 150 and 120 mm, allowing for 0.25 *duim* (6 mm) windage, indicate guns of 24 and 12 *pont*. It seems likely that at least BAT 578 was designed for a gun that was not on board the *Batavia* or possibly, although very unlikely, an iron gun not yet raised.

Smith (1627) describes the cartridge cases as: '....cases for Cartridges made of Latten' ("Latten: a mixed metal of yellow colour, either identical with or very like brass," *Shorter Oxford Dictionary*, Onions (1968)) 'to keepe the Cartridges in, which is to have no more powder in them than just the charge of your Peece, and they are closely covered in those cases of Latten, to keep them dry, and from any mischances by fire, and are farre more ready and safer than your Ladles and Budgbarrels'. Likewise Manwayring (1644) mentions these cases: 'There are also other carthrages, which are made of Latten; in which we use to put these other carthrages, to bring them amoungst the ship, so much the safer from fire till we put them in the Peeces mouth, which is a dare, that in the fight, there cannot be too much diligence or order used'.

### Touch-hole pricklers

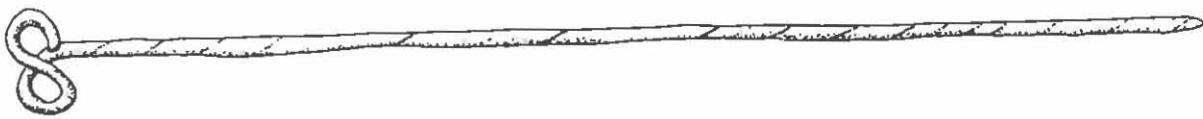
BAT 3337



BAT 3616



BAT 3680



BAT 3244B

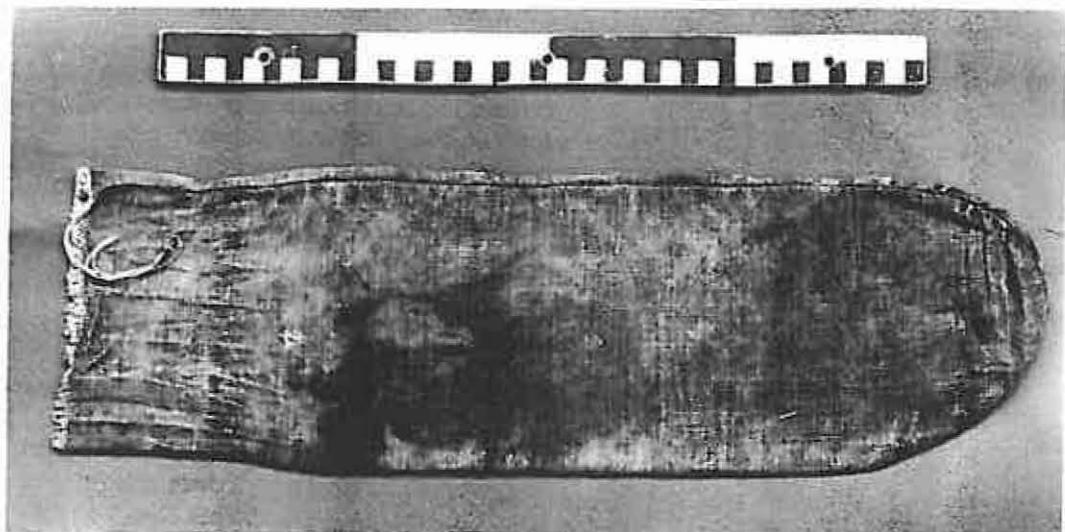


BAT 3337



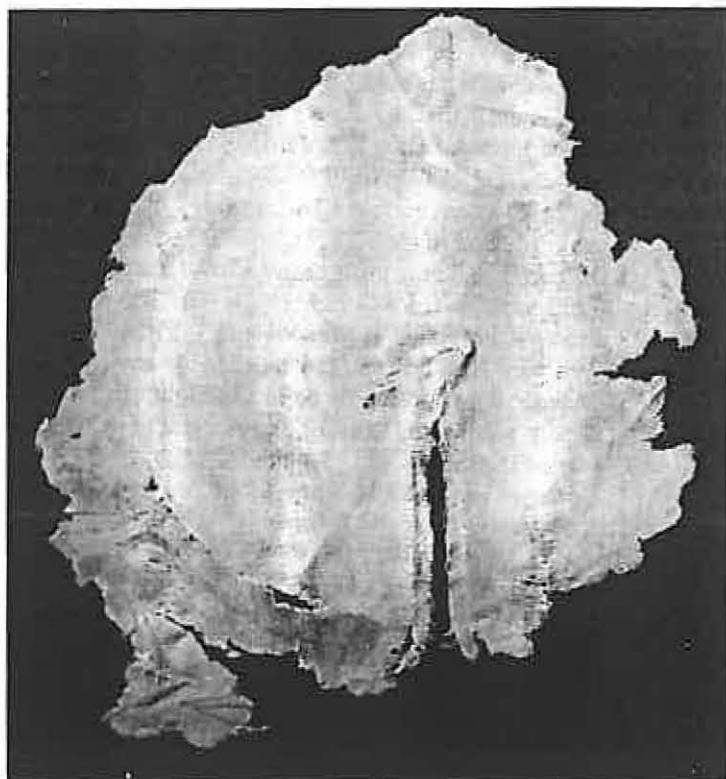
Several brass touch-hole pricklers were recovered. These consisted of a simple brass rod, between 320 and 330 mm long and about 4 mm in diameter, tapering to a twisted point at one end and a distinctive figure-of-eight at the other end. The pricklers were used to pierce the cartridges in the breech of the gun. This was done by inserting the pricker into the vent and pushing it into the cartridge so breaking the seal. Gunpowder was then run into the vent so that, on ignition, the fire ran down the vent and set off the cartridge.

**Gunpowder bag  
BAT 4573 (SCALE 1:4)**



During the cleaning out of the barrel of the iron gun No. 2 (BAT 8721), the contents of the barrel were recovered. This is shown in Fig. 32, and consists of the following items, in order of recovery: wooden tampion or barrel plug, covered in a linen material (BAT 4572); hemp wadding; the shot; wadding; a linen powder bag (BAT 4573); and a further piece of wadding. The latter is extremely unusual, since it would have caused problems in priming the charge. Fig. 32 shows the powder bag prior to conservation, the illustration here shows the bag after treatment. The treatment, which involved washing in 7.5% oxalic acid solution and then neutralization with a 5% EDTA solution, was carried out by the Conservation Laboratory (I am grateful to Rinske Car for the identification of the material and the conservation notes).

**Cannon tampion or wooden bore plug and covering material  
BAT 4572**

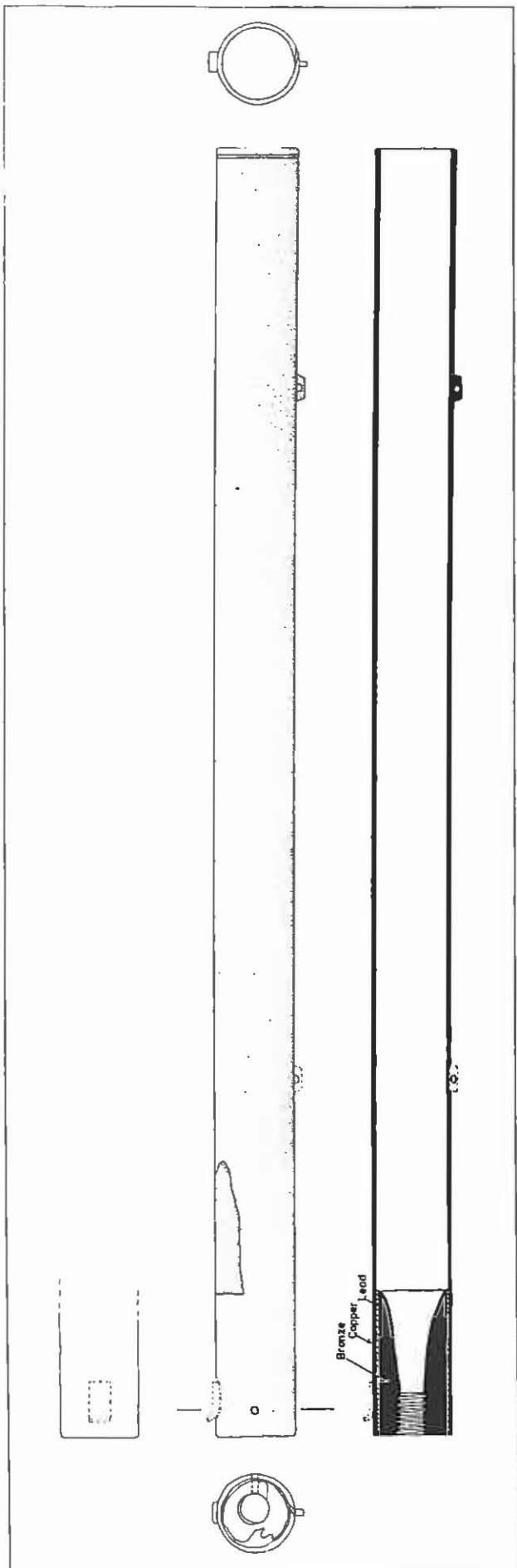


**SCALE 10:1**



A number of these bore plugs have been found during the cleaning of the iron guns. In most cases, the guns have been found loaded. Starting at the muzzle, the guns usually had a plug, then wadding, shot, more wadding and then the gun powder (Fig. 32). In one case the powder was preserved in a material bag (see below). The dimensions of the plug (BAT 4493) were: diameter 144 mm, thickness 32 mm and it was covered in plain weave linen BAT 4572.

## BAT 407 (SCALE 1:4)



## SMALL-ARMS AND ACCOUTREMENTS

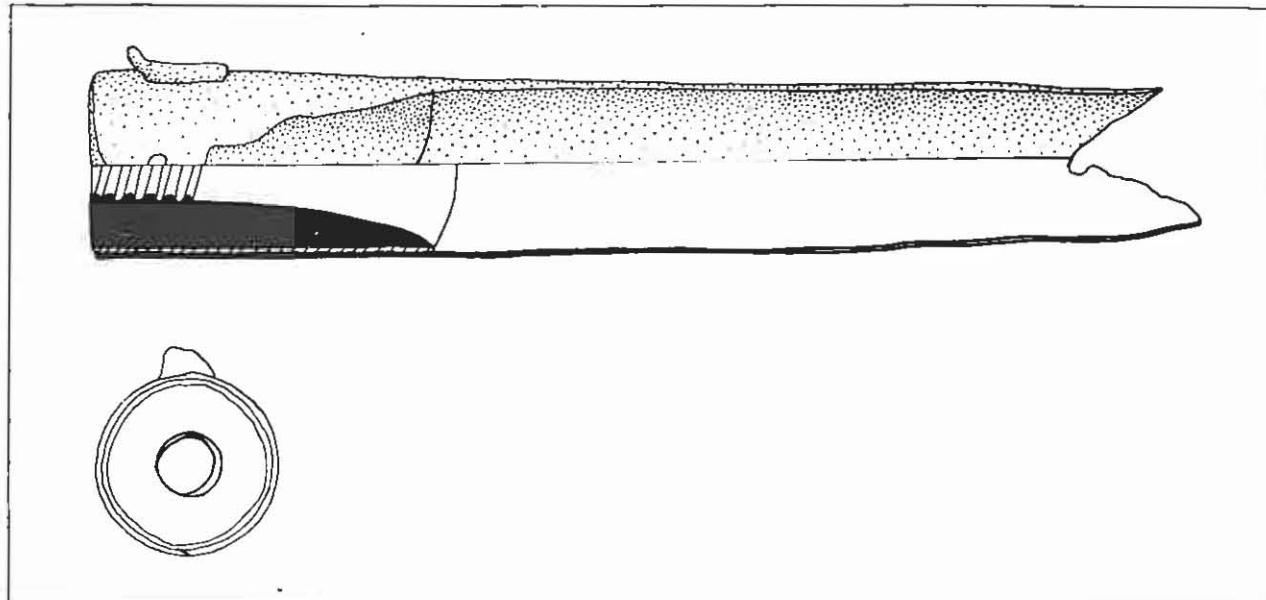
### Blunderbuss

Three examples of an unusual type of blunderbuss were found on the site, BAT 407, BAT 408 and BAT 3261. The guns have a parallel bore, made-up of copper sheeting rolled into a tube 44 mm in diameter and 830 mm long, with a tapered chamber at the breech made of a type of bronze. The breech has a screw-thread to allow for some form of iron block to be attached, rather similar to the composite gun arrangement (see above). There is no evidence of a touch-hole in the breech, so it was presumably fired in some way through the breech block screw. A small back-sight was mounted at the breech end of the tube. The copper sheeting was brazed into a tube with a lap-joint on the ventral surface. The breech block was soldered and pinned in place.

Samples of all four metals were taken and qualitatively analysed with a scanning electron microscope fitted with EDAX facilities. The tube was shown to be made of pure copper, with no other metals detectable (better than 99% pure Cu). The bronze-like breech block was shown to be a copper-based alloy with high levels of lead and small amounts of antimony and, thus, is not a true bronze. Dr Neil North, who analysed the metals, commented that the composition was quite unusual; the only advantage of using this alloy would be that it would be easy to machine; but at the same time, it would suffer from low strength and have a low melting-point. The lead solder or filler was shown to be a high-lead alloy with small and approximately equal amounts of copper and nickel, and traces of tin and antimony. The brazing was shown to be a typical single-phase brass, with only copper and about 20% zinc present. The author is grateful to Dr Neil North, then Head of the Department of Materials Conservation and Restoration of the Western Australian Maritime Museum, for the analysis and notes on the metallurgy.

It is clear that these guns were a type of matchlock blunderbuss. A similar gun, illustrated in Puype (1976:16) and Kist et al. (1974:No.17 & 18), is located in Skokloster Castle, Sweden, and is of Dutch origin, dating from the second quarter of the 17th century. The guns were used to fire pyrotechnic fire-balls or fire arrows such as shown in Fig. 35, taken from Galschut (c.1692). The use of fire arrows is described in Simienowicz (1676:400): 'But if ever they [fire-arrows] can be used to any very great purpose; it must certainly be in Sea-Fights, to set Fire to Enemy's Sailes and Rigging, and especially when they are headed with sharp iron.' Smith (1627:54) states:

Or you may make a ball of wild-fire burn in the water.....It is good eyther for service on sea to burne the sails of shippes, or on land for disordering men in battellray being neere, for divers other militarie services, to have certaine short muskets of an inch or very neare an inch bore, out of which you may shooeyther chained bulletts, or half a score pistol bulletts, or half a dozen harquebus bulletts at one shot; or you may shoot out the same fire-arrows made with strong shafts feathered with horne or with common feathers, glewed & bound on with threed: when you are to shoot a fire arrow out of these peeces, you must not give the peece her full loading of powder, but rather  $\frac{2}{3}$  parts thereof, and then put a close wad after the powder, and put in the arrow close to the wad, firing the same at the other end without the mouth of the



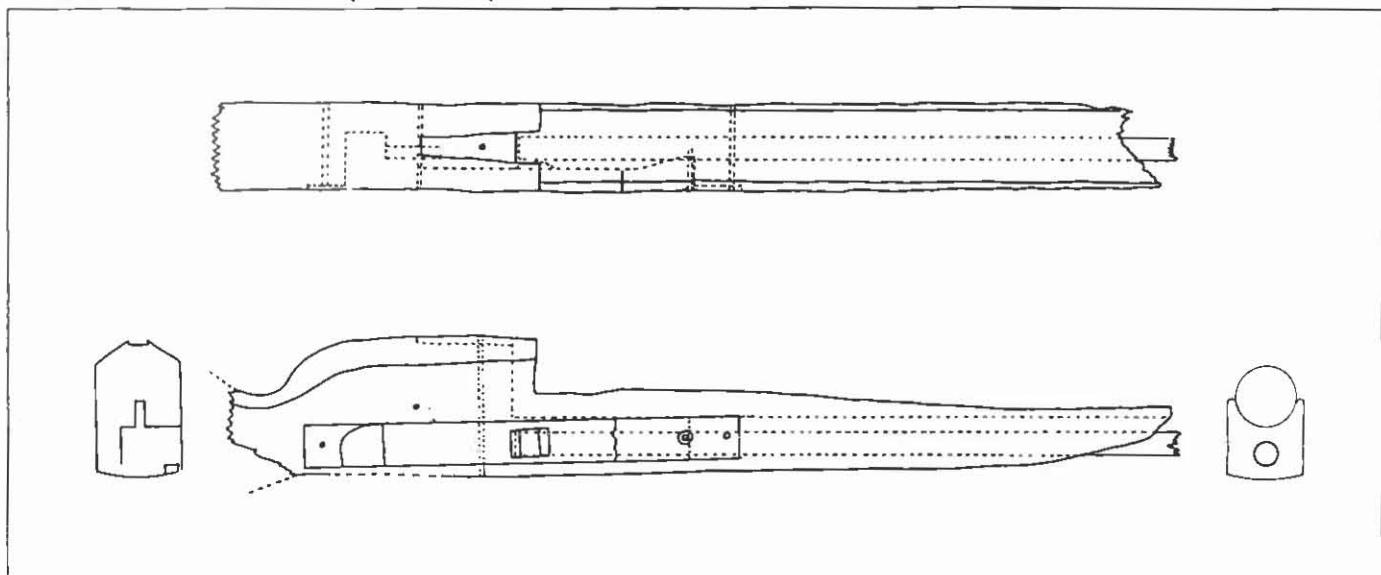
piece, as you see in the draught: which being well fired, you may discharge the same at your pleasure. The string made fast to the end of the fire-worke, is to keep the arrow streight in his passage, being shot eyther with or against the winde.

Morris (1984), illustrates a similar type of gun from the *Association* and the *Eagle*, although suggesting that these were 15th-century guns. The *Association* gun had a bore of 34 mm and a length of 720 mm, and was thus slightly smaller in size; but the thickness of metal is greater, about 6 mm thick, and the muzzle has a flare similar to the muzzle of a sea-service cannon. Both guns have a screw-thread at the breech and two lugs on the ventral surface for attaching the barrel to the stock. The *Eagle* gun appears to be more like the *Batavia* gun, but unfortunately some details are not clear – the barrel is noted as being tapered, 25 mm at the breech and 47 mm at the muzzle, but the illustration in the article appears to show the opposite. Possibly, the breech block may also have confused some of the measurements. The gun has a touch-hole on the body of the gun, not through the breech screw, but how this connects with the chamber is not clear.



Figure 35. A 17th century engraving showing a gunner about to discharge a fire arrow from a matchlock.

**Wooden gun-stock  
BAT 4383 and BAT 4246 (SCALE 1:4)**



Fragments of a gun-stock were recovered from the site. Unfortunately, some material failed during conservation, and was thus lost, so it is difficult to produce an accurate reconstruction. The barrel of the gun was missing, and may not have been fitted, but from measurements it seems unlikely that the stock was for the blunderbuss. The stock barrel had an approximate diameter of 33 mm whereas the blunderbuss had a diameter of 55 mm.

It is fairly clear that the stock was for a matchlock, as the lock-plate is similar to that shown in Gheijn (1607) for the caliver and musket (see Kist, 1971: No. 12), and a similar lock-plate is shown in Kist *et al.* (1974:12). The remains of the ramrod were found in a tubular cavity running parallel to the barrel. At present, it is not clear if the ramrod has a lead end to it (see below). A series of X-rays were made of the gun-stock in an attempt to learn more about the construction of the stock. The results quite clearly show the ramrod, and indicate that the lead fitting on the end was not inside the stock, but must have been at the other end. Other details shown by the X-ray are the construction of the fittings for the matchlock.

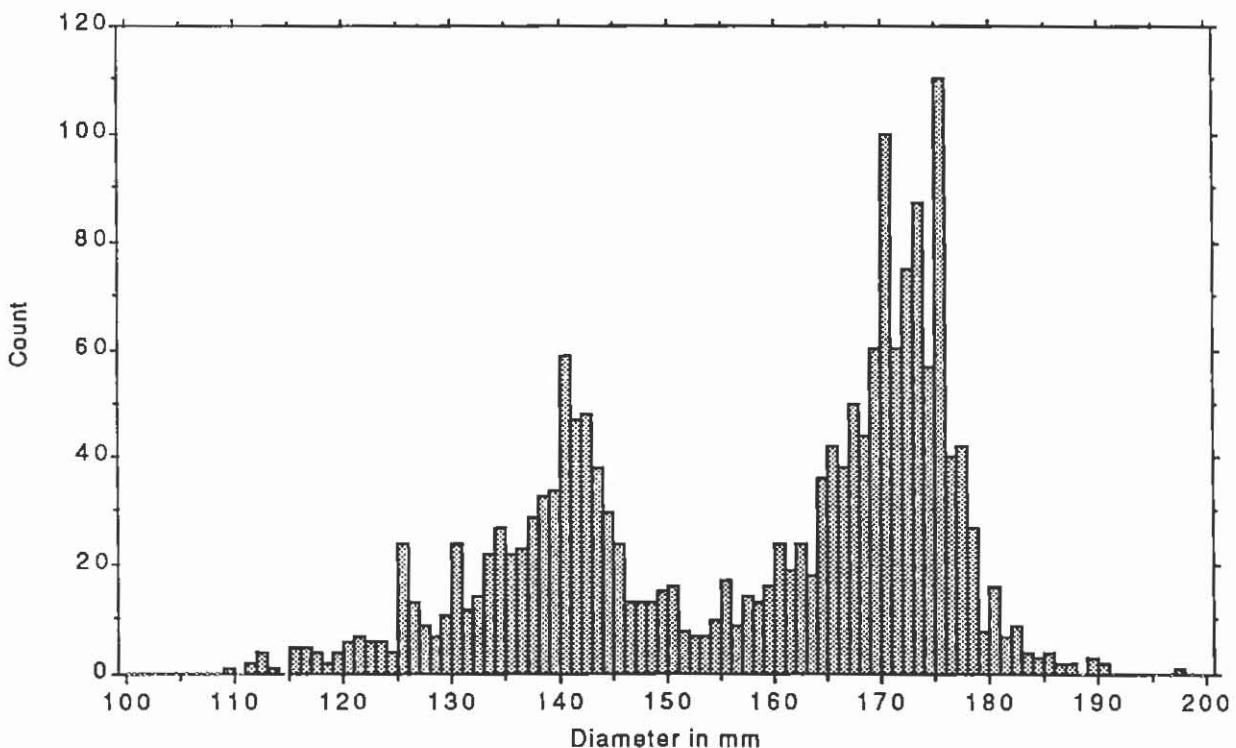


Figure 36. Frequency histogram of a selection of ordinary lead shot from the *Batavia*.

### Ordinary lead shot

A large quantity of lead shot (approximately 1794 shot were measured) was recovered from the site. The frequency histogram of the diameters (Fig. 36) shows two clear peaks, one at  $17.02 \pm 0.62$  mm representing about 1083 shot and the smaller at  $13.98 \pm 1.05$  mm representing about 802 shot. The regulations of 1599 and 1639 concerning firearms give the following information:

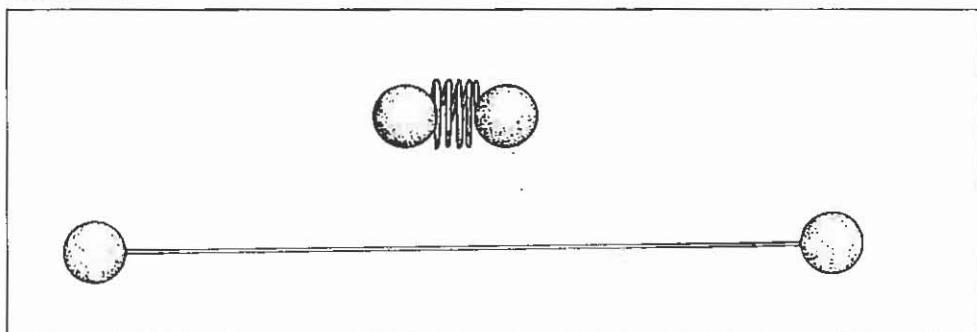
Date	Type of gun	No. rolling bullets in <i>pont</i>	diam in mm
1599	Musket	12	19.0
1599	Caliver	24	15.1
1639	Pistol	32	13.7
1639	Carbine	18	16.6
1639	Musket	12	19.0

Kist *et al.* (1974) illustrates a matchlock musket made in Amsterdam c. 1630 with a bore diameter of 17.7 mm (which the larger *Batavia* shot would fit into quite tightly); the smaller balls correspond with a flint-lock pistol dated c. 1635 with a bore diameter of 14.5 mm and a flint-lock gun c. 1640 bore diameter 13.8 mm.

Van Dam (1701) states that in 1659 the muskets were proofed with a running ball of 12 in a *pont* (19.0 mm) but fired a ball of 14 in a *pont* (18.1 mm) and that this should be changed to a proof with a running ball of 14 in a *pont* (18.1) but firing a ball of 16 or 17 in a *pont* (17.0 to 17.3 mm). It seems, however, that the majority of our balls were of the smaller calibre and that possibly the *Batavia* was armed with muskets and pistols.

### Wired lead shot

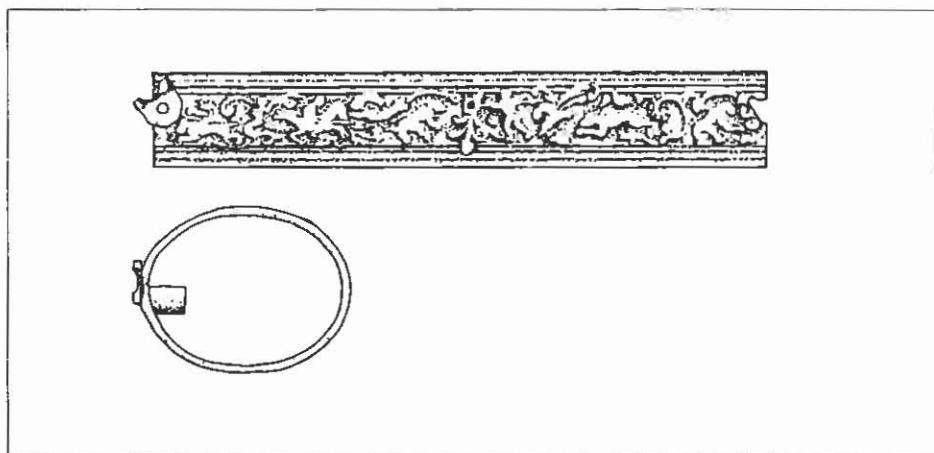
BAT 3673



A large quantity of wired lead shot was found on the site. It consists of two round lead shot, 16 mm in diameter, joined together with a coil of brass wire which when fully extended would be about 210 mm long.

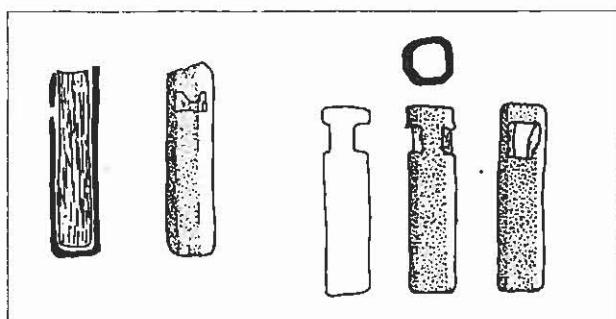
### Part of a powder-horn

BAT 3132



It is not certain what this item is. The decorative frieze of hunting scene with a man on horseback pursuing a bear (?), suggests a function related to the hunt. The fitting on the side which penetrates the collar-shaped object suggests that it was used to operate a flap of some sort, which may have been used to regulate the flow of something through the collar. The small hole on the opposite side to the fitting tends to confirm this.

**Lead ramrod ends**  
**BAT 7058**



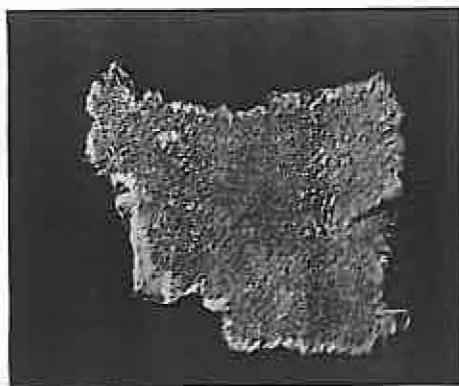
A number of lead ramrod ends were found on the site. These were identified by virtue of the wooden rod having the same diameter as the remains of the ramrods found in the stocks. As discussed above, it seems that the lead end of the ramrod was on the outer end of the ramrod when stored in the gun.

#### Patch-boxes

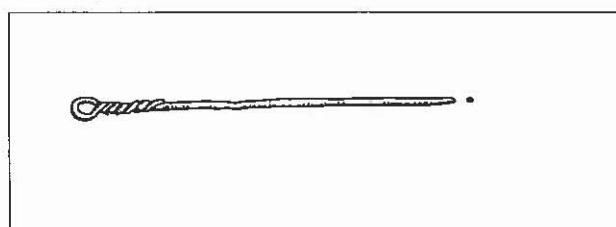
Three patch-boxes were found on the site BAT 3103, BAT 3113 and BAT 3131. The boxes are similar although different in size. BAT 3131, the most complete example, has a hinged lid decorated with stamped flowers and a small decoration in the form of a pointing hand; the finger points to the hook catch which retains the lid. On the section along which the lid is attached is a line of writing which is indecipherable. The end of the box is open, which suggests that the box was attached possibly to a leather strap. Inside the box were a number of wool twill patches (BAT 3131).

A similar box has been found at Colonial Williamsburg on a plantation site and associated with a slipware dish marked 1631. The author is grateful to Dr Ivor Noel Hume, Director of the Colonial Williamsburg Foundation, Virginia for this information, however it should be pointed out that Dr Noel Hume questions that these boxes were for patches for muskets. The author suggests that the box was part of the accoutrements for a musket or caliver, and it must be assumed that the gun may have been rifled. Stone (1934:488 Fig. 621(5)) illustrates a patch-box of similar shape, but made of silver gilt filigree and set with red and blue stones. At present the box cannot be definitely identified as a patch-box, since there is some disagreement on the availability of rifled guns in the early 17th century.

#### BAT 3131 (SCALE 1:1)

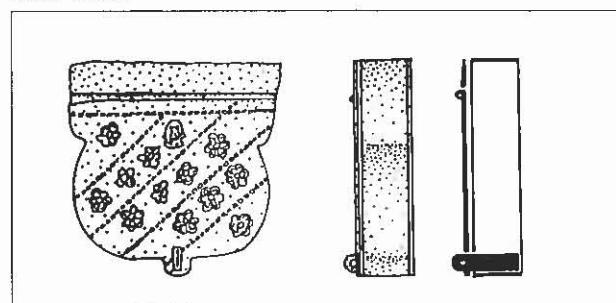


**Pricker**  
**BAT 3591**

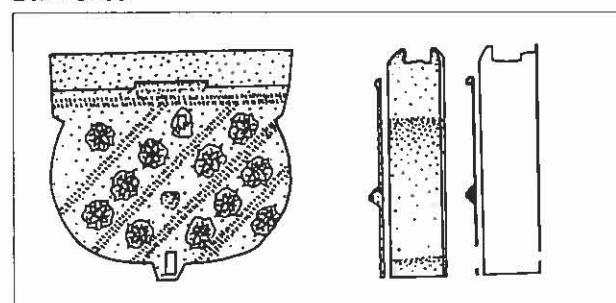


This small brass pricker is thought to be part of the hand-gun equipment used to clean out the touch-hole.

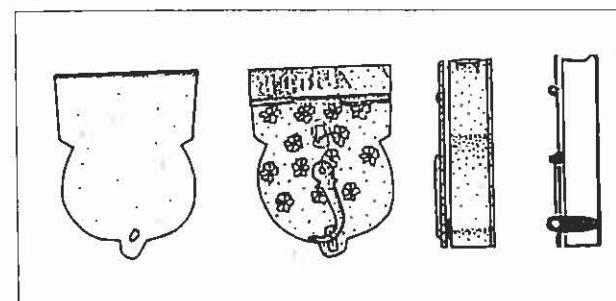
#### BAT 3113



#### BAT 3103



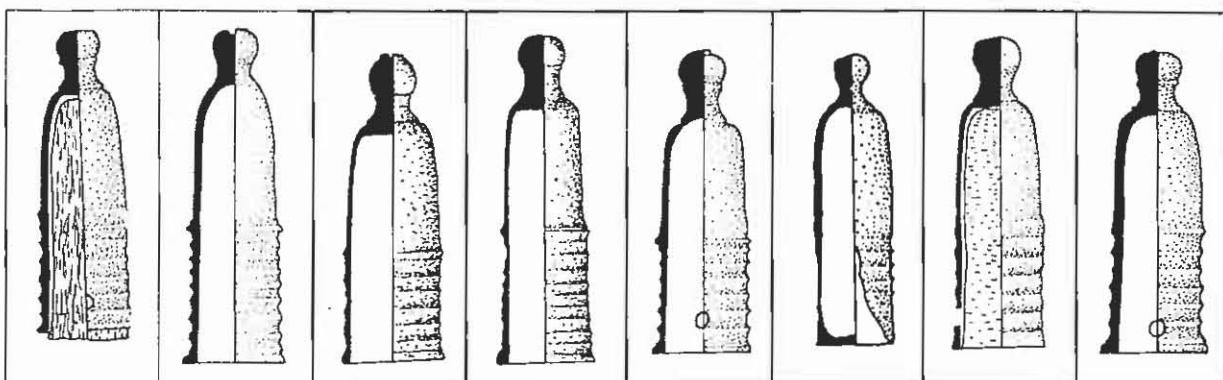
#### BAT 3131



## MISCELLANEOUS ACCOUTREMENTS

### Pike ferrules

BAT 3052 BAT 3133 BAT 3222 BAT 3247 BAT 3322 BAT 3481 BAT 3584 BAT 3612

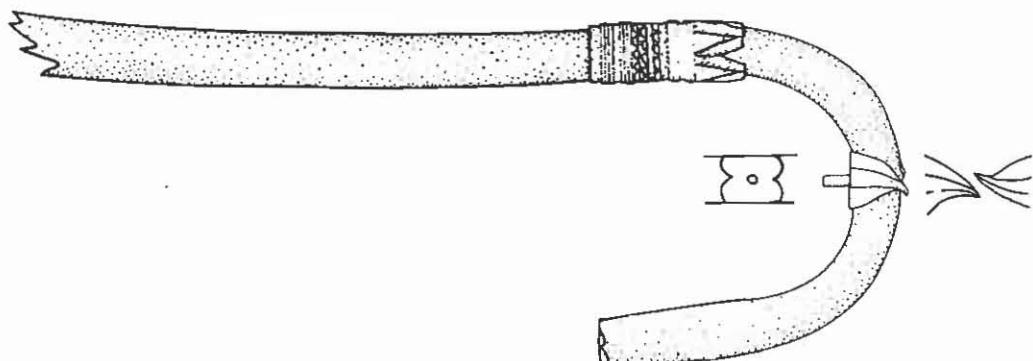


Eight bronze pike ferrules were recovered from the site. They are about 90 mm long by about 25 mm in diameter, hollow on the inside (inside diameter 18 mm) with a knob at one end. These objects were identified from a picture painted by Bartholomeus van der Helst (1613-70) entitled *Corporaalschap van Kapitein Roelof Bicker*, painted in 1639 and located in the Amsterdam Rijksmuseum (Fig. 37).



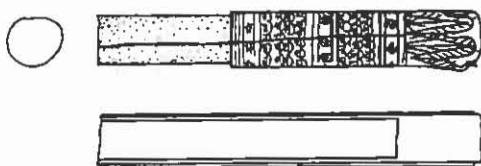
Figure 37. A detail from the *Corporaalschap van Kapitein Roelof Bicker* painted by van der Helst in 1639 showing a bronze pike ferrule, some of the other ferrules in this picture were iron.

Parts of a trumpet  
BAT 419

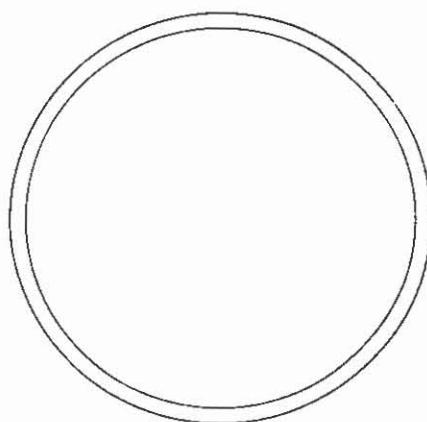


BAT 3765

BAT 3222 and BAT 3252



BAT 465



MDCXVIII·MACHT·ICH·CONRAT·DROCHL

Several parts of at least two trumpets were found on the site, namely two mouth-pieces and parts of the piping and the end of the trumpet. The trumpet end, BAT 465, is engraved with a decorative frieze with the inscription CONRAT DROCHL 1618 MACHT ICH. There is a small shield between MACHT and ICH, possibly the town of Ausburg or, more likely, Nürnberg. A very similar trumpet was found on the Swedish warship *Kronan* which was lost in 1676 (Karp, 1986). This trumpet was made by Michael Nagel of Nürnberg in 1654 and the details show where the fittings BAT 3765 and BAT 419 belong. Nürnberg was famous in the 17th century as a trumpet-making centre. The trumpet was used on-board ships for signalling and can be seen in many 17th-century marine paintings. It is possible that in these paintings the trumpet could be confused with a megaphone.

A megaphone can be seen in use in the painting *View of the Roads at Hoorn in 1622* by Hendrick Cornelisz Vroom (1566-1640). Here, a crew member of a ship's boat, lower centre right, is using it to call to the large ship on the right. However, the trumpet cannot be mistaken in some pictures; for example, the boat in the bottom left-hand corner of the painting *Battle near Gibraltar* by Hendrick van Wieringen, painted in 1622, shows a person with a trumpet, presumably signalling since it is in the midst of a battle. The trumpet is also seen in peacetime, generally used on small boats carrying passengers.

Drumstick  
BAT 6281



This drumstick is similar in size and shape to the drumstick found on the wreck of the *Vergulde Draeck* GT 1143 (Green, 1977). Drums were used, as also trumpets, for signalling and summoning at sea, although drums seem to be less common in contemporary illustrations; see, for example, on the poop deck of the Dutch ship in the painting *Engagement between a Dutch and English war ship, 1605* by Hendrick Cornelisz Vroom, painted in 1614.

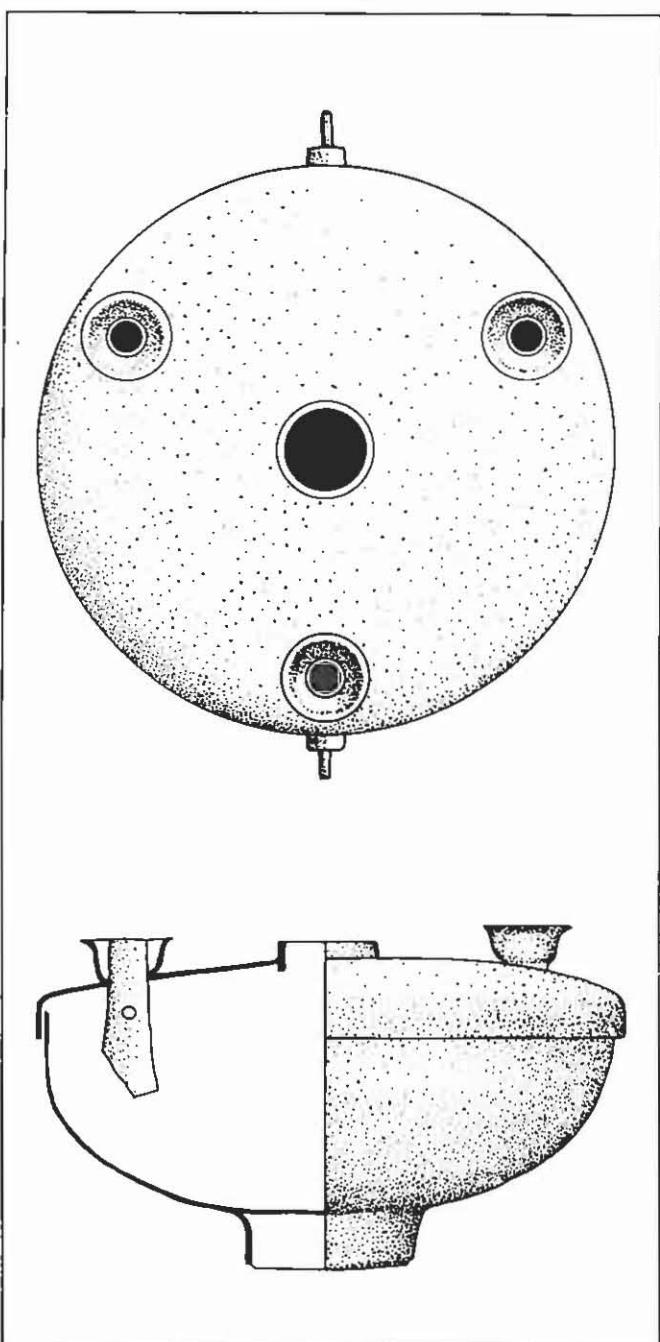
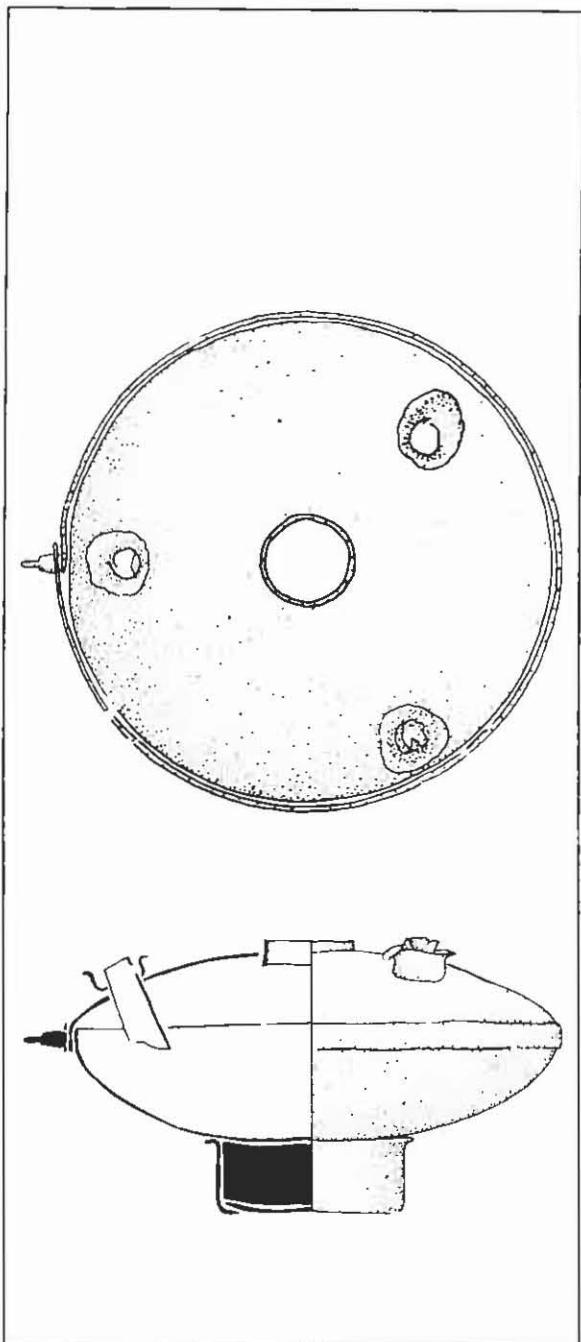
Sword-pommel  
BAT 4450



The remains of a sword-handle made of brass wire whipped on a wooden handle is one of the few items that can be associated with cutting weapons. The thin nature of this type of iron weapon would not enable it to survive well in a marine environment.

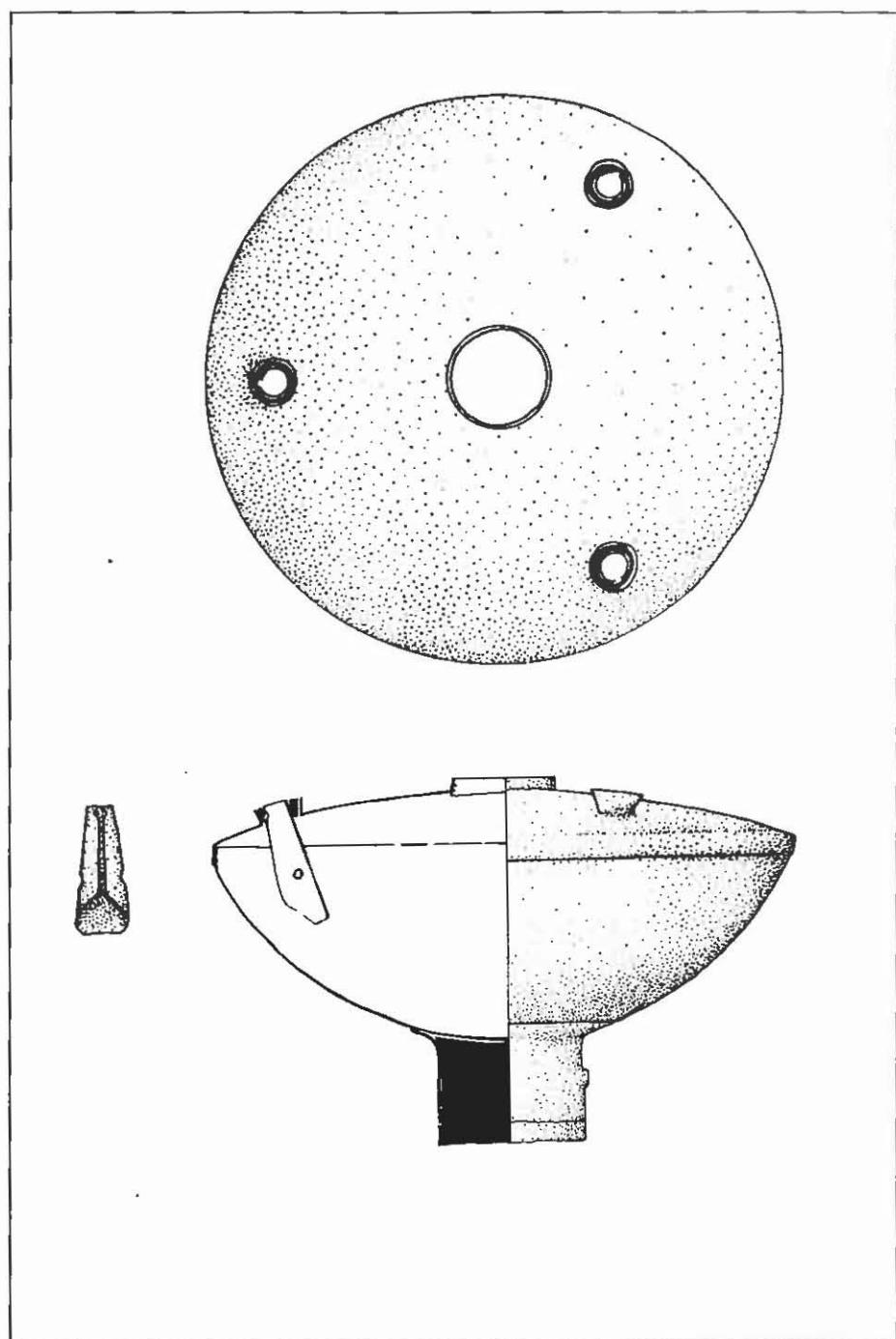
Three-wick, brass gimbal oil-lamp  
BAT 3634

BAT 3628

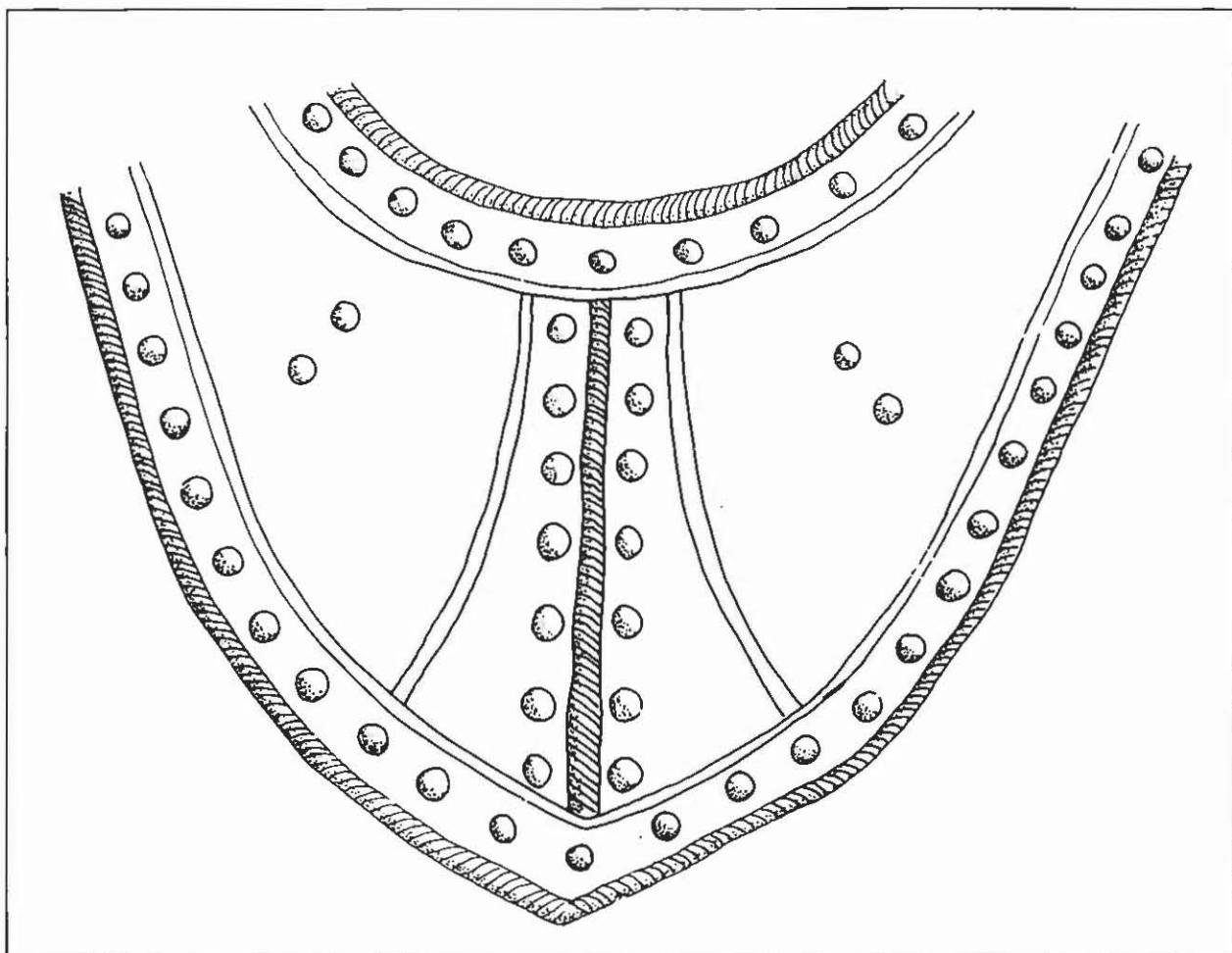


Three examples of three-wick gimbal oil-lamps were found on the site. These lamps are associated with the powder-room of the ship. They differ from ones found on the *Vergulde Draeck* GT 893 (Green, 1977) as the wick arrangement of these utilized a multiple yarn, lightly twined, cotton wick, rather than the wooden capillary wicks on the *Vergulde Draeck* lamps. BAT 3079 and BAT 3628 are similar in size (152 and 157 mm diameter respectively) whereas BAT 3634 is smaller (130 mm diameter).

BAT 3079



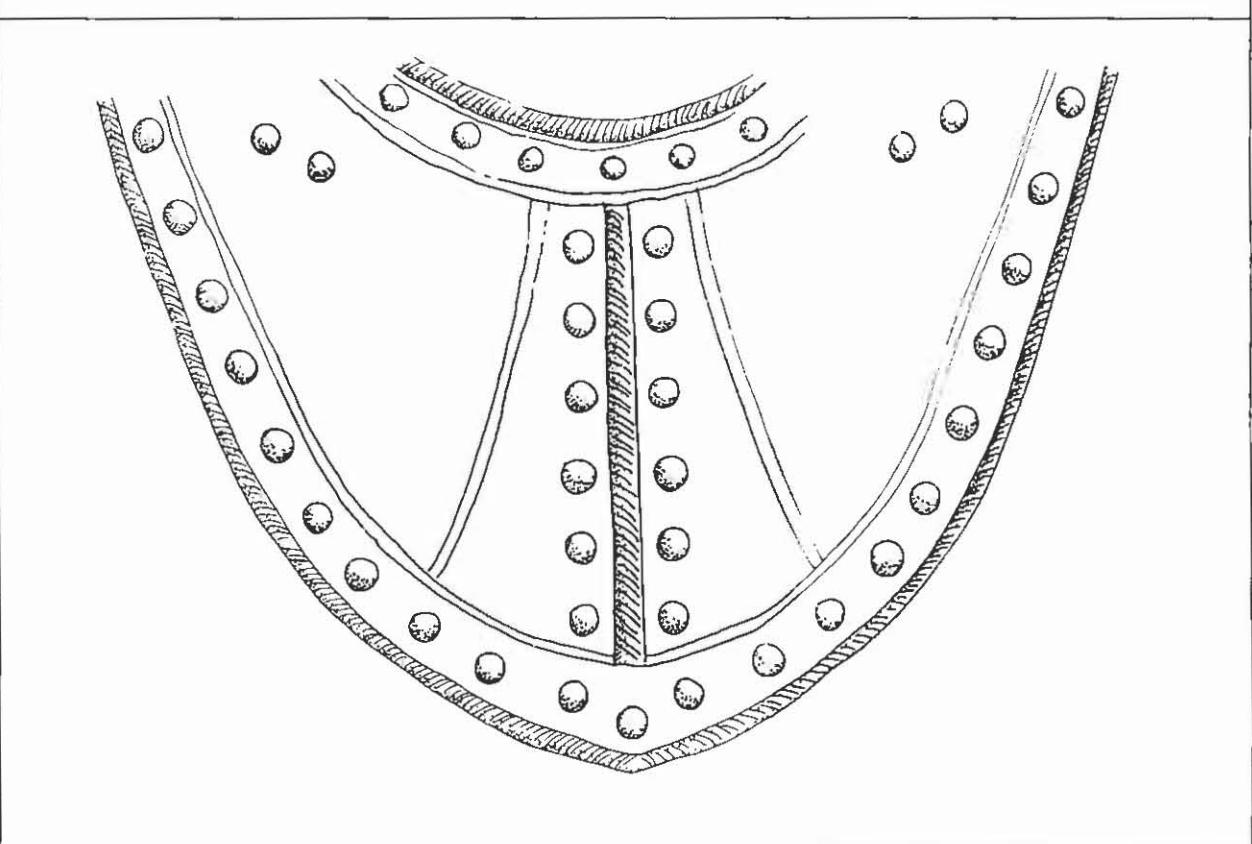
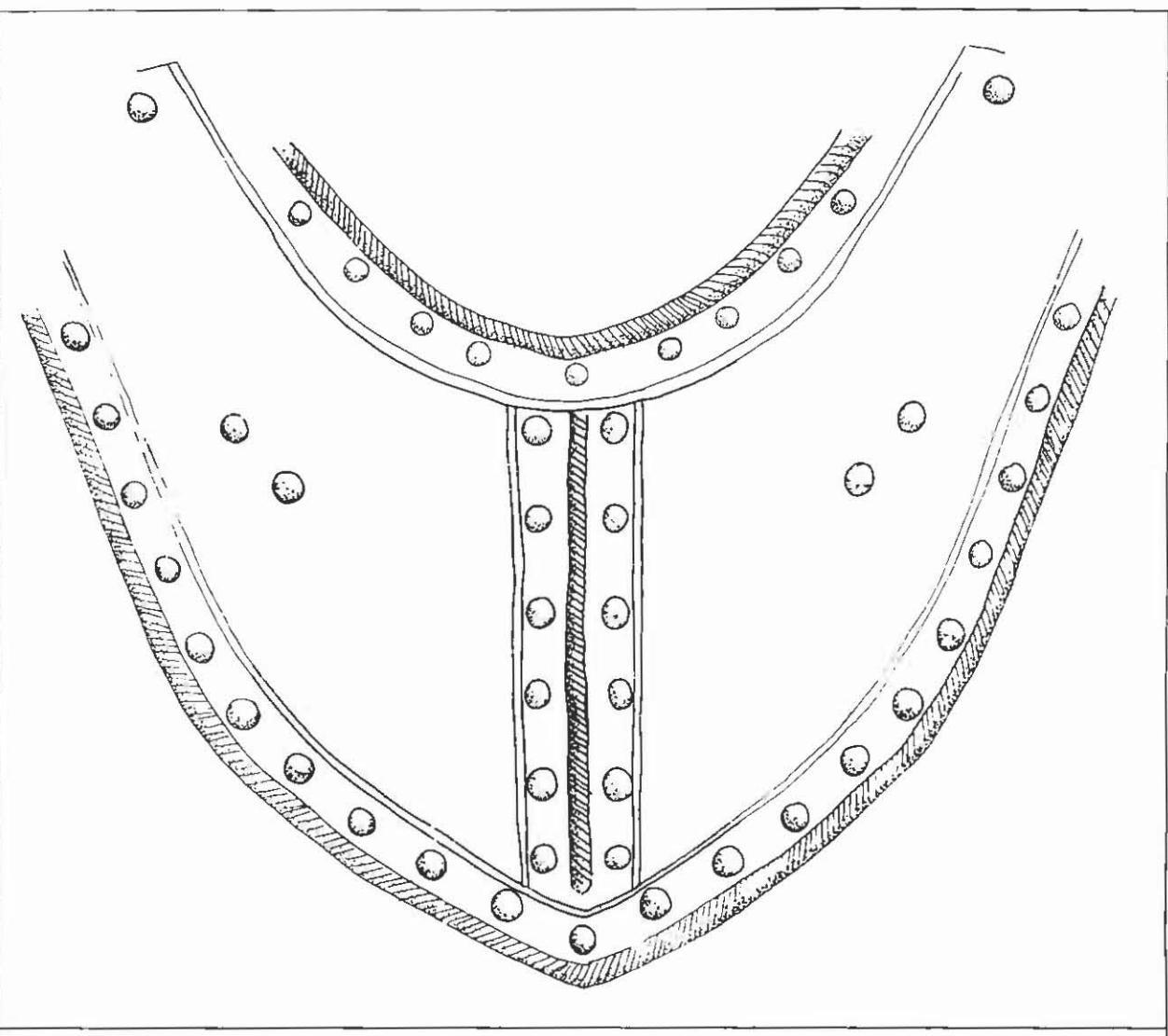
## Gorgets

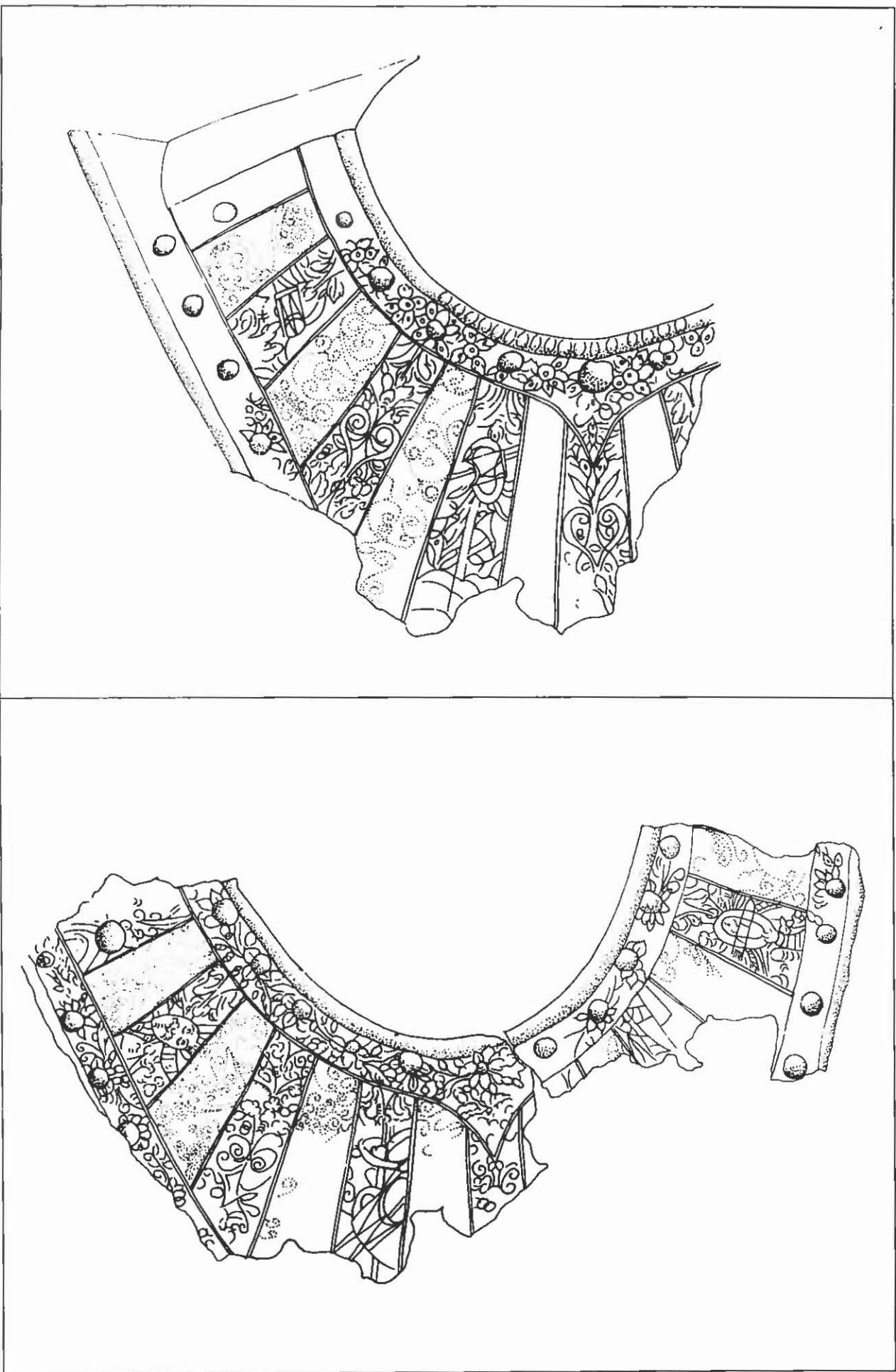


A large concretion containing a number of gorgets was found on the site in 1970. The concretion was subsequently broken open and a series of leather gorget padding was removed (Figs 38 and 39). Since the iron concretion was quite fragile, only the impression of the outer layers of the gorgets survived. At the time, efforts were concentrated on recovery of the leather and on making silicon rubber impressions of the gorgets. Unfortunately, during this process the concretion was badly damaged. In 1987, the remaining concretion was reassembled in an attempt to try and reconstruct the original. It seems that at least 85-90% of the concretion survives today and much of the original arrangement can be determined. There were four rows of gorgets, each gorget placed inside the next, about ten per row, with the fronts all on one side and the rears on the other. They were all roughly the same shape, but there were two basic types, one highly decorated, the other plain with some minor variation in design. There were traces of wood around the concretion, indicating that they were originally packed in a box.

When the concretion was broken open, the shoulder joints between the front and rear of the gorget, were damaged and, as a result, it is difficult to reconstruct how the gorget was put on and fastened. Usually, gorgets are made in one piece, with an open part at one shoulder. The neck of the gorget opened slightly by unfastening the shoulder joint so that it could be placed over the head. It was then closed and fastened at the shoulder with a fastening or clip. It is likely that these gorgets were fastened in the same way.

It must be remembered that the only available evidence of the design of the gorgets comes from the impression in the concretion of the outer-most front and rear parts of the gorgets, together with the small sections of the lower parts of the successive gorgets that were stacked one inside the other. There is evidence for at least five decorated gorgets, the rest being plain with varying styles of ornamentation. The studs were used to attach the leather to the rim of the gorget. A narrow strip of leather was first applied along the inside edges. The studs were driven through from the outside and used to attach the leather strips to the gorget; a small, square washer was applied over the end of the stem of the stud and then riveted to hold the leather firmly in place. The leather inside cover was then sewn to the outer edges of the leather strips.





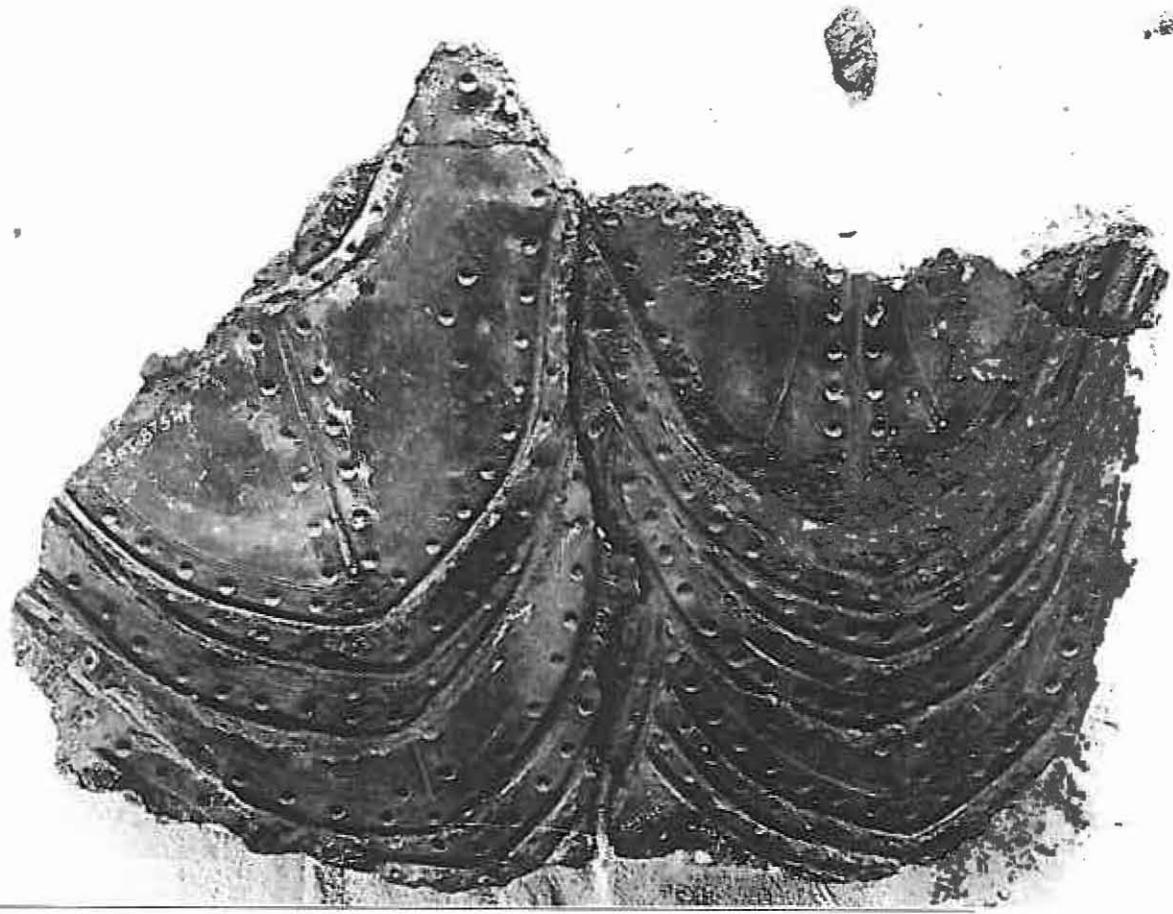


Figure 38. Two pieces of the front part of the plain gorget concretion. Note that top gorget on the left-hand side is a different type to that on the right-hand side.

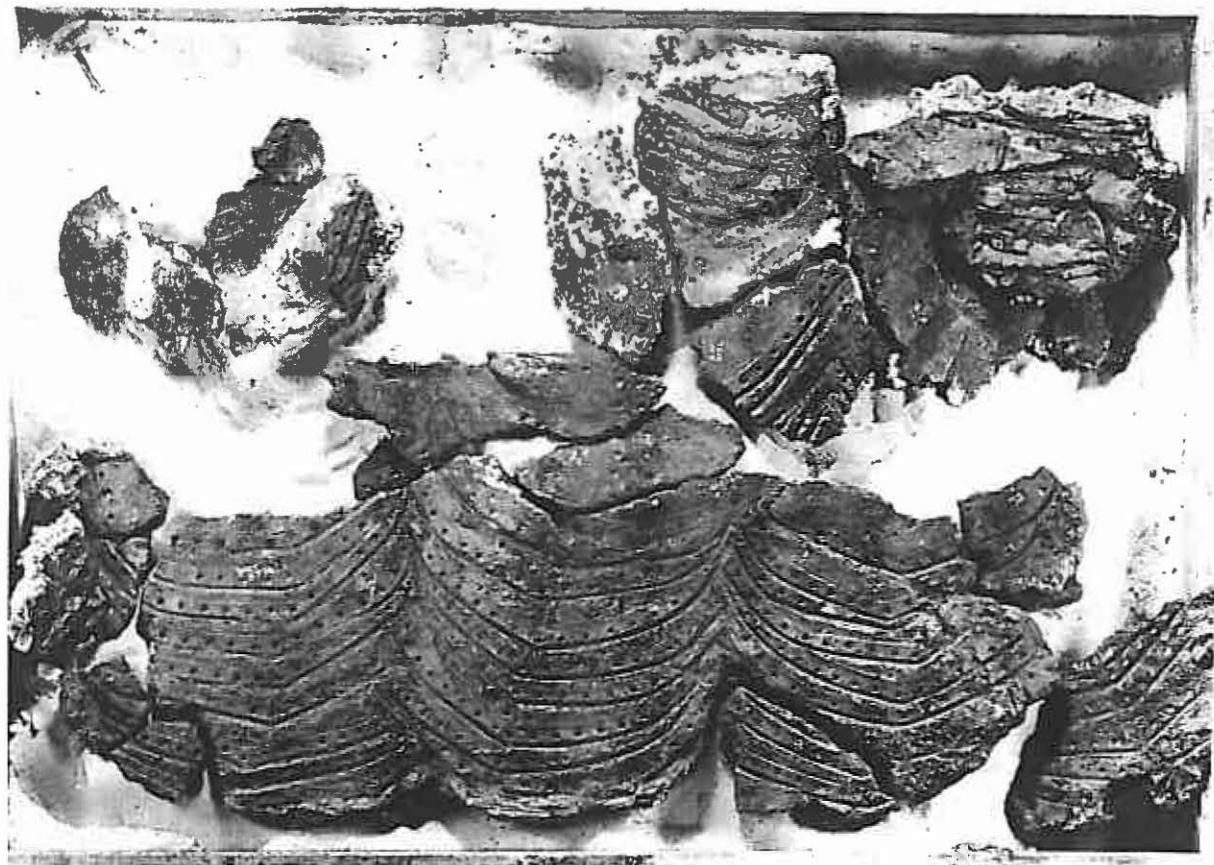


Figure 39. A reconstruction of the concretion containing the back part of the gorgets. Note that there are four groups of at least ten gorgets in each group. The top right-hand group is the decorated gorget type.



Figure 40. An illustration of the symbols of the *Verenigde Oostindische Compagnie*: the initials V.O.C. top, the ship in the shield is also a Company symbol, above the shield the weapons and navigation instruments.

## Navigation equipment

One of the most easily identifiable groups of material from the *Batavia* was the navigation material. Four astrolabes were found on the site, two during the 1972-76 seasons. One was found in the stern of the site, the other was associated with a massive concretion of silver coins. The astrolabes are of great interest because we know that some form of latitude measuring device must have survived the wreck, because Pelsaert was able to determine his latitude during the voyage from the wreck site to Batavia.

There are five lists of steersman's requirements in the Resolutions of the *Heren XVII* 16 April 1655 (*Resoluties genomen op de ordinaris en extraordinaris vergaderingen van de Heeren XVII KA187 23 September 1654 - 22 August 1660*). This is the earliest list of navigation equipment known for the VOC. The Resolutions list instruments and maps for the skippers, uppersteersmen, for the cabin which the uppersteersmen were responsible, for understeersmen and for the third watch.

The instrument list is as follows:

### Voor der schipper

1 <i>Catholicum</i>	2°20
1 <i>Koopere Astrolabum</i>	13°00
1 <i>Viercante peijlcompas</i>	7°00
1 <i>Viercante compas met parael naelden</i>	4°00
4 <i>Vaste roosen en</i>	4°00
1 <i>Schuijvende</i>	5°10
11 <i>Glasen a 6 stuijver</i>	
2 <i>koopere pennen a 1 stuijver</i>	3°13
1 <i>doos a 5 stuijvers</i>	
1 <i>halve rontje</i>	2°02
3 <i>caert passers</i>	"18
1 <i>Graetboogh met een Koopere visier en houte horisont</i>	2°11
1 <i>Hoeckboogh</i>	3°10
1 <i>Koopere compas rechter</i>	10°00

### Voor de hut opperstuijrsman ter verant woorden

2 <i>gelooden</i>	
2 <i>doosen tot deselves</i>	
1 <i>Catholicum</i>	
1 <i>Viercante compas met parael naelden</i>	
4 <i>Vaste en 1 schijverede roose</i>	
11 <i>Glasen a 6 stuijver in een dood meet 2 koopere pennen</i>	
a 1 stuijver bij een	
1 <i>halve rontje</i>	
1 <i>groote en een clyne winkelhaeck</i>	
2 <i>Koopere linalien</i>	
6 <i>Gissingh lijtjens</i>	
2 <i>Gissingh glaesjens</i>	
1 <i>Koopere compas rechter</i>	

### Voor de opperstuijrmans

1 <i>astrolabum van koopere</i>	
1 <i>Viercante peijlcompas</i>	
3 <i>Caertpassers</i>	
1 <i>Graetboogh met een Koopere visier en houte horisont</i>	
1 <i>Hoeckboogh</i>	

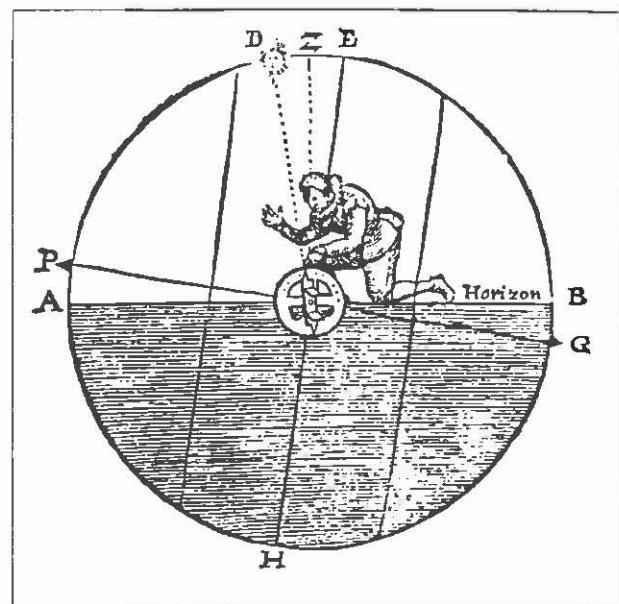


Figure 41. An illustration showing the use of the seaman's astrolabe.

### Voor de onderstuijrmans

1 <i>astrolabum van koopere</i>	
1 <i>Viercante peijlcompas</i>	
3 <i>Caertpassers</i>	
1 <i>Graetboogh met een Koopere visier en houte horisont</i>	
1 <i>Hoeckboogh</i>	

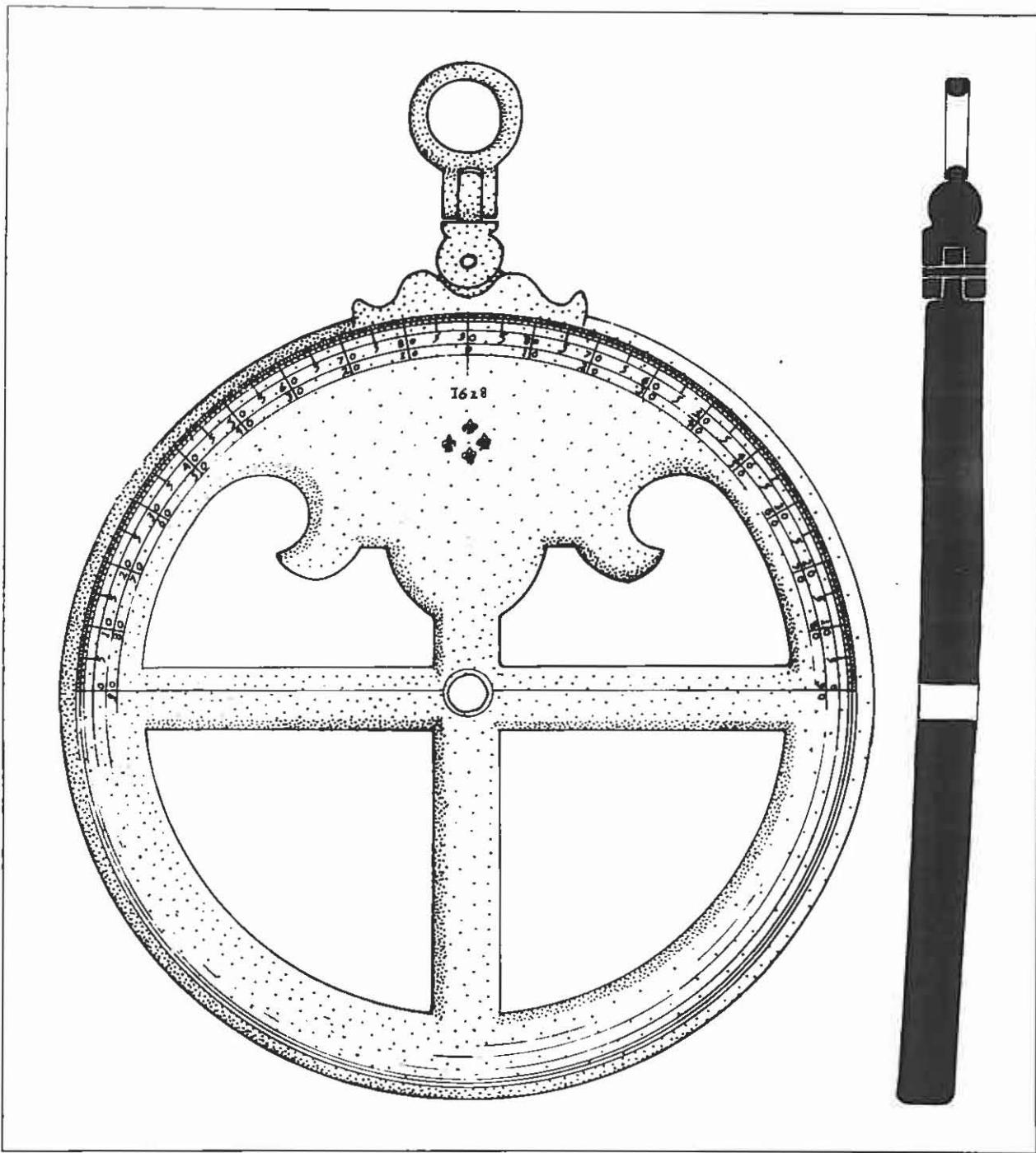
### Voor de derdewacht

3 <i>Caertpassers</i>	
1 <i>Graetboogh met een Koopere visier en houte horisont</i>	
1 <i>Hoeckboogh</i>	

This list is very similar to the published list of charts and steersman's requirements for the ship *Ternate* which was published in 1673 (KA 4393<sup>33</sup>). The *Ternate* list seems to be a printed version of the resolutions (with some variations) onto which was entered, in handwriting, the name of the ship, the skipper, the Chamber it was sailing for and the date of departure. These lists would be signed to confirm the receipt of the goods.

From the *Heren XVII* list we can see, for example, that a ship would carry three round astrolabes, two semi-circular astrolabes, two astrolabium catholicum, twelve pairs of compasses, four *graetboogh* or Jacob's Staff, four *Hoeckboogh* or Davies's Quadrant, together with a large assortment of charts and manuals.

Seaman's astrolabes  
BAT 3720

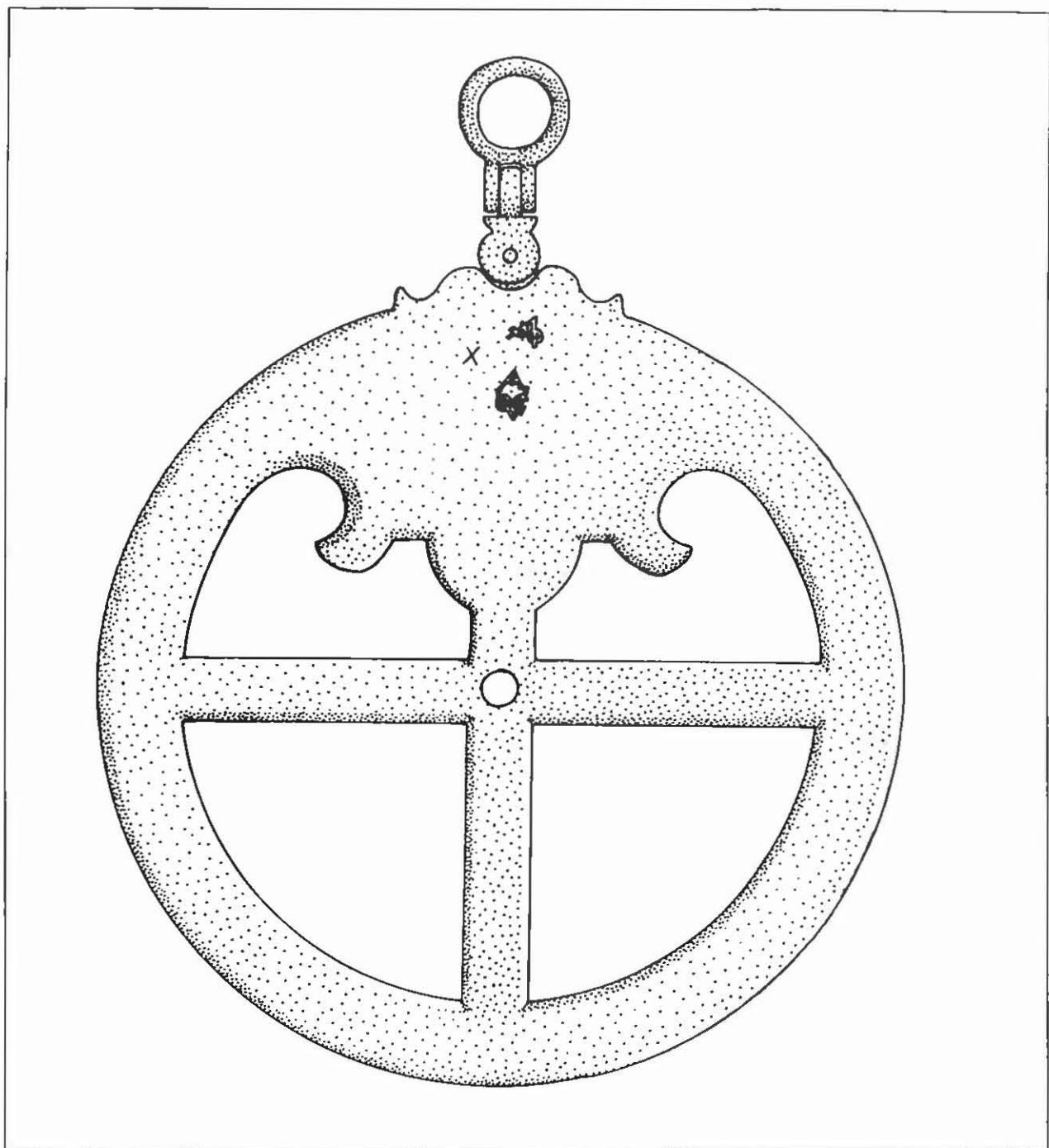


Unfortunately this is the only astrolabe that survived in good condition. It was found imbedded in a very large iron concretion which almost certainly was the reason for its good state of preservation. Only the astrolabe and gimbal support survive and there was no trace found of the alidade or locking nut. The astrolabe was slightly bent, indicating that it must have received a considerable blow at the time of the wreck, to bend such thick bronze.

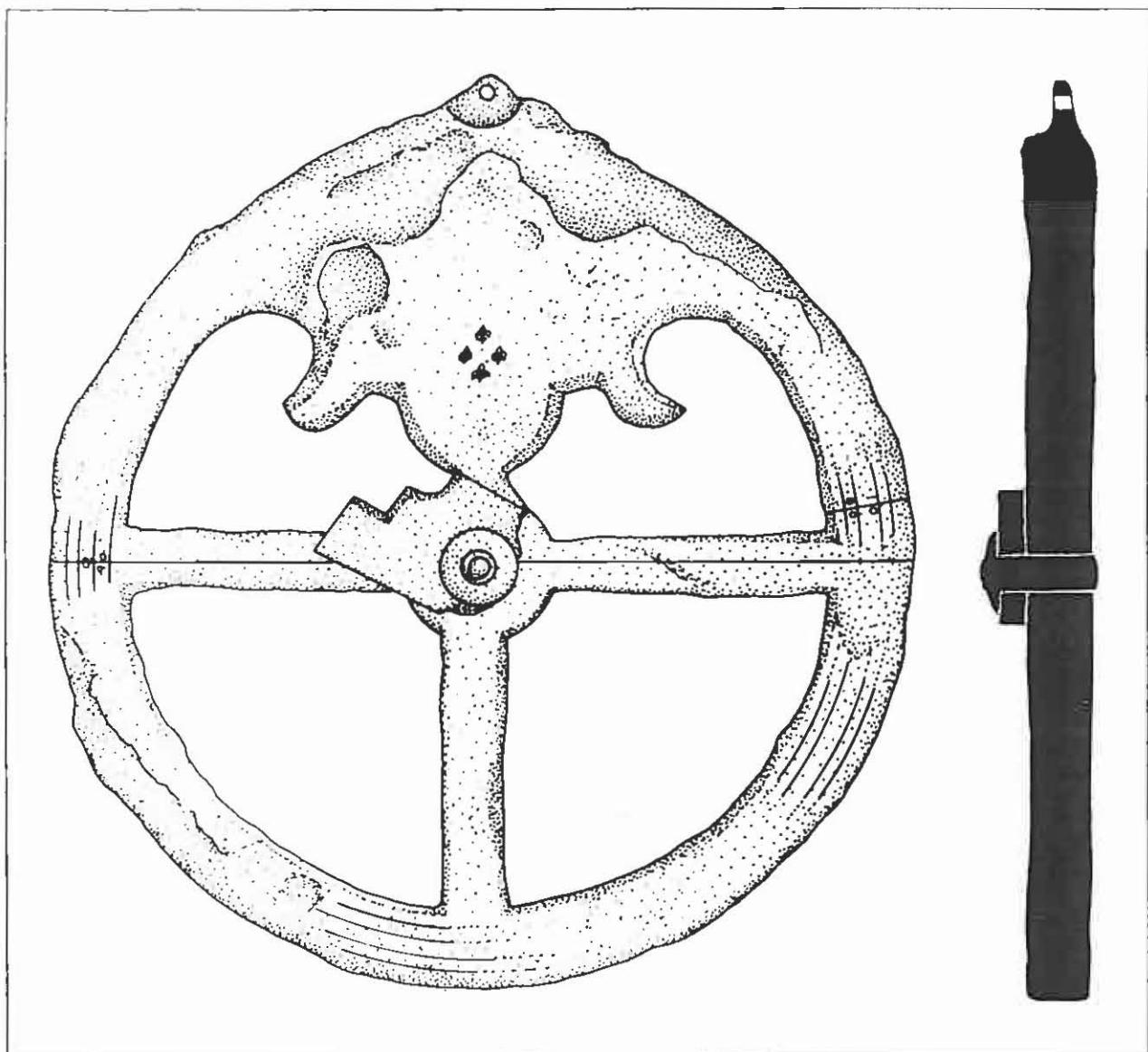
The astrolabe is of the type with the counter-weight at the top (National Maritime Museum Type 1b, Stimson, 1988). There is a diamond-shaped pattern of four fleur-de-lis and the date 1628 above. The scale is marked  $0^{\circ}$ - $90^{\circ}$ - $0^{\circ}$  and  $90^{\circ}$ - $0^{\circ}$ - $90^{\circ}$  in one degree intervals. The upper reverse side is stamped twice with the AVOC mark and with an inscribed 'X' of uncertain meaning. It is similar to the Skokloster Castle astrolabes Nos 2 and 3 (Anderson, 1972; Svensson, 1942; and Waters, 1966), although the scales, the inscriptions and the gimbal moulding are different.

It is likely that this, together with BAT 394, Skokloster Nos 1, 2 and 3, the *Vergulde Draeck* and the Isle of Wight astrolabes (Stimson, 1988) are all Dutch: they have the same basic shape; they have the same diameter of 250–253 mm; and all have Dutch associations. There were 25.7 mm in an Amsterdam *duim*, so it is likely that these astrolabes were standardized by the Dutch, or possibly the V.O.C., with a ten Amsterdam *duim* in diameter.

BAT 3720 (Reverse)

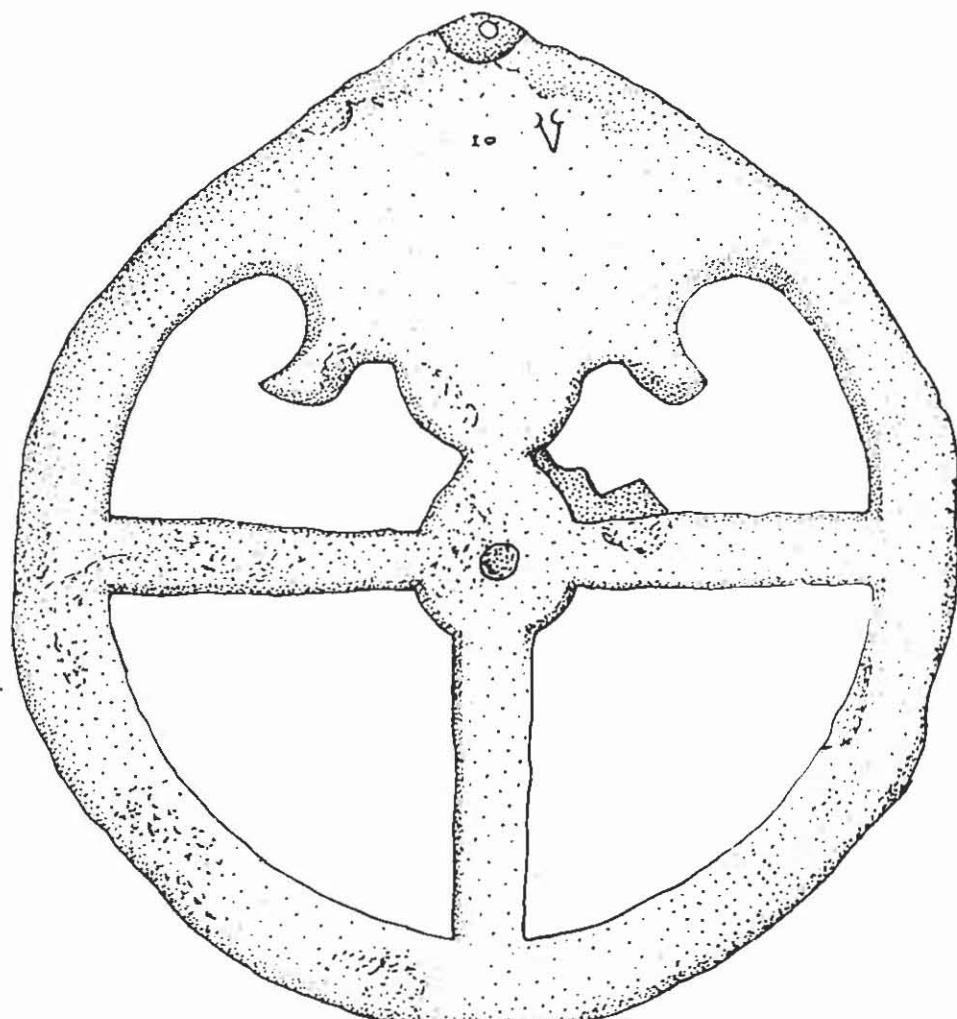


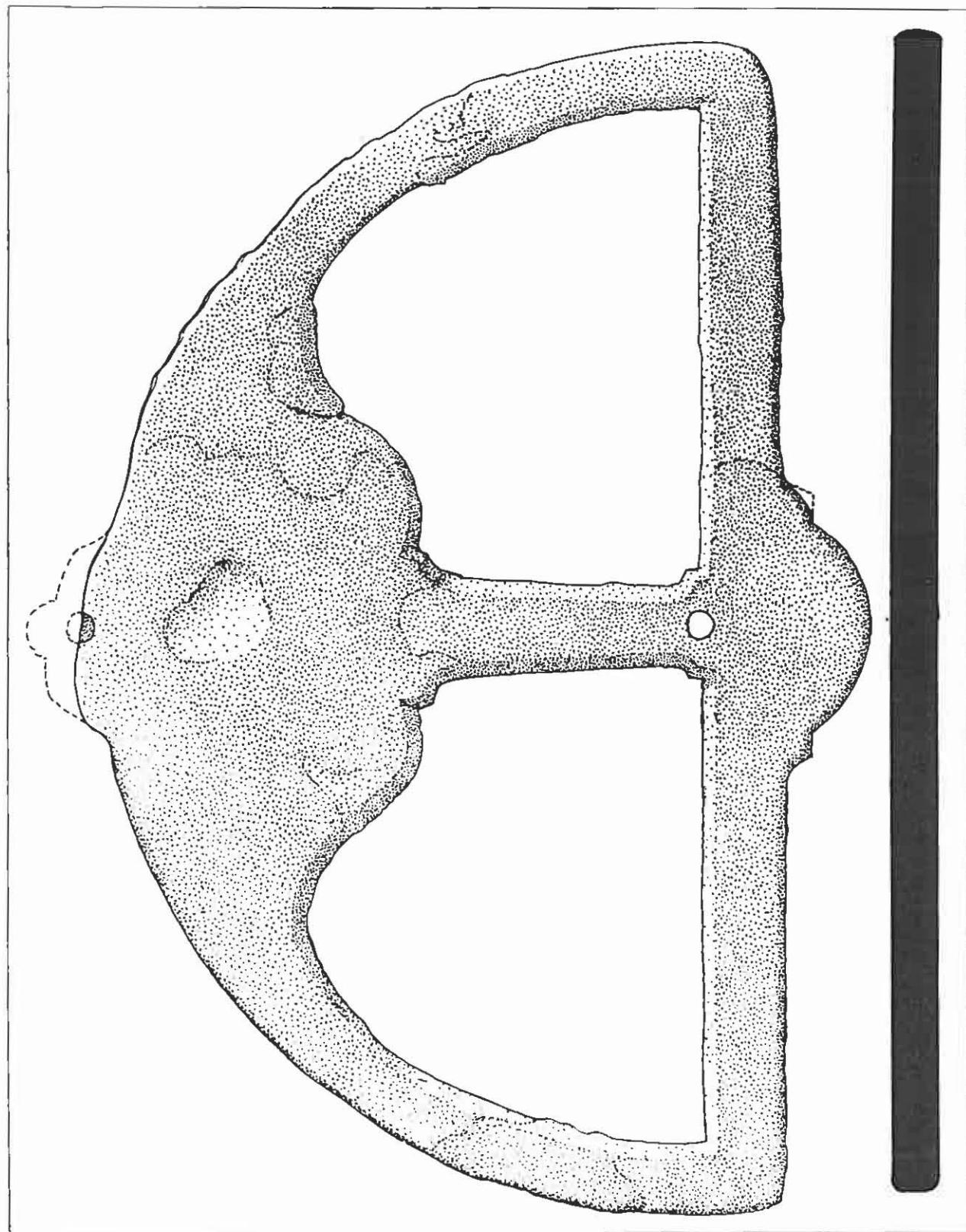
BAT 394



This astrolabe is almost certainly one of a pair with BAT 3720. It has the four fleur-de-lis, the remnants of the VOC stamp and the same inscribed circles and graduations on the circumference. It also has the remains of the alidade and lock nut.

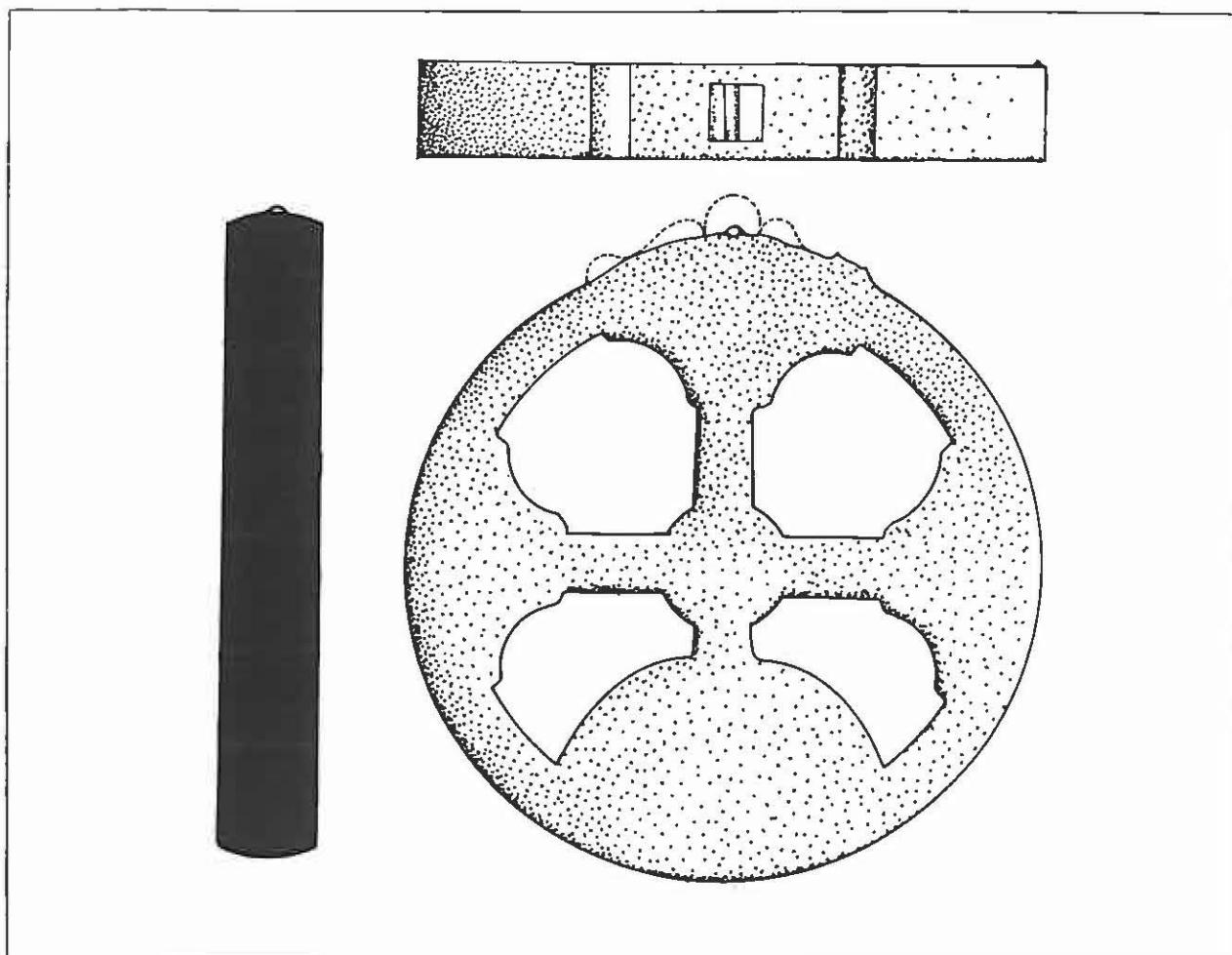
BAT 394 (Reverse)





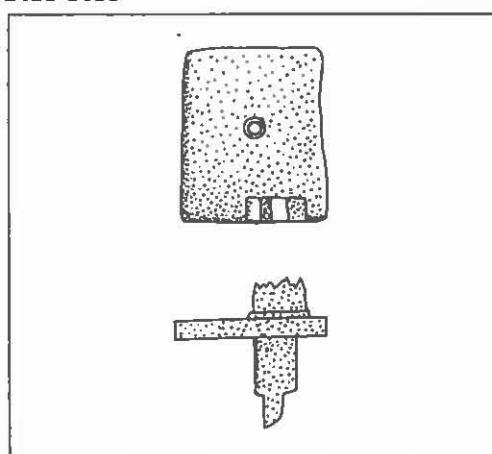
This is a semi-circular astrolabe (National Maritime Museum type IIb (Stimson, 1988)) and is in very poor condition. It is unlike the other astrolabes from this site as it is of very large size, and is similar to the Helsingør astrolabe in the Handels- og Søfartsmuseet på Kronborg, Helsingør (Mörzer Bruyns and Schilder, 1974), although the counter-weight is below the axis. The Helsingør astrolabe has four fleur-de-lis stamped on the face which may indicate a similar maker to the Skokloster No. 1 and BAT 3720 and BAT 394 astrolabes. Unfortunately, there are no remains of inscriptions or graduations on this astrolabe from the *Batavia*.

BAT 3400



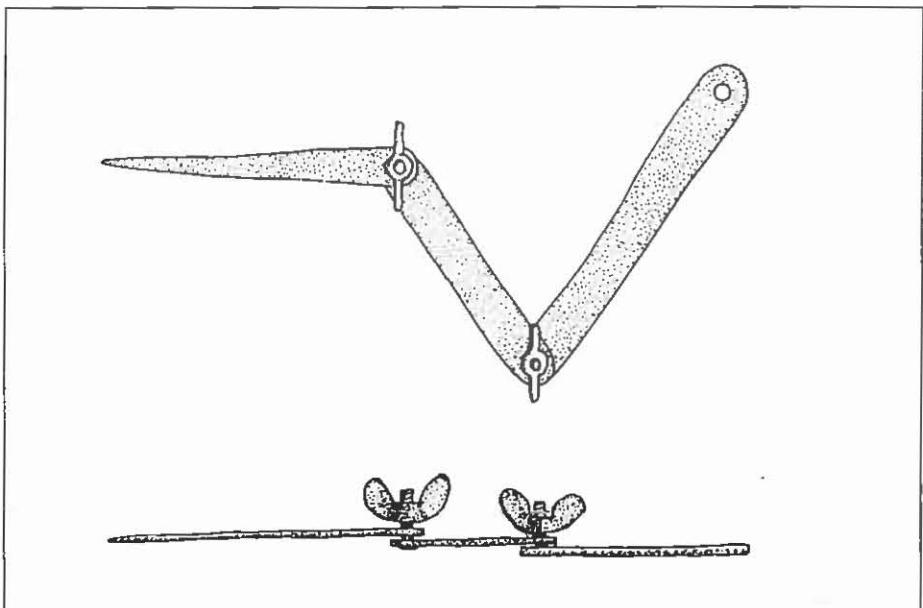
This astrolabe is in poor condition, it has the counter-weight at the bottom (National Maritime Museum type Ia (Stimson, 1988)) and is much smaller and considerably thicker than the others. It is very similar in size and shape to a number of astrolabes of Iberian provenance as suggested by Stimson (1988).

BAT 3635



This is a fragment of the alidade from an astrolabe, possibly, because of its small size, deriving from BAT 3400.

Part of a *brachiolus* or so-called *Armken van Barentsz*  
BAT 3083



This was part of an *astrolabum catholicum* or universal astrolabe (see Fig. 42). Two other examples are known, one from Nova Zembla, which has the *brachiolus* and wooden slide (Crone, 1916 and 1966) and the other from the V.O.C. fluyt *Lastdrager* (1653) which consists only of the brass *brachiolus* (Sténuit, 1974). The Batavia *brachiolus* is about 1.5 times larger than the *Lastdrager* find. The *astrolabum catholicum* was used for solving problems of spherical geometry – a simple and cheap modification for seamen, of the more complex universal astrolabes.

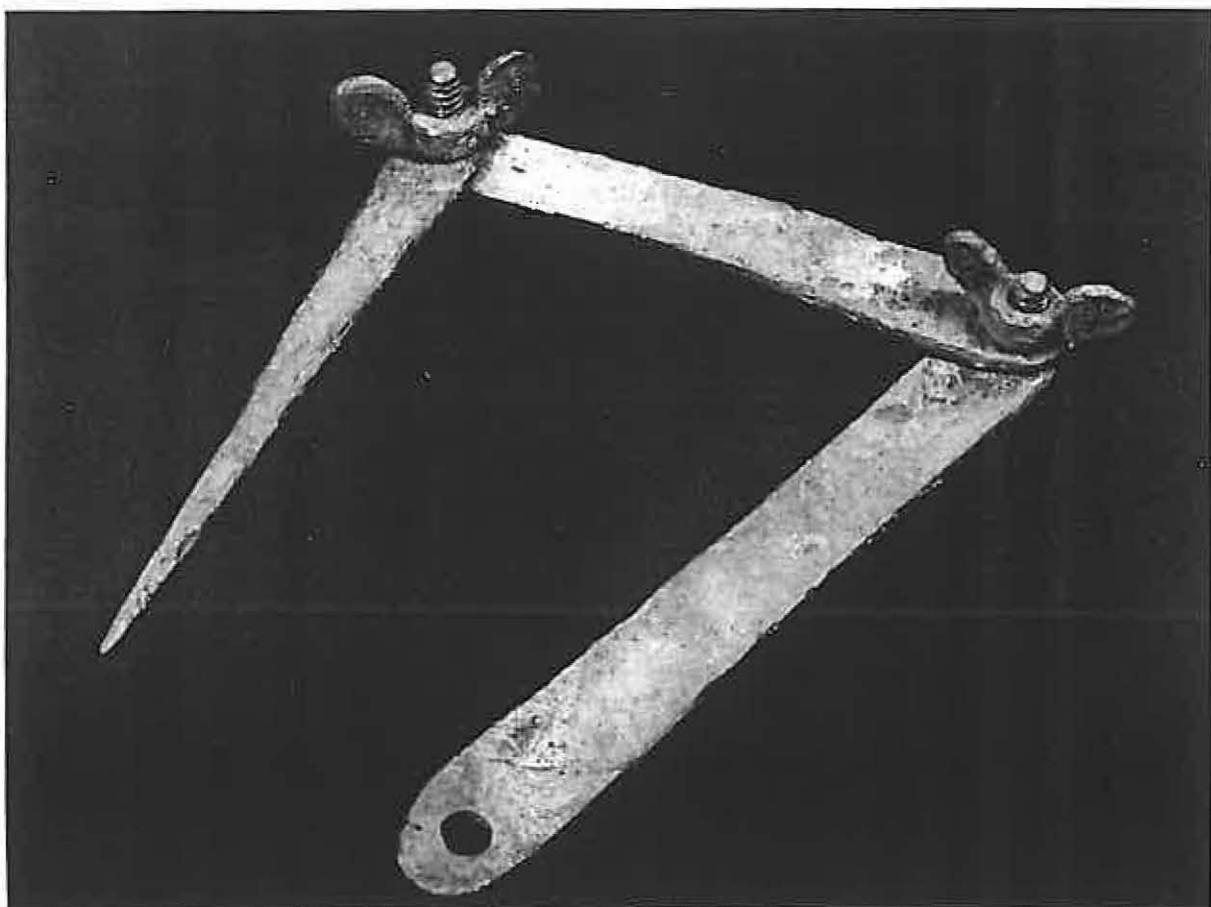
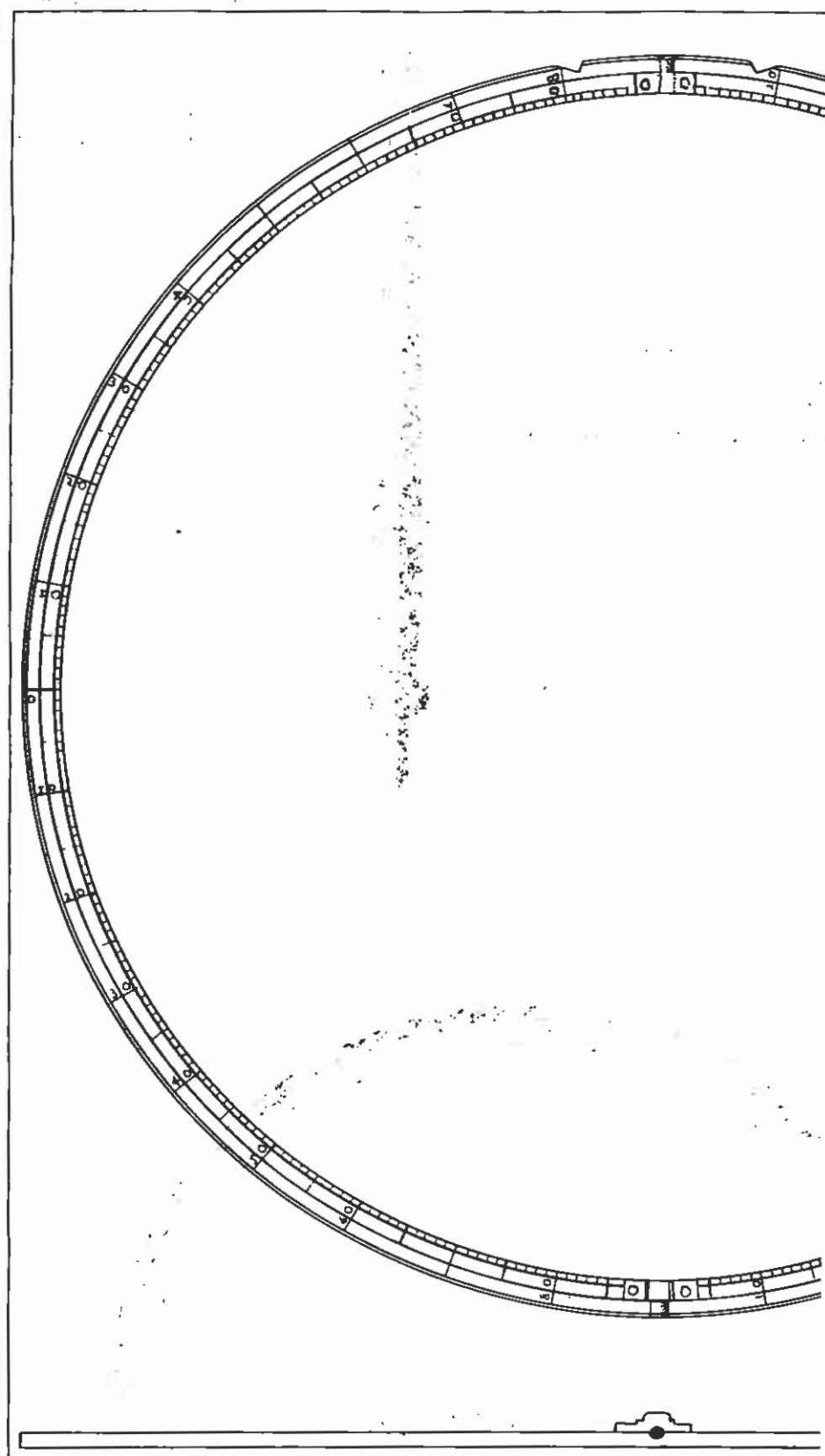


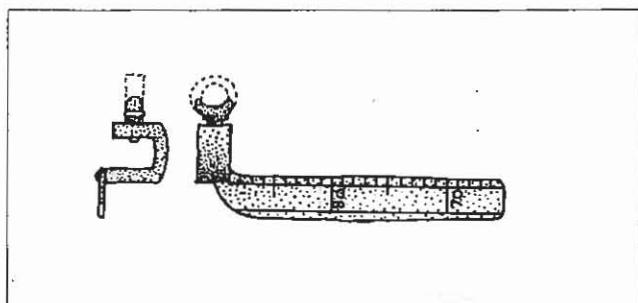
Figure 42. Photograph of the *brachiolus* or *Armken van Barentsz*.

Globes  
BAT 3646



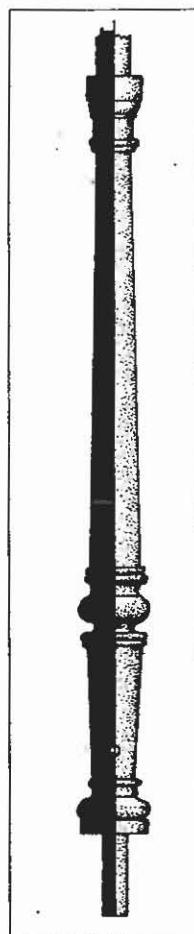
Blaeu made a number of both terrestrial and celestial globes of 340 and globe-ring could have been for either type. Navigational items found on the of 1655, include a brass globe-ring and a brass protractor. The globe-ring is that the VOC ships of this time may have been using globes for navigations the Indies in 1627, noted that Eendrachtsland was incorrectly placed on th

BAT 3071



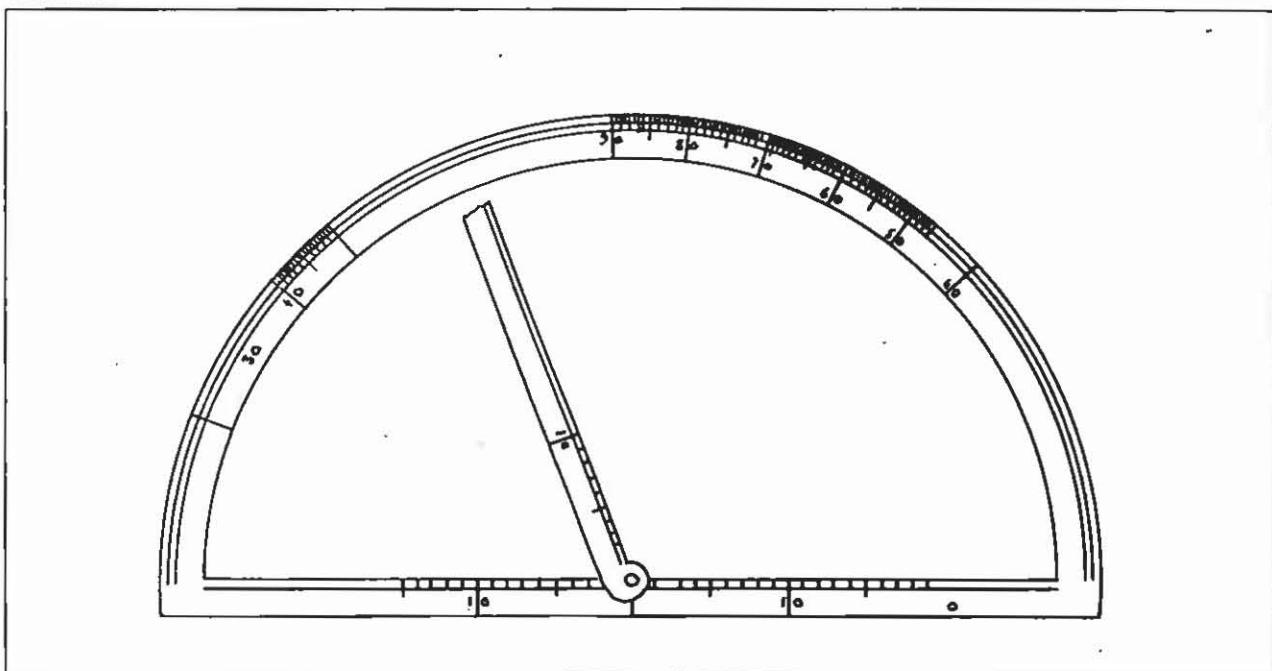
Associated with the globe-ring BAT 3646, was a small graduated brass strip with a clamp on the end. The graduations are degrees and exactly match the size of the degrees on the globe-ring. A similar arrangement on a globe can be seen on the frontispiece of *The Light of Navigation* (1612) and on the celestial globe of Willem Janzoon Blaeu (Keuning and Donkersloot-de Vrij, 1973: Fig. 8).

BAT 3718



This unusual bronze object of uncertain function is possibly part of a stand for a globe. This is far from certain, since most 17th-century globes have stands made of wood. However, the general size and shape is similar.

Protractor  
BAT 422



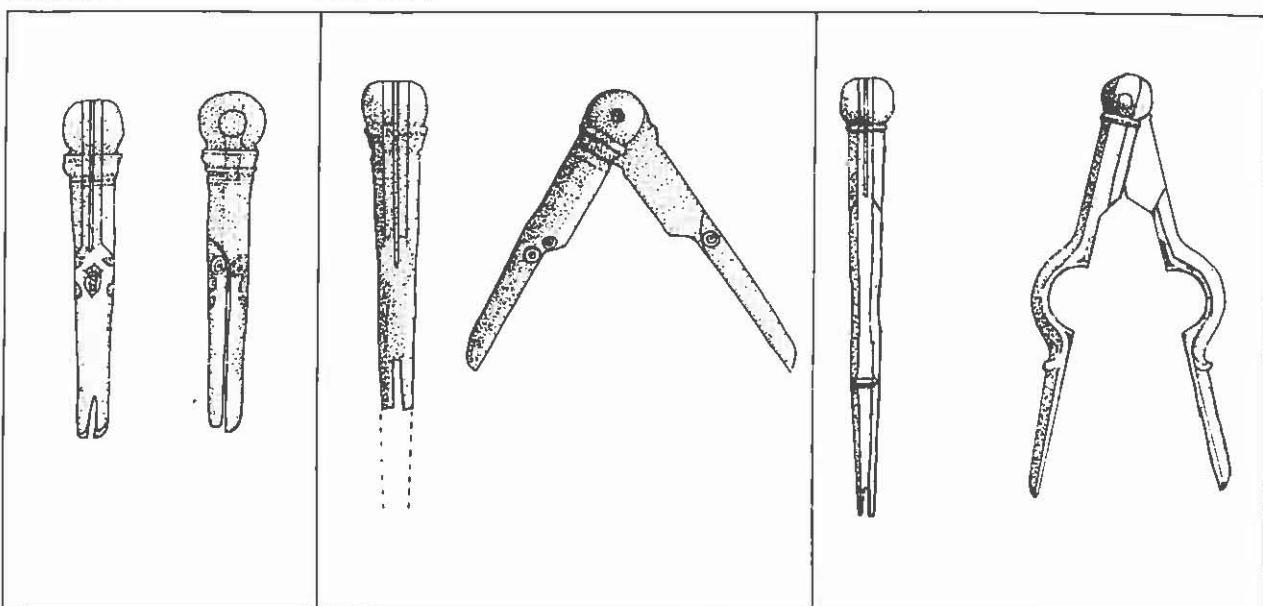
There is no previous known parallel to the brass protractor, nor is it mentioned in the Resolutions. The linear units on the base and moveable arm or pointer are 30.5 mm and do not correspond to any commonly known inch or duim. The graduations  $0^\circ - 90^\circ - 0^\circ$  of the semi-circle are in half-degrees.

**Dividers**

BAT 3320

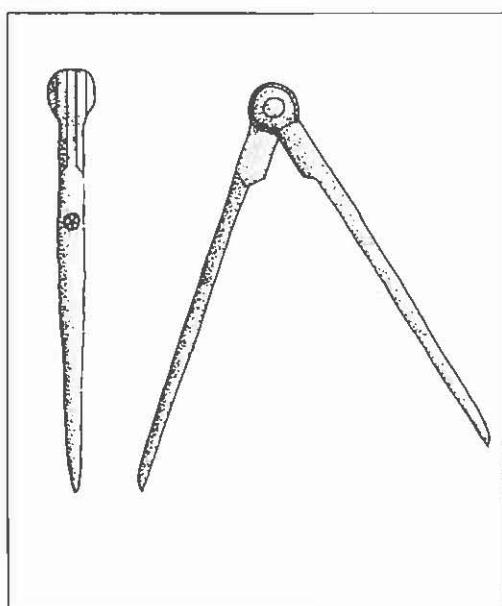
BAT 3171

BAT 3388

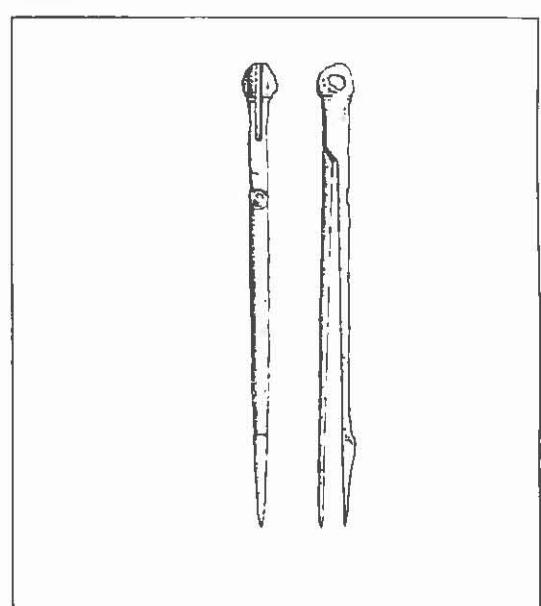


Of the five pairs of dividers recovered, two are similar (BAT 3171 and BAT 3320). Both pairs are decorated with a circle on the side, and the latter pair has the Arms of the City of Amsterdam stamped in the middle. Both have a slot at the lower end of the arms where originally the iron points were attached. The hinge mechanism consists of three leaves belonging to one arm and two leaves belonging to the other. Numerous similar dividers have been found on other sites. Sténuit (1974) found a number of similar dividers on the *Lastdrager* (1653) site, these ones stamped with a fleur-de-lis and decorated with circles.

BAT 3053



BAT 3046



The pair of dividers (BAT 3388) with an iron tip is slightly different from the two above, having a round opening in the body of the instrument, presumably to assist in separating the legs. The only parallels are from the *Firebrand* (1707), but this is not absolutely certain, particularly as one of the other dividers, said to come from *Colossus*, looks distinctly like a divider from the *Lastdrager* (Morris, 1984).

The two pure brass dividers (BAT 3053 and BAT 3046) both have small wheel-like stamps on their shoulders.

### Sounding-leads

A total of eight sounding-leads were recovered from the site. These are as follows:

Reg. No.	Weight Kg	Notes
BAT 379	2.55	Octagonal
BAT 380	6.88	Octagonal marked XIII
BAT 381	6.93	
BAT 430	7.2	
BAT 3273	5.6	
BAT 3437	2.6	Round
BAT 3539	2.7	Round
BAT 3540	4.09	

BAT 3540

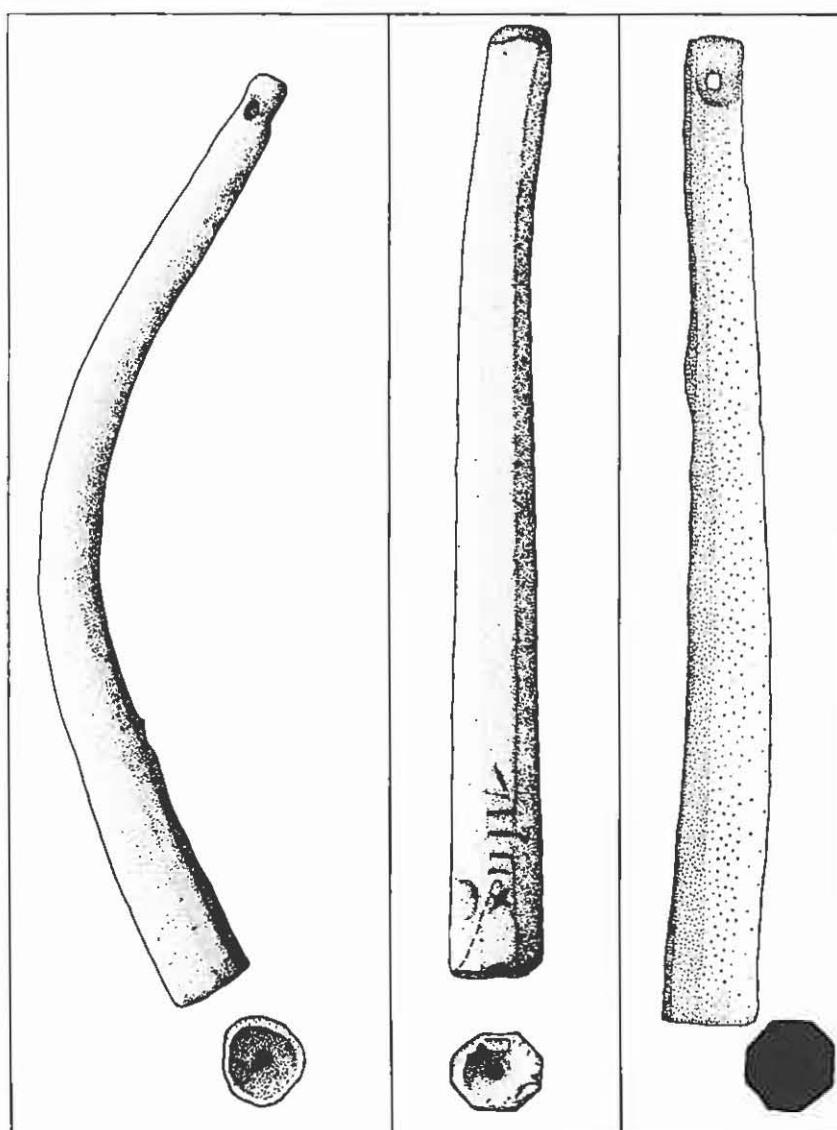
BAT 3539

It seems that the figure fourteen refers to the weight in Amsterdam *pont*, since this would equal 6.9 Kg, very close to the value of BAT 380. The smaller sounding leads were, possibly, 6 *pont*. BAT 430 may have been a sixteen *pont* sounding-lead.

BAT 3273

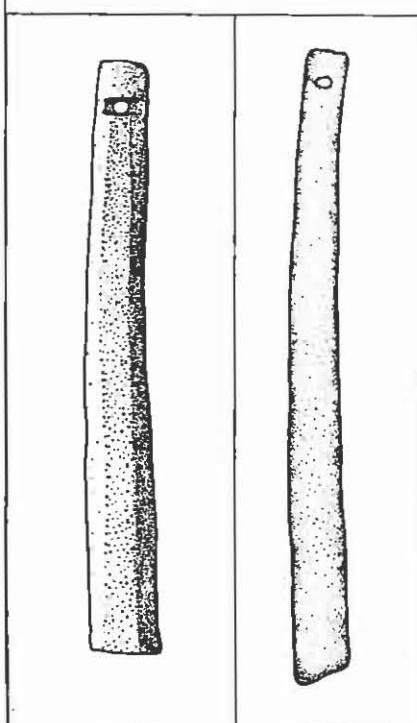
BAT 380

BAT 430



BAT 379

BAT 3437

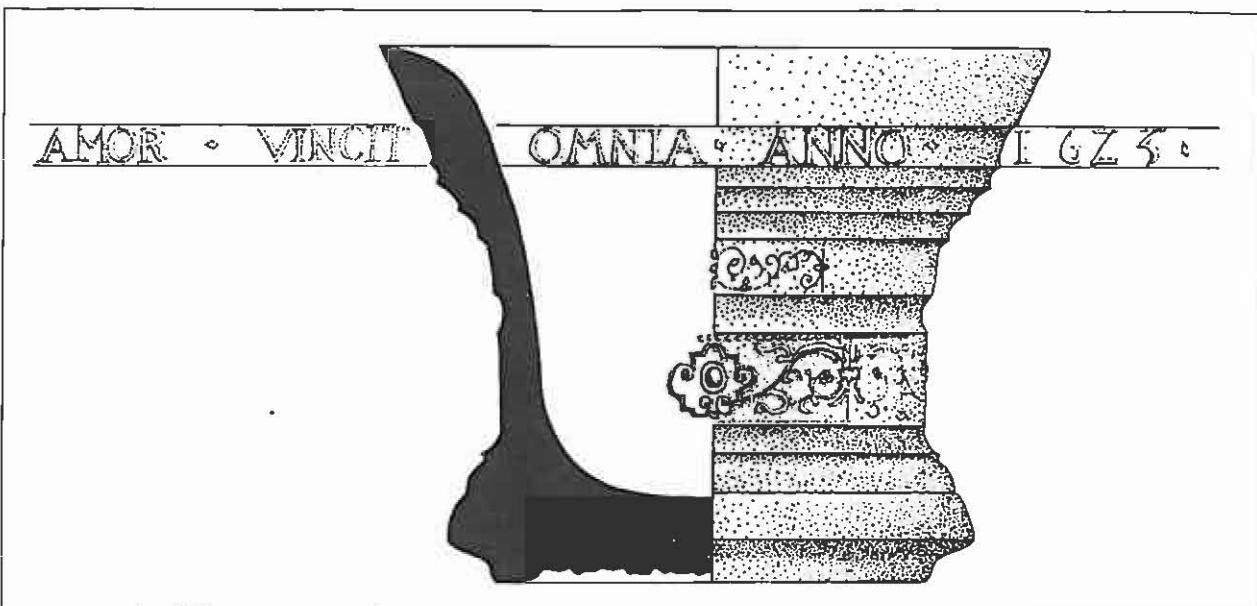


## Surgeon's equipment

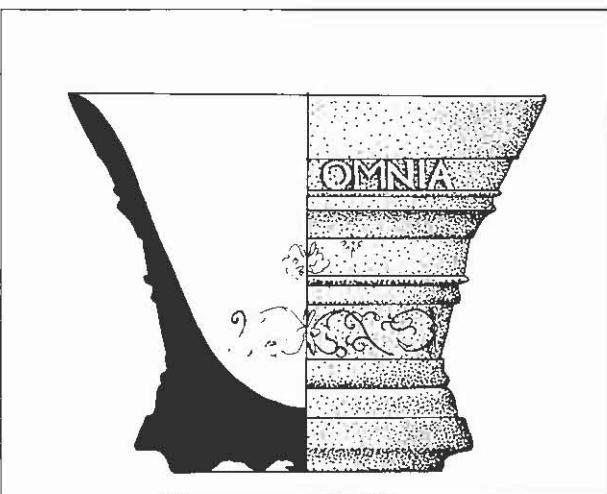
This group of material includes a number of items that may have belonged to the surgeon, or could have had other purposes or functions on board the ship

### Mortars

BAT 457



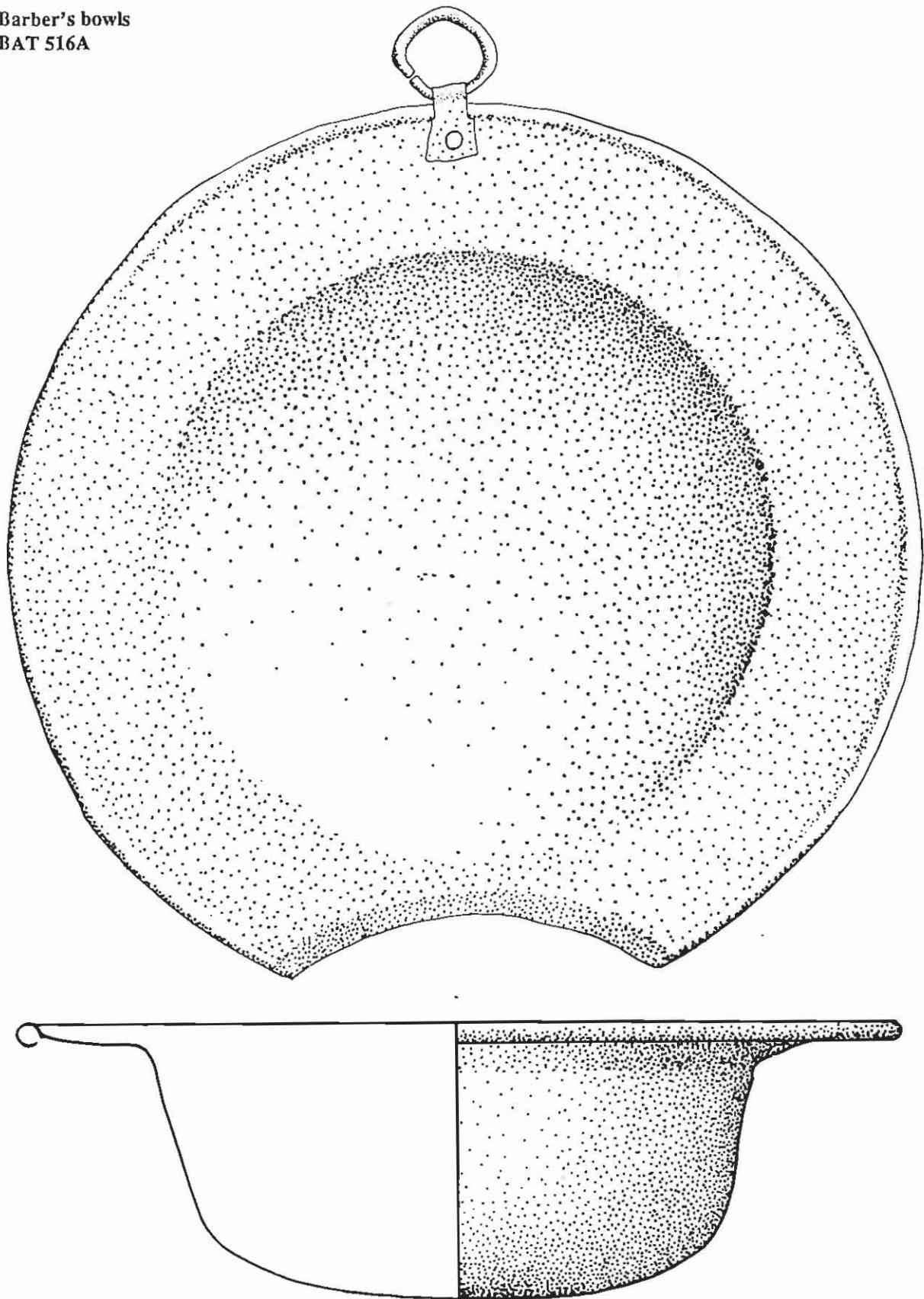
BAT 56



The larger mortar (BAT 457) had the inscription AMOR VINCIT OMNIA ANNO 1625; the other, BAT 562, was broken and although the inscription was the same as the other, the date could not be identified. This style and type of mortar is commonly found on VOC ships, two were found on the *Vergulde Draeck* (GT 6 and GT 74), both were similar in size to the two *Batavia* mortars, possibly indicating that they were standard sizes. The larger of the *Vergulde Draeck* mortars was dated 1654 and had AVOC (Amsterdam Chamber of the VOC) cast into the decoration, indicating that the mortar was especially made for that Chamber of the Company. The main dimensions of the mortars discussed above are given below.

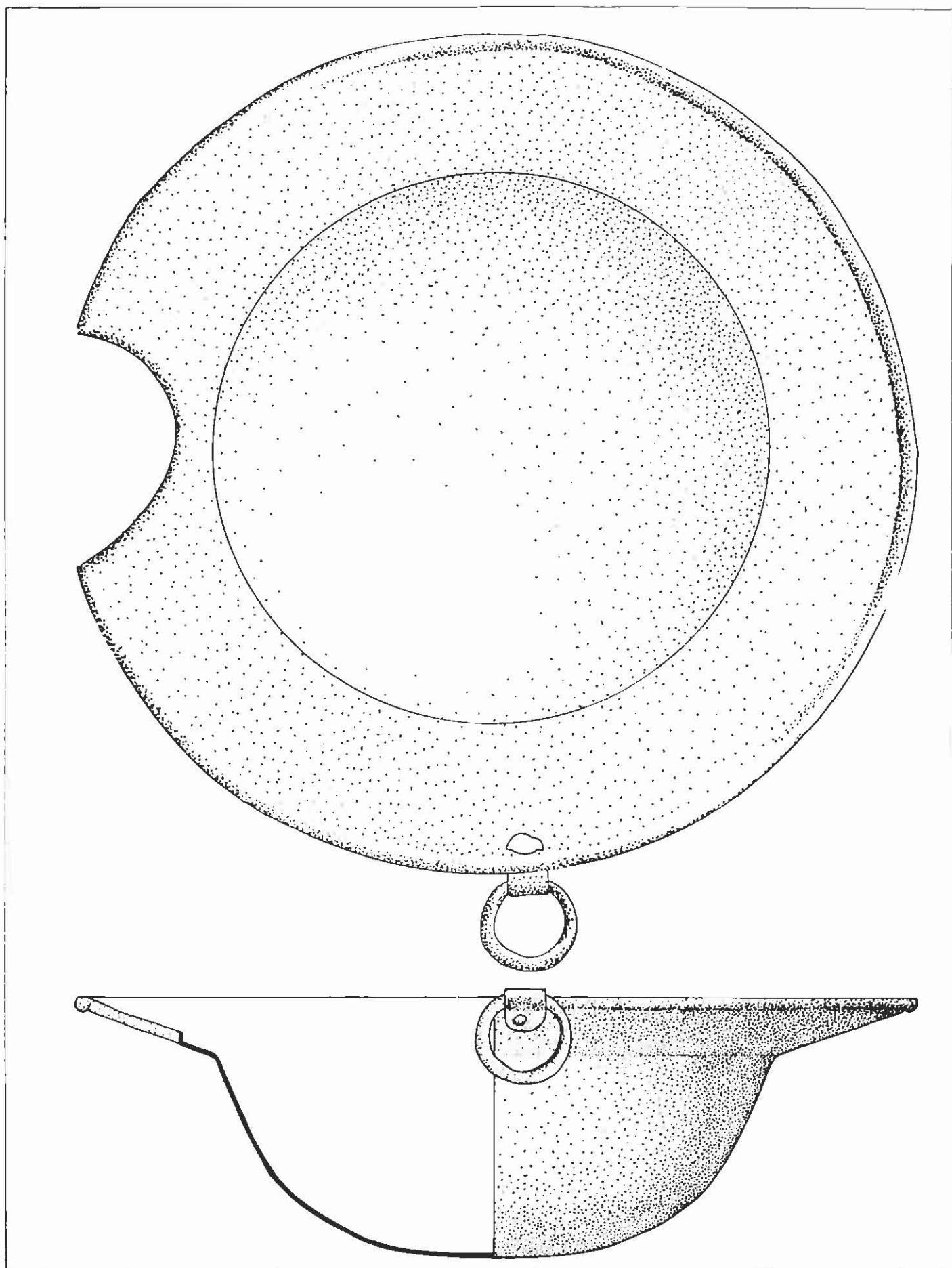
Reg. No	Height mm	Base mm	Neck mm
GT6	118	94	148
BAT 562	99	70	124
GT74	146	110	178
BAT 457	142	113	175

Barber's bowls  
BAT 516A

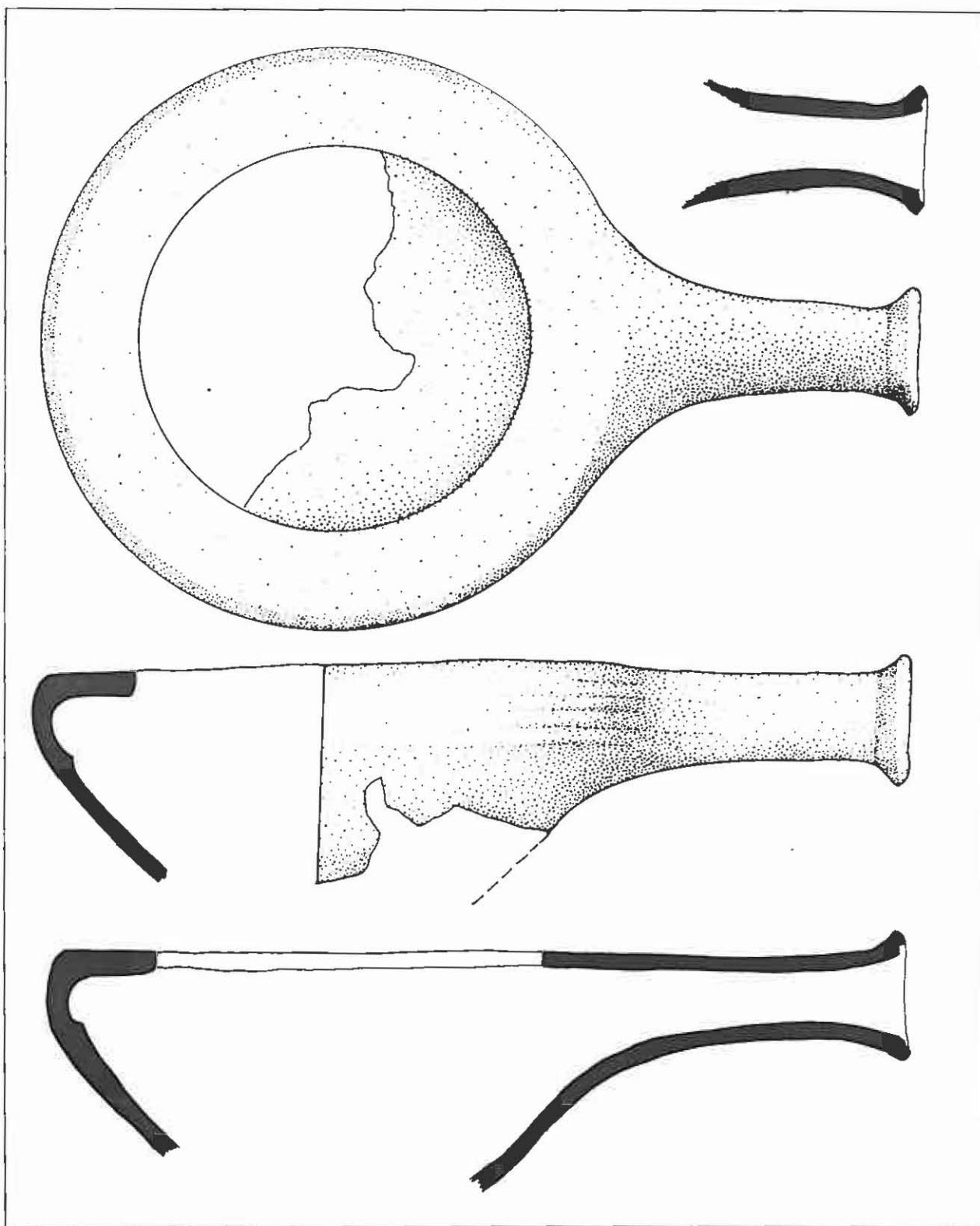


The two bowls both had hanging rings and were about the same size and shape. They were possibly designed to fit one inside the other. It is assumed that these bowls could have been for shaving or for bleeding and had the typical cut-out for the neck, for shaving, or for the crook of the elbow for bleeding. Two similar brass barber's bowls are illustrated in Gentle and Field (1975) and porcelain bowls were also common.

BAT 516B



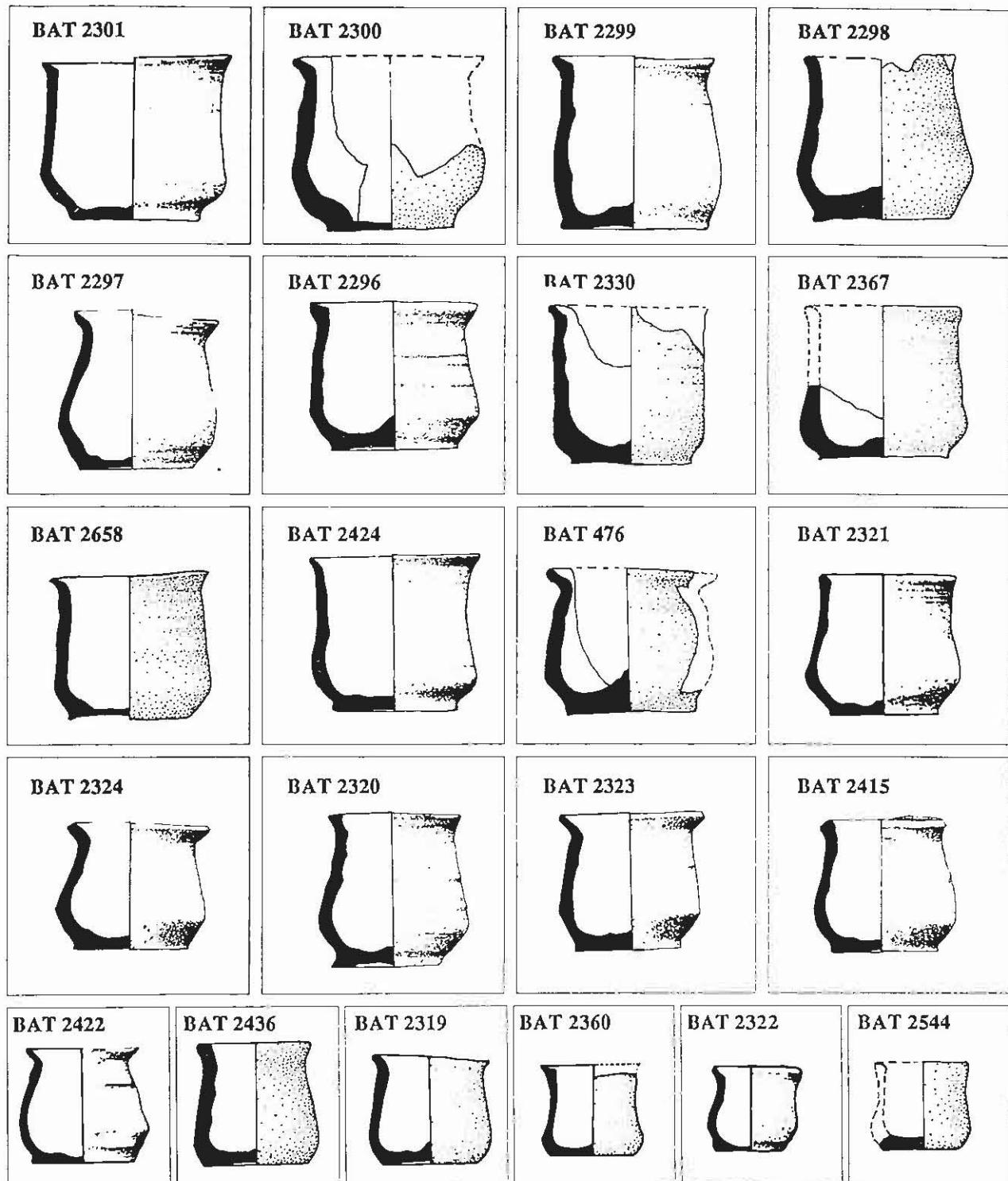
Earthenware-redware bedpan or urinal  
BAT 504



This is a very unusual item consisting of a round-bottomed pan, almost certainly without a footing, with a hollow handle. The upper surface of the pan is flat with a round hole 131 mm in diameter in the centre. The handle has an everted opening at the end, with a diameter of 30 mm at the end, tapering to 18 mm. The pan is made of a fine red earthenware, with a green glaze inside and out.

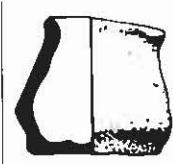
It is thought to be a combination bedpan and urinal, and may be associated with the surgeon's chest. The size suggests that it may have been intended for a child.

Earthenware-redware ointment jars



These jars are known in the Netherlands as *zalfpotten* and belong to the group which includes majolica *albarelli*, examples of which are illustrated below. They have a red body, similar to the domestic redwares above, and a brown lead-glaze on the inside. Similar items were found in the Amsterdam city excavations (Baart, 1977), and they are traditionally associated with the apothecary. On the Batavia site, the jars were found in association with a number of majolica *albarelli* and are thought to be part of the surgeon's chest.

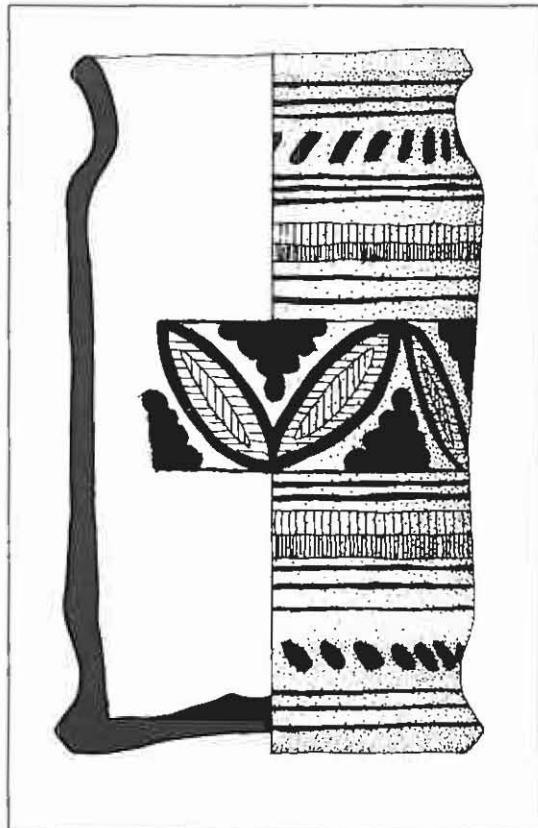
BAT 2252



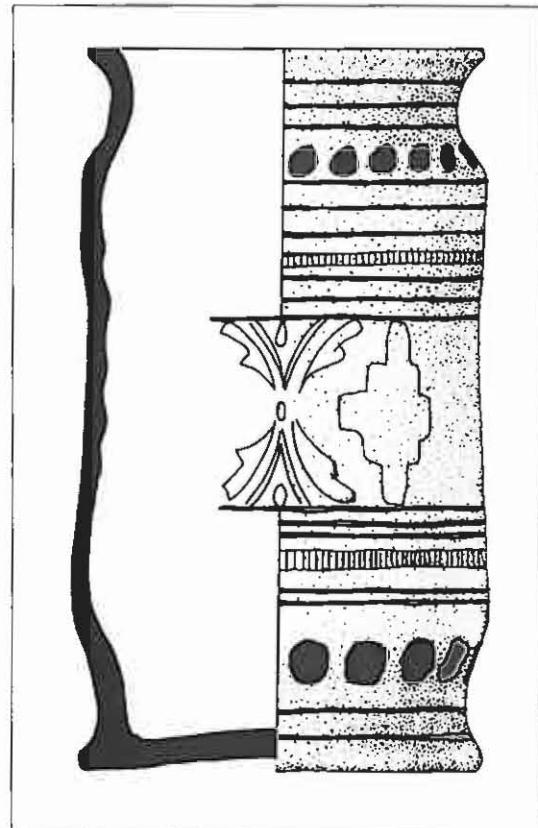
### Majolica or tin-glazed earthenware *albarelli*

These items all come from the same area on the site, close to where the earthenware ointment jars were found, and they are almost certainly from the surgeon's chest. Analysis of the material in one of the *albarello* revealed that it was red mercuric oxide, a chemical commonly associated with 17th-century medicine and used as a topical antiseptic, particularly for ulcers (Woodall, 1617). The body of the *albarelli* is yellowish-buff, and the decoration, in blue, orange, yellow and green, is painted over a white tin-glaze. This material is typical of Netherlands majolica of the early part of the 17th century.

BAT 2326



BAT 2331



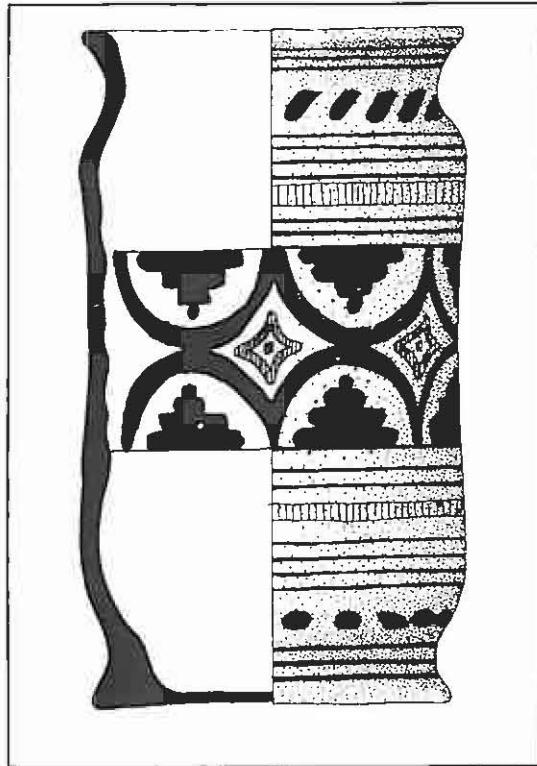
BLUE

YELLOW

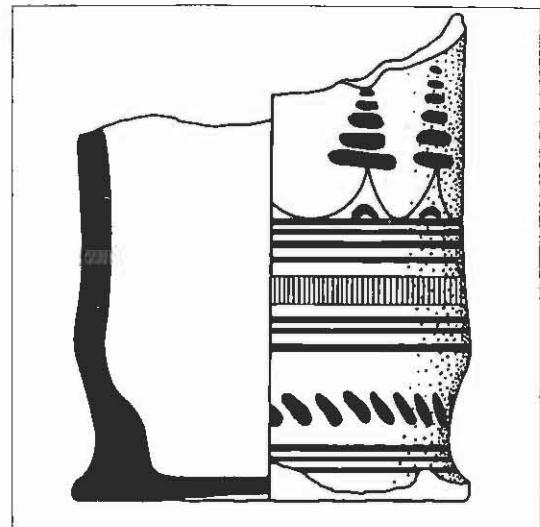
ORANGE

GREEN

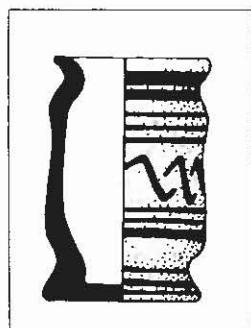
BAT 2318



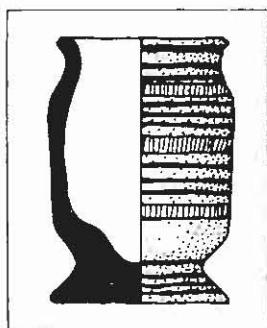
BAT 2305



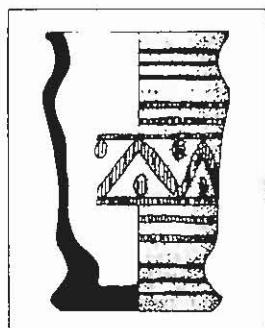
BAT 2670



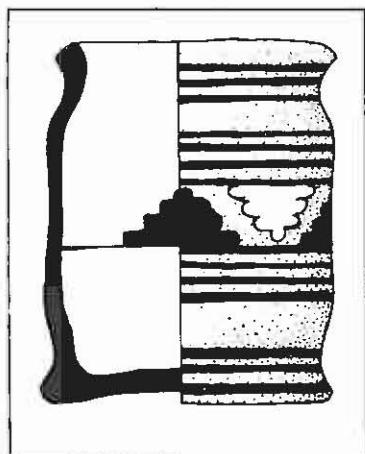
BAT 2669



BAT 2337



BAT 2668

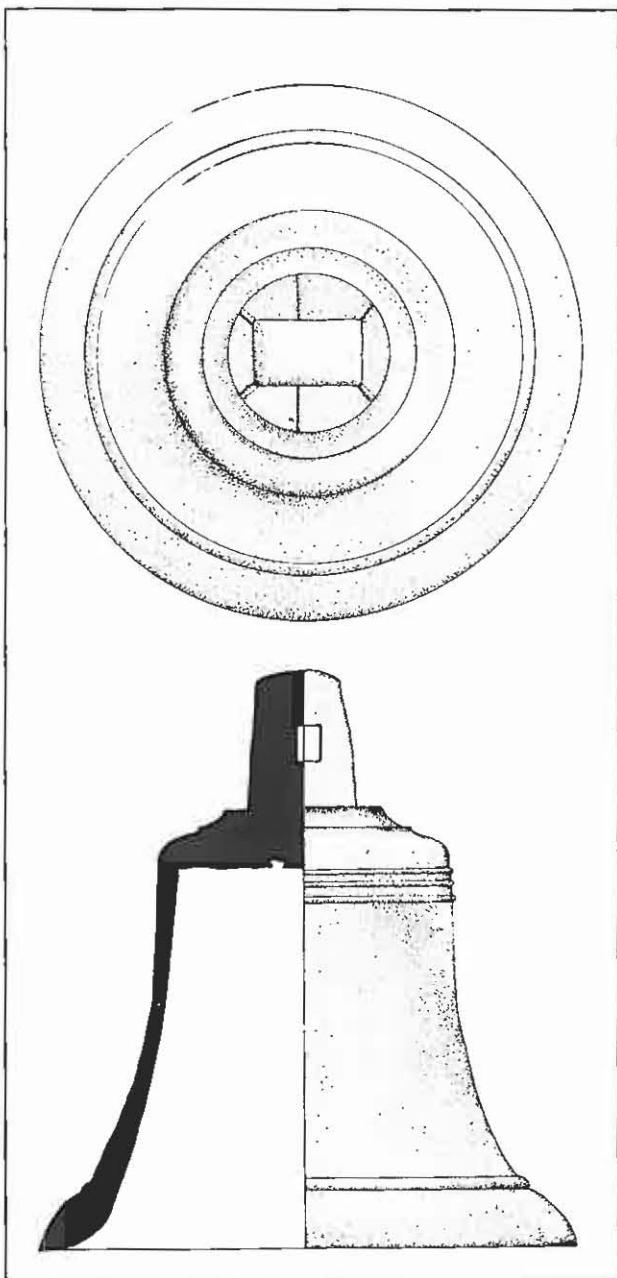


## Ship's equipment

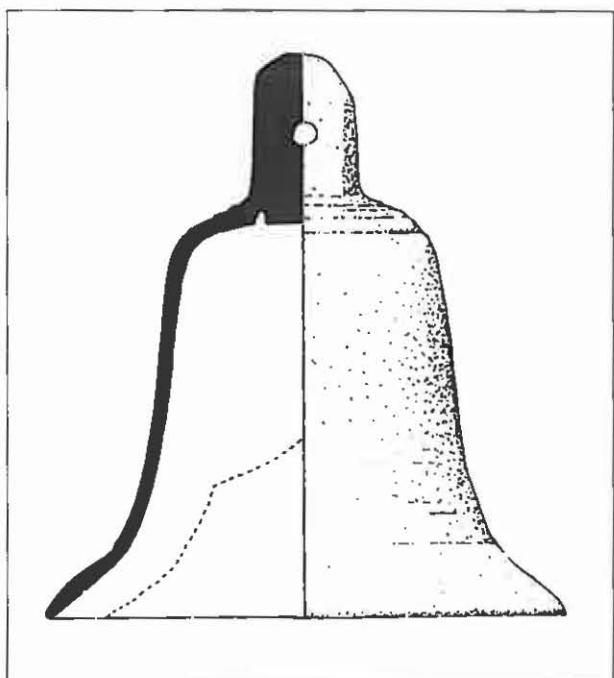
This listing includes all items that are thought to be directly related to the outfitting of the ship for the voyage. Naturally, items could have been additional supplies for the ship or requisitions for the Company in the Indies.

### Bronze bell

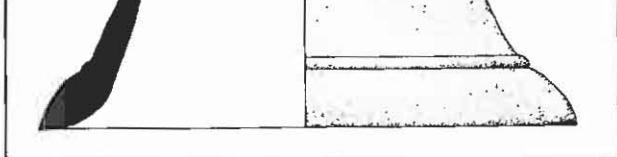
BAT 3404 (SCALE 1:4)



BAT 3201



A smaller bell, in poor condition. Possibly for domestic purposes.

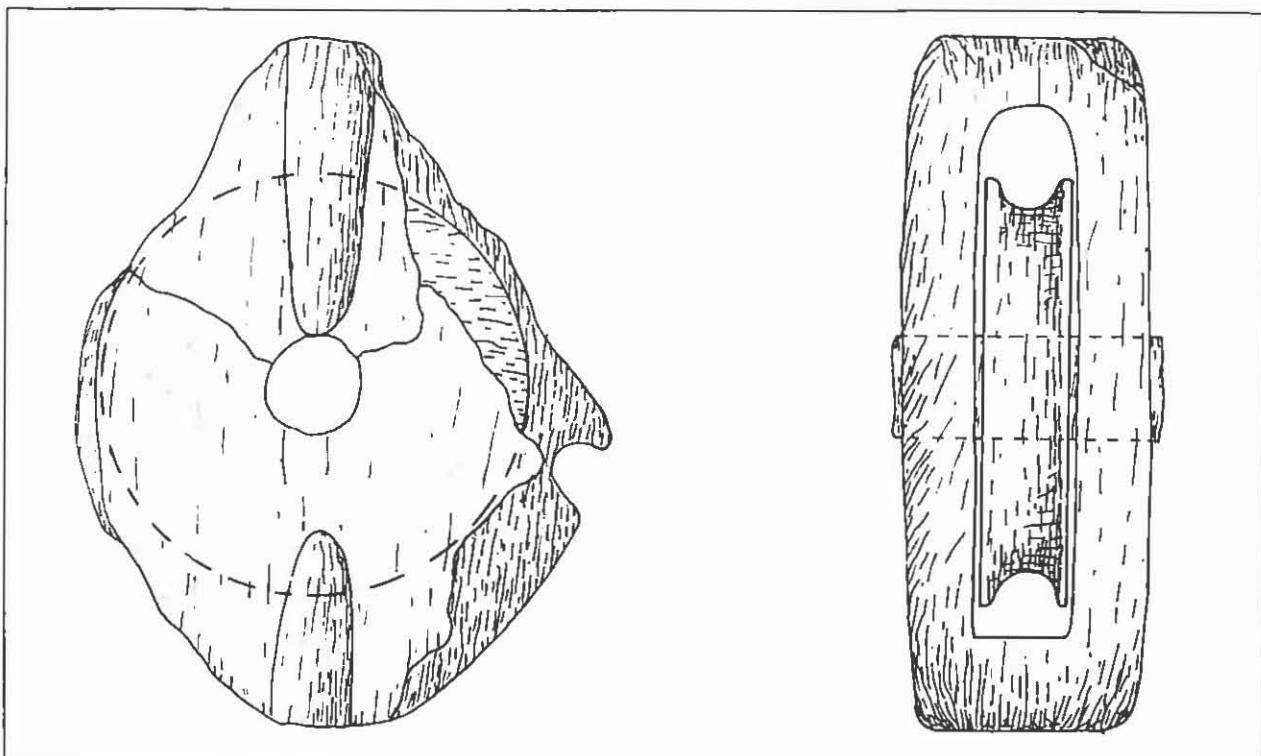


This is one of two large bells found on the site, this particular bell was found near the stern of the ship and may have been the watch bell that was located on the poop.

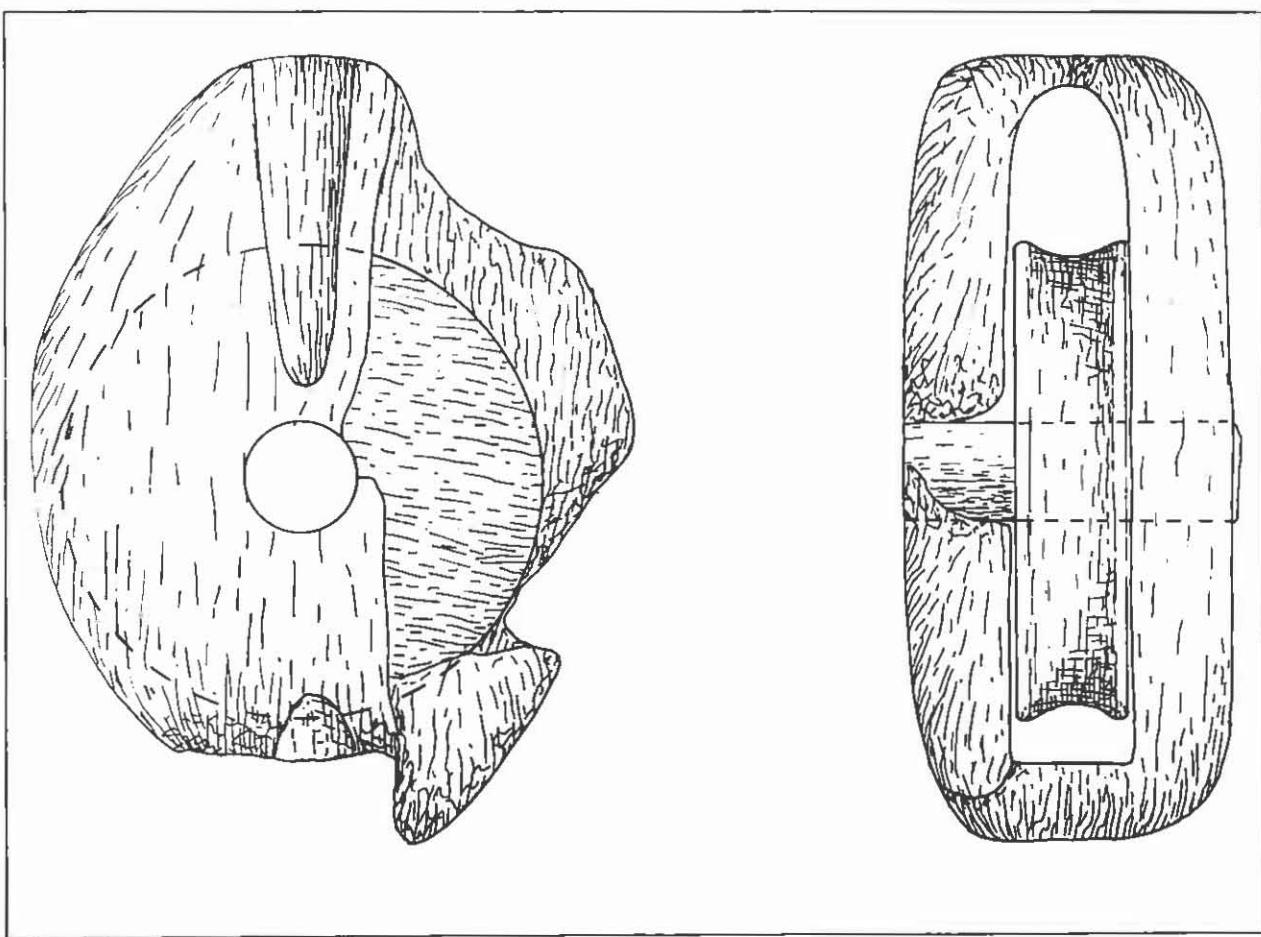
### Blocks

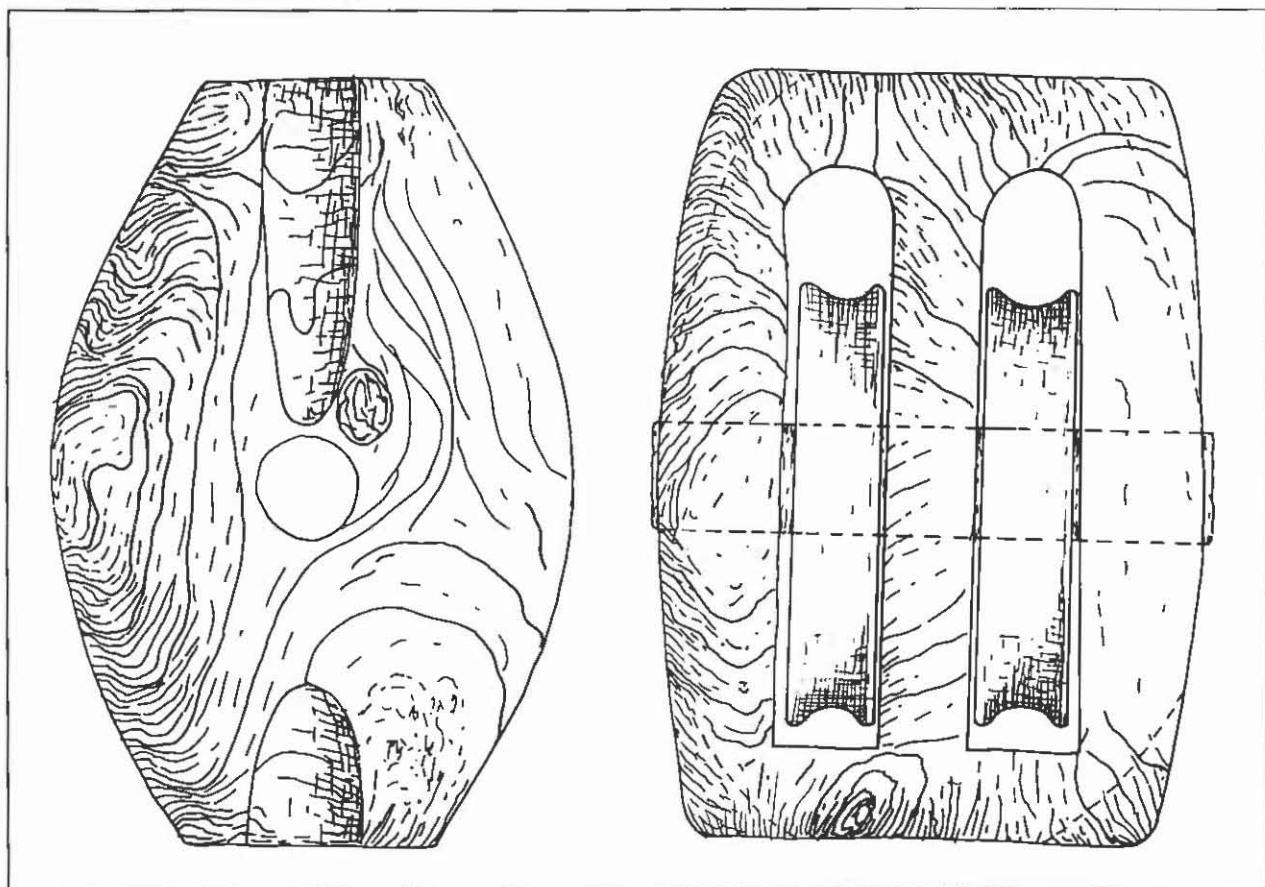
Only three blocks were found on the site. Naturally their original purpose cannot be determined. It is likely that they may have been from gun tackle or stores, since it is unlikely that blocks from the upper works would have survived.

BAT 4361



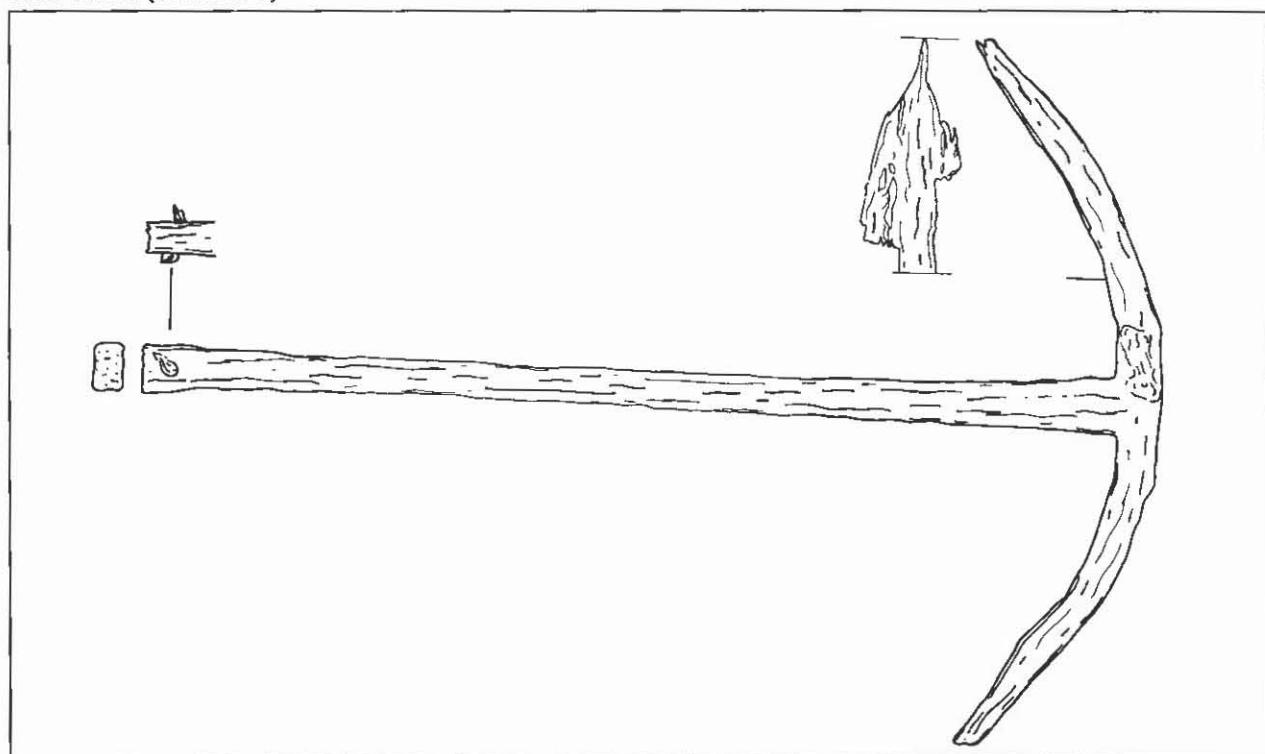
BAT 4088





Anchor

BAT 80311 (Scale 1:20)



Only one anchor has been recovered from the site; this came from the nest of three anchors in the middle part of the site. Almost certainly, these anchors were originally stored in the hold, probably lashed upright to the aft part of the main hatch, just in front of the mainmast. The anchor is in a poor state of preservation, it would have originally had an iron ring and probably flanges to locate a wooden stock.

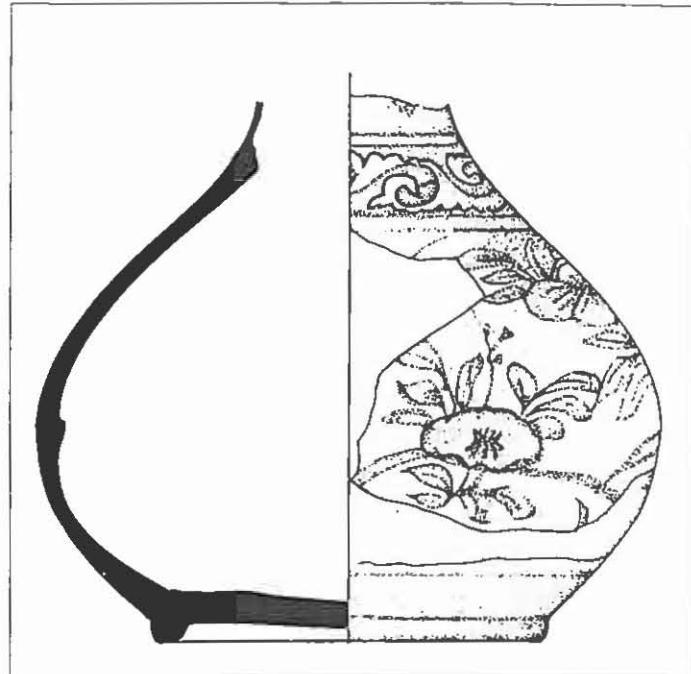
## Domestic ceramic material

### PORCELAIN

#### Flask or bottle

BAT 2555

The remains of a single porcelain object was found on the site. The fragments indicate that the object was probably a flask or pear-shaped bottle, about 250 mm high. There was also a small fragment of the same material which suggested that the object had a spout of some sort, although there was no evidence on the body of the vessel, for its position. The body was luted together at two points, the mid-body and the neck. The blue and white decoration is a pale-blue (Munsell 10 PB 5/10) outline and wash of flowers on rocks with a type of key-fret frieze around the lower neck. A similar type of flask is illustrated in Pijl-Ketel (1982:134-137), from the VOC ship *Witte Leeuw* (1613).



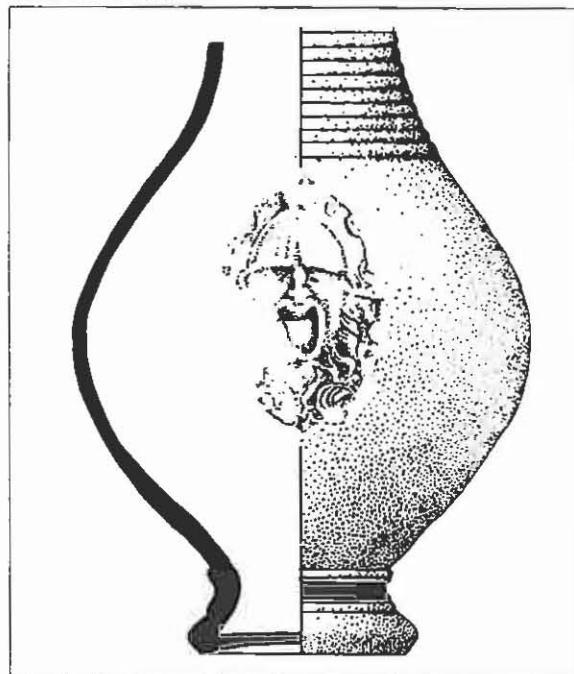
#### GREY-WHITE STONEWARES

This type of ware is distinguished by a white or grey-white body (Munsell 10 PB 7/2), uniform and fine-grained. The surface is often decorated with splashes or outlines of cobalt-blue (Munsell 10 PB 3/10 to 5/10). Glaze is variable, ranging from a fine, glass-like glaze through to a poorly-fused, flaking and degraded glaze. In the latter case, it appears that the body is not properly vitrified, possibly indicating that the object came from a part of the kiln that did not reach a high-enough temperature to achieve a true stoneware. It should also be noted that the sea-water environment has a tendency to degrade glazes, giving a calcinated appearance and feel, which may add to this effect.

#### Jugs with reeded or corded neck

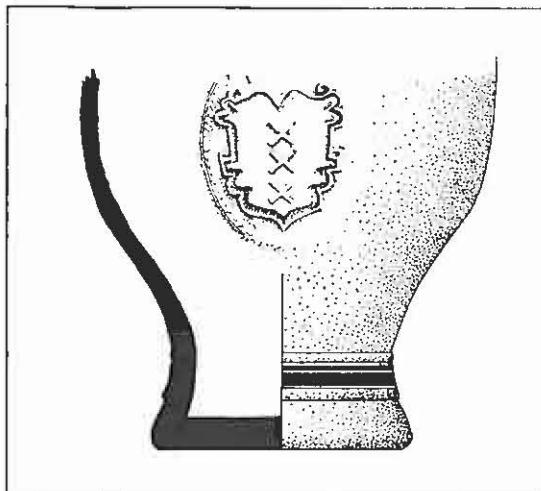
Small jugs (250 mm high) with reeding on the neck and medallions on the body. No complete examples were found on the site, although a similar complete example was found on the *Vergulde Draeck* 1656 (Green, 1983: Fig. 3 GT2109). These jugs are illustrated in von Bock (1971: Nos 366, 378, 444 and 367 (brown glaze)) and attributed variously to Raren, Westerwald and Westerwald-Grenzau. The jug stands on a pronounced foot with moulded cordon band between the foot and the body, the central band consisting of a line of cobalt-blue. The body of the jug is ovoid, tapering at the neck, and from the shoulder decorated with moulded reeding, banded in places with cobalt-blue. Three medallions on the central body of the jug are placed symmetrically with the handle. The medallions are generally outlined in cobalt-blue. Base diameters are 68 mm, 64 mm and 61 mm.

BAT 2118-20443



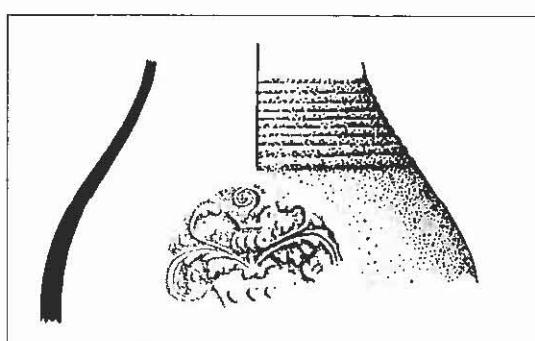
Part of a mask of either human or leonine face. This was possibly flanked by two heraldic medallions.

BAT 2223-2012



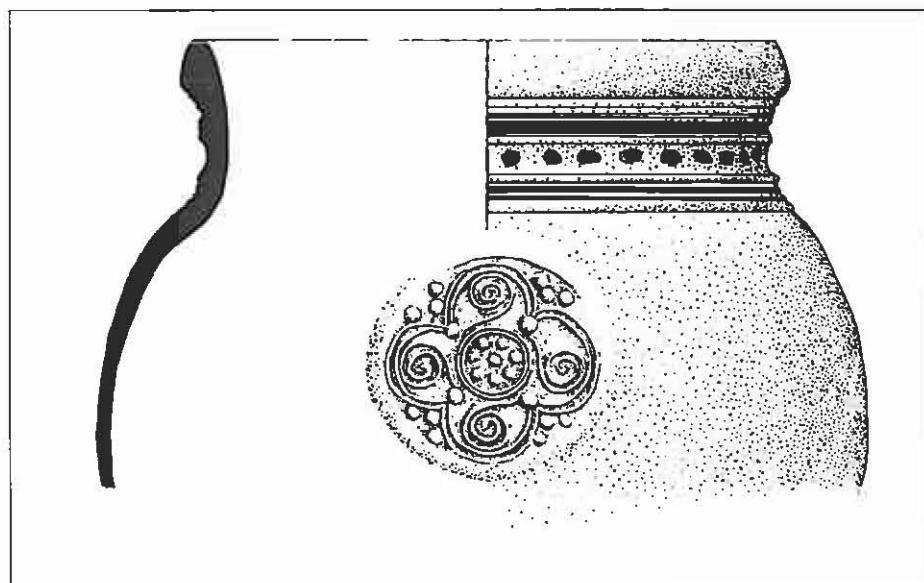
Part of the Arms of the City of Amsterdam, date or maker's mark at the top, but without lion supporters.

BAT 704



Part of a medallion with an unknown Arms, parted per fess, three hearts in the chief, the letter 'W' or 'VV' (possibly a maker's mark) upper left, crowned helm and floral sprays. This is identical to the medallion illustrated in von Kohnemann (1982:15) of unknown significance.

Bowl or chamber pot  
BAT 2580-20234-2128



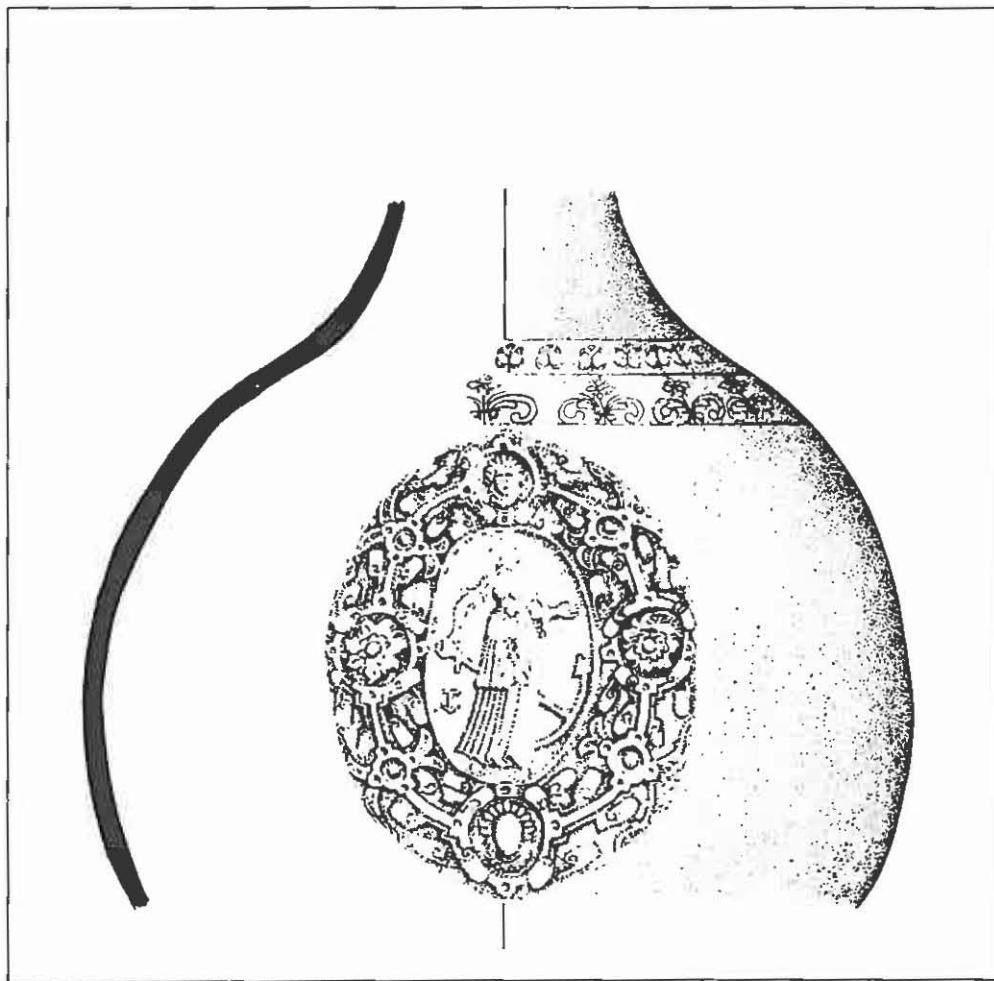
Fragments of this bowl indicate a neck diameter of 160 mm. This is an unusual type of stoneware object. The neck has a double cobalt-blue cordon band flanking a wide band which has a series of splashes or blobs of cobalt-blue. The body of the bowl has at least one medallion which closely resembles the cordon jug medallions (see below). The medallions consist of a small, central, circular, floral medallion with six dots, surrounded by six similar medallions. Unfortunately, neither the base nor evidence of a handle has been found.

### Cordon jugs

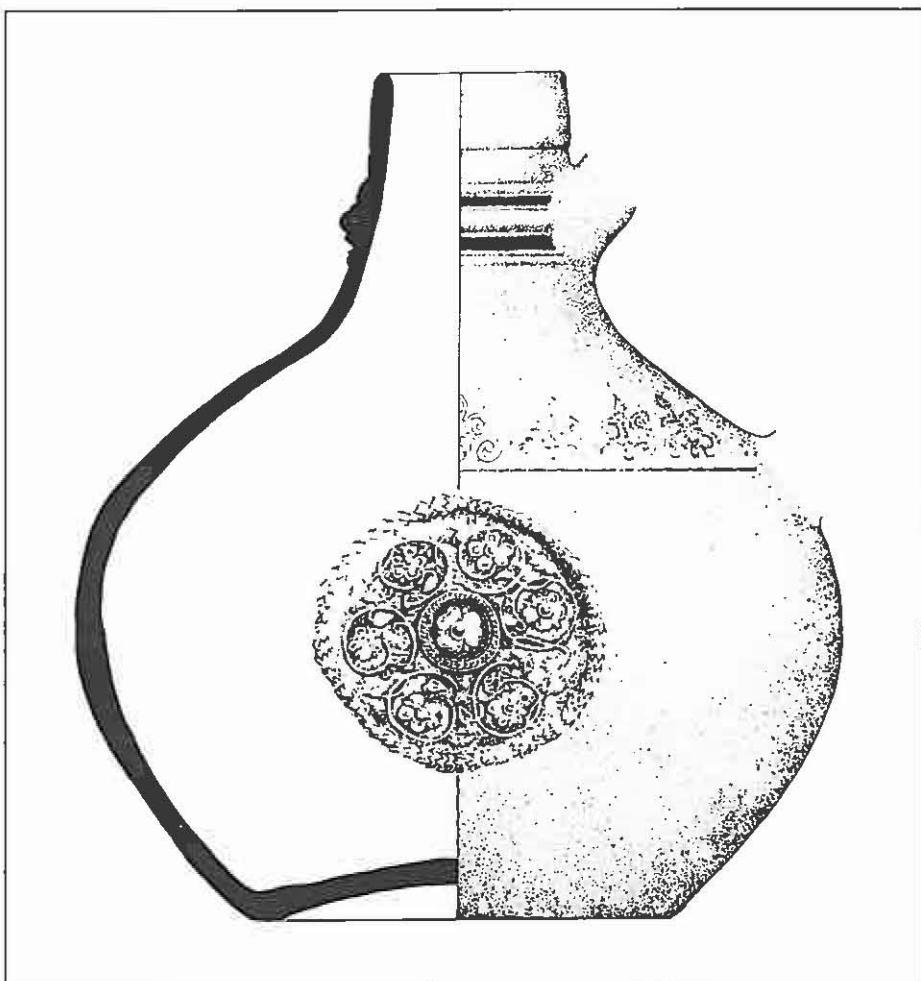
This group consists of a number of large, spheroid jugs with a cordon neck. The jugs have an ornate, moulded handle and no foot-rim. In general, the neck consists of an unverted mouth with a single incised groove above the cordons. The cordons, usually single but sometimes double, are flanked by one or more cobalt-blue bands. On the shoulder of the jug is another incised groove, above which is generally a frieze of incised or stamped floral motifs. On the main body of the jug are a series of sprigged medallions. The jugs are relatively thin-walled and finely-potted.

Interestingly, no exact parallel has been found for these cordon jugs. Most authors attribute this type of ware to Westerwald (an area north-east of Koblenz). Similar jugs are illustrated in von Bock (1966: No. 186); von Bock (1971: Section 9: *Steinzeug aus dem Westerwald, (7). Grosse Kugelbauchkrüge*); and Hurst, Neal and Beuningen (1986: Fig. 90.270). Several medallions in the *Trichterhalskrug* (von Bock, 1971: Nos 394 and 395) from Westerwald resemble the floral medallions.

BAT 2023



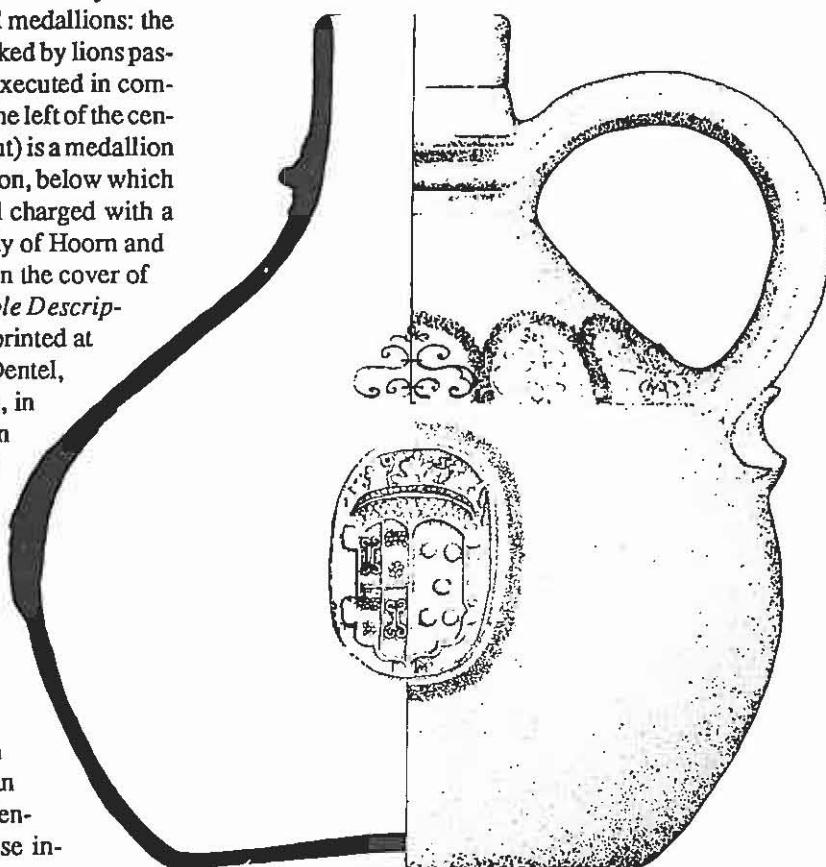
Fragments of at least three sprigged medallions showing the representation of Hope, bearing her symbol, the anchor. The medallion is ornate and almost identical to the medallion on the *Pulle* in von Bock (1971: No. 182), from Seiburg, dated to about 1566. It would be unusual to find three medallions of this type on one jug, so possibly they come from three separate jugs. The incised line and stamped band of decoration above the medallion indicate that the jug is of the cordon type, rather than the slightly different form shown in von Bock, which lacks the complex cordon and cobalt-blue on the neck. The shape is similar to the globular jugs (*kugelbauchkanne*) from Westerwald (von Bock, 1971: No. 567).



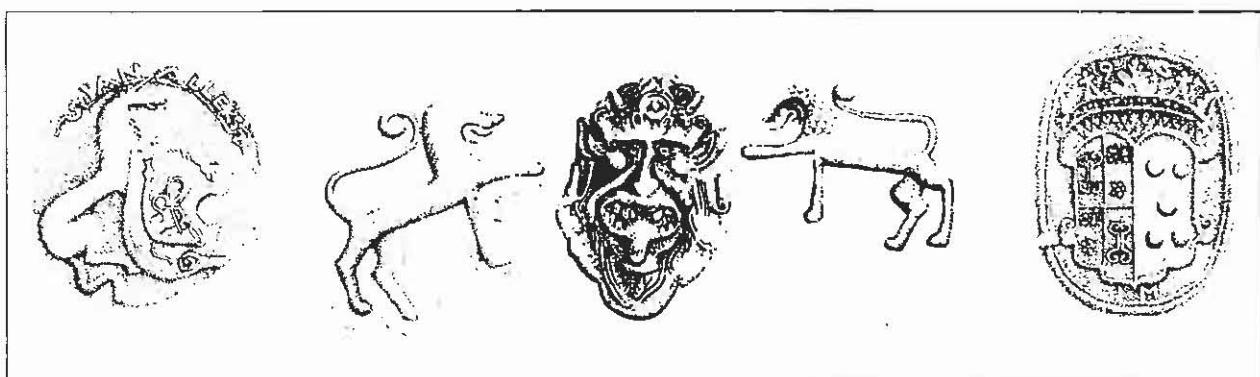
This jug has one or possibly three floral, sprigged medallions. The design consists of a central flower (rose?) surrounded symmetrically with six flowers and vegetal tendrils. The central flower is ringed with a rope-like surround. The left-hand flower (at 9 o'clock) has the unidentified maker's initials 'PR'.

BAT 326

This is one of the more interesting ceramic objects in the collection. The jug has three sprigged medallions: the central medallion is a grotesque face, flanked by lions passant. The lions are surprisingly crudely executed in comparison with the rest of the sprigging. To the left of the central medallion (when viewed from the front) is a medallion bearing the name IAN ALLERS on a ribbon, below which is a rampant unicorn supporting a shield charged with a bugle horn. This is the emblem of the City of Hoorn and an almost identical illustration is found on the cover of Willem Ysbrantsz. Bontekoe's *Memorable Description of the East Indian Voyage 1618-25* printed at Hoorn by Isaac Willemesz. for Jan Jansz. Dentel, Bookseller in the East Street in Biestkins, in 1646. The whole illustration of the unicorn and the horn may be a pun on the name of the city. The connection with Jan (Ian) Allers is obscure. Jan Allers was a skipper and merchant from the town of Nijmegen, exporting Raren pottery (Raren is a small town in Belgium near Aachen famous for pottery) (Linon, 1963; van Loo, 1984). A similar medallion is illustrated in Linon (1963:25), who states that the Arms has no known connection with Nijmegen. Recently, van Loo (1984) has illustrated a number of identical medallions on bearded man jugs. These include bearded men from the Museum of London, excavated Moorgate Street 1912, Fig. 15 and from Thames Street 1923, Fig. 16. Another similar medallion is illustrated (Fig. 17) from the Westfries Museum, Hoorn. Other medallions with the same motif include a broken jug from the Musée Communal des Beaux Arts, Fig. 13 and a shenkkan from the Westfries Museum, Hoorn, Fig. 14. Linon (1963), van Loo (1984) and Hellebrandt (1977) illustrate the Arms of Jan Allers, which do not resemble the medallion on BAT 326. Another example (von Bock, 1971: No. 367) on a brown jug with a reeded neck from Raren has a unicorn supporting a globe. Allers is discussed by von Falke (1908), van Loo (1984) and Göbels (1971).

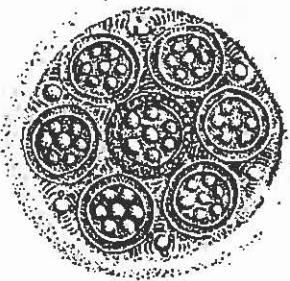


Another similar medallion is illustrated (Fig. 17) from the Westfries Museum, Hoorn. Other medallions with the same motif include a broken jug from the Musée Communal des Beaux Arts, Fig. 13 and a shenkkan from the Westfries Museum, Hoorn, Fig. 14. Linon (1963), van Loo (1984) and Hellebrandt (1977) illustrate the Arms of Jan Allers, which do not resemble the medallion on BAT 326. Another example (von Bock, 1971: No. 367) on a brown jug with a reeded neck from Raren has a unicorn supporting a globe. Allers is discussed by von Falke (1908), van Loo (1984) and Göbels (1971).



The right-hand medallion shows the impaled Arms of Sebastian von Hatzfeld and his wife Lucia von Sickingen. They were the parents of Field Marshal Melchior of the Thirty Years War fame.

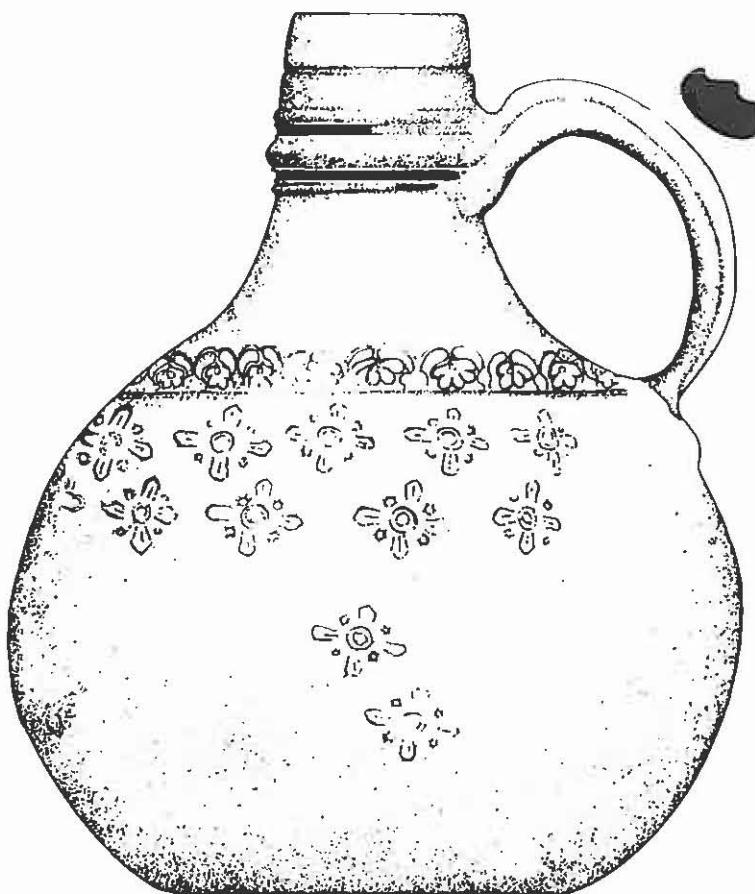
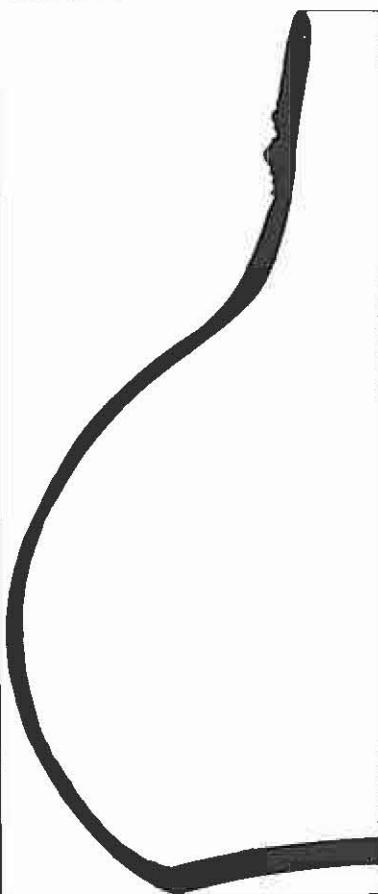
In the upper part of this medallion, above the crown, are the numbers '95', representing the date 1595. It is possible that the jug was an heirloom on the *Batavia*, but the presence of at least five other Hatzfeld-Sickingen medallion fragments suggests that this is unlikely. Further, there is no evidence of wear on the base, which would suggest a long working life. The more reasonable explanation is that the date does not reflect the year of manufacture and the sprig moulds were old.

**BAT 2571**

The medallion closely resembles the floral medallion of the cordon jug (BAT 2304), but the flower is replaced by a ball motif, similar to the central medallion of the bowl (BAT 2580-20234-2128). The centre of the medallion is a flower-like design, consisting of a single ball encircled by six balls. This is surrounded by a double concentric ring with small dots in-between. Surrounding this, is another series of six flower-like designs arranged symmetrically. Whilst the exact type of jug that this medallion belongs to cannot be identified, it is assumed that it is a cordon type.

**BAT 697**

This jug fragment with part of a medallion shows the Arms of Philip of Spain. Unfortunately, it is not possible to identify the exact ruler. The medallion has an unidentified maker's mark in the top left-hand corner and the figures '23' in the top right-hand corner indicating the date 1623.

**BAT 2304**

The jug has no sprigged medallions, but it has instead a symmetrical pattern of stamped flowers on the main body below the frieze and incised groove. The stamping is rather crude and badly-finished. In some cases, the stamping has dented the body of the jug.

## BROWN STONEWARES

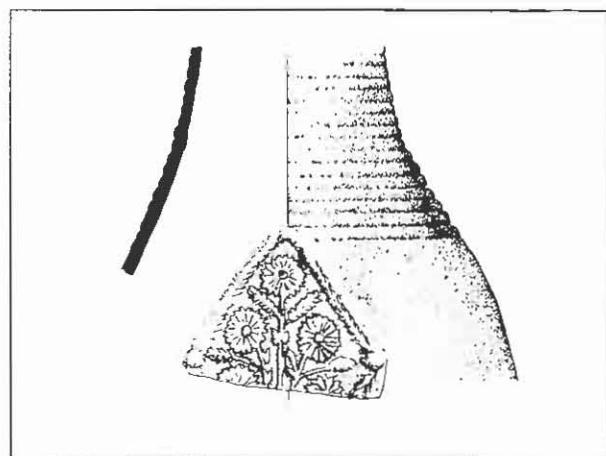
### Jugs with reeded or corded necks

These jugs belong to the same group as the grey-white, reeded or corded neck jugs (p. 105 above). They possibly originate from Raren and closely resemble von Bock (1971: No. 367) and Hellebrandt (1977: Figs 45 and 49).

BAT 428



BAT 2682-602A



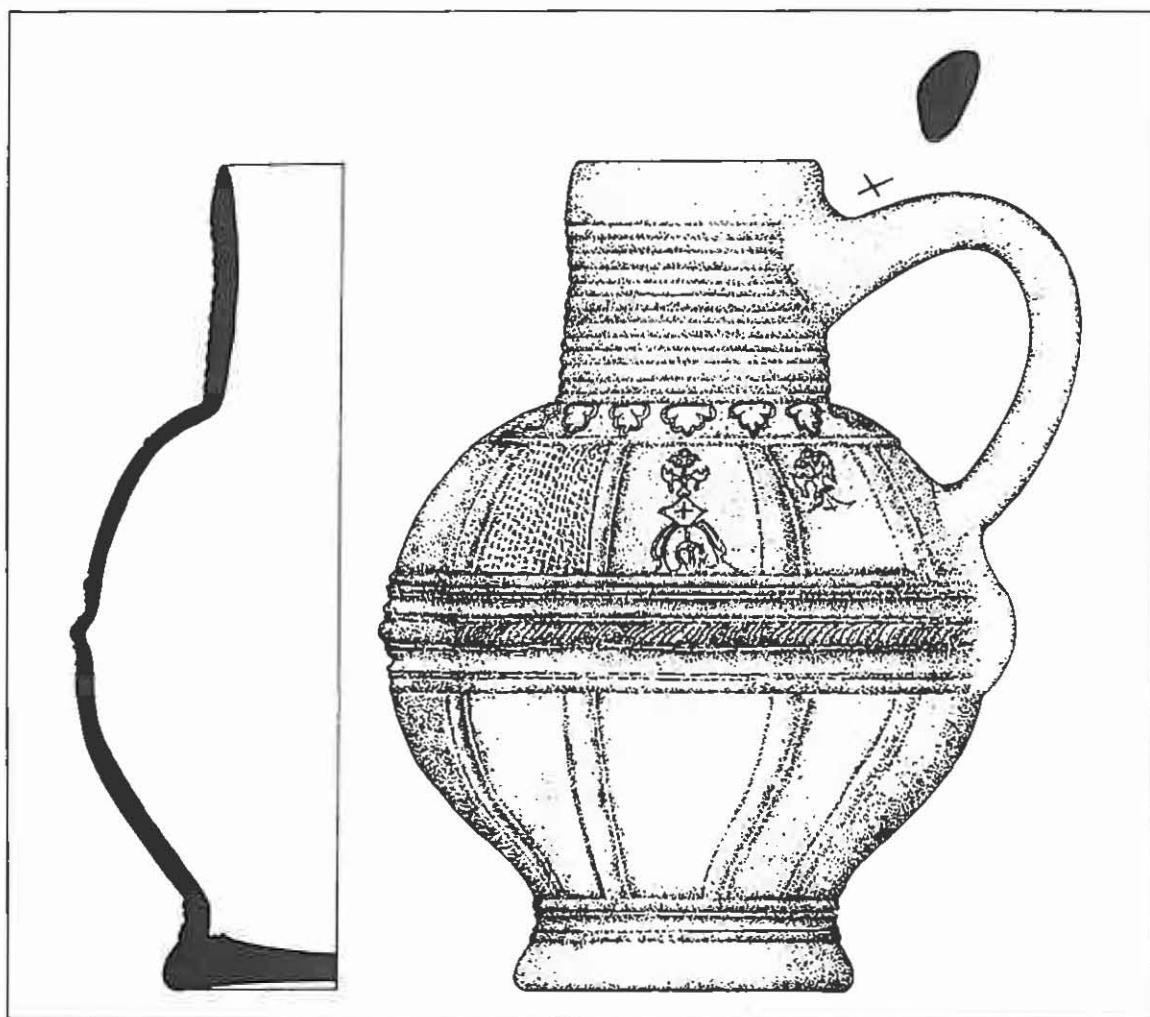
The fragment has part of the Arms of England with the insignia of the Most Noble Order of the Garter: *Honi soit qui mal y pense*, (—QUI.MAL.Y.P—) together with the lions passant and fleur-de-lis. This is probably the Royal Standard of Elizabeth I, the last of the Tudor Sovereigns, for the Royal Arms changed, on her death in 1603, to the House of Stewart.

Two fragments with diamond-shaped medallion with a flower and shrub, possibly a marigold.

### Biconic paneled jugs

These jugs have a series of vertical sections on the upper and lower body, forming panels, with or without impressed decoration. There are multiple cordons around the middle and the necks are reeded. Their provenance is generally attributed to Raren; but it should be noted that this group is very similar in form to the Westerwaldcerware material (see below) from this site.

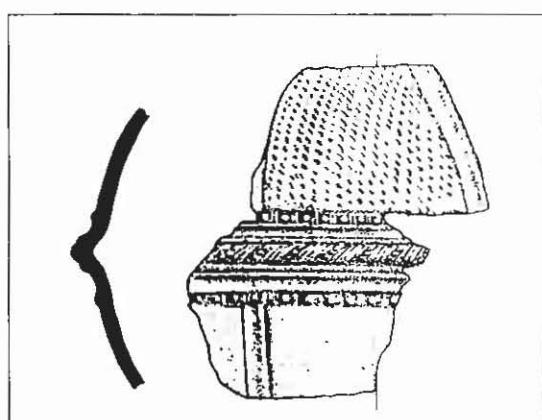
BAT 540



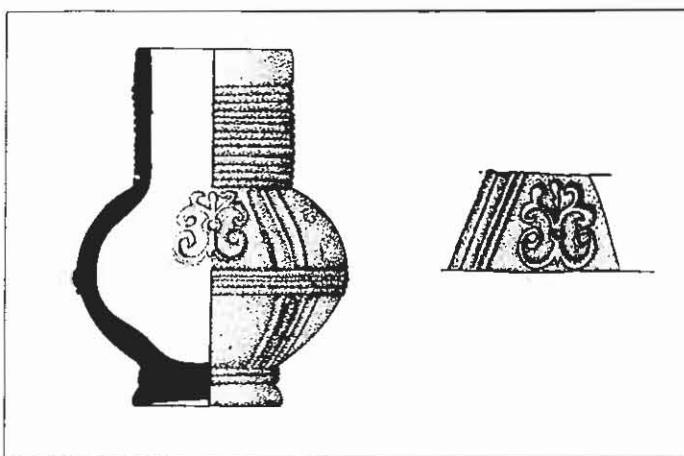
The jug has a central cordon separating an upper and lower vertical-sectioned body. The upper section has a series of impressed decorations, alternating with sections of impressed basket-work pattern which looks a little like woven material. The neck has a frieze of impressed flowers or leaf pattern with a plain, parallel-sided, reeded neck. The panels on the sections of the lower body are undecorated.

BAT 2513

A similar fragment to BAT 540 with a slightly different cordon treatment.

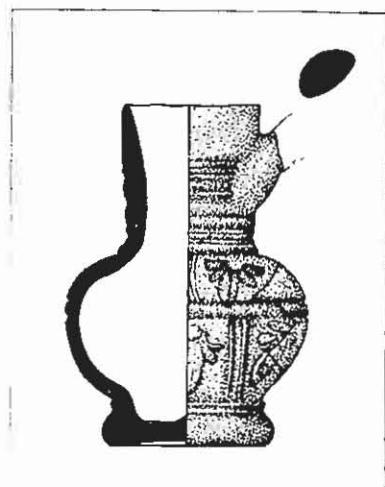


**Small biconic jugs**  
**BAT 2114**



This small jug fragment has the handle missing. The upper and lower body is divided by a series of vertical grooves into six panels. It has impressed floral decoration in upper panels and no decoration in lower panels. There are a series of cordons around the waist and above the foot. The neck is reeded. It closely resembles Hurst, Neal and Beuningen (1986: Fig. 99.317), from Raren-Born.

**BAT 2002**

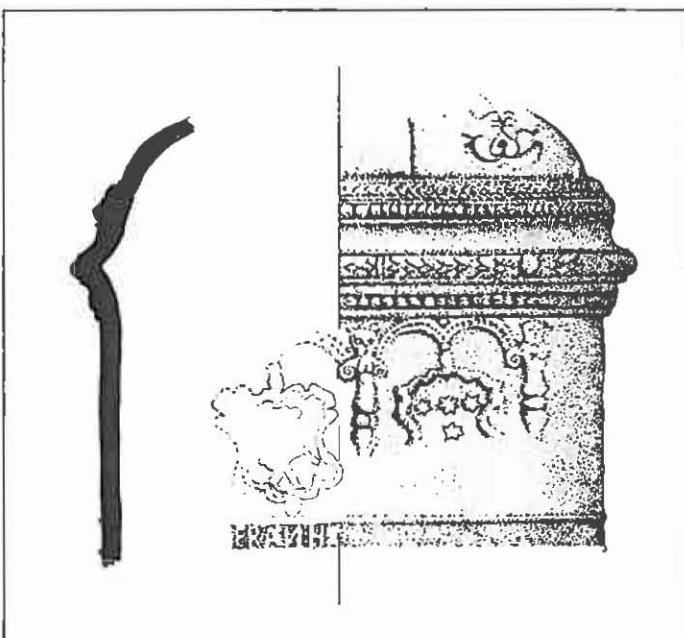


Fragments of a small jug similar to BAT 2114. The neck is reeded or possibly multiple-cordoned. The upper and lower body is divided into vertical panels with impressed floral decoration.

**Jugs with a frieze**

These jugs have a central band or frieze, comprising a decorated motif contained within an arcade, formed by caryatids supporting arches. The frieze is parallel-sided and enclosed between cordons. The upper and lower sections are divided vertically to form panels, decorated on the upper body only with impressed decorations.

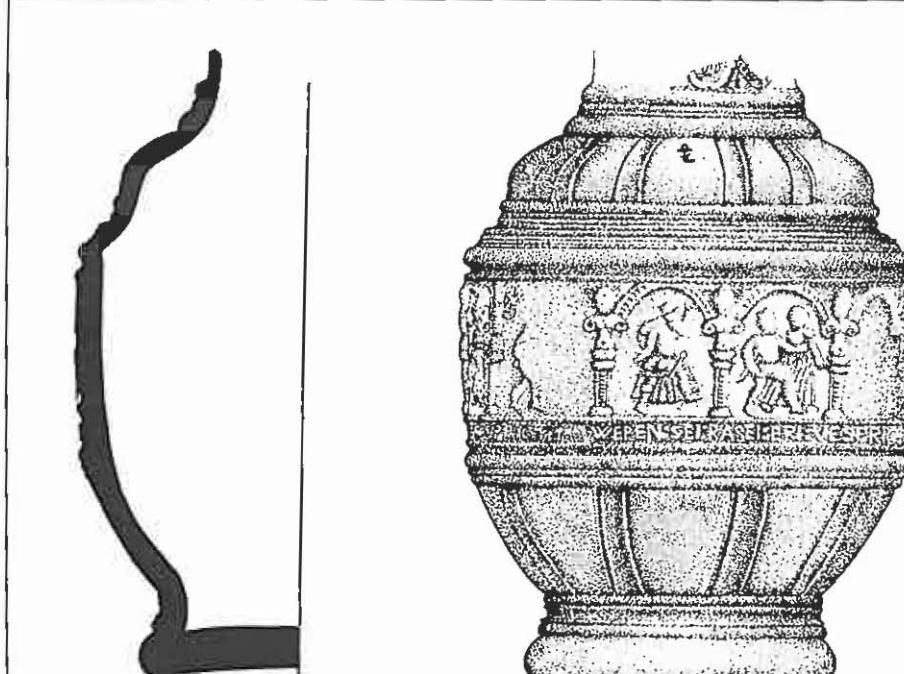
**BAT 540**



The jug features a series of Coats of Arms, each separated in a small, arched panel with caryatids supporting the arches. Beneath this is a frieze of writing: '—ERAII:H—'. The frieze is illustrated in von Kohnemann (1982:227), reading: *Der Becher und die Kann' hat mich gemacht zu einem armen Mann; wie ich nichts mehr habe, so muß ich lassen ab.* However, the significance of the Arms is not explained. Von Bock (1971:Nos 429 and 430), illustrates a similar item from Westerwald.



GERET : DVMVS : DANSEN : BLASEN : SO : DEI : BVREN : ALS : WEREN : SEI : RASEI : ERI : VESPRICHT : B—



This is the famous 'Farmers Dance' (*Bauern Tanz*) jug. Fragments of this jug give the main part of the frieze with the inscription: 'GERET : DVMVS : DANSEN : BLASEN : SO : DEI : BVREN : ALS : WEREN : SEI : RASEI : ERI : VESPRICHT : B—'. The frieze is the same as one illustrated in von Kohnemann (1982:195 (lower)). The missing words at the end of the frieze, according to von Kohnemann, would be ': BASTOR : ICH:' followed by the date. These two friezes are unusual as the fourth word is normally 'DAPER'. Similar friezes are shown in Hellebrandt (1977), particularly No. 50. The author was given an almost identical example by Mr van Beuningen from a waster site at Raren (BAT Special No. F1538). This frieze has the inscription: '? : DV : MVS : DA?ER : ??AS :: ALS : WEREN :: BASEN : FRS : VERSP ??CHT : BASIO : CH : VERDANS??KP'.

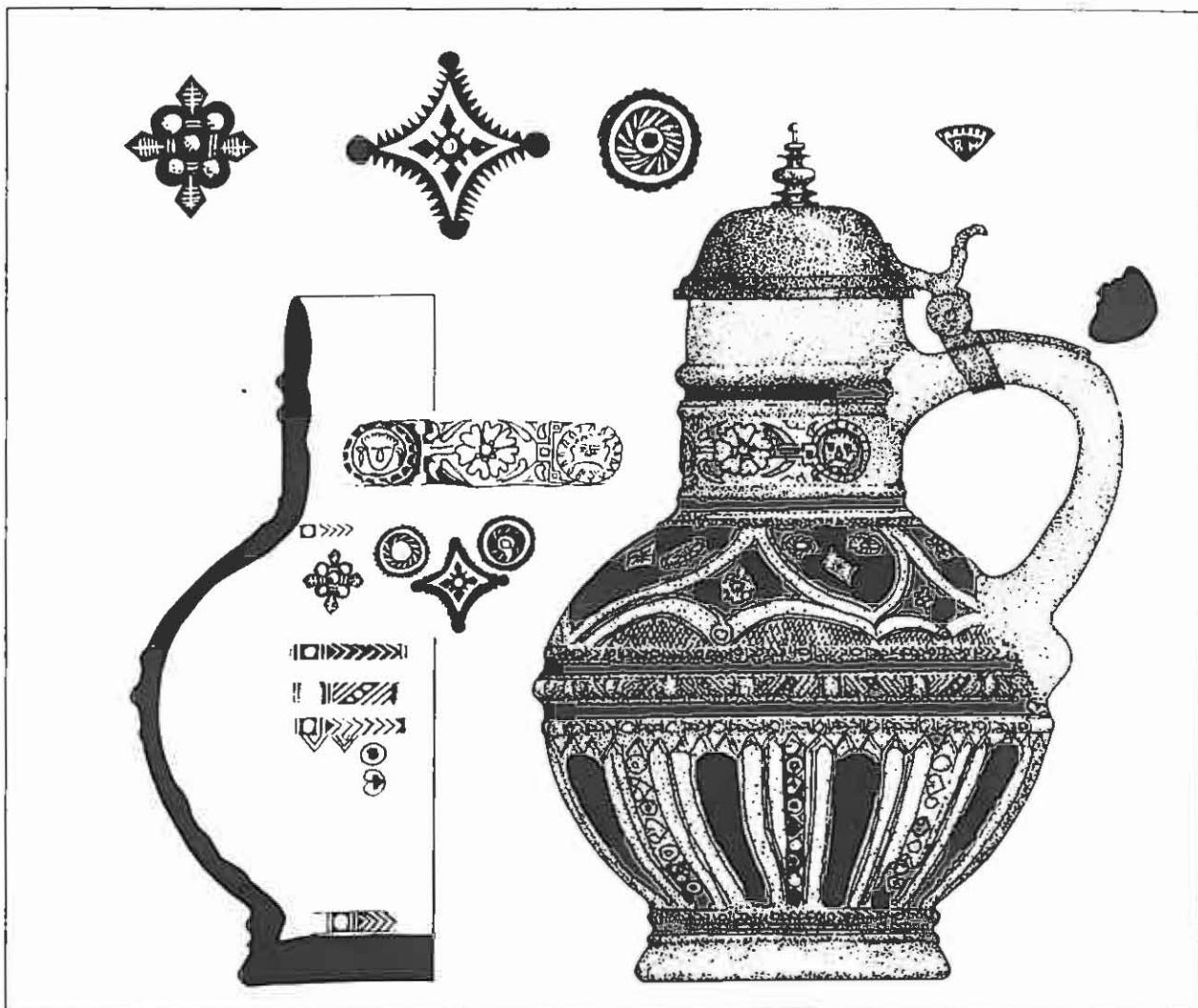
This material is characterized by a generally strong, uniformly blue-grey stoneware, decorated with impressed and sprigged work. The body is grey (Munsell 10PB 7/2) with a tinge of blue, caused by the volatilization in the kiln, of the cobalt used in the decoration. Usually the sprigging is picked out in cobalt-blue (Munsell 10PB 3/10). In some cases, the stoneware is degraded, again indicating that the object has been incompletely fired. In such instances, the salt glaze is flaked and crazed. In some examples, the glaze has puddled to give an 'orange peel' effect, whereas in other cases the glaze has fused totally with the body. A number of the bases show evidence of the square of refractory clay that the pot was placed on during firing. Evidence indicates that they may have been stacked in the kiln base-to-neck, with the clay square separating them. Handles have sometimes one or more pin pricks at the top near the junction with the neck. This may be to facilitate the fitting of a hinged pewter lid, or it may be a technique to prevent cracking or bursting of the body at the join between the handle and the body, during the firing process.

## WESTERWALD-TYPE, BLUE-GREY STONEWARE

### Biconic jugs with cordons at the mid-body

These represent the main group in this section. Many of the designs are similar to the brownwares but in most cases the treatment of the lower body is different.

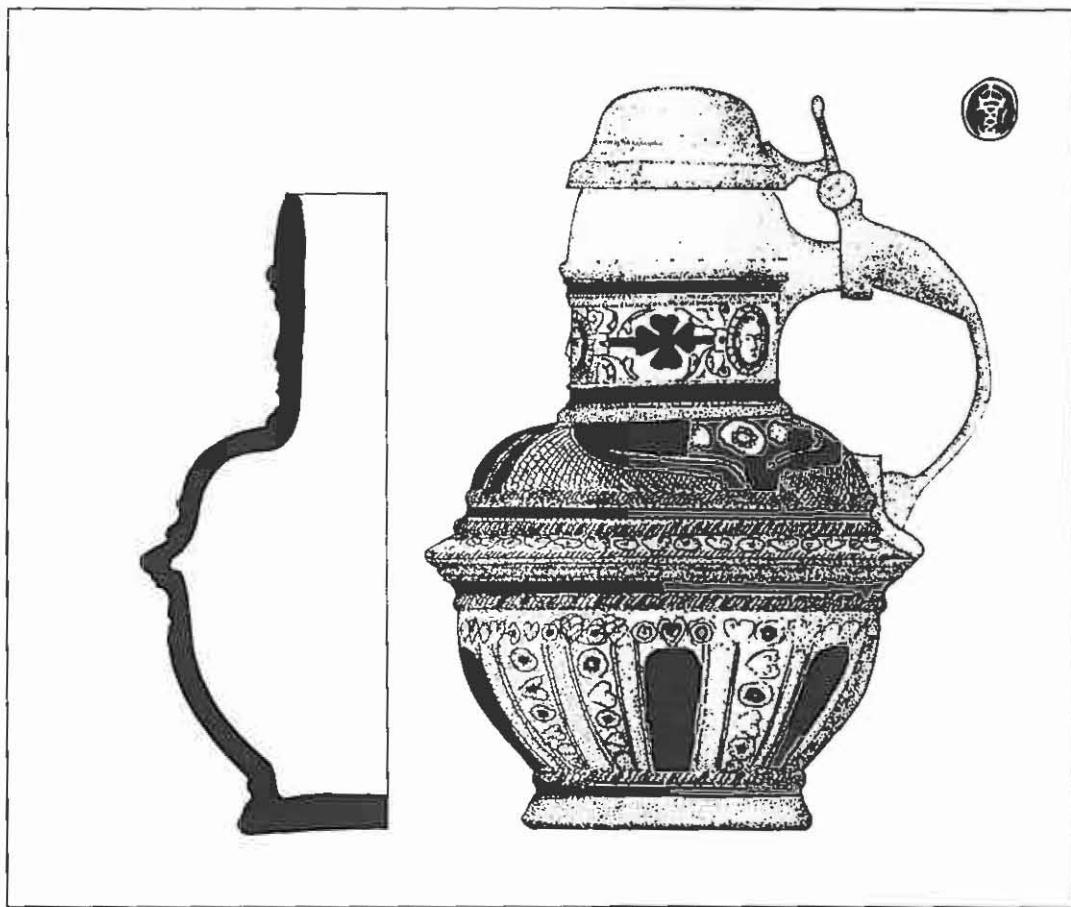
BAT 2303



This is a well-made, blue and grey, biconical jug with a pewter lid. The jug has a pronounced foot, narrow-paneled decoration on lower body, alternating plain, cobalt-blue and rouleau heart-wheel decoration. The upper body has ornate paneling with stamped decorations blocked out in cobalt-blue. Neck frieze with flower and masks, similar to von Kohnemann (1982:260). Cordon at mid-body. Pewter lid with ornately decorated top. The lid attachment has a long tang running along the handle, a pewterer's touch-mark with crown over the letters 'BH'. Similar to von Bock (1971: No. 486).



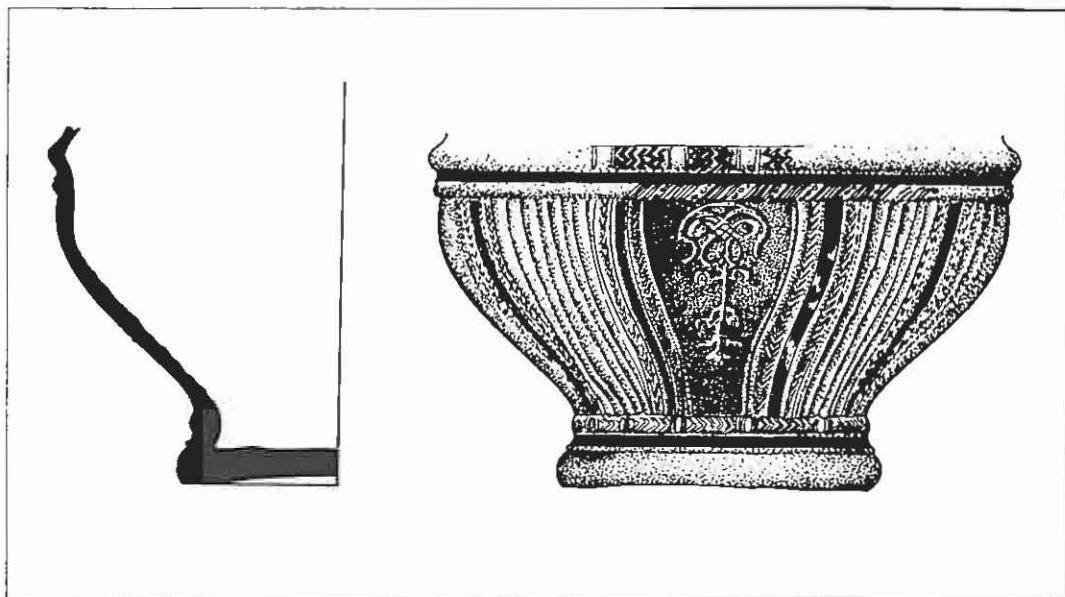
BAT 2303 (Scale 10:1)  
→ Pewterer's touch-mark



BAT 2358 (SCALE 10:1)  
Pewterer's touch-mark



An interesting complete, blue and grey, biconical jug with pewter lid and repaired pewter handle. The jug, similar to BAT 2303, has a rouletted heart and wheel decoration on some of the lower vertical panels, together with two horizontal bands below the mid-cordon and a band on the shoulder of the cordon. The mid-body cordon is more wedge-shaped in profile than BAT 2303, resembling the more ornate style of jug, notably von Bock (1971: No. 479). The neck has a sprigged frieze of faces alternating with four-leafed clover, similar to von Kohnemann (1982:267 (lower left)). The lid is a plain dome with no decorative knob, and is attached to a repaired pewter handle. Obviously at some point in the life of the jug, the ceramic handle was broken and it was repaired with a pewter one, indicating that the jug was valuable enough to effect a repair. The pewterer's touch-mark is the Arms of the City of Amsterdam flanked with a 'V' on either side. Another pewter addition is a small, bead-like spot on the side of the neck which passes through the body of the neck of the jug. It is possible that this is either a repair of a flaw in the neck of the jug, or a volume mark. The volume capacity to the lower point on the mark is 675 ml, to the upper point 693 ml, and the total capacity to the brim 739 ml. This is slightly larger than the Netherlands *pint* which equalled 0.6 litre (Staple, 1927).



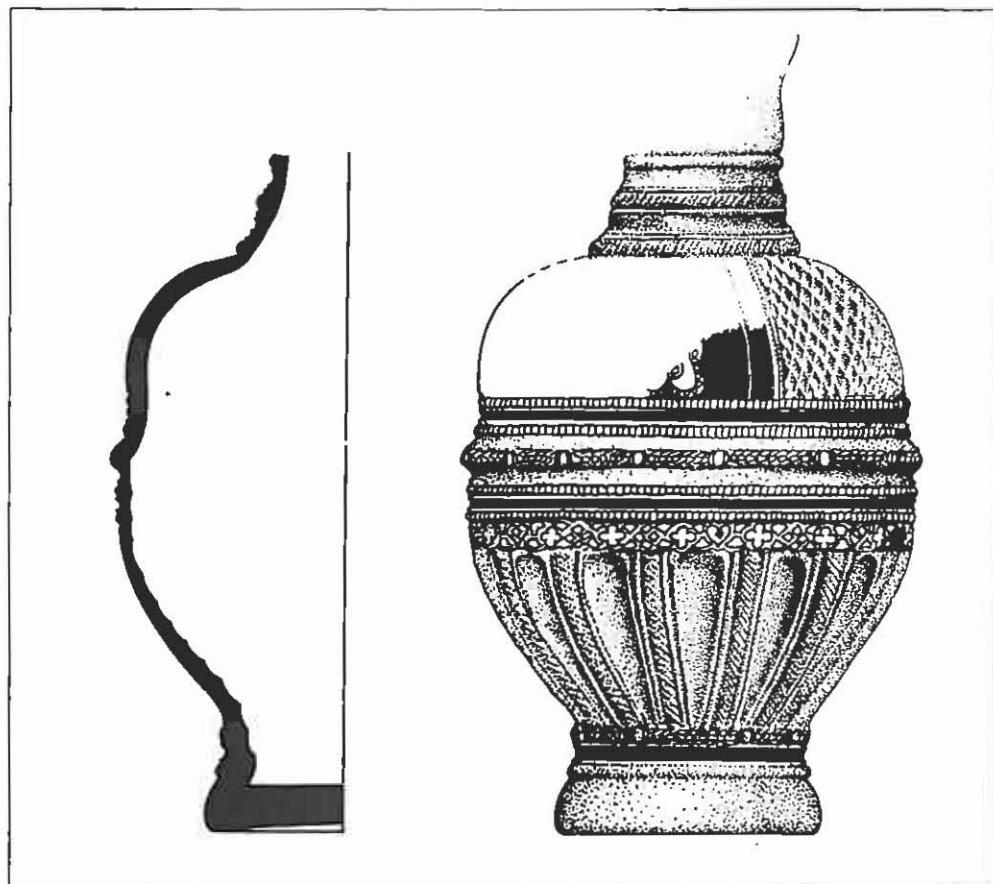
The lower body of this fragmentary jug has vertical paneling, with an alternating pattern of cobalt-blue, zig-zag and five plain stripes. The large cobalt-blue panels have an impressed decorative motif. The cordons at the mid-body have heart-wheel, beading and zig-zag patterns as well as the cobalt-blue stripe. The upper body (not shown) is cobalt-blue with a saw-tooth pattern of stamped lozenge-shapes with flowers. There are cordons at base of neck and mid-neck and an applied neck frieze.

Jugs with mid-body cordon and mask on neck  
BAT 329-405

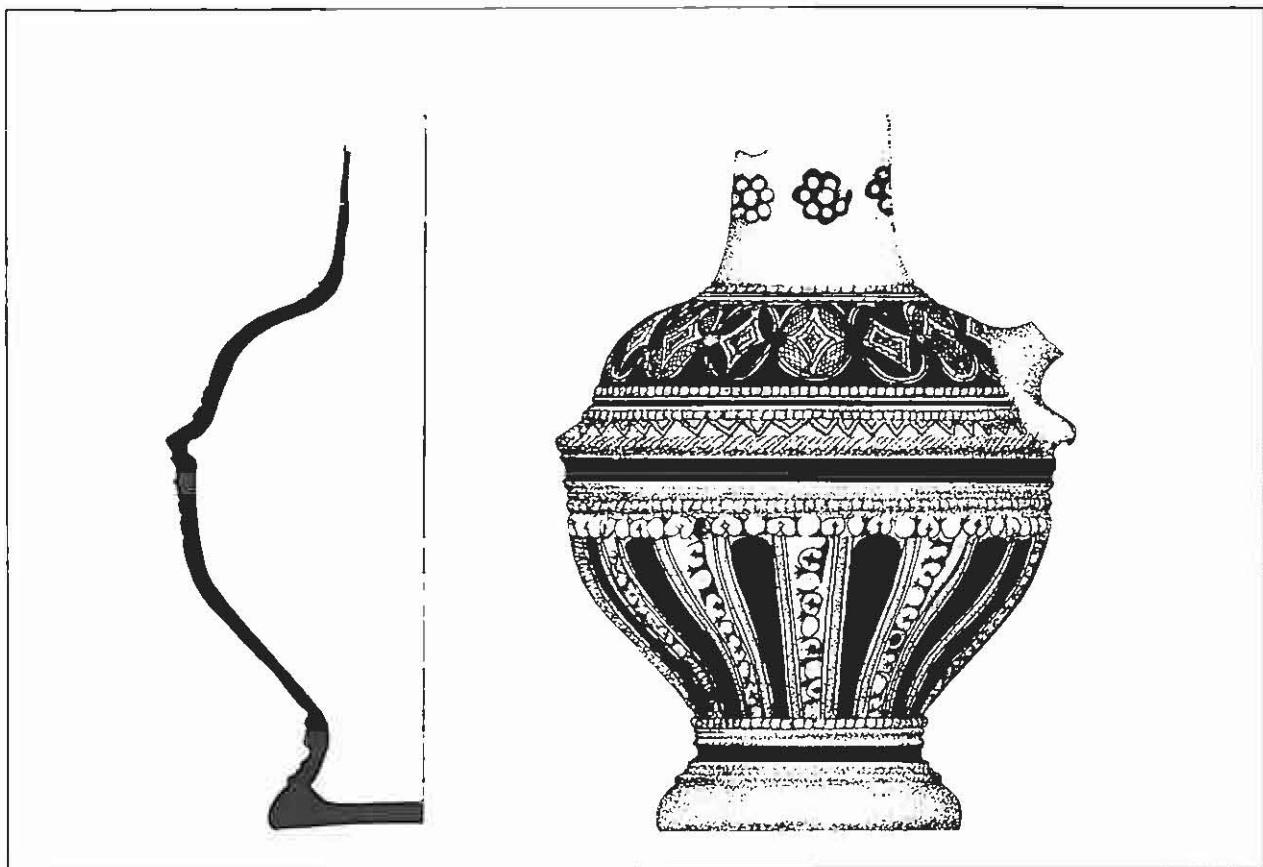


This is a fragmentary jug with pouring lip, mask and pewter lid. It has the normal pronounced foot, with lower body paneled with alternating cobalt-blue. The mid-cordon is wide and wedge-shaped. The upper body consists of two intricately decorated panels, with two floral, stamped decorations surrounded with cobalt-blue. Two roughly semi-circular panels are divided by moulding lines; one is decorated with scalloping, the other is plain. Above at the base of the neck is another series of cordons with a central, naturalistic mask and a distinctive pouring lip. A pewter lid has a knob decoration comprised of a series of disks. The lid extends outwards to cover the jug lip and is attached to the handle. Again, there are no exact parallels, but von Bock (1971: Nos 477 and 480) illustrates a series of *Engalsannvit* masks.

Jugs with mid-body cordon and narrow neck  
BAT 607



The jug is similar to BAT 329-405, but without any evidence of a mask. This may be because the appropriate fragments are missing. The cordon above the foot has a cobalt-blue stripe and a wreath-like cordon. The lower body vertical paneling alternates plain and rope-like divisions. The mid-body cordon has a narrow impressed frieze, beading, wreath-like cordon and cobalt-blue stripe. The upper body is fragmentary, exhibiting vertical panels of cobalt-blue with impressed decoration, and basket or lattice-work impression. The lower neck has a complex series of cordons.

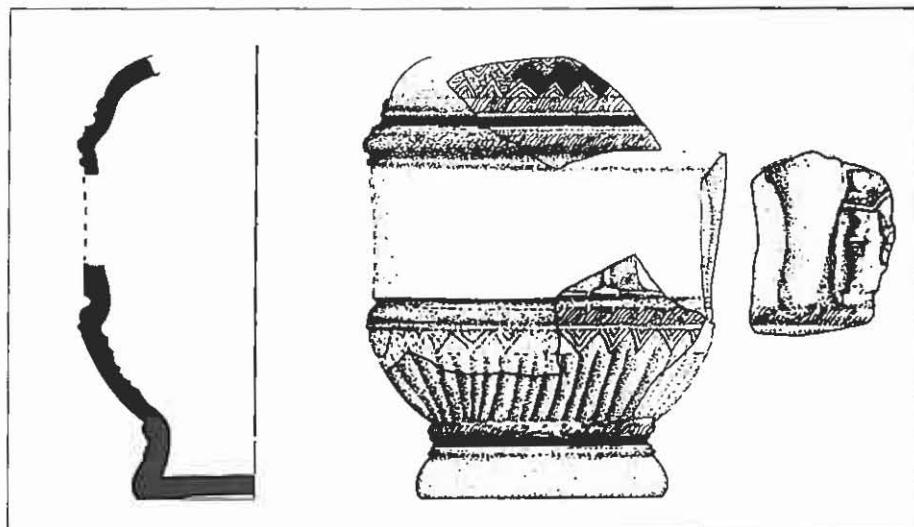


This jug also has no evidence of a mask. It has a pedestal foot with cordons above. Lower body alternating plain cobalt-blue and rouletting of crude hearts and wheels. Mid-body cordon has hearts and wheels, beading, rope-like, zig-zag and plain cobalt-blue. The upper body has impressed decoration on a cobalt-blue background. The decoration consists of a series of linked ovals, with alternating decoration. There is no neck cordon, and the plain narrow neck has a frieze of impressed flowers around the middle.

### Jugs with central frieze

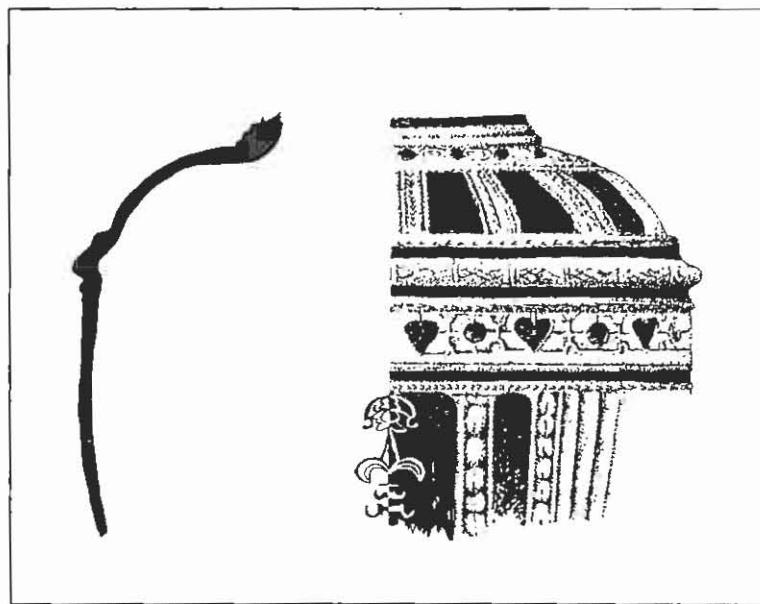
Whilst these jugs are widely illustrated in Von Bock (1971), only two examples were found on the site.

BAT 546-2988-2906



Lower body has simple, stamped reeding and a crudely-executed, rouletted zig-zag below the frieze. The fragments of the panel show caryatids, the number '16' part of the date, but unfortunately the main subject of the frieze is missing. Traces indicate that the subject may be Coats of Arms. There are cordons on either side of the frieze. The upper body has a crude, stamped decoration.

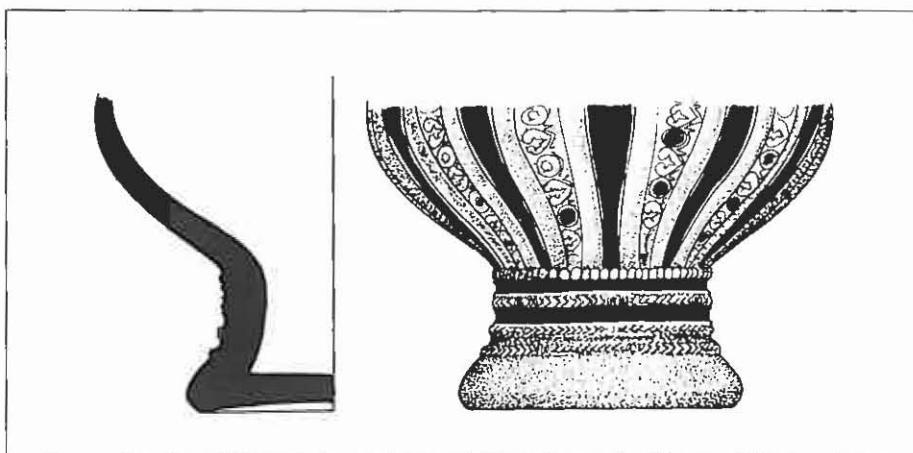
BAT 2533-20015



Mid-body fragment showing a variation to the normal frieze. In this case, the frieze is a narrow, impressed decoration consisting of alternating hearts and circles highlighted in cobalt-blue. The lower body consists of vertical panels alternating: cobalt-blue background with impressed floral decoration; beading; plain narrow panels; reeding; and possibly other forms. There are no pronounced cordons between the lower body and mid-frieze, and it may be that this should be considered as a type of biconical jug.

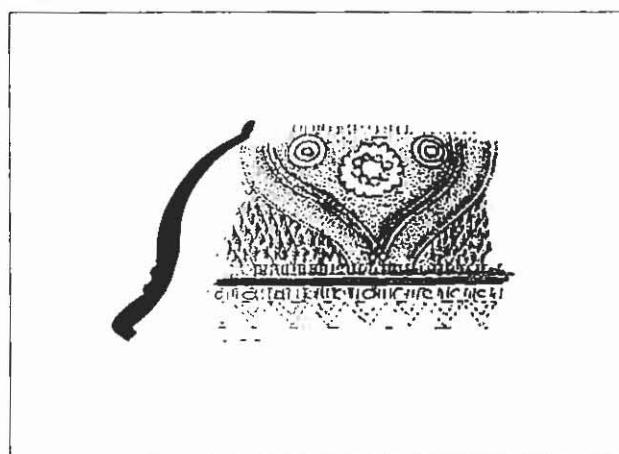
## FRAGMENTS

BAT 20020



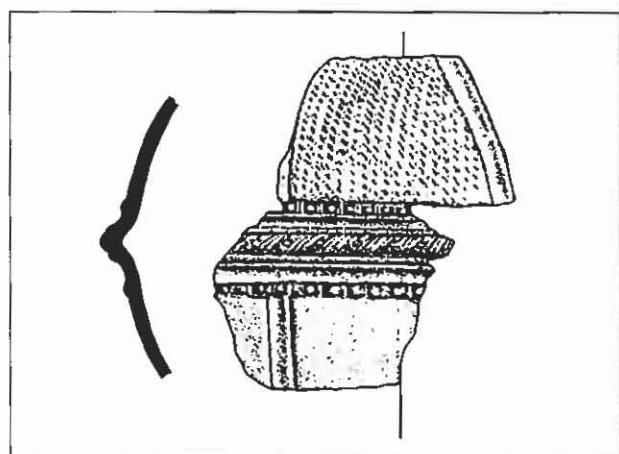
Base fragment of jug with a pronounced foot, and vertical bands of alternating cobalt-blue, plain and a rouletting of hearts and wheels. Possibly a narrow-necked type.

BAT 2799-2697



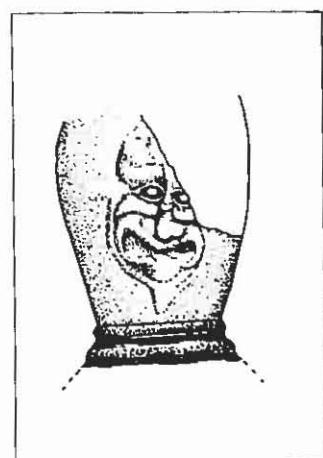
Fragment of upper body of biconical jug with lattice work and impressed floral decoration. The mid-body cordon is pronounced.

BAT 539



Part of upper body of a biconical jug. Impressed floral spray surrounded by a band of beading.

BAT 2964

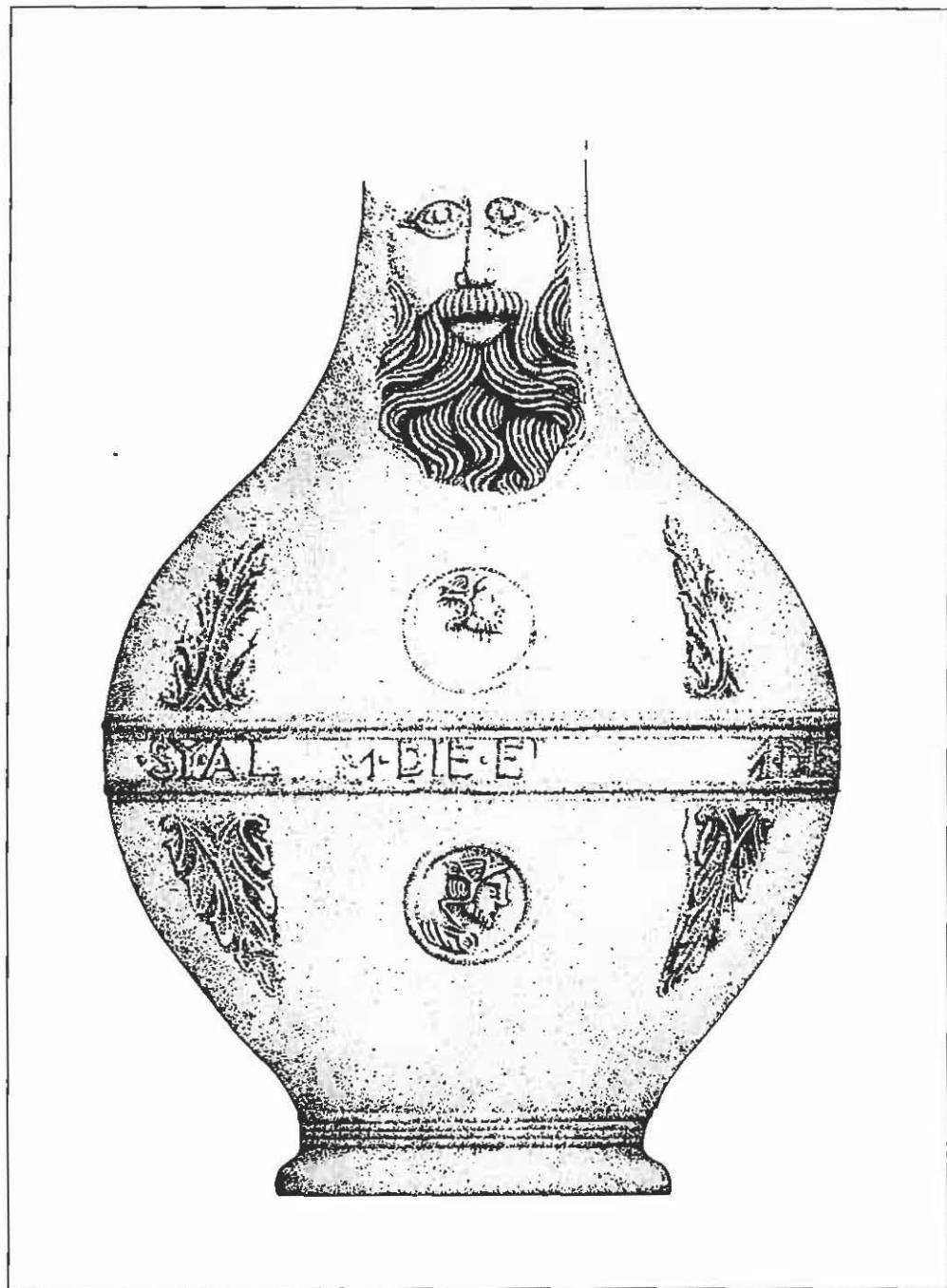


Unusual neck fragment. This fragment may belong in the section above related to the blue and white cordon and reeded neck jugs. The fragment has a mask similar to BAT 2118-20443 and the neck has an ovoid shape with fragment of cobalt-blue cordons at the base.

**BARTMANN OR BEARDMAN JUGS**

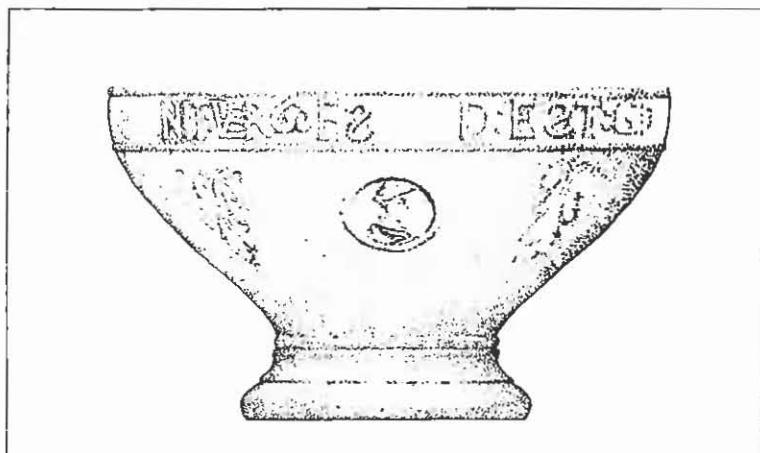
Beardman with inscribed band, acanthus leaves and portrait medallions

BAT 2165



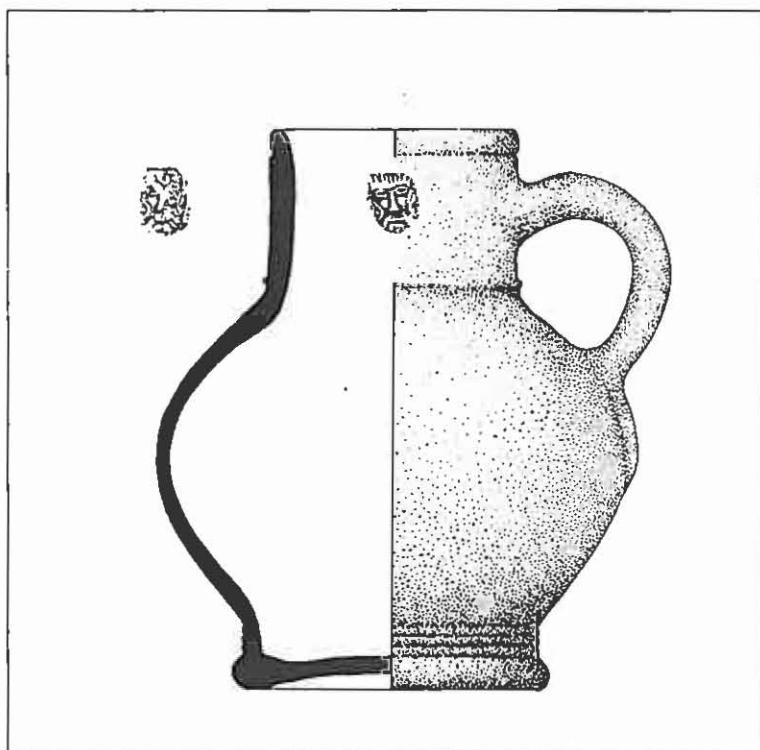
This is a very fragmentary jug made-up of pieces collected over a number of years. However, enough fragments exist to reconstruct all but the rim. The jug is thought to have four pairs of acanthus leaves set on either side of the inscription. Between these would be three pairs of portrait medallions, set so that the front pair is under the mask and thus the fourth pair could not be put on the jug because of the handle. The portrait medallions show a man with a winged helm, possibly Mercury. The inscribed band reads '• SY - AL — M • DIE • EI — M • DIE •' which suggests that it is a repeated group of words. The mask is very naturalistic. The jug is well-made and the applied decoration is of a high quality.

BAT 546



Fragments of the base of an inscription band bearded man. Acanthus leaves and portrait medallions on the lower part of the body. The inscription is crude with the letter 'S' inverted and the VE ligatured. Thus: '—NIT : VER : inverted heart ': ES —— D : EST : GD——'. The jug is crudely-made.

Globular jug with small masks  
BAT 2809-20455

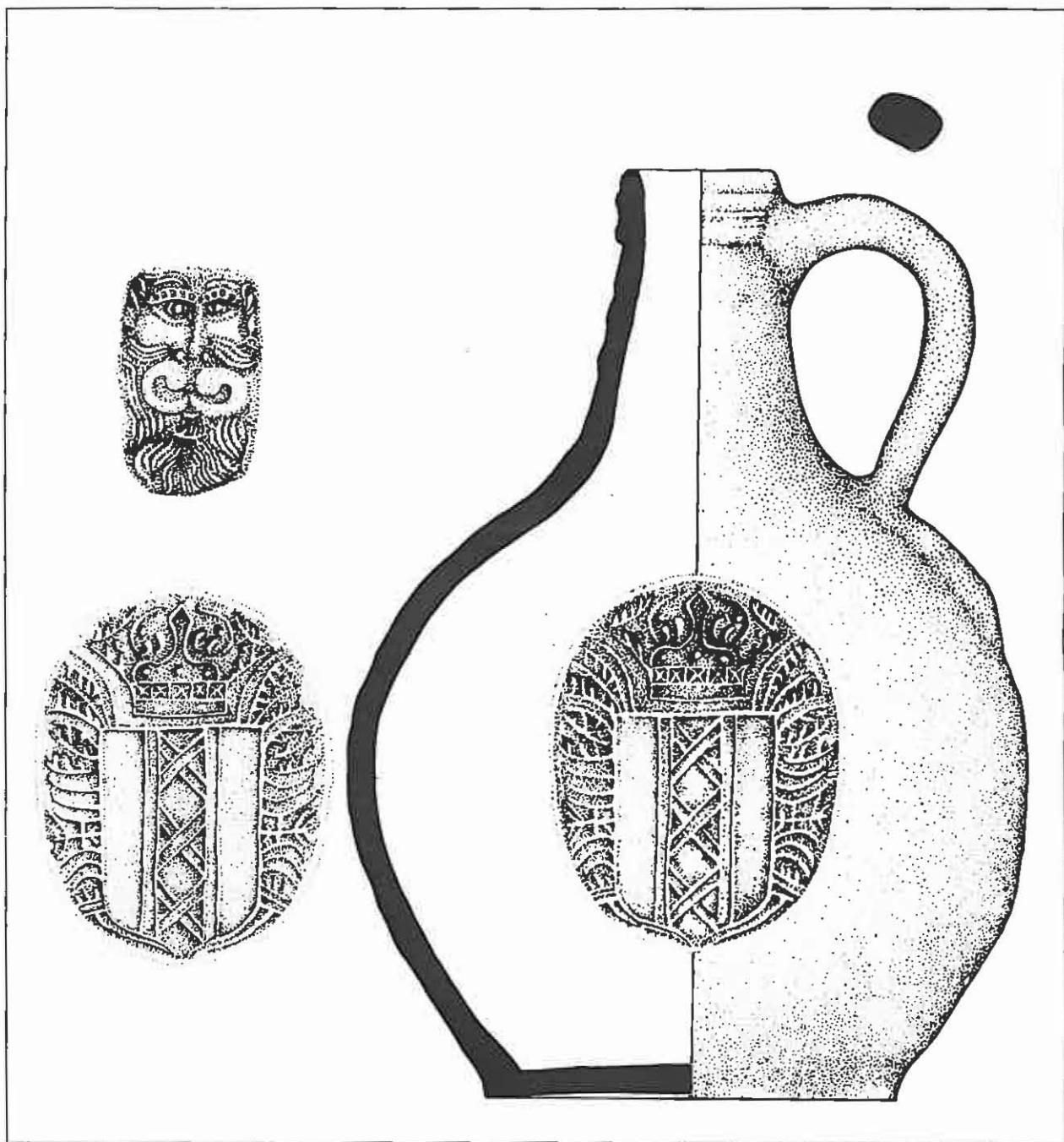


A globular jug with a wide, parallel-sided neck, cordons above foot and below neck. Three small masks are applied symmetrically about the neck. In shape it is similar to Hurst, Neal and van Beuningen (1986: Fig. 106.332).

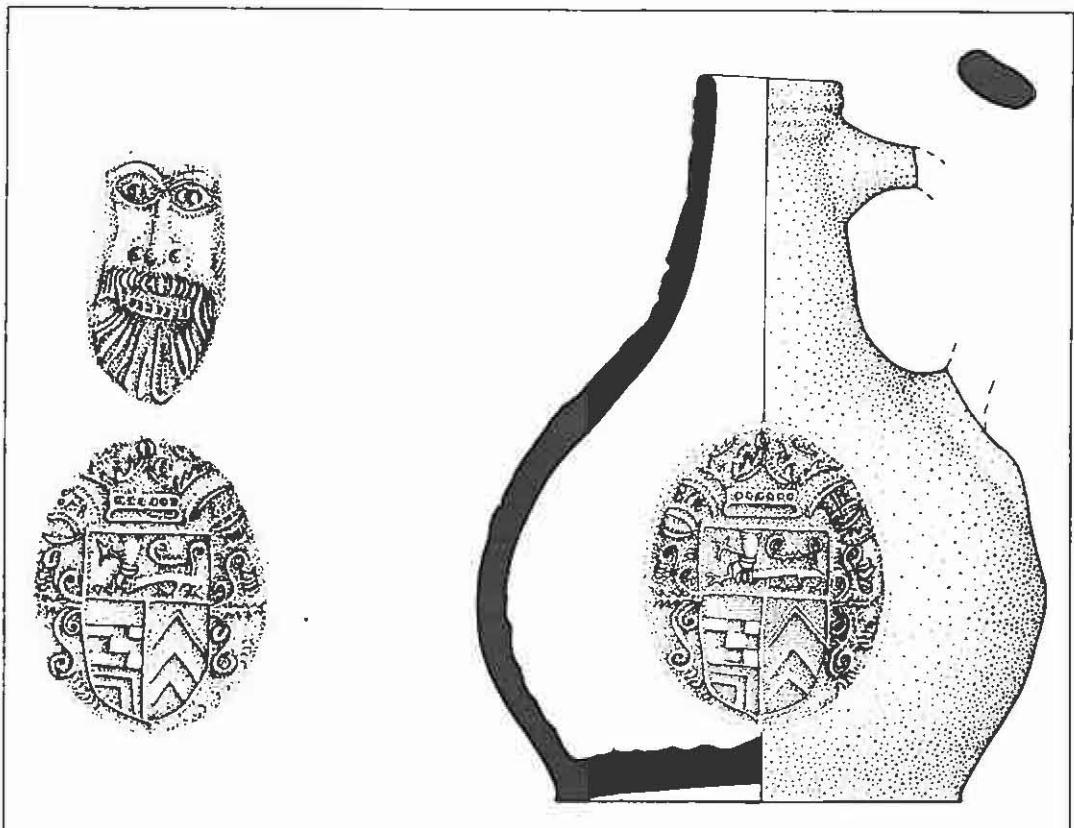
### Standard bearded jugs

There are a large number of shards of bearded jugs found on the *Batavia* site: most of the material has come from the inside reef area. There are a total of 88.01 Kg of shards, representing about 117 complete jugs (based on a very rough average of 750 grms per jug).

BAT 2397

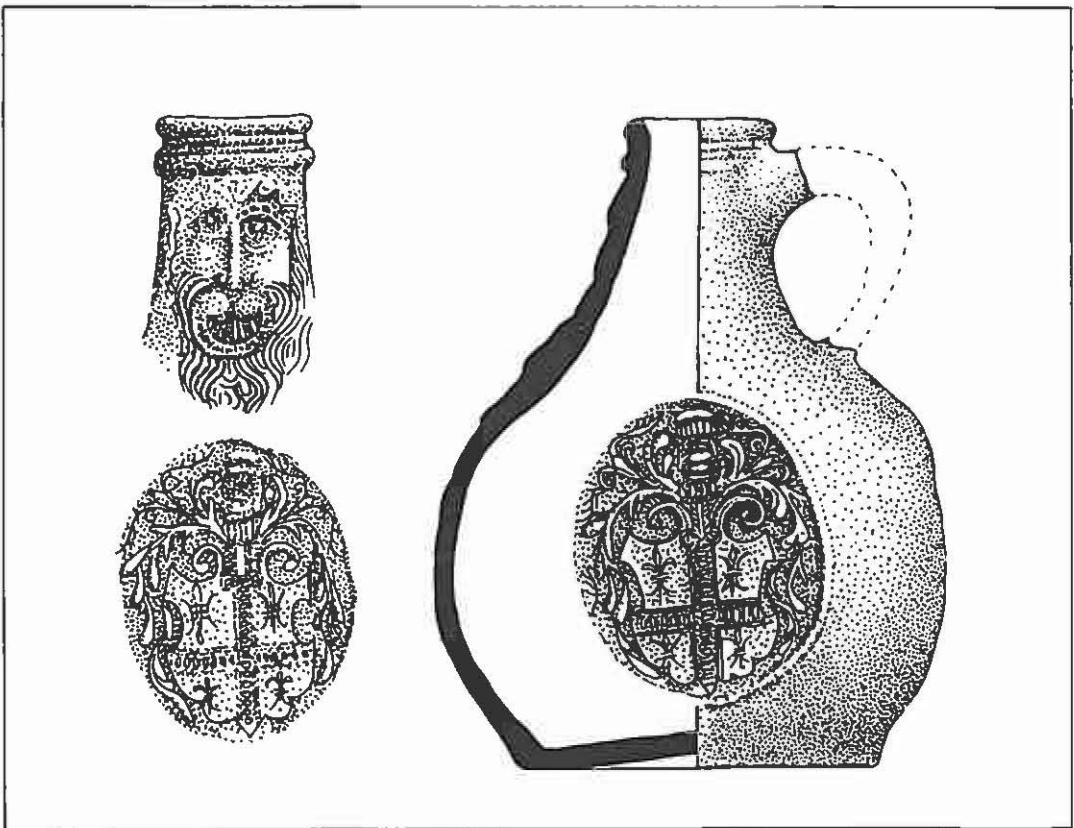


BAT 2372



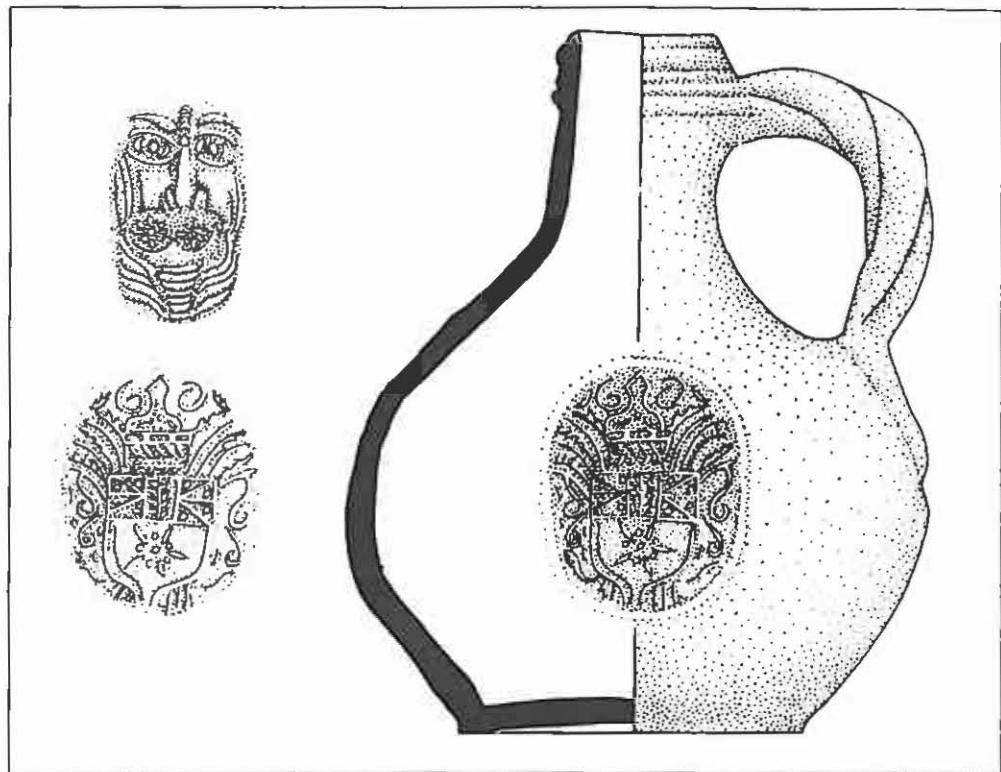
Arms similar to the Arms of the Duchy of Jülich-Cleve and Mark (occasionally Ravensburg is included in the Arms). The jug has a very wide base, three medallions and the handle is missing.

BAT 2147



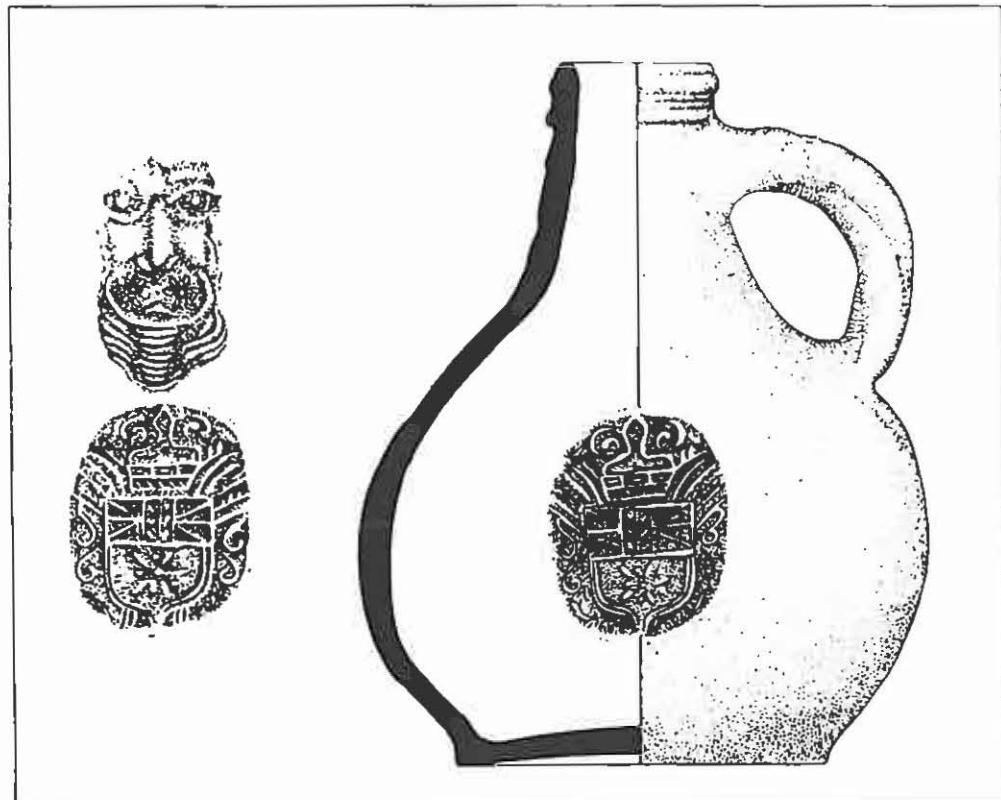
An unidentified Arms, with four fleurs-de-lis in a quartered shield. The jug has a wide base, three medallions and the handle is missing.

BAT 327



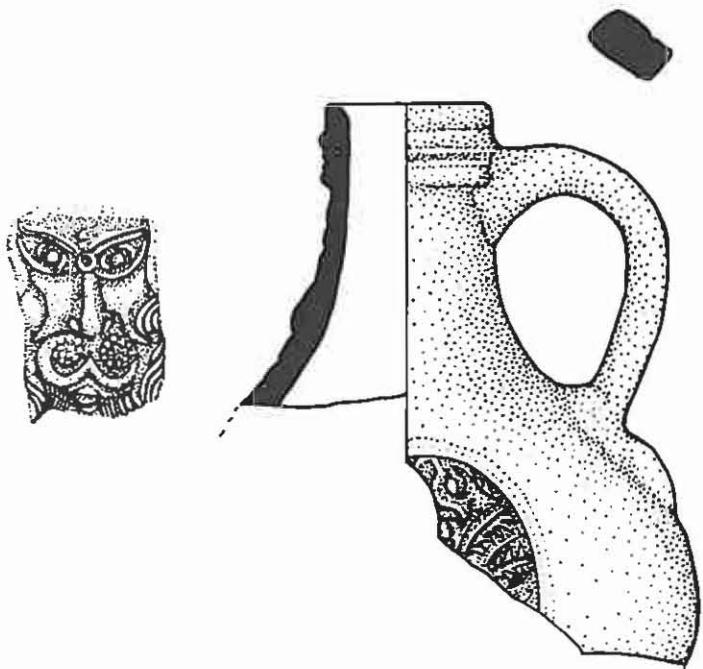
This jug and BAT 2240 are almost identical, the medallions and masks of both jugs were probably made from the same sprigs. The jugs each have three medallions, with the box-cross-corn-rose type, the handles are twisted and the masks are the same. The foot is narrower than the examples above.

BAT 2240



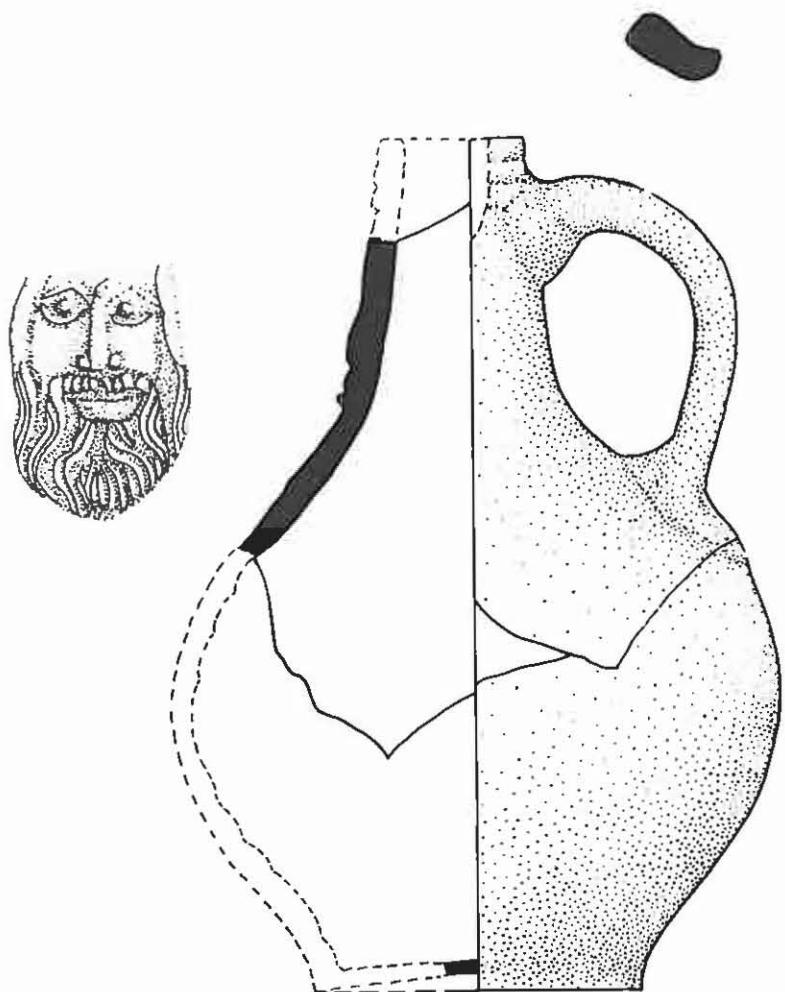
**BAT 2373**

Fragment of a jug with  
three medallions.

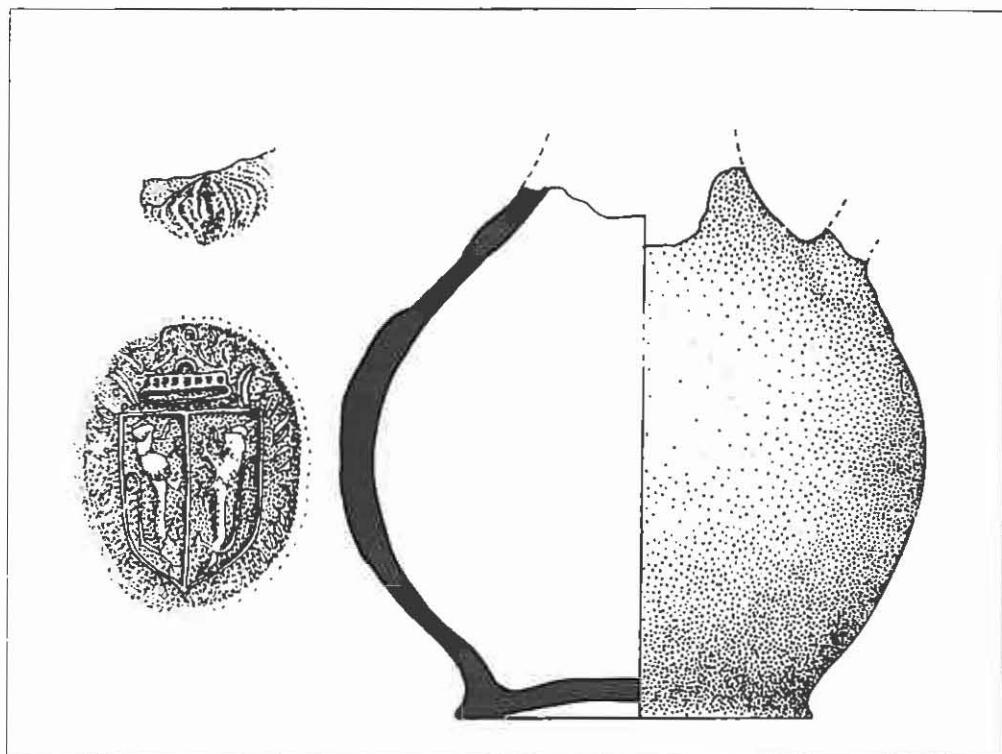


**BAT 2259**

Fragments of a jug with  
either no medallions or pos-  
sibly one.

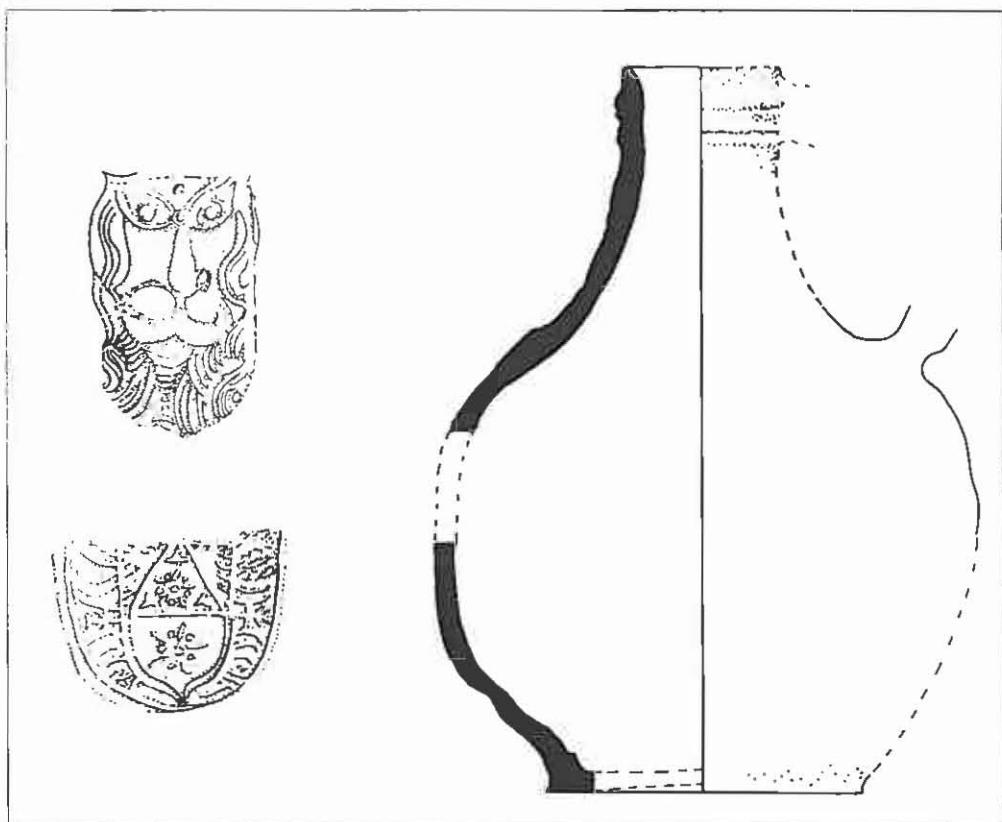


Jugs with mask and one medallion  
BAT 2150



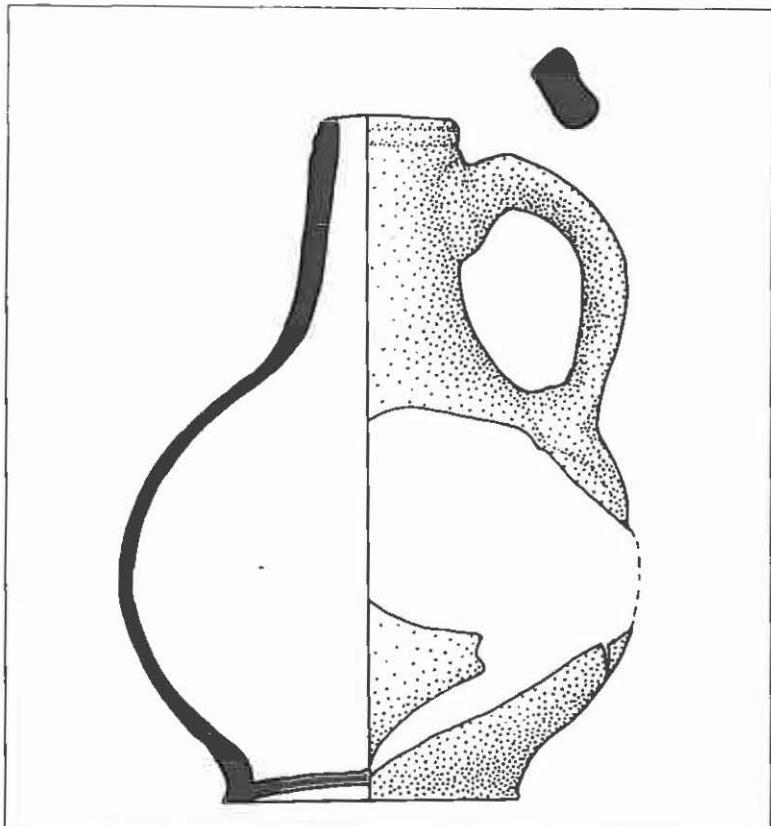
This jug has a broken neck and handle. The single medallion is the Arms of the Province of Gelderland.

BAT No Number

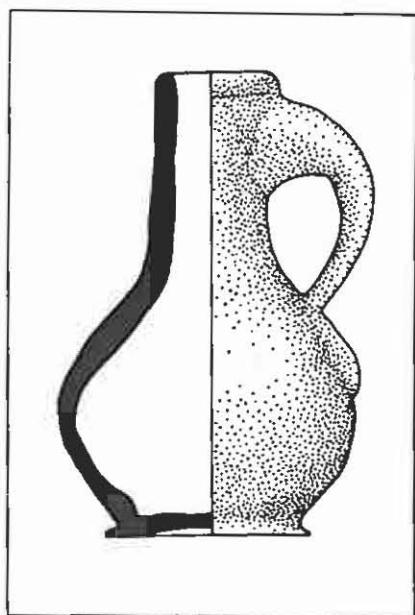


These fragments form a jug with a rose-triangle-rose type medallion, possibly the jug's only medallion.

Plain medium jugs  
BAT 2579

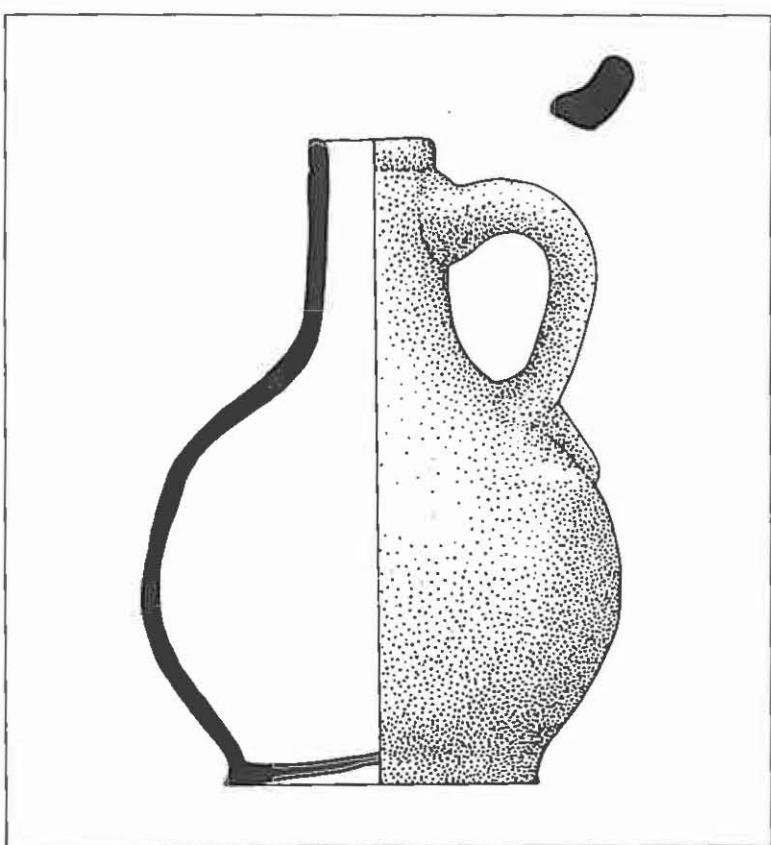


Plain small jugs  
BAT 2667

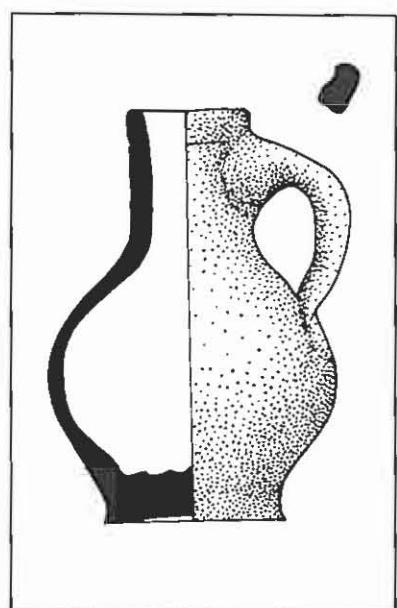


Plain jug fragments.

BAT 445



BAT 505



Plain jug complete.

### Masks

There are a large variety of masks belonging to the common bearded jug. The greatest stylistic variation of these grotesque visages is in the execution of the mouth. The masks have, therefore, been classified according to the shape of the mouth although there are other variables. In the author's previous report on bearded jugs from the *Vergulde Draeck* (Green, 1977), fourteen types of mask were noted. The *Batavia* material is even more complex, with many more different types of masks and greater variation within the groups. The various forms will be described here and the examples illustrated in the following pages (the references to examples given in parenthesis below have the illustration number prefixed with 'No.' and refer to the illustrations on the following pages; the registration number is prefixed with 'BAT').

The execution of the mouth, together with the variations of the moustache, form the basis of the classification scheme. These forms include: horizontal ladder (Nos 1–4); horizontal dots (No. 5); curved ladder (Nos 6–12); segment-shaped (Nos 13–23); segment-shaped with fangs (No. 24); hour-glass (Nos 25–33); open hour-glass (Nos 34–41); two plain pads with point in centre (Nos 42–45); two plain pads with fangs (Nos 46–47); two dotted or flower pads (Nos 48–61); two small pads with teeth and cross in circle (No. 62); three pads plain (Nos 63–68); three pads small U-shaped (No. 69); 'smiling' or fish-mouth (Nos 70–71).

The beard has six forms (a single example is given in parenthesis): palmettes, comprising a number of vertical palmettes or leaf-shaped blades usually with a central line running down the middle resembling a vein (No. 3 BAT 2214); palmettes and lines, as above but with a line between each palmette (No. 29 BAT 2568); linear, consisting of a series of vertical lines curved outward on either side of the centre line (No. 36 BAT 21575); curly and naturalistic, comprising a series of curly segments and usually belonging to the larger and better executed jugs (No. 6 BAT 538D); curly and forked, similar to the previous type but less ornate and less curly with a more inward forked appearance (No. 17 BAT 2527); three-part, consisting of a central wedge-shaped section of horizontal lines, flanked by curly sections on each side (No. 55 BAT 20081).

The form of the eye is generally a dot flanked laterally by crescents representing an iris (?) and enclosed longitudinally by two crescents representing the eyelids. This is the basic form of the eye which can be classified under 13 sub-types depending on other features of the eye. For the sake of convenience in the description, the first feature above the eyelid, which could be described as the eye-

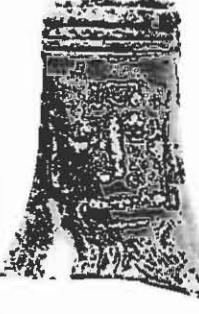
lashes, will be given first, and the feature above this, the stylized eyebrows, will be given second. The types are given with a single example in parenthesis and are as follows: nothing above (No. 6 BAT 538D); ladder and tear-drop (No. 43 BAT 2138–2141); ladder and dog-tooth (No. 7 BAT 2530); ladder and three inverted crescents (No. 47 BAT 21581); ladder across both eyes nothing (No. 2 BAT 2182); tear-drop and dog-tooth (No. 46 BAT 538C); dog-tooth and dog-tooth (No. 68 BAT 2110); dog-tooth and line (No. 70 BAT 2997–2956); dog-tooth and nothing (No. 8 BAT 538–2271); dog-tooth across both eyes (No. 5 BAT 20472); dots across both eyes and nothing (No. 19 BAT 603B); curly naturalistic and nothing (No. 11 BAT 21523); semi-circular lozenges and three inverted crescents (No. 40 BAT 21573).

These masks offer some interesting comparisons with the masks recovered from the *Vergulde Draeck*. The *Batavia* and the *Vergulde Draeck* sites have produced one of the largest, accurately datable collections of 17th-century bearded jugs and, for this reason, the majority of the *Batavia* masks have been illustrated.

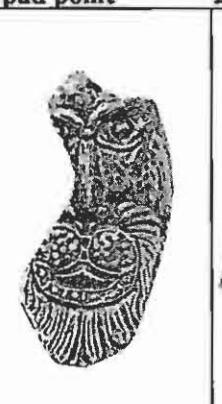
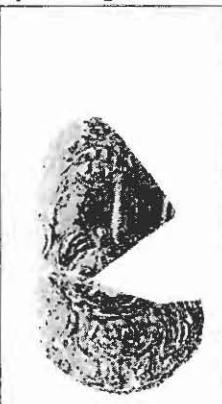
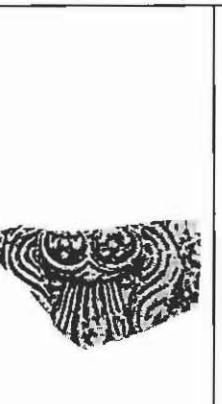
### Medallions

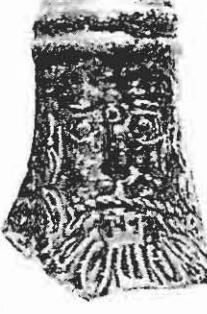
The *Batavia* medallions are also more complex and varied than the *Vergulde Draeck* material, and may be divided into the following groups: Arms of the City of Amsterdam with lion supporters (Nos 1–21); Arms of the City of Amsterdam without lion supporters (Nos 22–30); Arms of the Province of Gelderland (Nos 31–33); Arms of the Province of Holland (Nos 34–35); the Duchy of Jülich-Cleve-Berg with variations (Nos 37–63); Arms of the City of Köln (Nos 66–68); the Holy Roman Empire (Nos 69–71); Arms of the House of Tudor (No. 72); unknown heraldic (Nos 73–80); a bend charged with three roses (Nos 81–83); pale bendy (Nos 84–85); box-cross-cornrose (Nos 86–89); other box-cross types (Nos 90–92); rose-triangle-rose (Nos 93–96); rosette 5-odd-5 (Nos 97–104); rosette 4-odd-4 with a cross (No. 105); rosette 5-even-5 (Nos 106–112); rosette 5-even-10 (No. 113); rosette 5–10–10 (Nos 114–120); rosette 5–10–10–10 (Nos 121–125); miscellaneous (Nos 126–132).

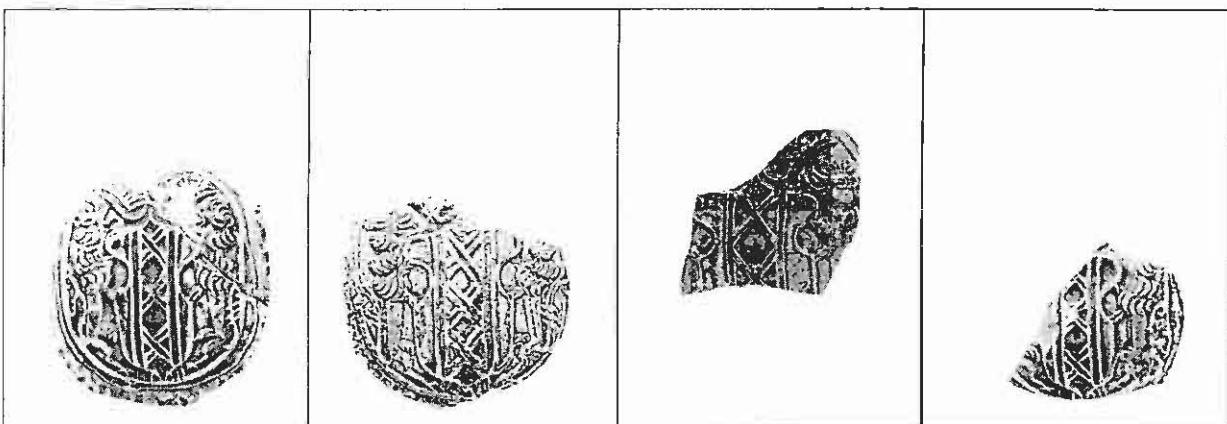
There were several differences between the *Batavia* and *Vergulde Draeck* material. In particular, the rose-crown-heart and several types of rosette medallions which were common on the *Vergulde Draeck*, were not found on the *Batavia*. Conversely, the large variety of heraldic medallions found on the *Batavia* were not found on the *Vergulde Draeck*. It seems that some of the *Batavia* medallions were better executed than the *Vergulde Draeck* medallions, although the majority were of about the same quality.

				
1 BAT 2502 Horizontal ladder	2 BAT2182 Horizontal ladder	3 BAT2214 Horizontal ladder	4 BAT21523 Horizontal ladder	5 BAT20472 Horizontal dots
				
6 BAT538D Curved ladder	7 BAT2530 Curved ladder	8 BAT2234 Curved ladder	9 BAT2968 Curved ladder	10 BAT21576 Curved ladder
				
11 BAT21523 Curved ladder	12 BAT2773 Curved ladder	13 BAT538B Segment mouth	14 BAT603B Segment mouth	15 BAT538C Segment mouth
				
16 BAT538A Segment mouth	17 BAT2527 Segment mouth	18 BAT2968/2065 Segment mouth	19 BAT603B Segment mouth	20 BAT2272 Segment mouth

21 BAT2450 Segment mouth	22 BAT2064 Segment mouth	23 BAT2957etal Segment mouth	24 BAT20157 Seg. mouth & fangs	25 BAT2181 Hourglass mouth
26 BAT538F Hourglass mouth	27 BAT21572 Hourglass mouth	28 BAT2140 Hourglass mouth	29 BAT2568 Hourglass mouth	30 BAT538H Hourglass mouth
31 BAT538G Hourglass mouth	32 BAT538E Hourglass mouth	33 BAT2291 Hourglass mouth	34 BAT603 Open hourglass	35 BAT2568 Open hourglass
36 BAT21575 Open hourglass	37 BAT2106/2568 Open hourglass	38 BAT20209 Open hourglass	39 BAT21574 Open hourglass	40 BAT21573 Open hourglass

				
41 BAT5381 Open hourglass	42 BAT2060etal 2 pad point	43 BAT2138/2141 2 pad point	44 BAT2181 2 pad point	45 BAT2161 2 pad point
				
46 BAT 538C 2 pad fangs	47 BAT21581 2 pad fangs	48 BAT538 Flower pads	49 BAT538B Flower pads	50 BAT538 Flower pads
				
51 BAT2713/2226 Flower pads	52 BAT21580 Flower pads	53 BAT21579 Flower pads	54 BAT2112 Flower pads	55 BAT20081 Flower pads
				
56 BAT2885 Flower pads	57 BAT20468 Flower pads	58 BAT601 Flower pads	59 BAT2037/2724 Flower pads	60 BAT2167 Flower pads?

				
61 BAT21582 Flower pads	62 BAT2104 Fangs	63 BAT477 3 pads	64 BAT2481/2222 3 pads	65 BAT2166 3 pads
				
66 BAT20281 3 pads	67 BAT2684 3 pads	68 BAT2110 3 pads	69 BAT21577 U-shaped	70 BAT2997/2956 Fish-mouth
				
71 BAT2794/2391 Fish-mouth	72 BAT2055 Rope-mouth	73 BAT540 Miscellaneous	74 BAT21578 Miscellaneous	75 BAT2103/2794 Double struck mask



**1 BAT 539/2079**

Arms of Amsterdam (lions)

**2 BAT 602**

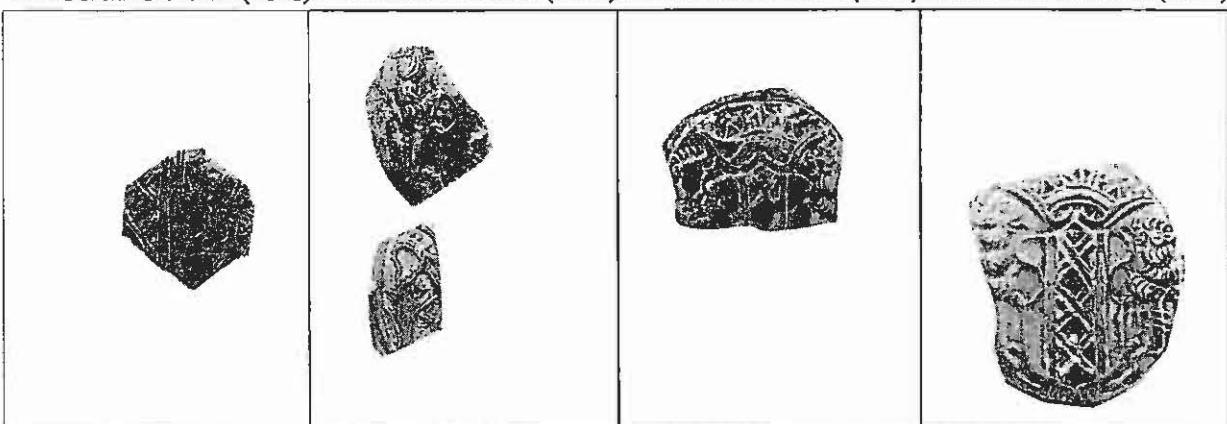
Arms of Amsterdam (lions)

**3 BAT 20166**

Arms of Amsterdam (lions)

**4 BAT 539**

Arms of Amsterdam (lions)



**5 BAT 20171**

Arms of Amsterdam (lions)

**6 BAT 2590/22004**

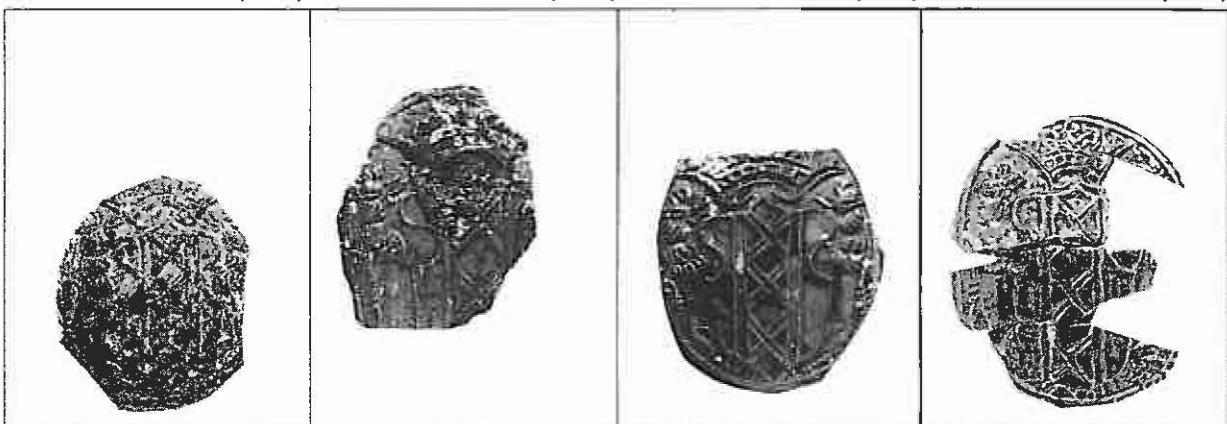
Arms of Amsterdam (lions)

**7 BAT 21923**

Arms of Amsterdam (lions)

**8 BAT 539**

Arms of Amsterdam (lions)



**9 BAT 2121**

Arms of Amsterdam (lions)

**10 BAT 20339**

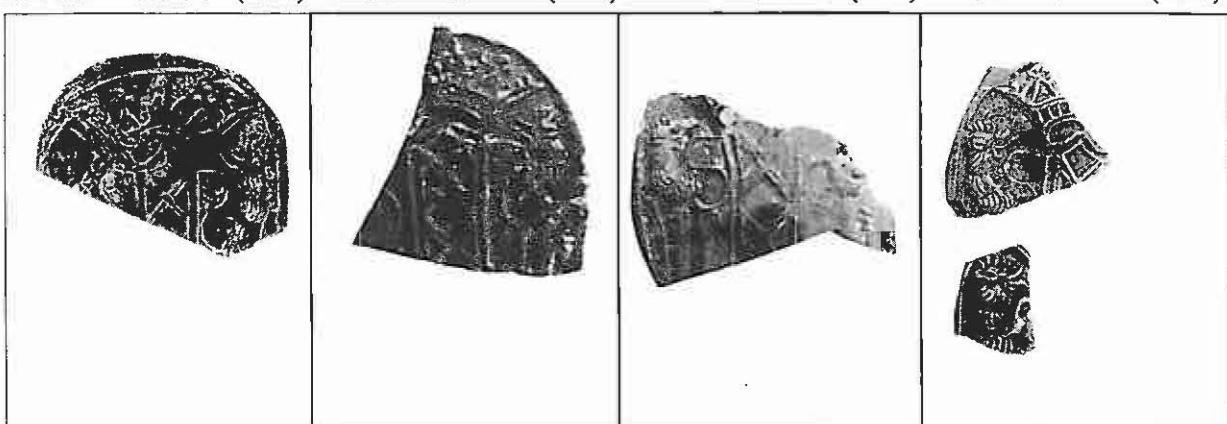
Arms of Amsterdam (lions)

**11 BAT 21587**

Arms of Amsterdam (lions)

**12 BAT 2517 et al**

Arms of Amsterdam (lions)



**13 BAT 602**

Arms of Amsterdam (lions)

**14 BAT 2529**

Arms of Amsterdam (lions)

**15 BAT 21588**

Arms of Amsterdam (lions)

**16 BAT 2023**

Arms of Amsterdam (lions)



17 BAT 21589

Arms of Amsterdam (lions)



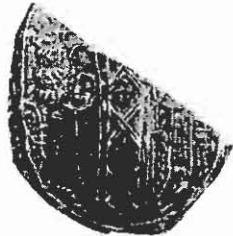
18 BAT 20456/20484

Arms of Amsterdam (lions)



19 BAT 2918

Arms of Amsterdam (lions)



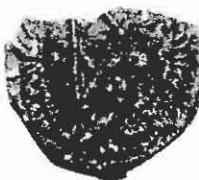
20 BAT 2031

Arms of Amsterdam (lions)



21 BAT 20461

Arms of Amsterdam (lions)



22 BAT 2529

Arms of Amsterdam



23 BAT 2570

Arms of Amsterdam



24 BAT 539

Arms of Amsterdam



25 BAT 21584

Arms of Amsterdam



26 BAT 2158

Arms of Amsterdam



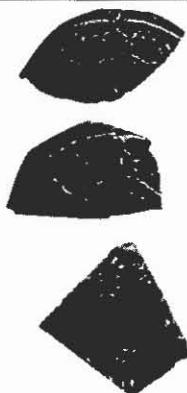
27 BAT 539/21583

Arms of Amsterdam



28 BAT 20256

Arms of Amsterdam



29 BAT 2517 et al

Arms of Amsterdam



30 BAT 2824

Arms of Amsterdam



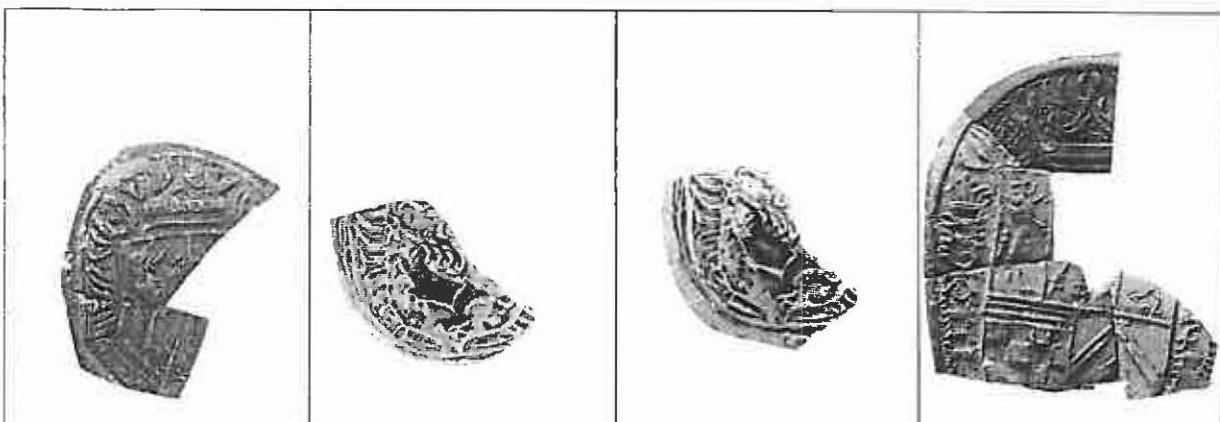
31 BAT 2813

Arms of Gelderland



32 BAT 20463 et al

Arms of Gelderland

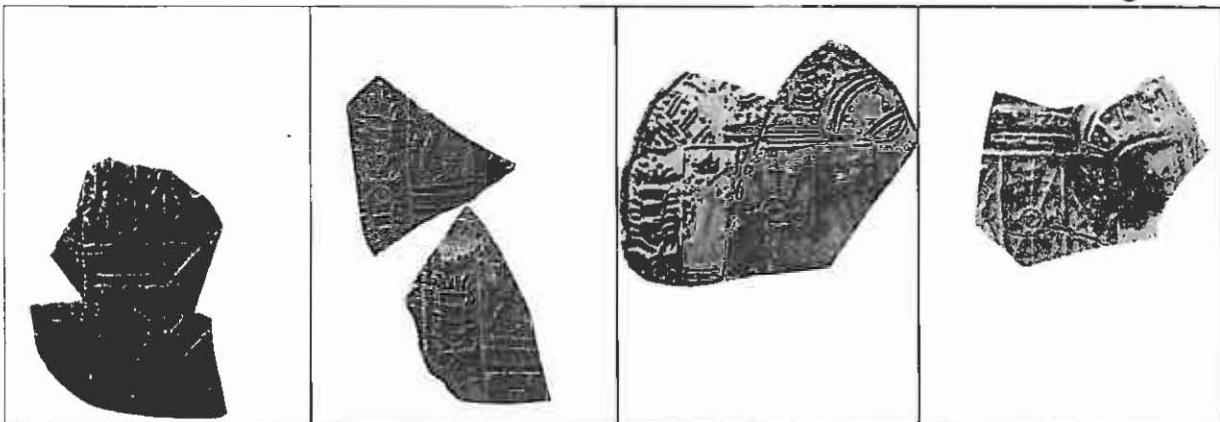


33 BAT2124/602  
Arms of Gelderland

34 BAT 2766  
Arms of Holland

35 BAT 2766  
Arms of Holland

37 BAT 2040 et al  
Jülich-Cleve-Berg

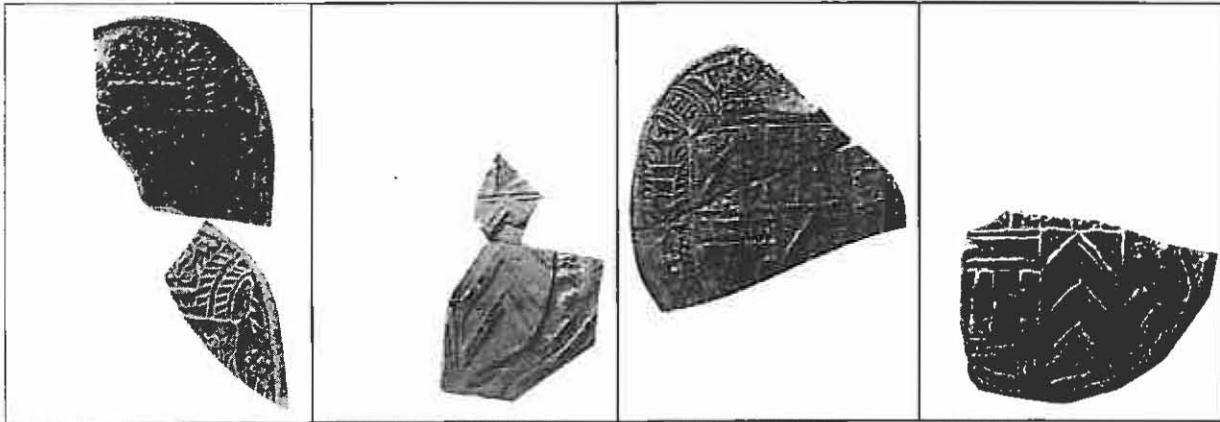


38 BAT2364  
Jülich-Cleve-Berg

39 BAT 539/602  
Jülich-Cleve-Berg

40 BAT 20251/2168  
Jülich-Cleve-Berg

41 BAT 602/2123  
Jülich-Cleve-Berg

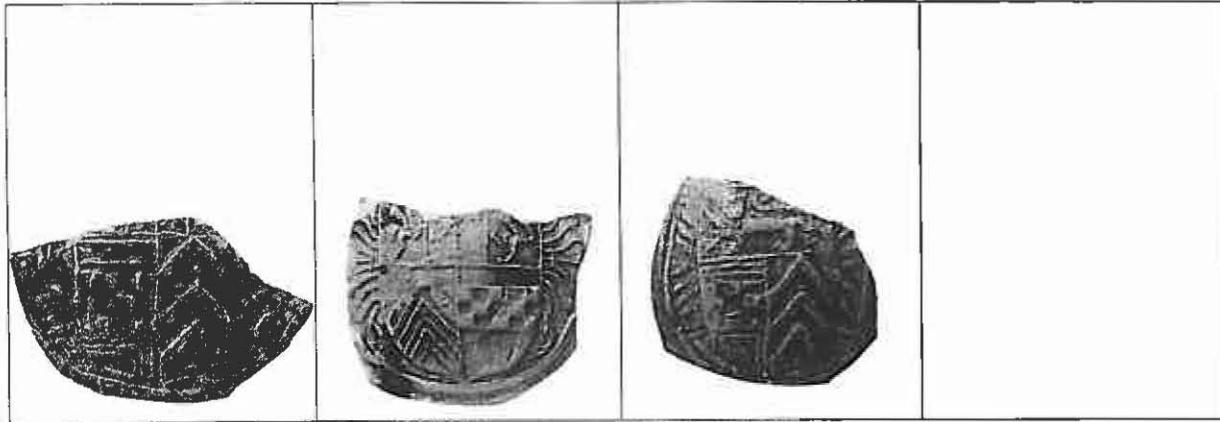


42 BAT 697  
Jülich-Cleve-Berg

43 BAT 20006/20082  
Jülich-Cleve-Berg

44 BAT 602/20337  
Jülich-Cleve-Berg

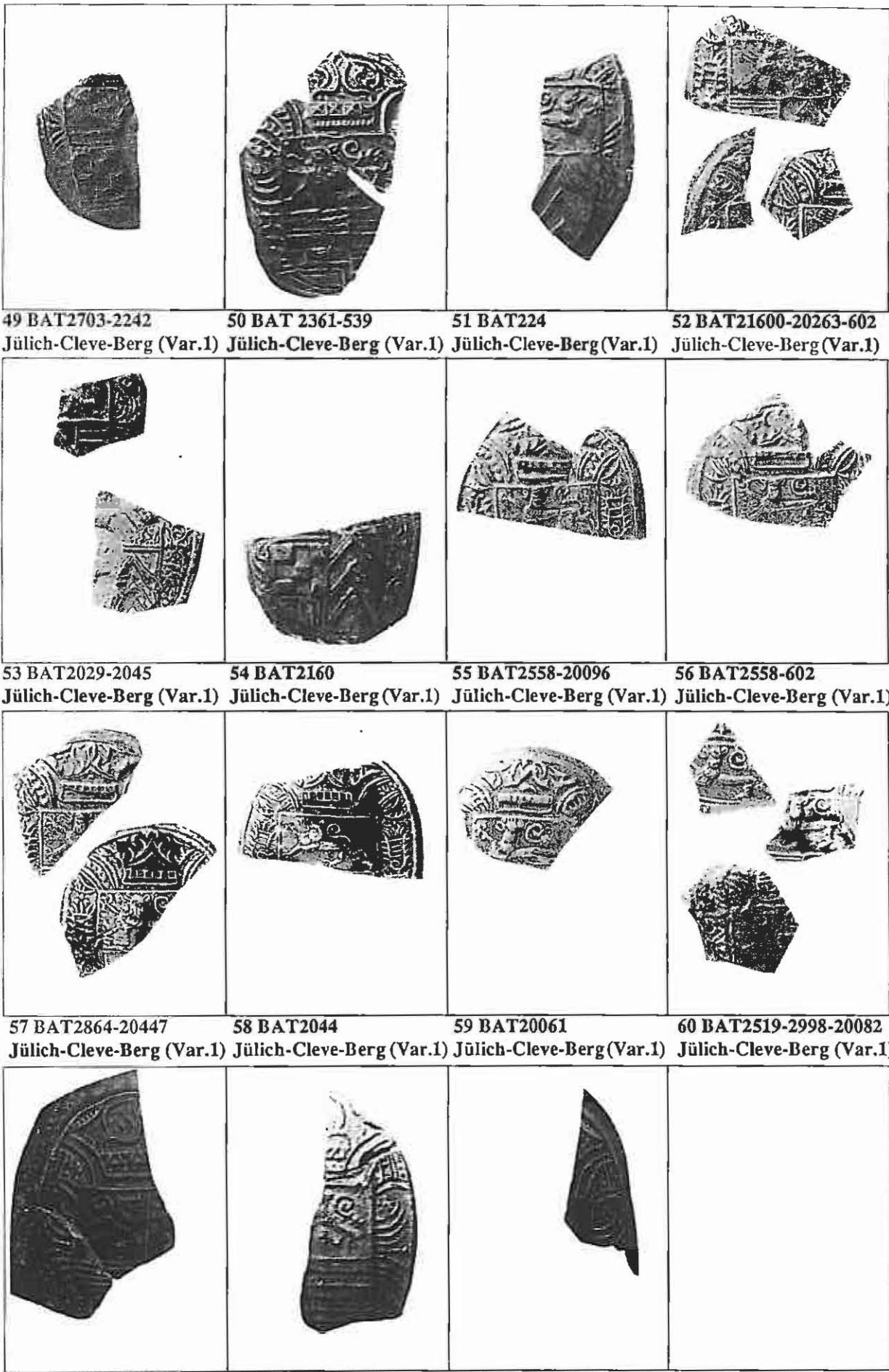
45 BAT 539  
Jülich-Cleve-Berg



46 BAT539  
Jülich-Cleve-Berg

47 BAT 20209  
Jülich-Cleve-Berg

48 BAT20089  
Jülich-Cleve-Berg (Var.1)

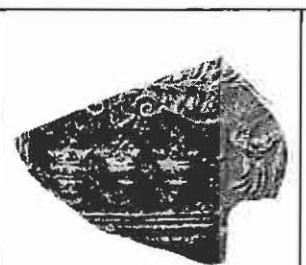




65 BAT2191-2764  
Arms of the City of Köln



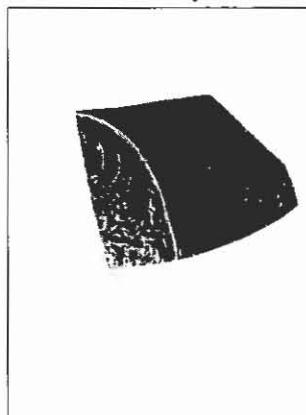
66 BAT539-2014  
Arms of the City of Köln



67 BAT2189  
Arms of the City of Köln



68 BAT539-2463  
Arms of the City of Köln



69 BAT20359  
The Holy Roman Empire



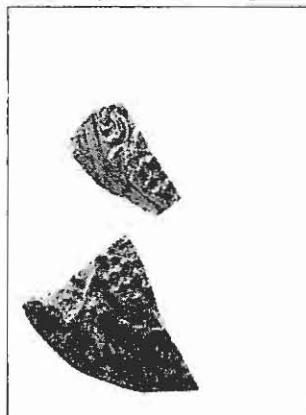
70 BAT2029  
The Holy Roman Empire



71 BAT2023-2456-2224  
The Holy Roman Empire



72 BAT21530A  
The House of Tudor



73 BAT21607-2790-20364  
Various unknown



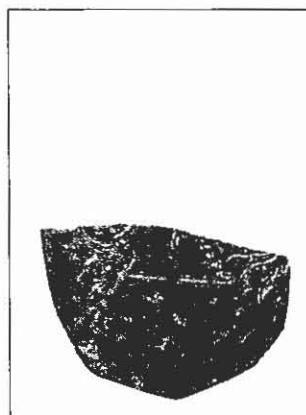
74 BAT2558-2570-21523  
Various unknown



75 BAT2125  
Various unknown



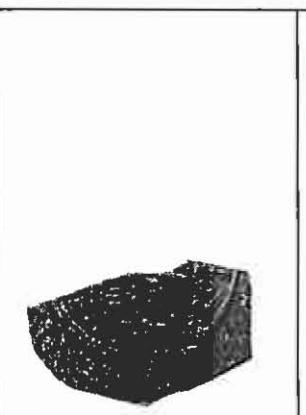
76 BAT539B  
Various unknown



77 BAT2187  
Unknown



78 BAT21598-2072  
Unknown



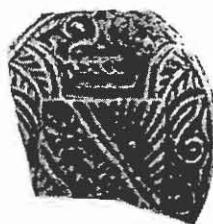
79 BAT2558  
Unknown



80 BAT539A  
Unknown



81 BAT2276-2274-2819  
Bend charged with 3 roses



82 BAT602  
Bend charged with 3 roses



83 BAT2994  
Bend charged with 3 roses



84 BAT20408  
Pale bendy



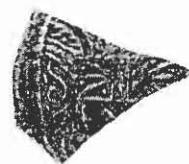
85 BAT602-21593  
Pale bendy sinister



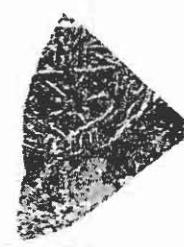
86 BAT2007  
Box-cross-corn-rose



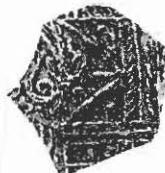
87 BAT2718-2472-2465  
Box-cross-corn-rose



88 BAT2570-2611-2075  
Box-cross-corn-rose



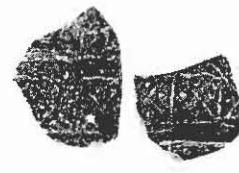
89 BAT2207  
Box-cross-corn-rose



90 BAT602  
Box-cross-corn-checky



91 BAT2073  
Box-cross-dots



92 BAT2049-21594  
Box-cross-dots



93 BAT2971  
Rose-triangle-rose



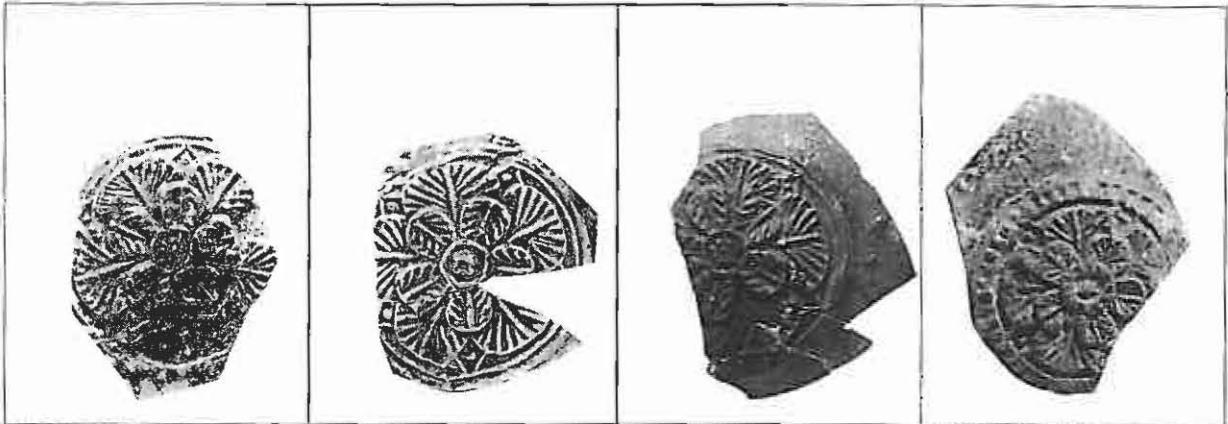
94 BAT2719  
Rose-triangle-rose



95 BAT539  
Rose-triangle-rose



96 BAT267  
Rose-triangle-rose



97 BAT2067  
Rosette (5o5)

98 BAT2961-539  
Rosette (5o5)

99 BAT2414  
Rosette (5o5)

100 BAT21595  
Rosette (5o5)

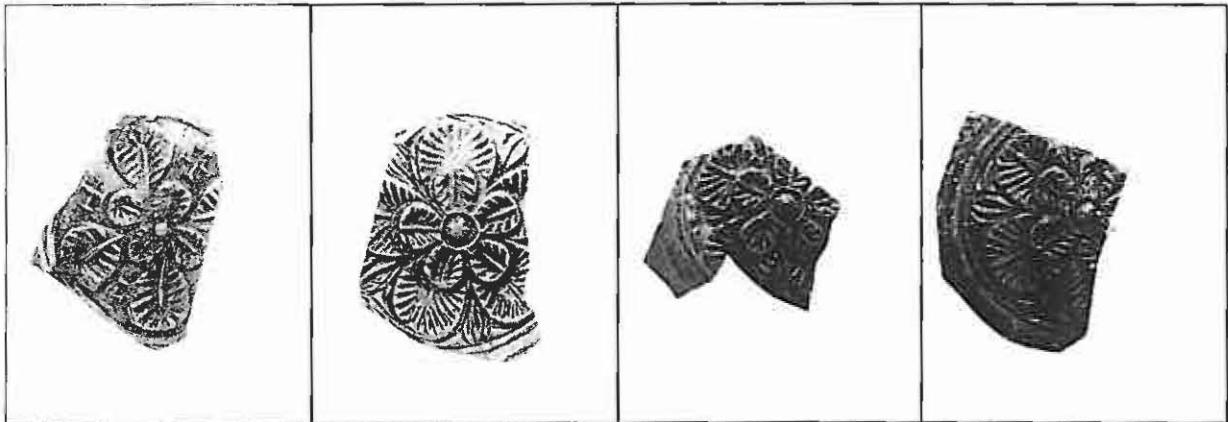


101 BAT20484-2967  
Rosette (5o5)

102 BAT527  
Rosette (5o5)

103 BAT2117-365  
Rosette (5o5)

104 BAT2153B  
Rosette (5o5)

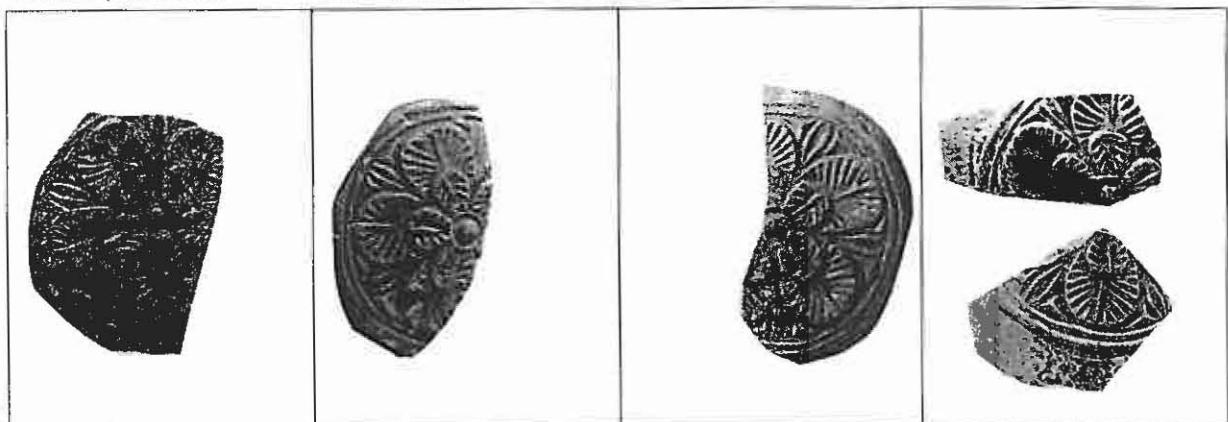


105 BAT20458  
Rosette (4o4 cross)

106 BAT539  
Rosette (5e5)

107 BAT2685-20182  
Rosette (5e5)

108 BAT2517  
Rosette (5e5)

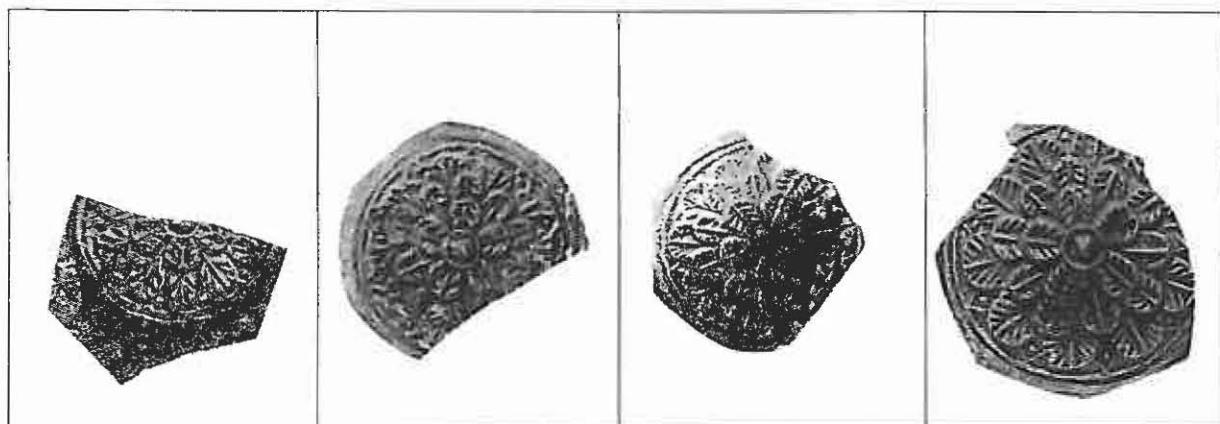


109 BAT2068  
Rosette (5e5)

110 BAT2585  
Rosette (5e5)

111 BAT20503  
Rosette (5e5)

112 BAT2797-539  
Rosette (5e5)

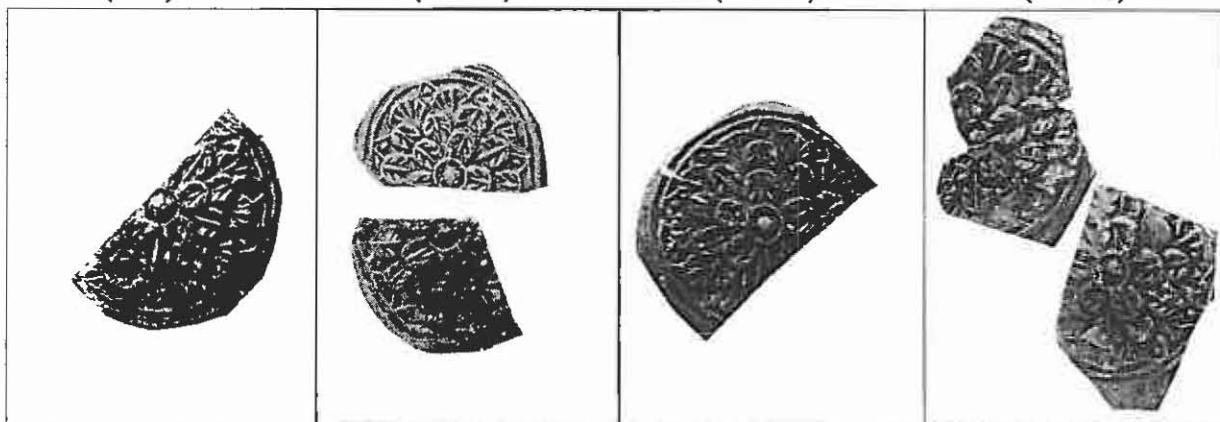


113 BAT2024  
Rosette (5e10)

114 BAT2185  
Rosette (5-10-10)

115 BAT221  
Rosette (5-10-10)

116 BAT21596  
Rosette (5-10-10)

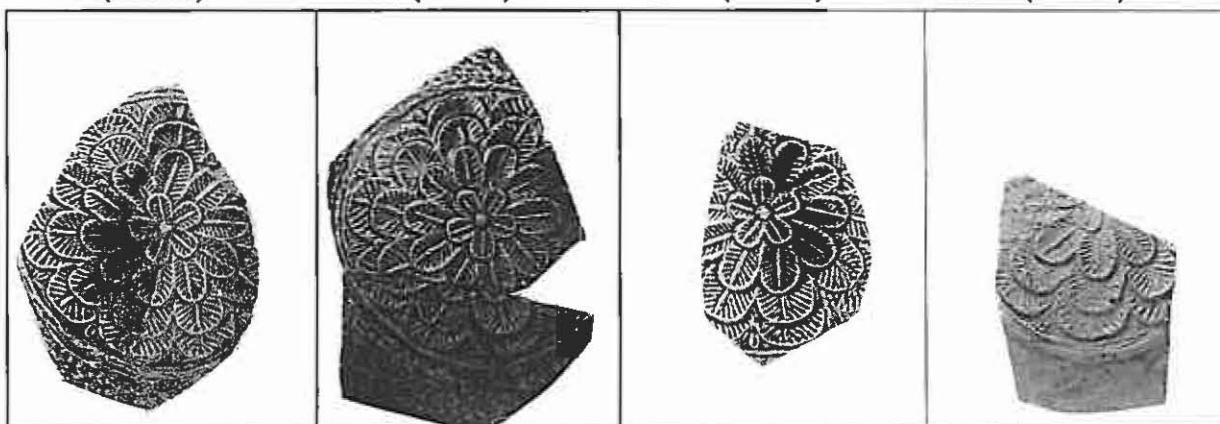


117 BAT2418  
Rosette (5-10-10)

118 BAT20424-21597  
Rosette (5-10-10)

119 BAT2989  
Rosette (5-10-10)

120 BAT2570-2786-2009  
Rosette (5-10-10)

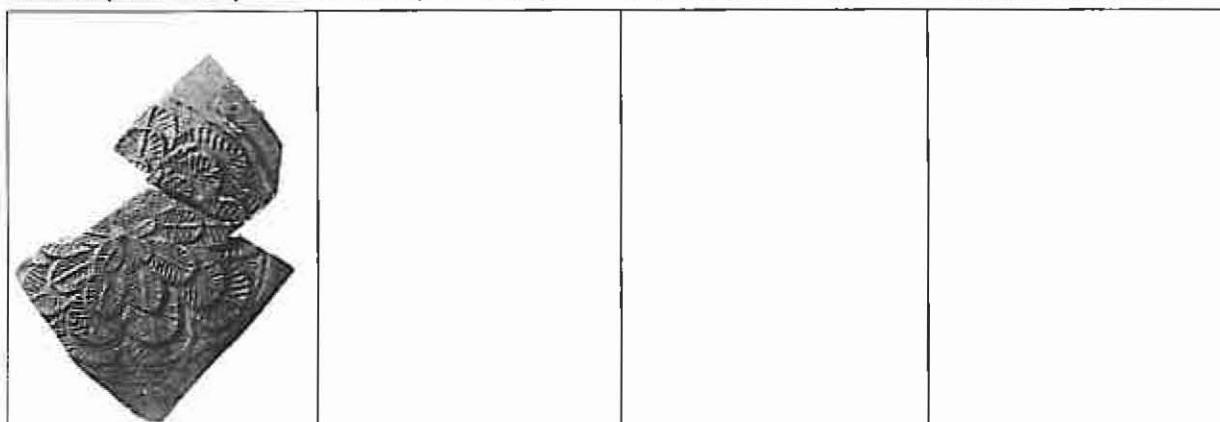


121 BAT602  
Rosette (5-10-10-10)

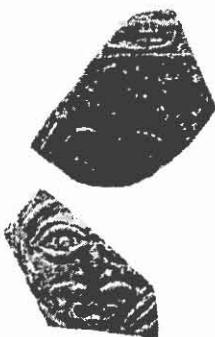
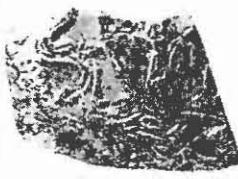
122 BAT2989-2126  
Rosette (5-10-10-10)

123 BAT602  
Rosette (5-10-10-10)

124 BAT20238  
Rosette (5-10-10-10)



125 BAT2714-2740  
Rosette (5-10-10-10)

			
126 BAT2036-2078 Face	127 BAT539-2558 Two persons	128 BAT2186-483 Caesar medallion	129 BAT2534-602-2032 Caesar medallion
			
130 BAT20404 Caesar medallion	131 BAT2532-539-21605 Caesar medallion	132 BAT2520 Jan Allers medallion	

## COOKING WARES – EARTHENWARE-REDWARES

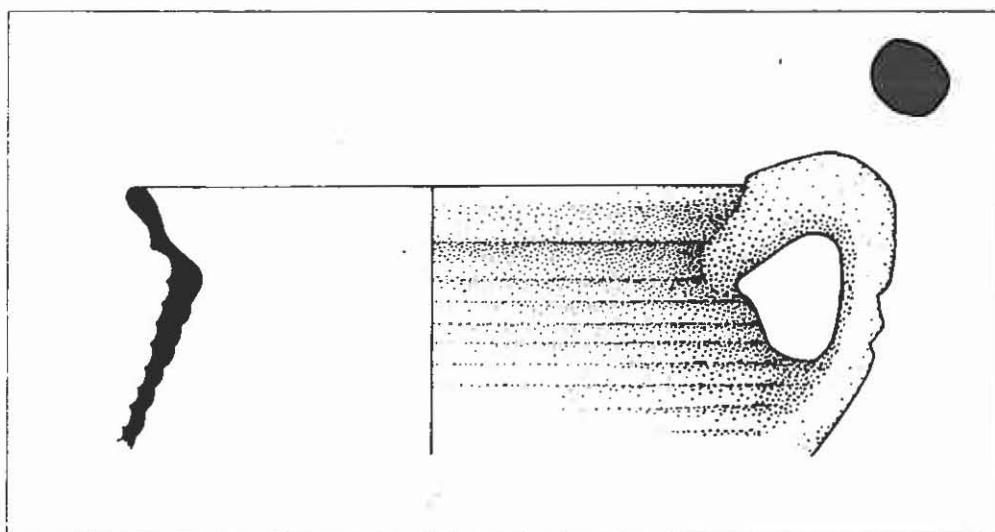
A variety of redwares were found on the site. Possibly much of this material was associated with the officers' and passengers' area of the ship. The resolutions of the middle of the 17th century do not specifically mention earthenwares and most of the items are rather small for the needs of the cookhouse which would have to handle over 300 meals.

The items undoubtedly originate from kilns in the Low Countries and similar forms may be seen in Hurst et al. (1986) and Baart et al. (1977). The fabric is a fine, sandy-red colour, with glazes varying from a rich honey-brown to green. It is noteworthy that there are a large number of vessels with footings rather than the more commonly encountered tripod leg. Also, it should be recorded that footings do not occur in the cooking pots or the pipkins illustrated in Hurst et al. (1986), nor in Baart et al. (1977). Additionally, there appears to be an unusual type not illustrated in the above-mentioned references, which has the form of a deep bowl with a footing. It is possible, at this time, that the Company was commissioning specialized forms from the potteries, although this would seem doubtful. More than likely, these forms were of particular use on board the ship, although less commonly encountered on land.

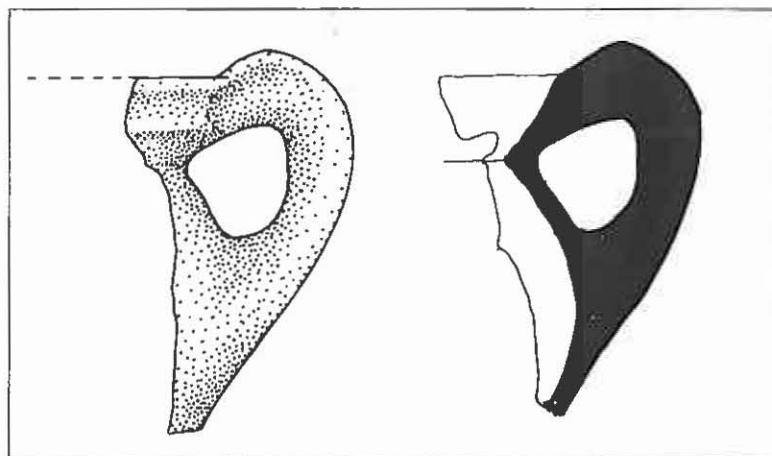
### Cooking pots or tripod pipkin

Unfortunately, no complete examples of this type were found. As a result, it is uncertain if they are cooking pots, which would have had two handles, or pipkins which would have had one handle and a spout. It is not certain either, if these items had a footing or a tripod.

BAT 349



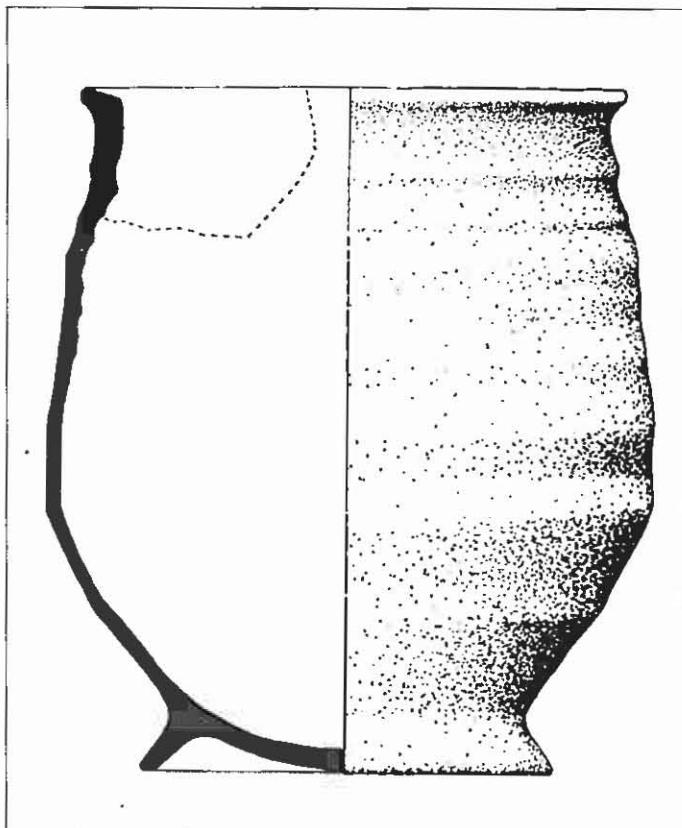
BAT 2290



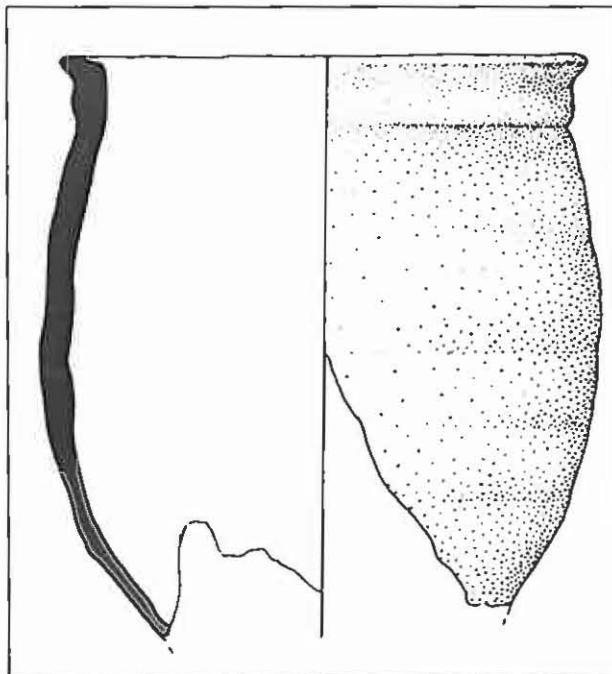
### Tall cooking pots with footring

The three examples of this type of pot, are all glazed on the inside. As they don't all have a complete base, it is not absolutely certain if each of them had footrings, but their shape is very similar.

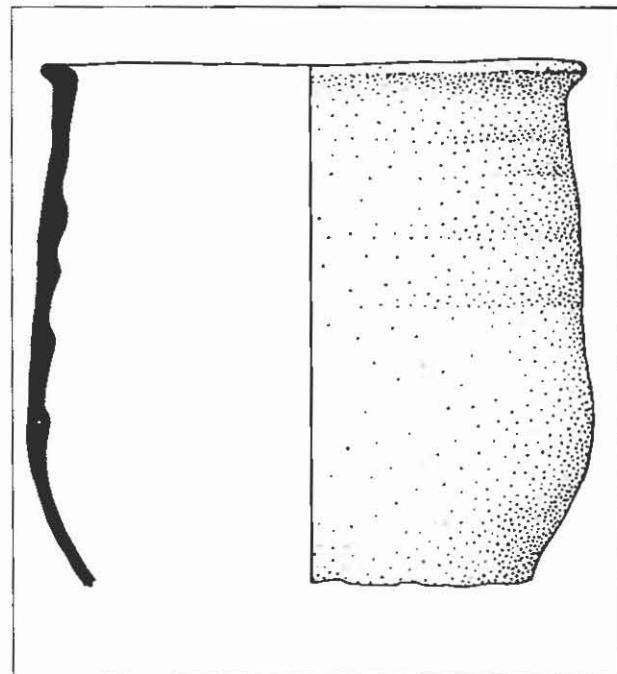
BAT 2315



BAT 2336



BAT 2335

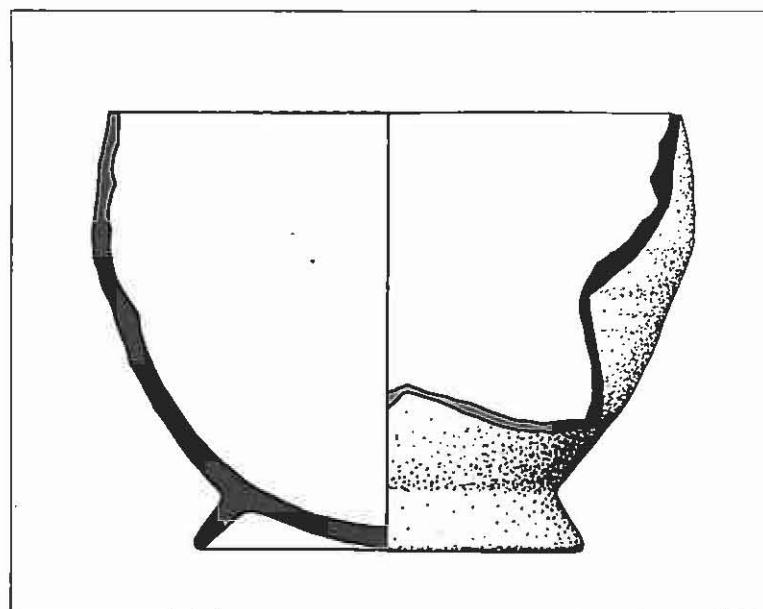


Fragment without a base.

Fragment without a base.

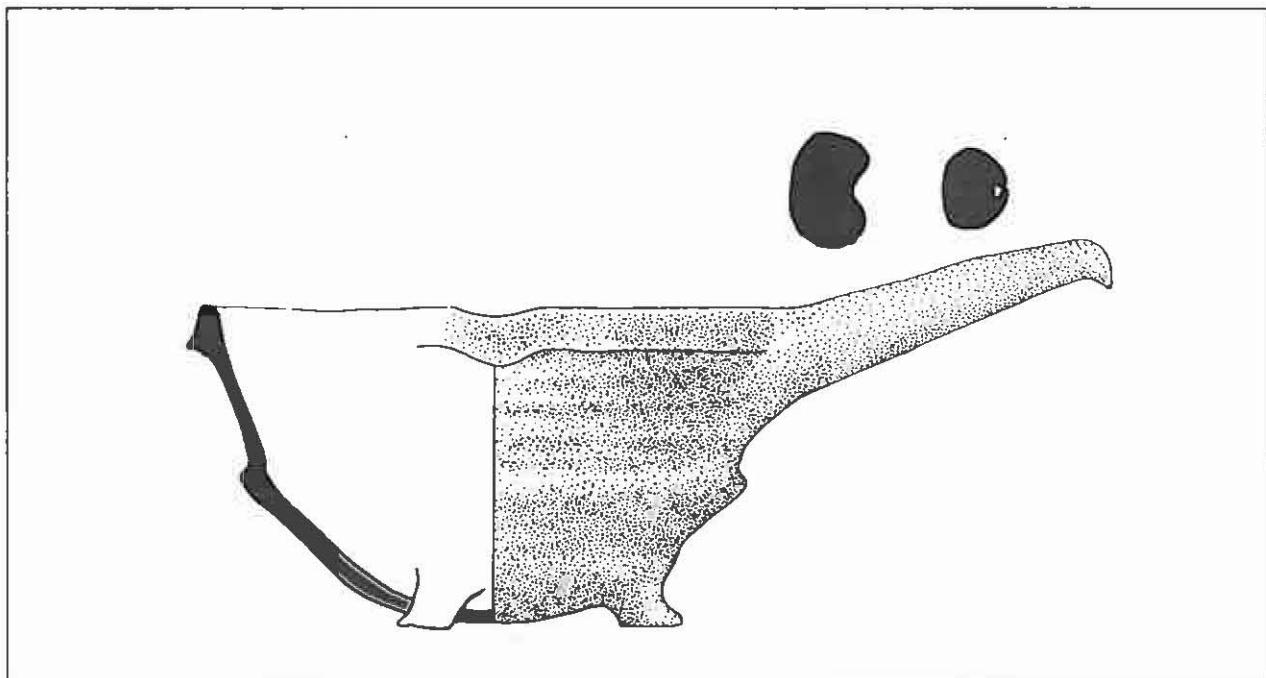
**Shallow cooking pots with footring**

BAT 2339



This type has almost exactly the same form as the tall cooking pots above, and again is not commonly illustrated.

**Skillets with tripod feet**  
**BAT 2333**

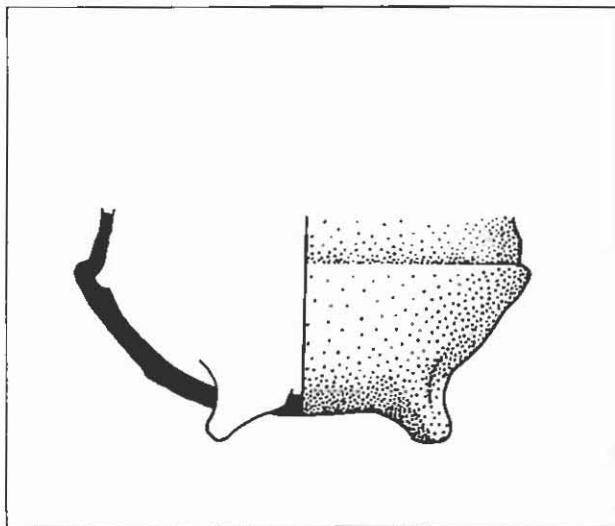
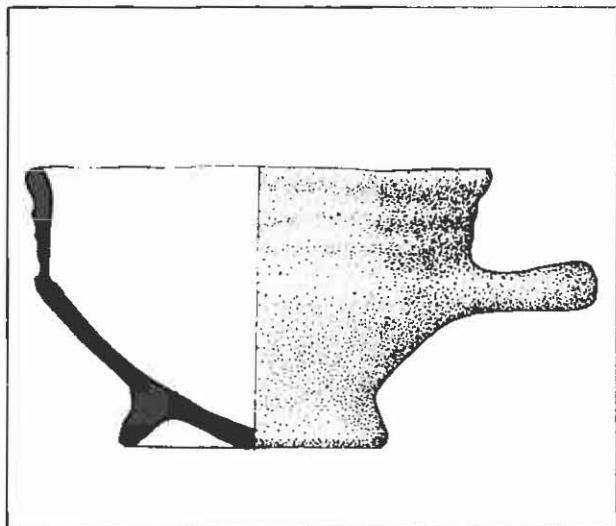


**CONTAINERS – EARTHENWARE-REDWARE**

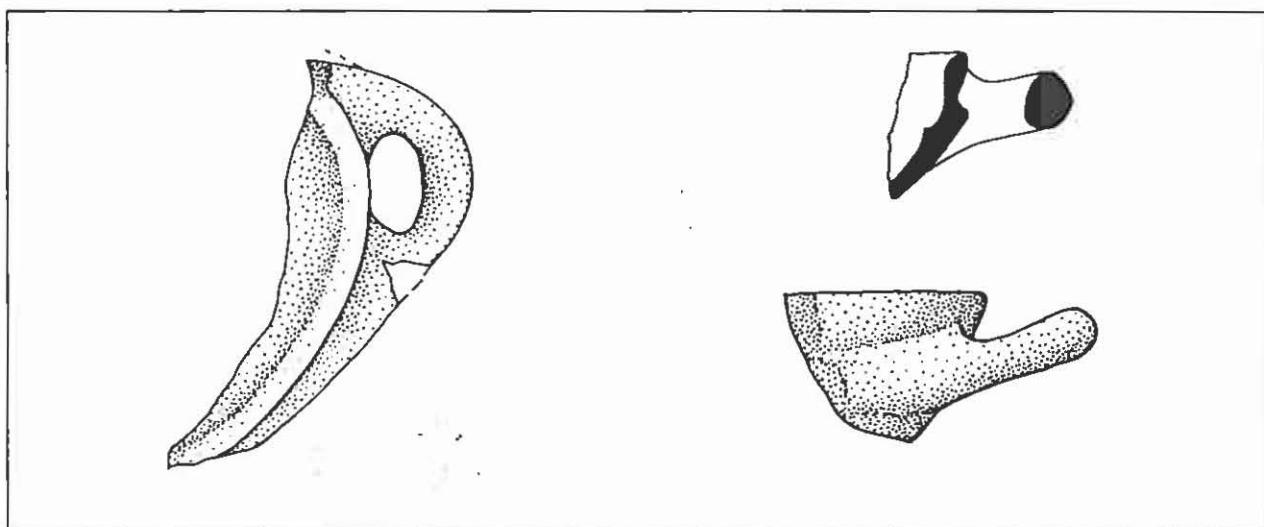
Cups with horizontal handle

BAT 2334

BAT2344

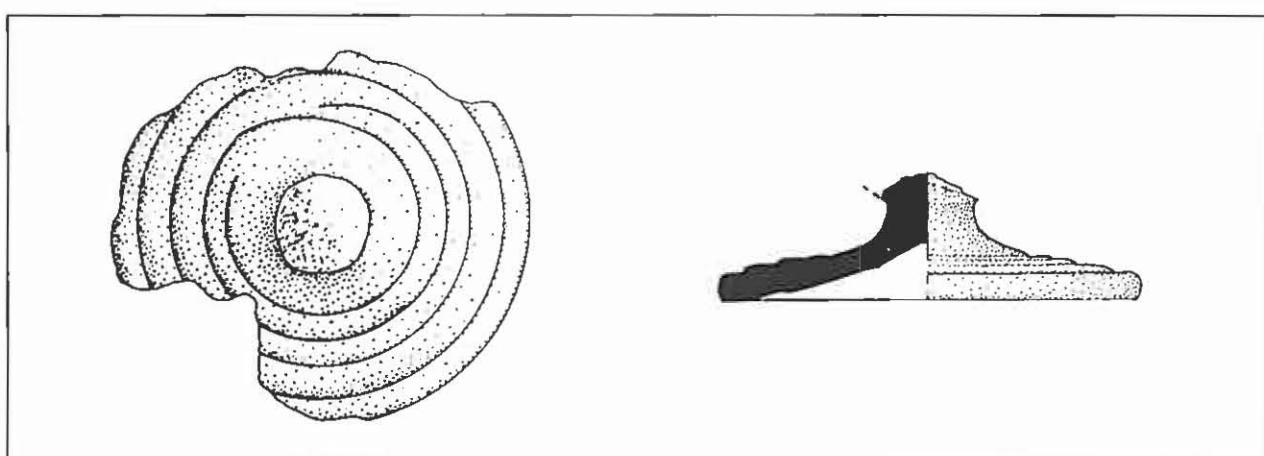


BAT 503



Lid

BAT 2267



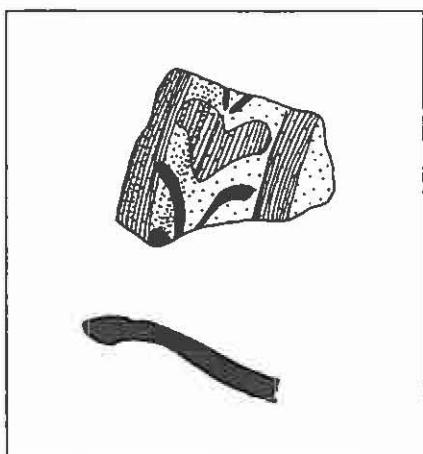
This lid has the same diameter as the cup, and possibly was used as a cover for this or other types of containers.

## MISCELLANEOUS DOMESTIC CERAMIC WARES

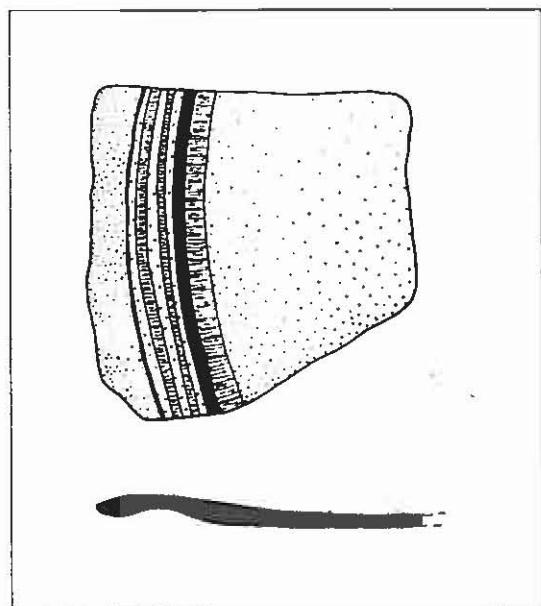
Plate – majolica or tin-glazed earthenware

Fragments of heavily eroded majolica plates.

BAT No Number



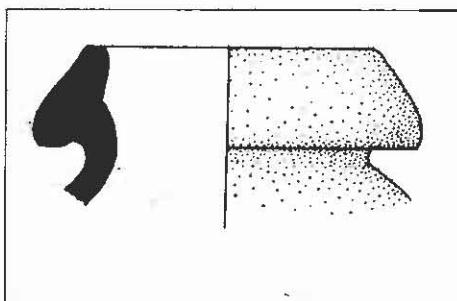
BAT No Number



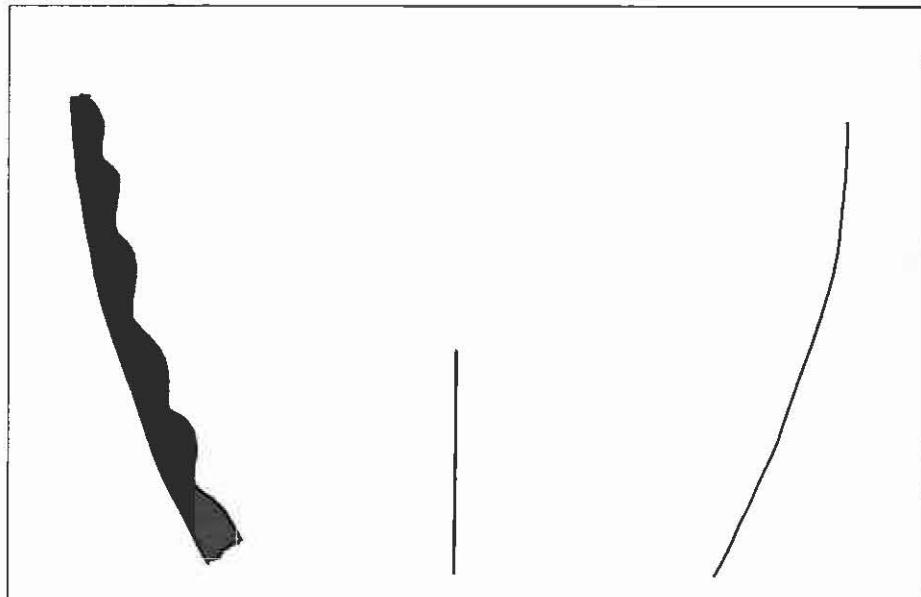
## Olive jars

Two fragments of a single olive jar have been found on the site. It is similar to the elongated form of the 17th century. It is not certain of the exact provenance of these olive jars, which were formerly thought to originate from Seville, but have now been identified as coming from elsewhere in the Iberian peninsula.

BAT 330



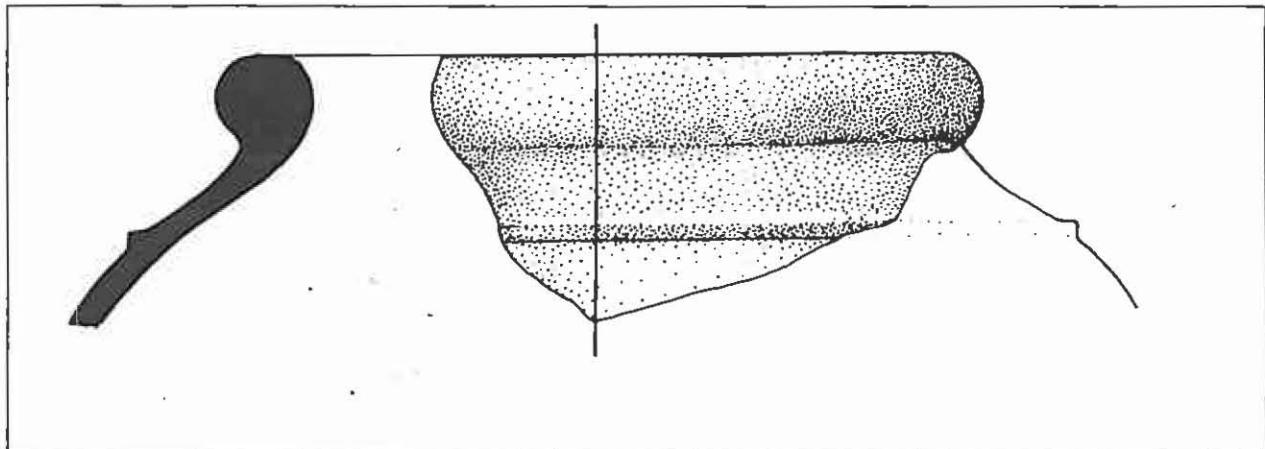
BAT 618



### Thai stoneware storage jar

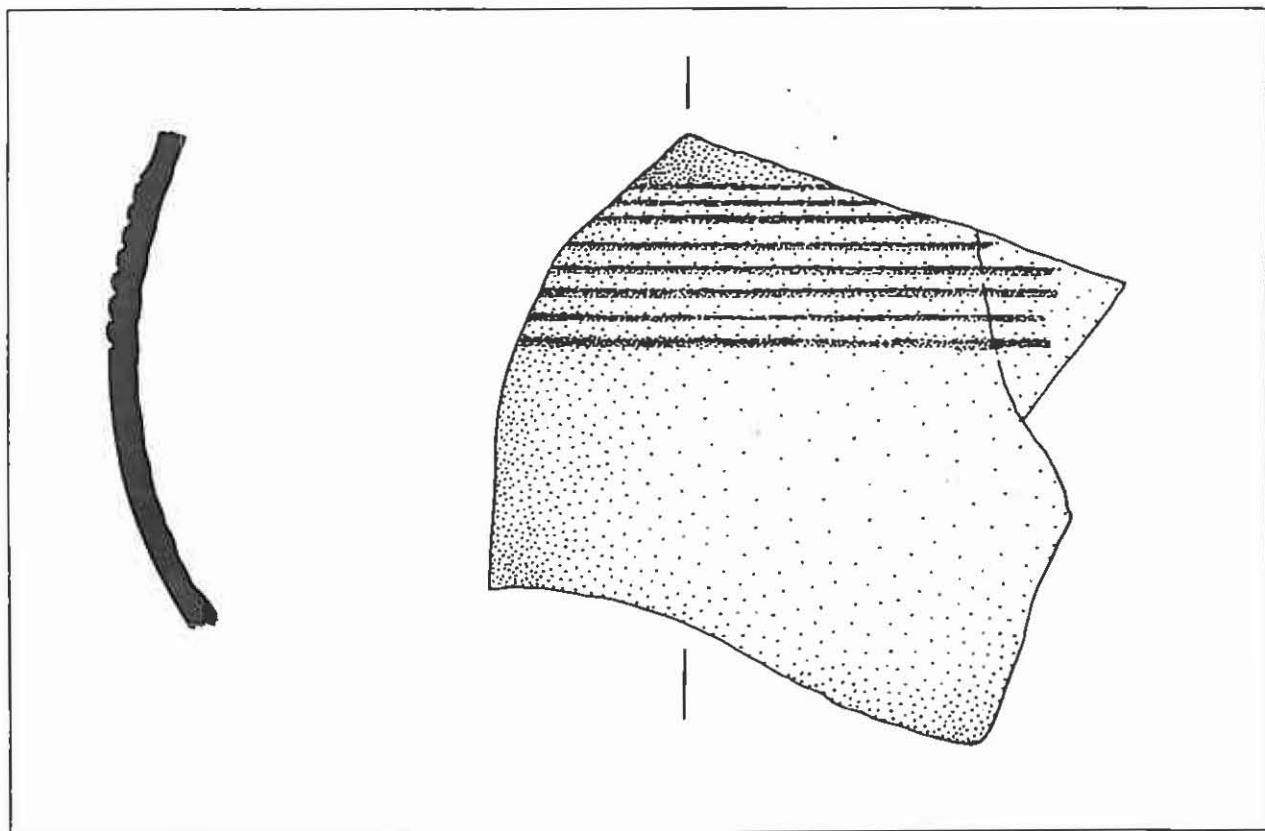
A number of high-fired, Thai stoneware, storage jars have been found on sites such as the *Batavia*. These wares are not well known in Europe, but the distinctive body and the shape and treatment of the neck and shoulders, is unmistakable. It was first thought that these wares came from the kilns in the area near the city of Sawankhalok, in north-central Thailand, and thus they were called Sawankhalok wares. Recent work has identified the kilns more correctly at Sisatchanalai, a nearby town, but has cast doubt on the suggestion that these and other storage jars of a similar type were, in fact, produced there. For a full discussion of this, see Green and Harper (1987)

BAT 545



Neck fragment, with a rolled neck rim standing on the shoulder of the jar. There is a small moulded ridge below the neck rim, which is a distinctive feature of these wares. Below this is usually a series of five to fifteen grooves onto which is applied four massive lug handles (see below).

BAT 608 & 500

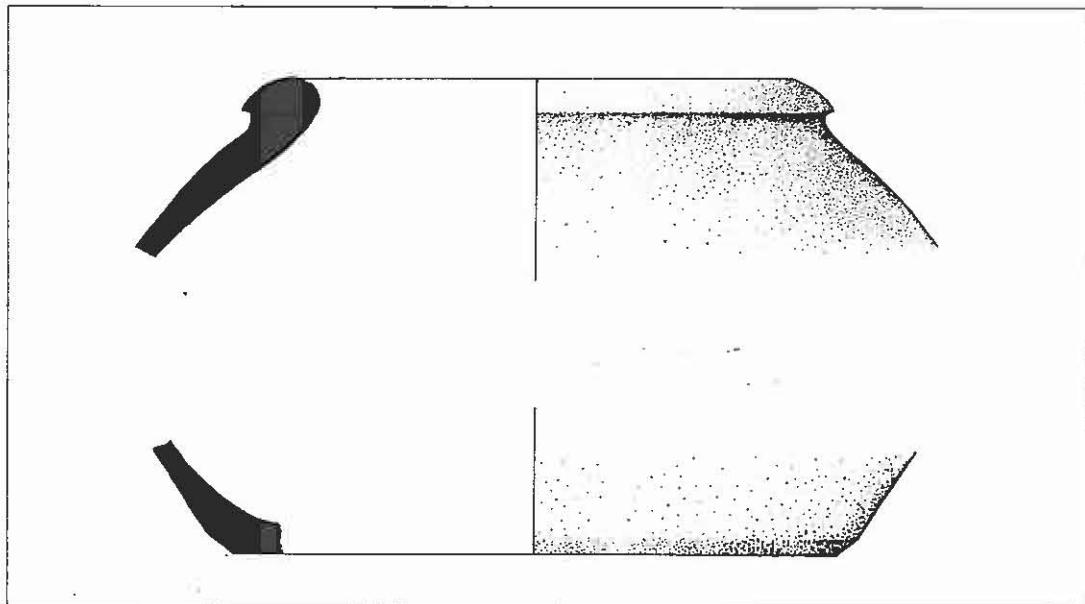


Wall fragment, showing the distinctive incised ridges on the shoulders. On the right is part of the moulding for the lug handles. A similar example is illustrated from the *Vergulde Draeck* in Green (1977).

#### **Unidentified large storage jar**

This jar must have stood over 500 mm high with a body diameter of about 500 mm. No exact parallels have been found, but it is similar to jars that had a moulded loop-shaped handle applied to the side of the jar, often with a cartouche containing a European house-mark enclosed below, suggesting a European origin for the kilns. This particular type of jar is discussed by Ashdown (1972) who suggests an Iberian or north Italian origin. The body is a fine reddish-brown, and is quite soft, suggesting earthenware or proto-stoneware. The fragments are very eroded and no glaze is evident.

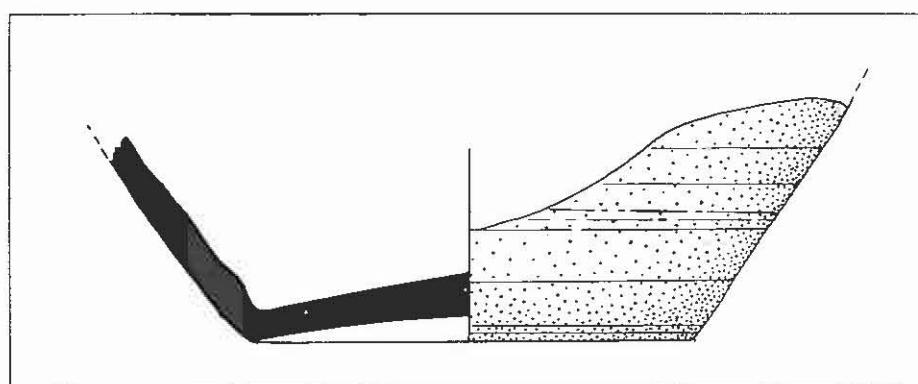
**BAT 2416 (SCALE 1:4)**



#### **Unidentified stoneware jar**

This is possibly the fragment of a base of a storage jar from a kiln-site somewhere in China, probably in the south. This type of jar had small horizontal strap handles around the neck. The body of this particular example is a fine white-buff, high-fired stoneware.

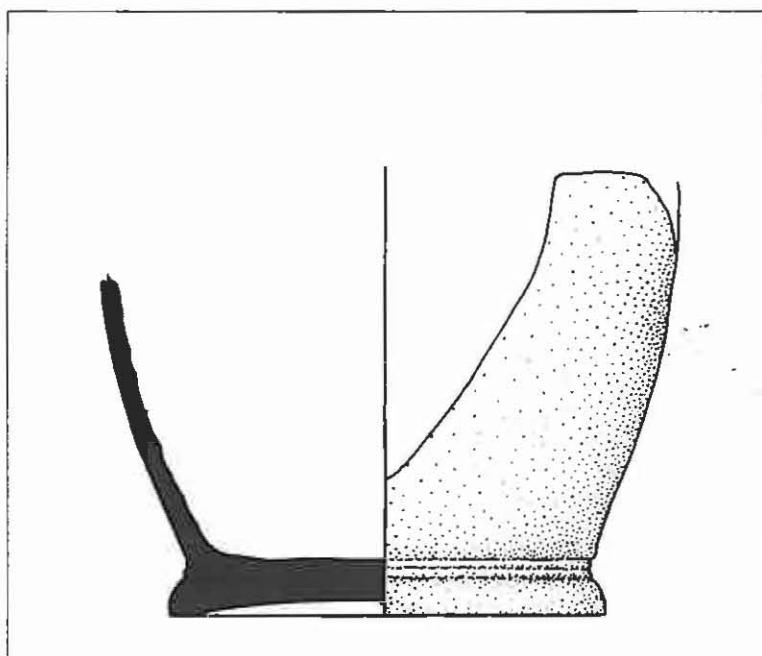
**BAT 2562**



#### **Unidentified base of a stoneware jar with a footing**

This is possibly a variation of a German saltglazed, stoneware jar or jug. The footing is similar to other examples.

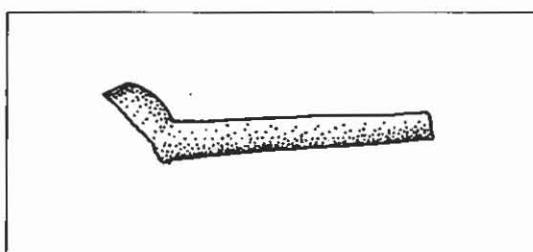
**BAT 331**



#### **Smoking pipe**

A single example of a clay smoking pipe was found on the site. It is a very small fragment of part of the bowl and the stem. Unfortunately, the fragment is very degraded and the heel-mark, if it was present, has been lost. There is evidence of rouletting around the mouth of the bowl. This is a very early example of a clay pipe from the 17th century.

**BAT 2672**



## PEWTER-WARES FOR THE TABLE

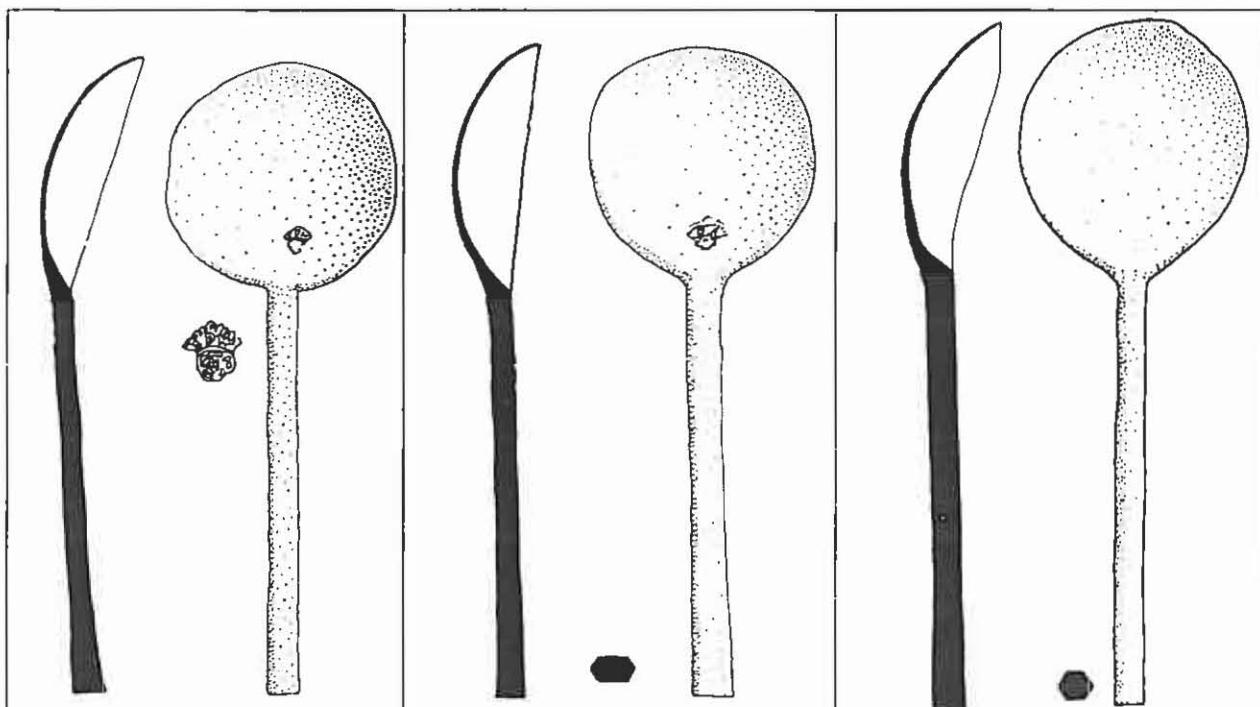
### Spoons

A number of these spoons have the same maker's mark BDW and BH, suggesting that they were supplied to the Company for use on board. It is known from the lists of supplies for the cabin that spoons were required, together with other pewter ware. Some of the spoons have graffiti suggesting that they were marked by their owners.

BAT 3073A

BAT 3073

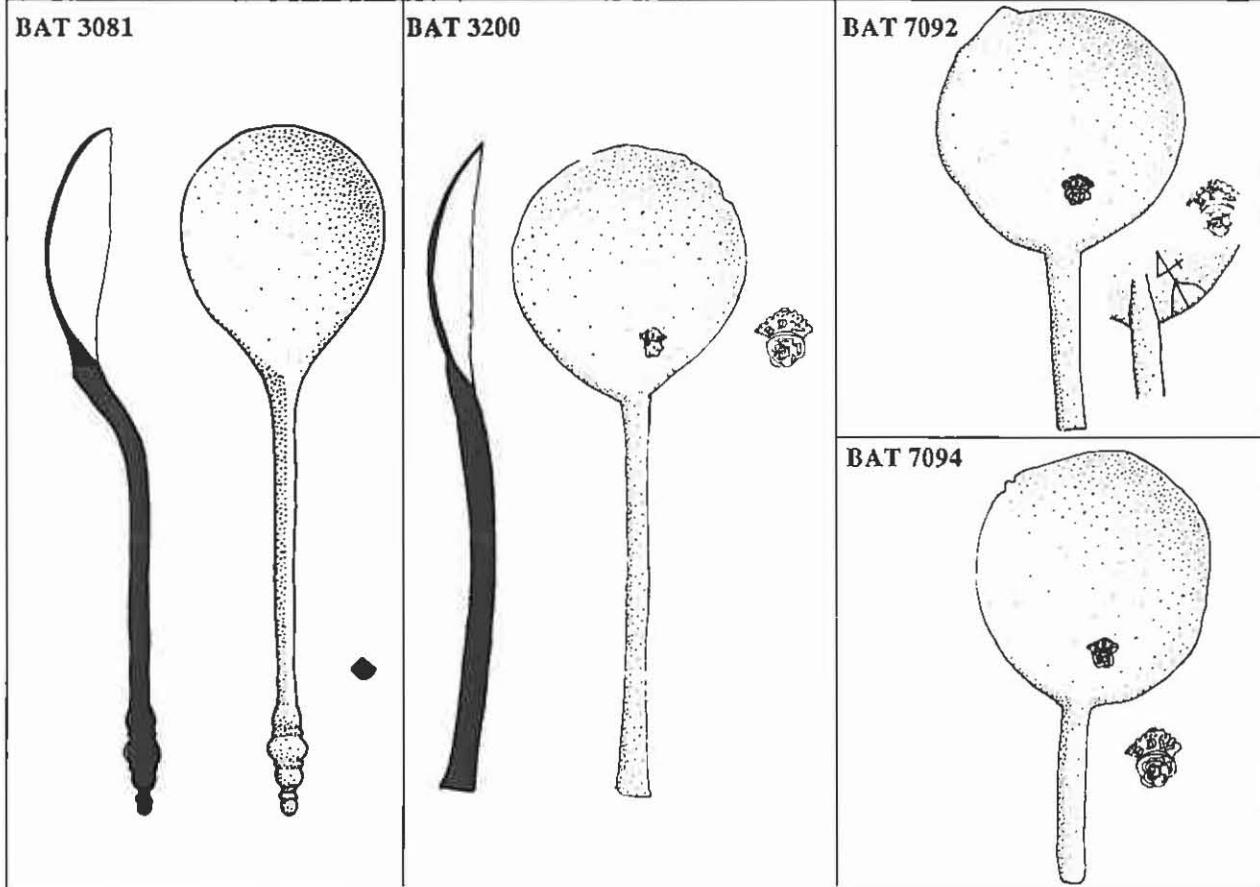
BAT 3080



BAT 3081

BAT 3200

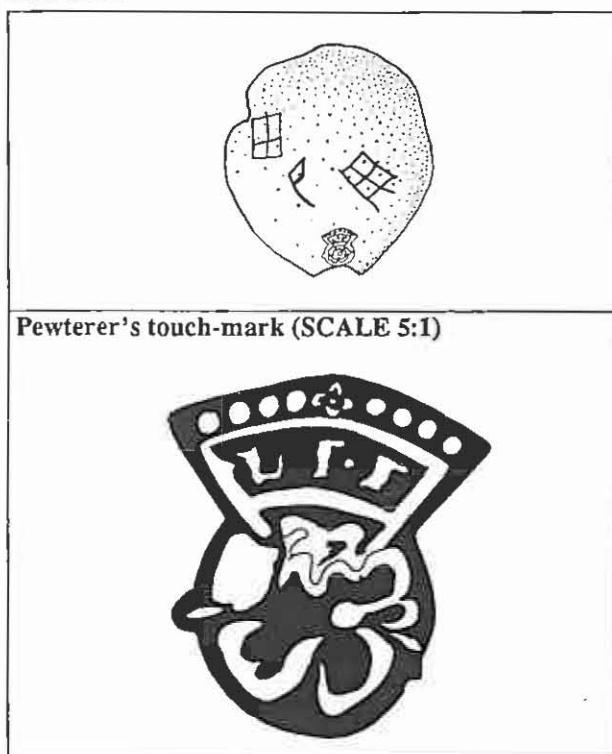
BAT 7092



BAT 3687 (SCALE 1:1)



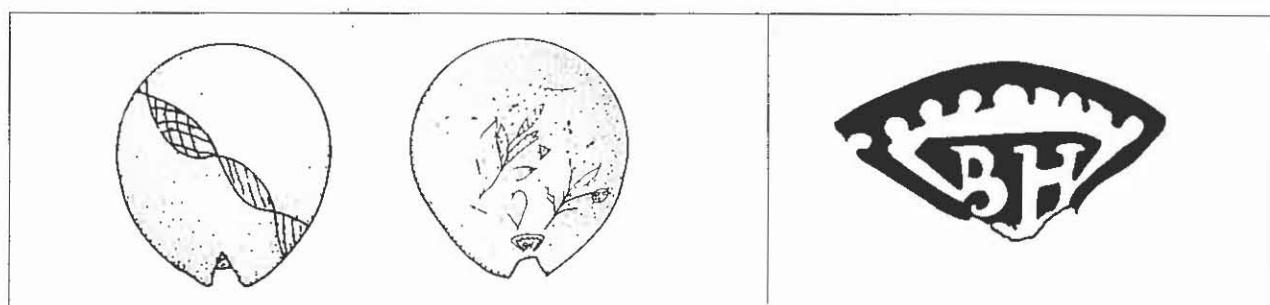
BAT 3111



Note the pewterer's unusual double touch-mark with the date 1627.

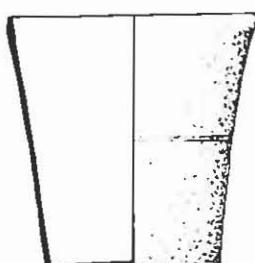
BAT 567

Pewterer's touch-mark (SCALE 5:1)

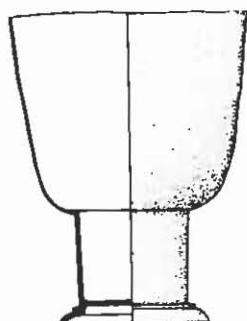


#### Drinking vessels

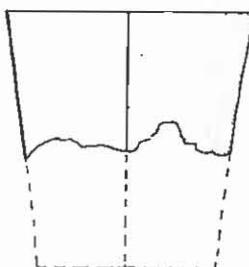
BAT 3220



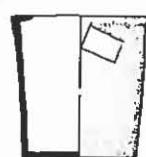
BAT 3376



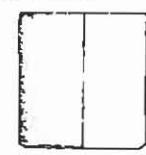
BAT 529



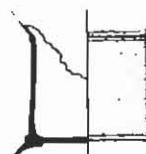
BAT 3318



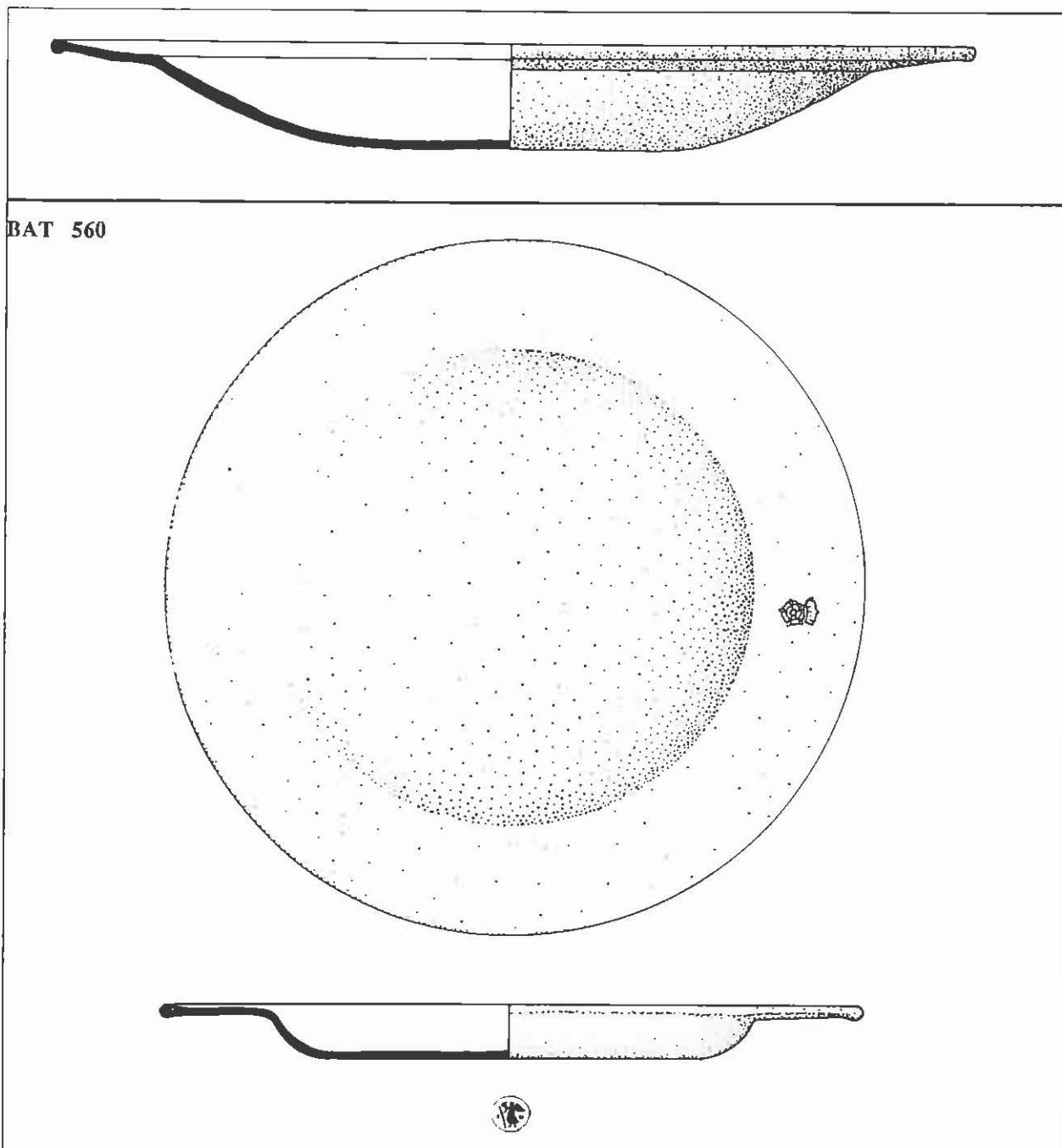
BAT 3214



BAT 373

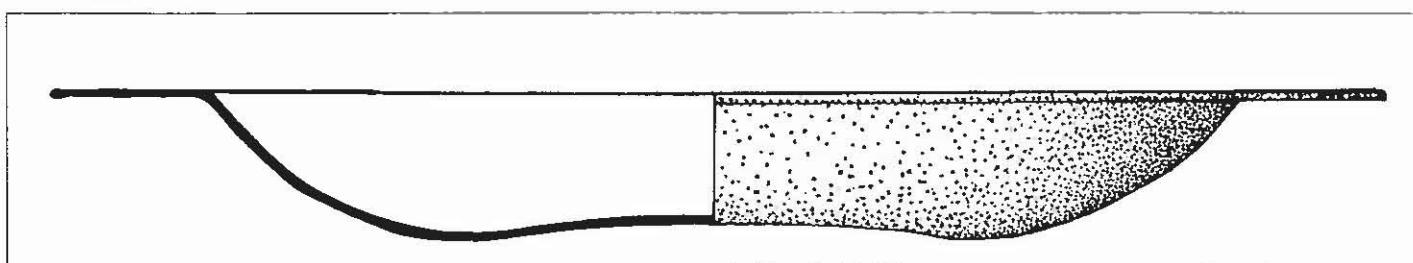


Pewter plates  
BAT 442



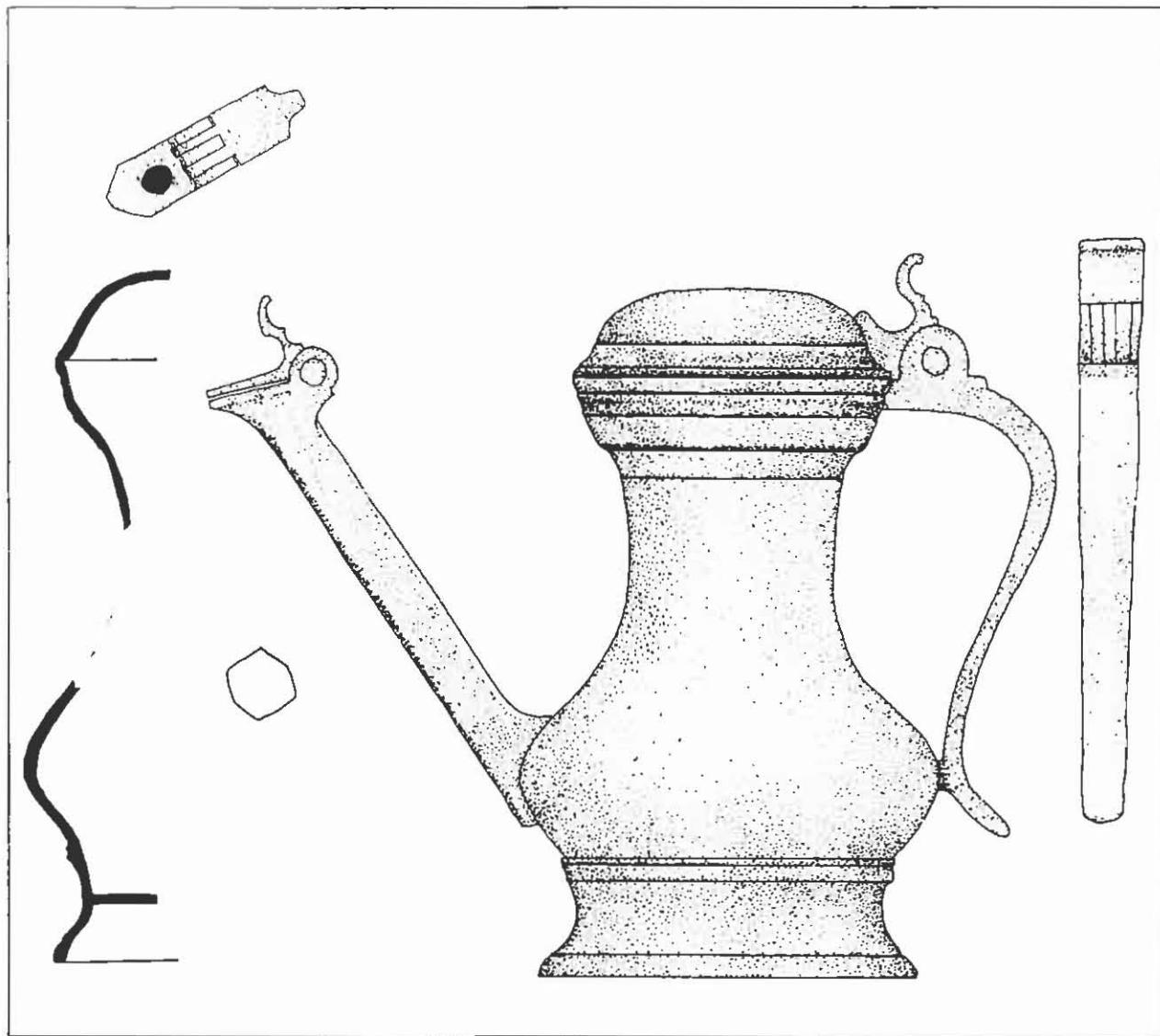
This plate is interesting because it has the crowned rose mark on the rim of the plate and the angel fine pewter mark on the base of the plate.

BAT 3279

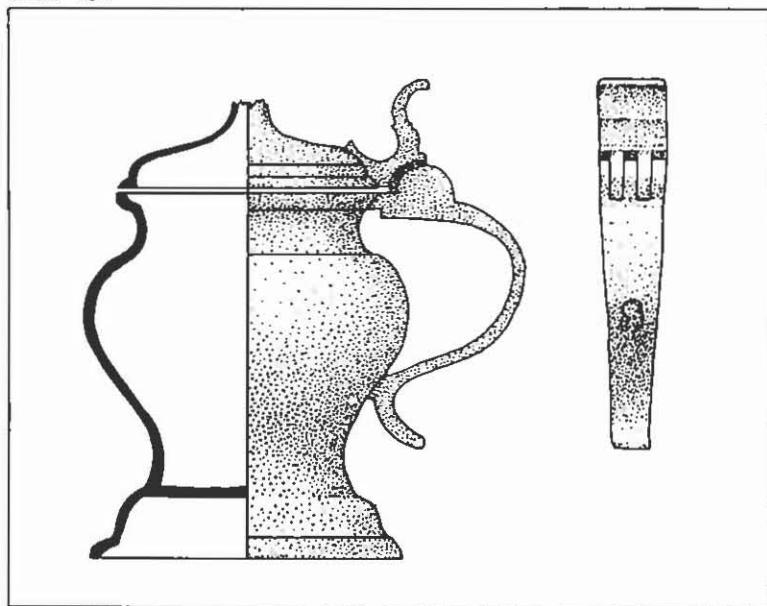


This plate has a crowned rose on the rim, but the maker's mark is indecipherable.  
Two other plates (BAT 441 and BAT 3208) and some plate fragments were also found on the site.

**Spouted or so-called coffee pots and unspouted pots**  
**BAT 430**



**BAT 437**

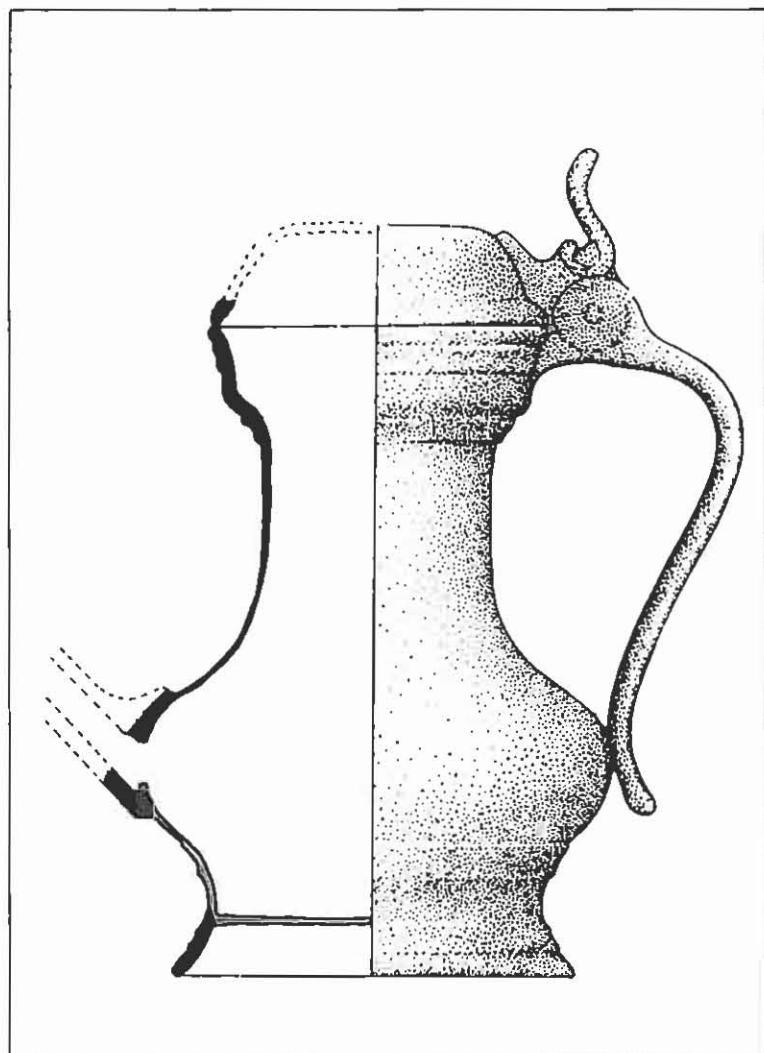


**BAT 437 (SCALE 4:1) Peweterer's mark**



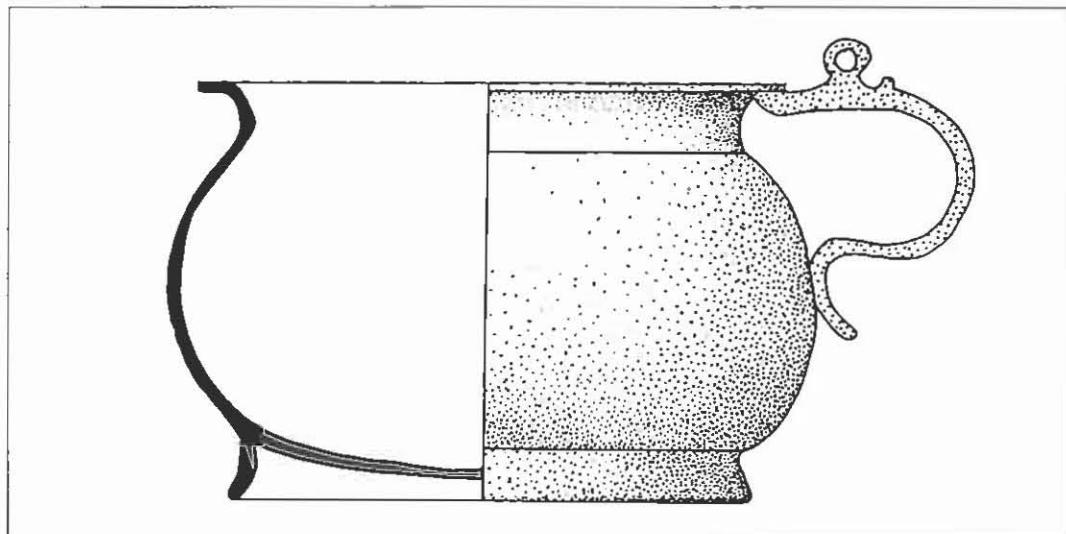
This pot is an unusual small vessel without a spout. The lid had a decorative knob which is now missing.

BAT 3004

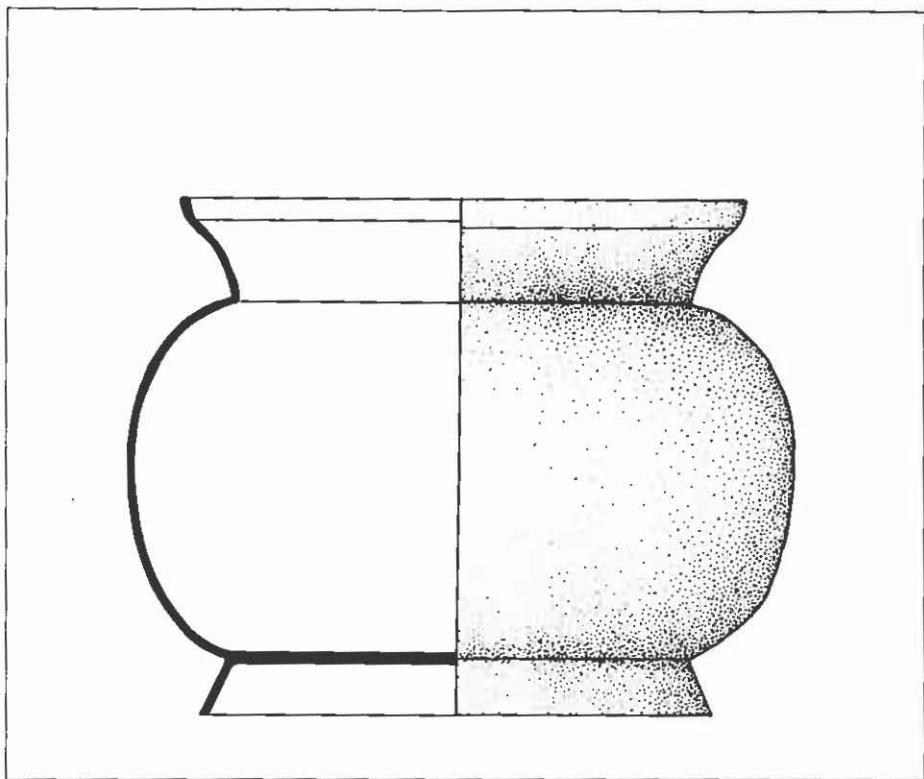


This pot almost exactly matches BAT 430; the details and decorations are identical except that BAT 3004 has the spout missing. These pots were more likely to be used as wine decanters than coffee pots which they are often erroneously called.

Chamber pots  
BAT 7112

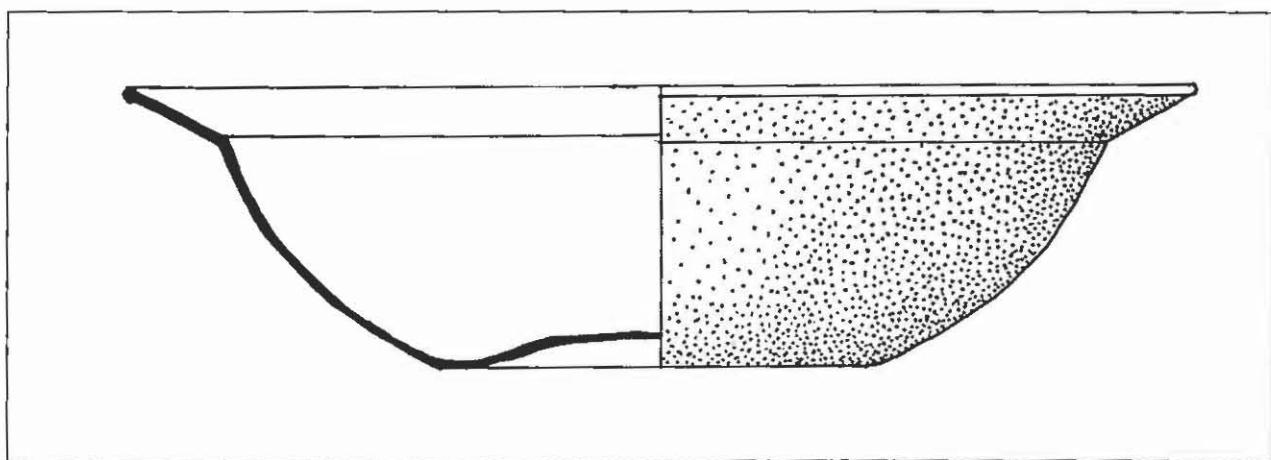


BAT 3031



Possibly part of the surgeon's equipment but also recorded as part of the pewter for the cabin. It seems likely that they had a hinged lid as BAT 7112 has the remnants of the hinge mechanism. BAT 3031 is in a very deteriorated condition and it is uncertain if it had a handle or lid.

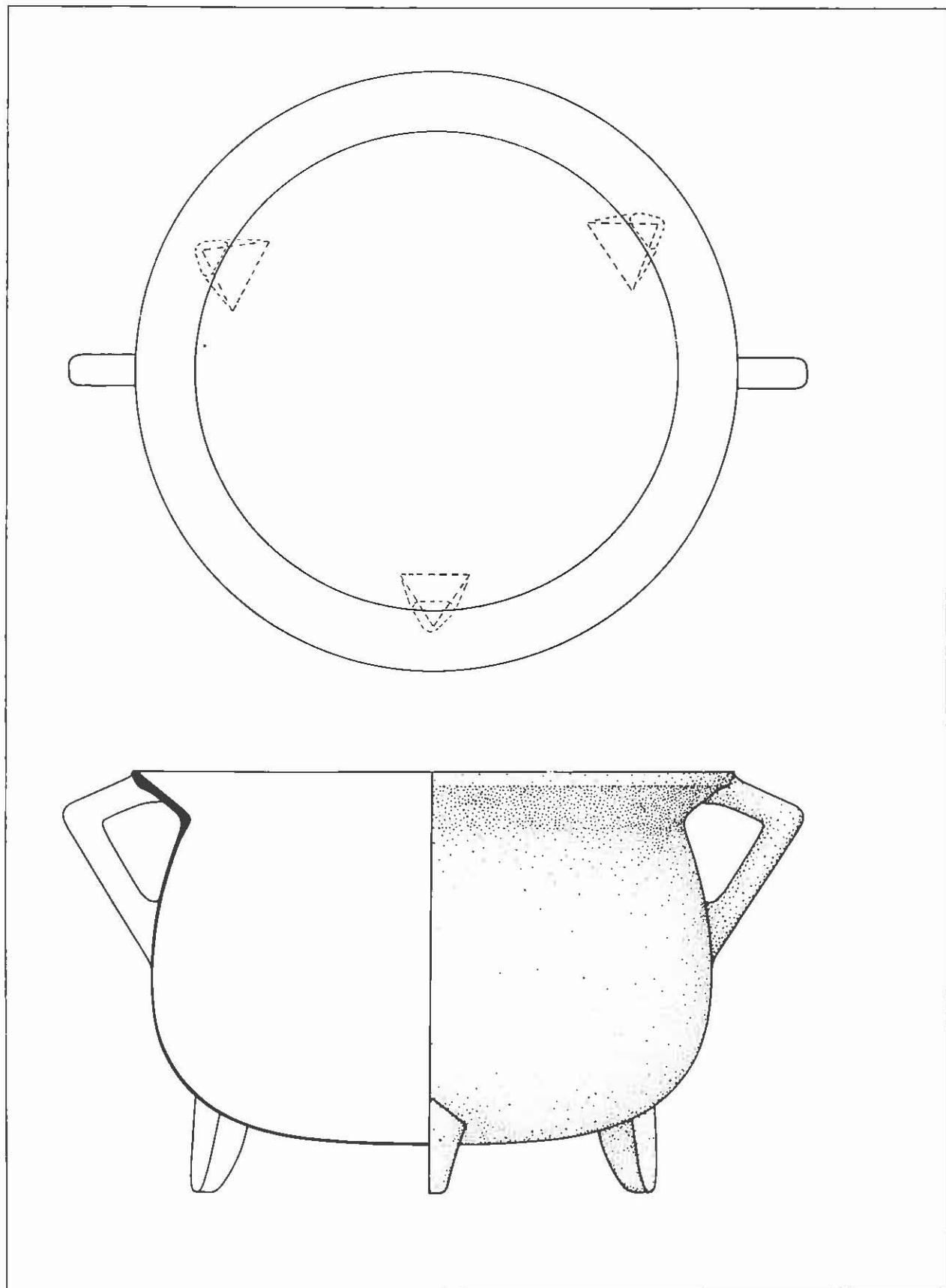
Bowl  
BAT 3886



**DOMESTIC NON-FERROUS WARES**

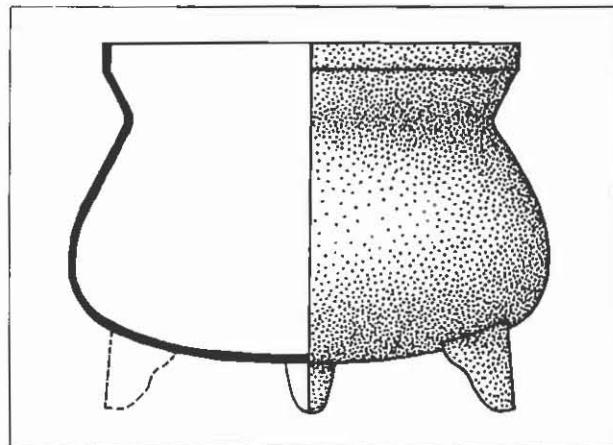
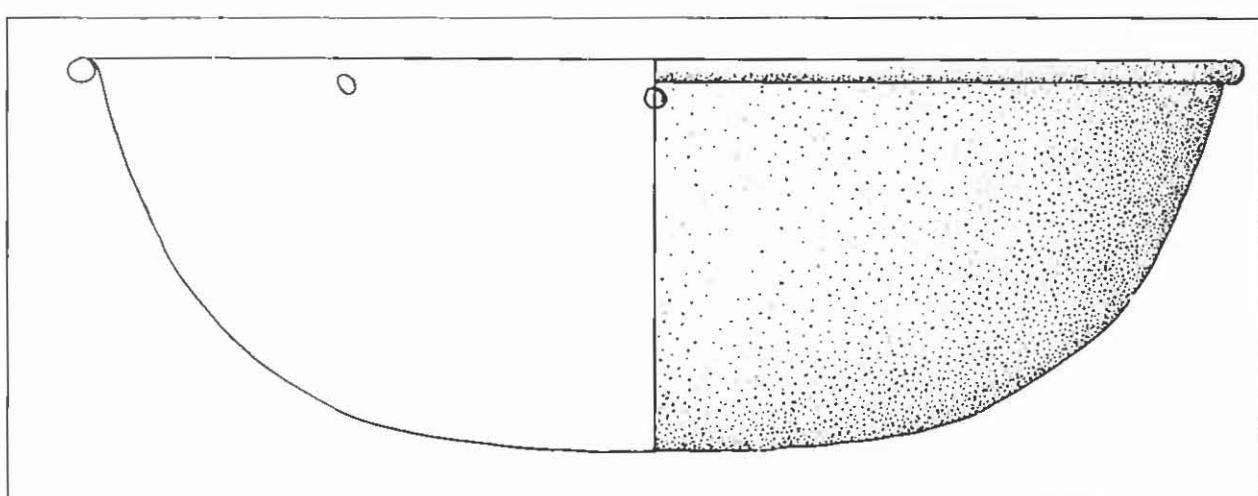
Bronze tripod-pot

BAT 3254

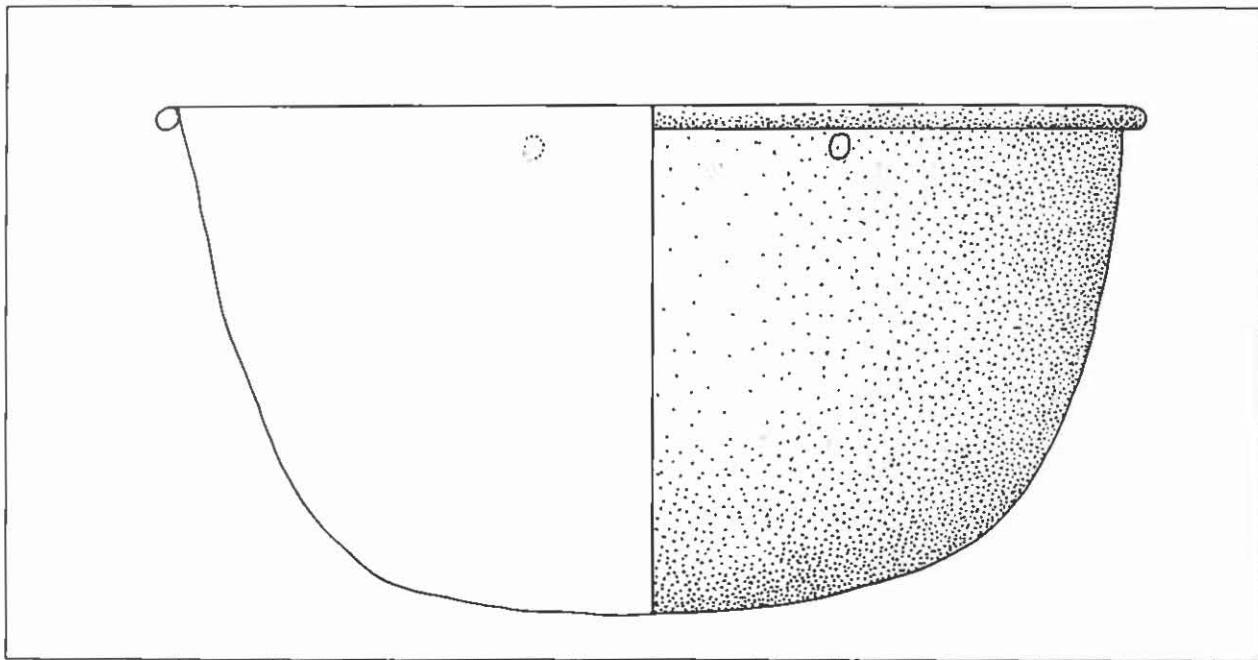


**BAT 3136**

The larger pot, BAT 3254, has two round angular handles, the smaller is without handles. It is not certain what these pots were intended for, possibly cooking or for a more robust purpose such as for melting metals.

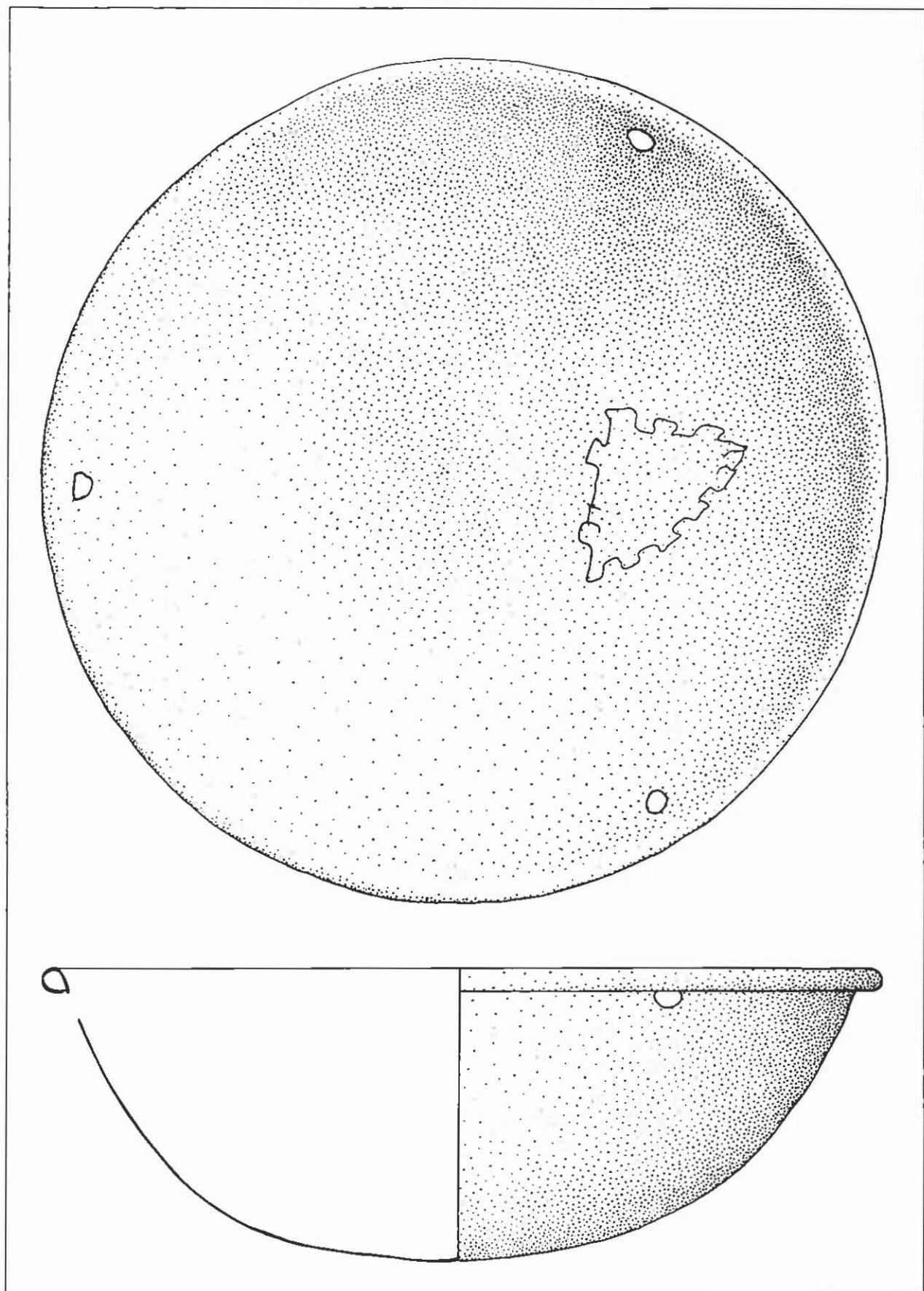
**Brass bowl  
BAT 3215**

Brass bowl with 3 holes around rim, possibly some form of hanging pan or a pan from a steelyard.

**Copper bowl  
BAT 3280**

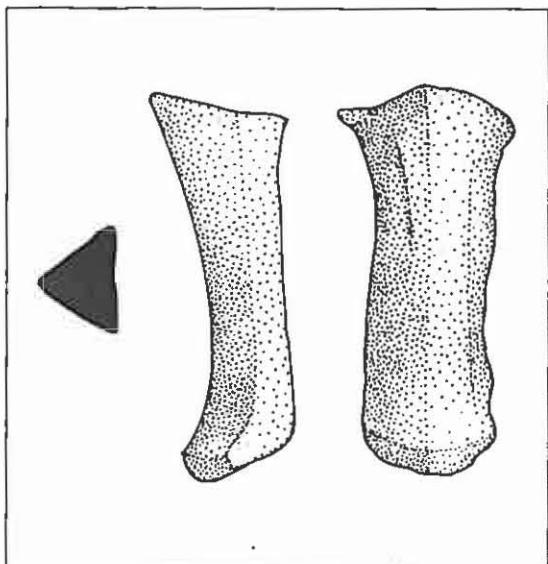
Copper bowl with 3 holes around rim, slightly deeper than BAT 3215 and possibly with a similar purpose.

BAT 3604

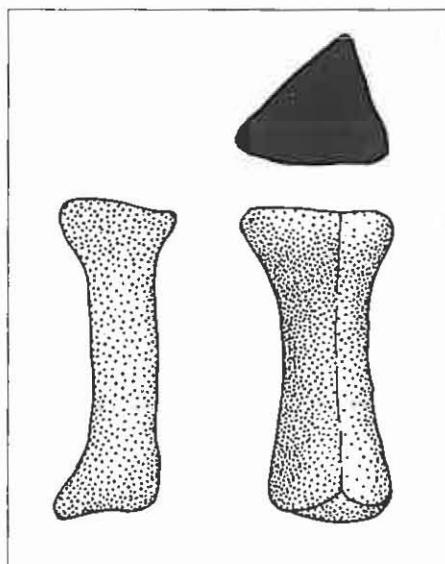


Brass bowl with 3 holes around rim, possibly some form of hanging pan or a pan from a steelyard. There is a very interesting triangular-shaped repair in the centre. The repair has been made by cutting a series of dove-tails out of the body of the bowl and then cutting a patch with the corresponding shape.

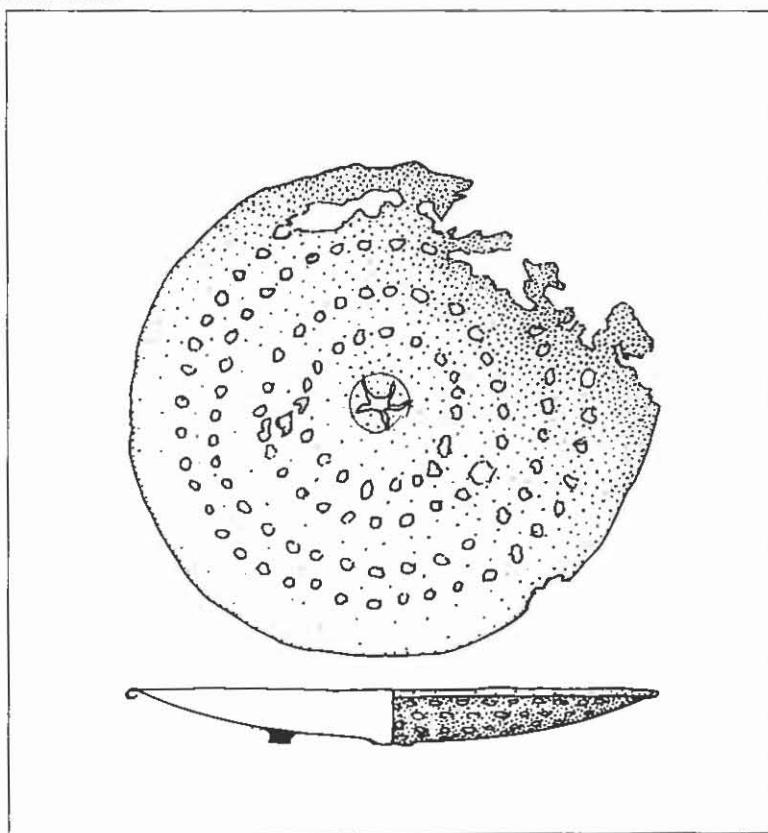
Copper legs from bowl  
BAT 654



BAT 644

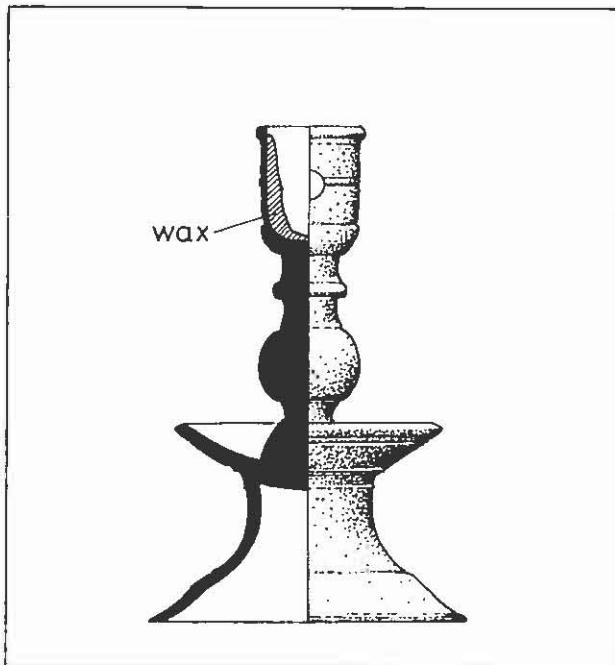


Brass skimmer spoon  
BAT 3816



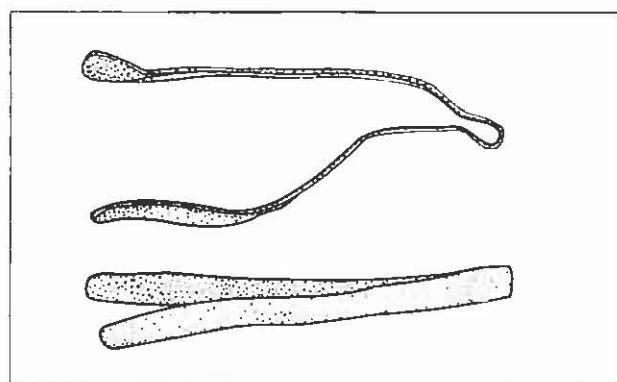
Badly-corroded skimmer spoon bowl with the original attachment rivets for an iron handle, now missing.

Brass candlestick  
BAT 3068

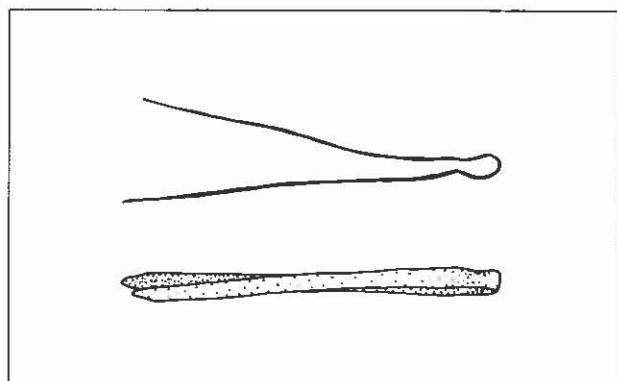


This candlestick has a solid base and is unlike the more delicate candlesticks from the *Vergulde Draeck*; it is possible that this type was of more use on board a ship because of its stability. Traces of wax were noted in the candle holder.

Tongs  
BAT 3087



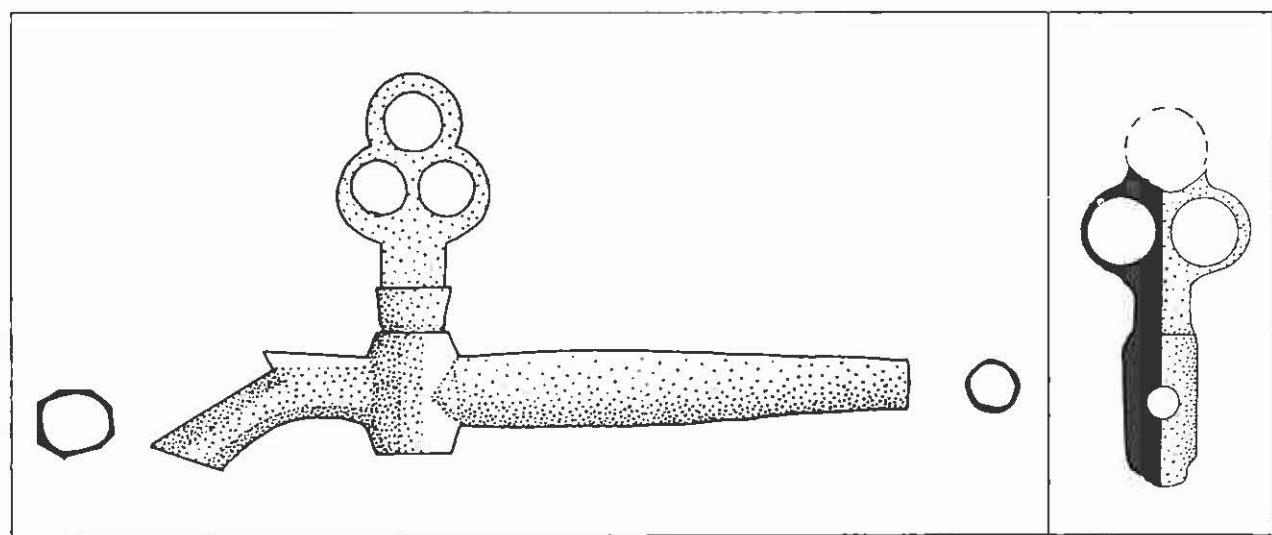
BAT 424



Brass tongs used for bringing coals to light a pipe, but also used to raise the wick of an oil-lamp and other fire-related tasks.

Brass tap  
BAT 3260

BAT 493

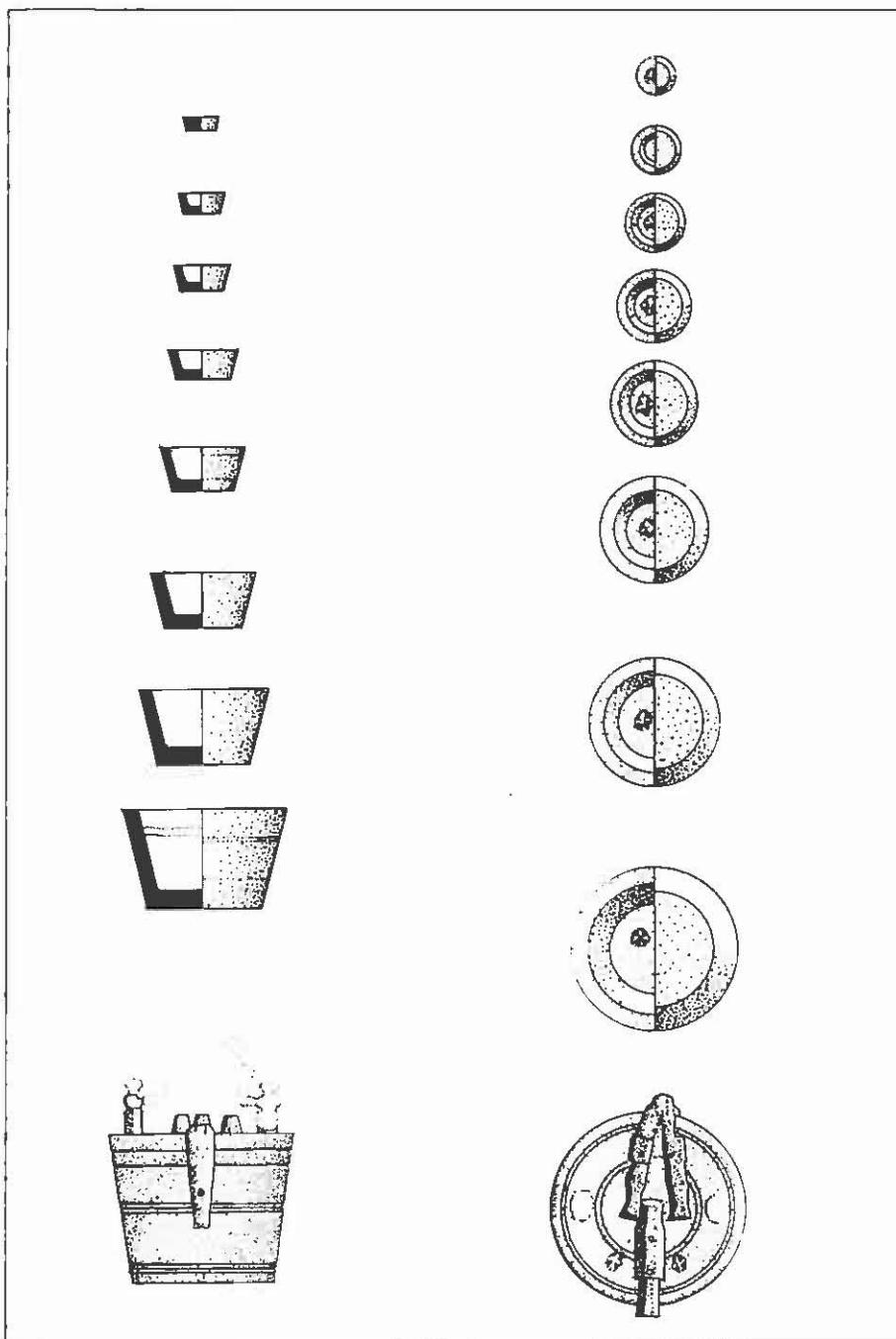


The tap is typical of the 17th century. Unfortunately, there is no mark on the tap handle. Similar to taps found on the *Vergulde Draeck* and either for the *bottlers kist* or alternatively requisitions for the Indies.

## WEIGHTS

Nürnberg nest weight

BAT 3219



Nest of weights consisting of eight weights fitting inside each other and then set in further cup with a lid. Measurements indicate that the weights make up an Avoirdupois pound. The sixth nested weight was 28.29 grms which is one ounce Avoirdupois (the exact value is 28.3495 grms). The nest makes up a total of 1 pound: the two smallest weights which are about equal weigh 1.6 grams (about 1 dram Avoirdupois); the first five weights thus make an ounce ( $1+1+2+4+8=16$ ) as there are 16 drams in an Avoirdupois ounce; the remaining four weights make 15 ounces ( $1+2+4+8$ ) which, together with the first five weights, make a total of 16 ounces or 1 pound. A fleur-de-lis is stamped in the base of the cup of each weight and also on the top of the smallest weight and on the lid of the box. The box had a complicated locking or catch mechanism which held the lid in place; in this case, the corrosion of the metal makes it difficult to determine how, exactly, this worked. Nested weights such as these are known to have been made in Nürnberg and are often referred-to as Nürnberg weights.

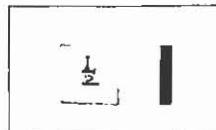
Pan weights

BAT 628



A round weight of about 0.5 ounce Avoirdupois.

BAT 3295



This is a small, square pan weight with the figure  $\frac{1}{2}$  stamped in the centre. It is not certain what unit the half refers to since it is too heavy to be a half ounce of either the Troy or Avoirdupois.

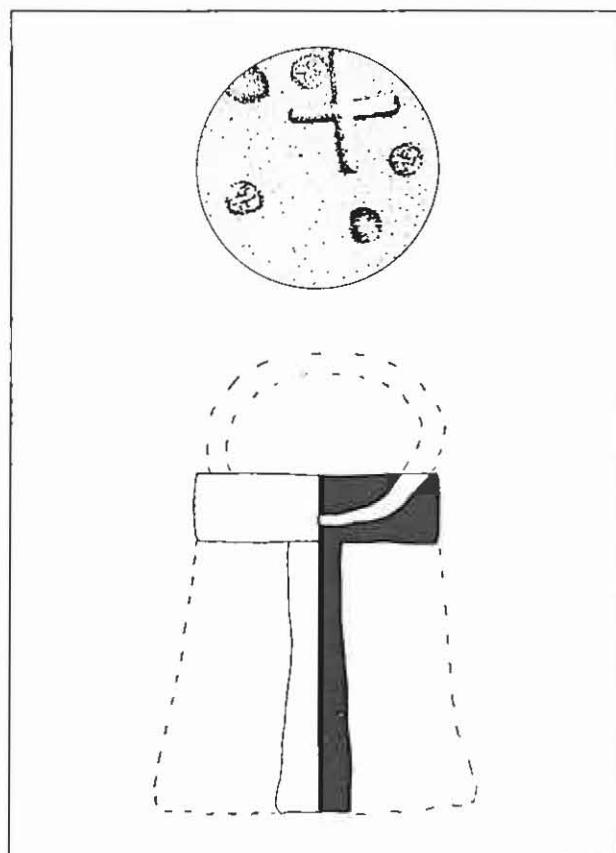
BAT 3296



A square pan weight with the figure III stamped in the centre.

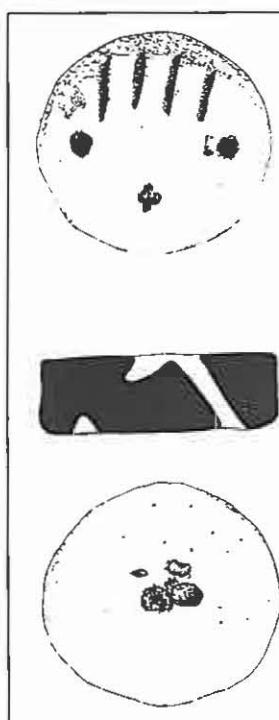
Ring and cylindrical weights

BAT 569

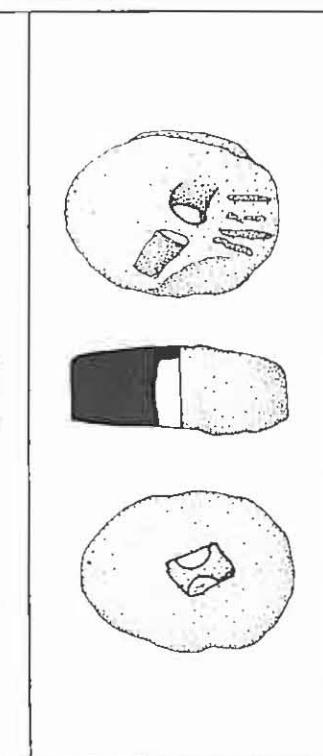


This type of lead object is often mis-identified as a stamp, the assumption being that the rod-shaped part is a handle and the disk-shaped part is the stamp. It is, in fact, the lead core to an iron, ring-topped weight, the iron having completely corroded away, leaving just the lead part. This can be seen where the curved hole in the lead disk would have taken the iron ring. The '+' in the centre is presumably the Roman numeral 'X' referring to ten *pont*. The fleur-de-lis stamps are commonly found on weights and may be either a proof mark that the weight is accurate or a mark indicating that the weight is Avoirdupois.

BAT 3308



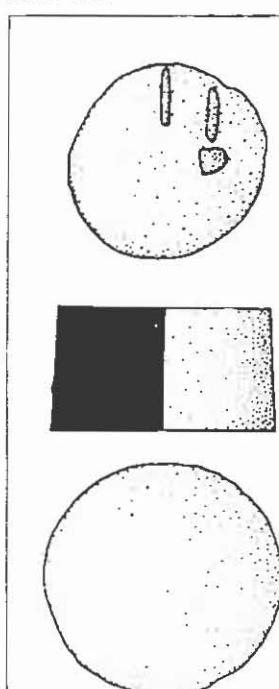
BAT 684



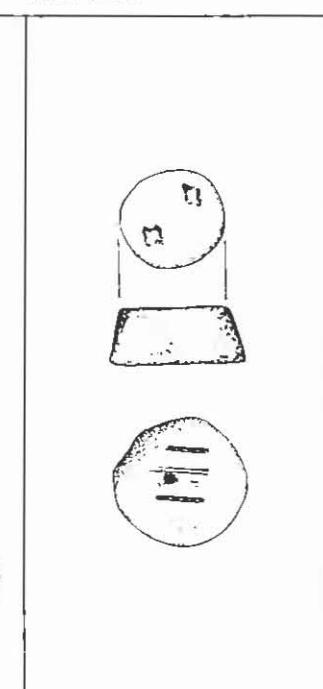
As BAT 569, without the rod-shaped part, but with the ring impression and the fleur-de-lis. The figure 'III' presumably refers to a four *pont* weight.

As BAT 3308, but in poor condition.

BAT 557



BAT 3272



A round lead weight with no sign of a ring impression. Possibly the figure 'II' stamped on the top.

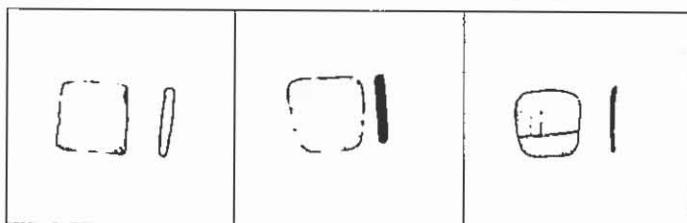
A small, round lead weight with stamped fleur-de-lis and the figure 'II'.

**Flat, square lead weights**

BAT 3327

BAT 7066

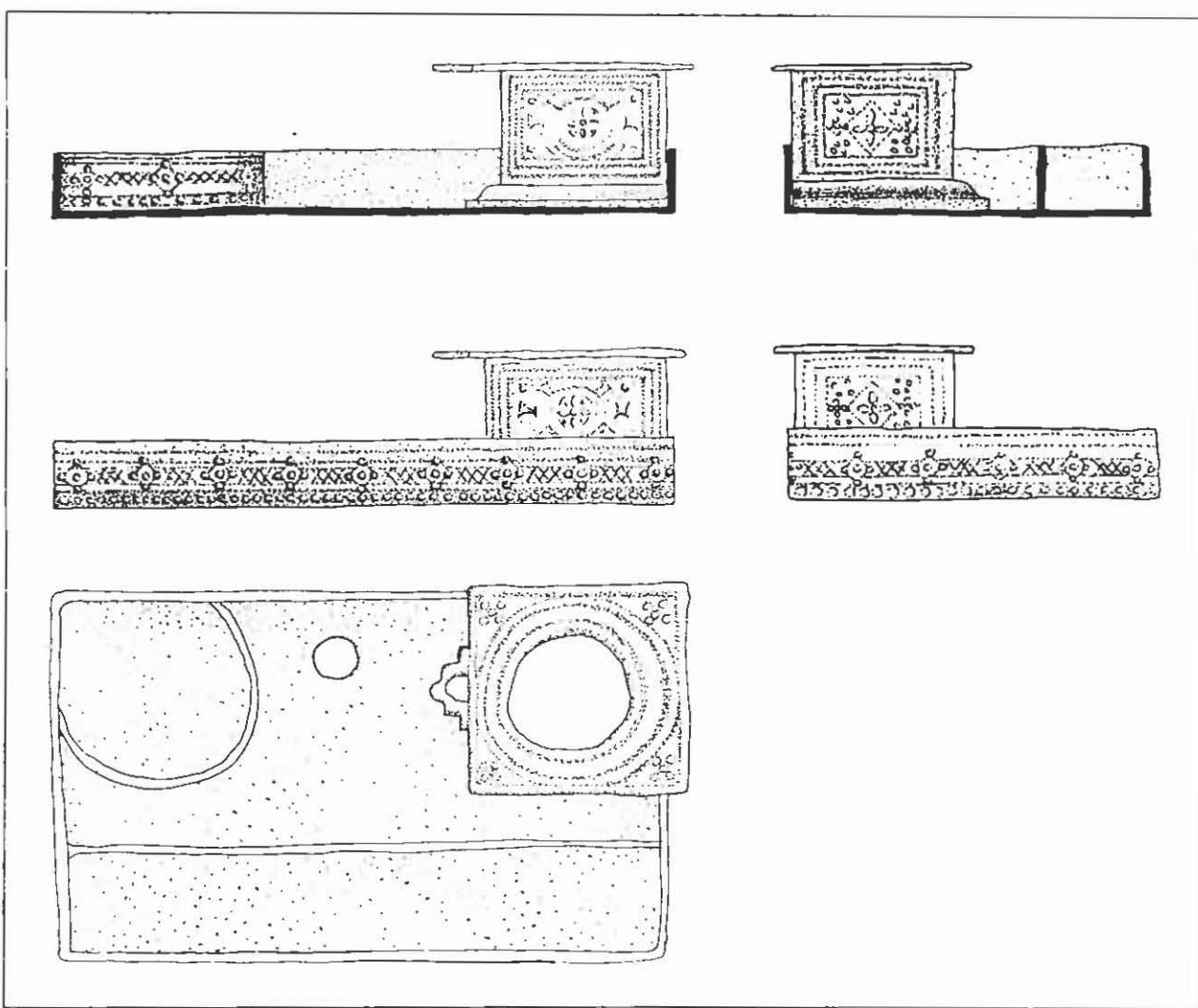
BAT 3159



**WRITING ACCESSORIES**

**Pen and inkstand**

BAT 566

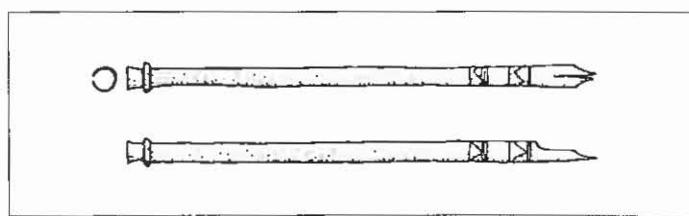


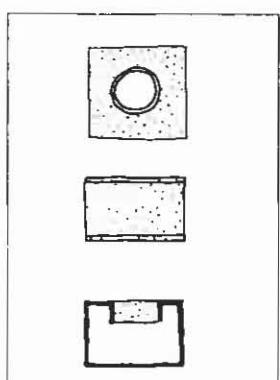
This oblong stand is made out of lead and is ornamented with stamped decoration of a rather crude form. The stand is oblong in shape, with a square ink-well in the right-hand corner and a round enclosure in the left-hand corner, possibly to hold a bottle. The front part has a long narrow enclosure, presumably to hold the pens.

**Brass writing pen**

BAT 3590

The pen is made out of sheet brass, rolled into a tube. The nib is split and there are simple, engraved decorations around the part where the pen would be held.

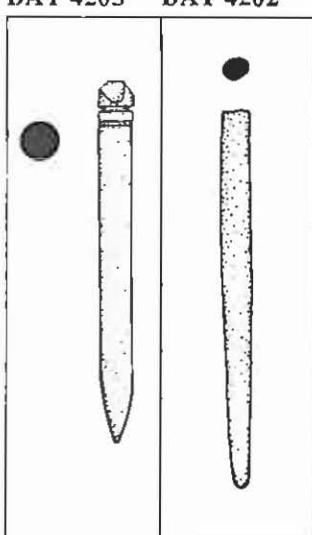




**Ink-well  
BAT 7065**

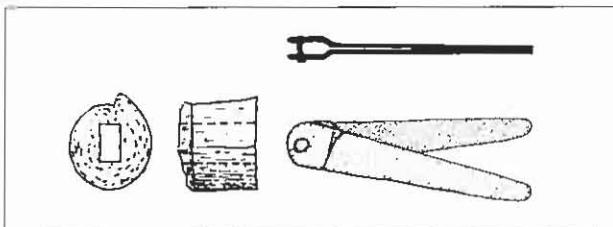
This is a well-made, small ink-well, with traces of a screw thread in the top indicating that it originally had a cap of some sort.

**Slate pencil  
BAT 4205 BAT 4202**

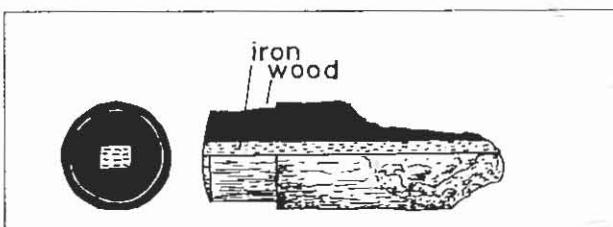


These slate pencils were used for writing notes and calculations onto a piece of slate. Such writing was non-permanent and could be easily wiped off the slate.

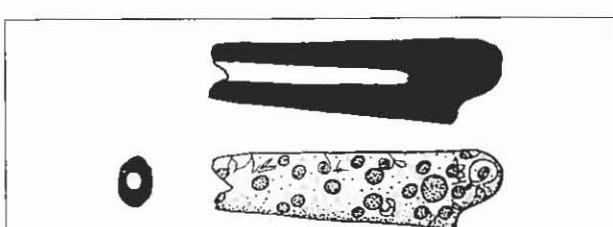
**Handles  
BAT 3379**



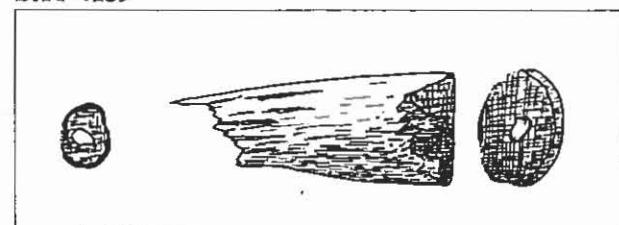
**BAT 4085**



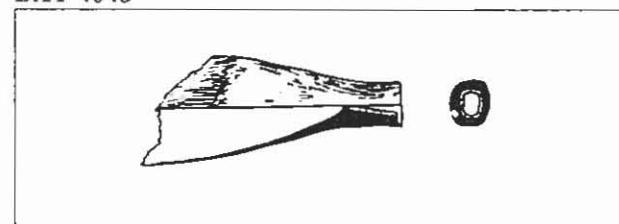
**BAT 4121**



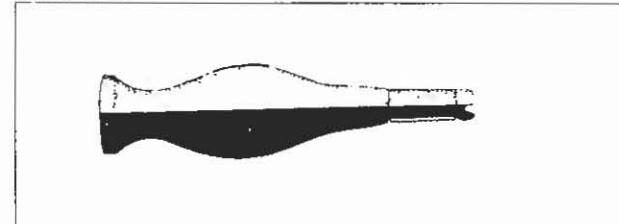
**BAT 4159**



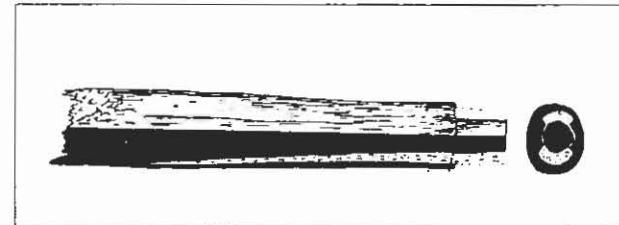
**BAT 4048**



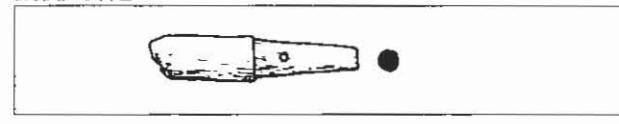
**BAT 4028**



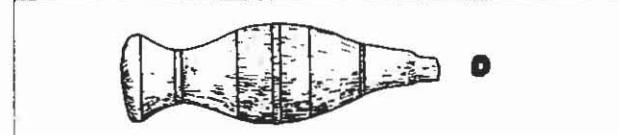
**BAT 4069**



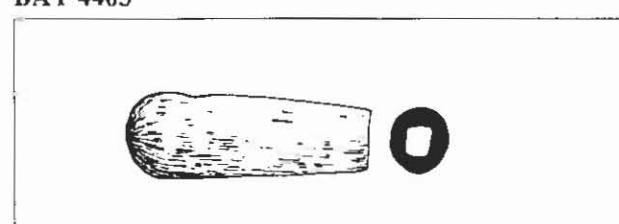
**BAT 4472**



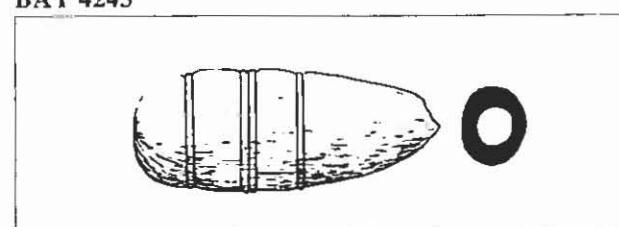
**BAT 4426**



**BAT 4463**

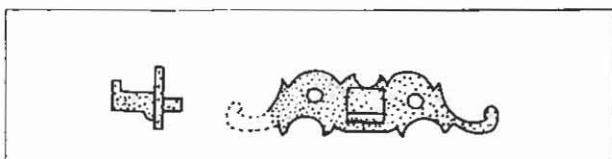


**BAT 4243**



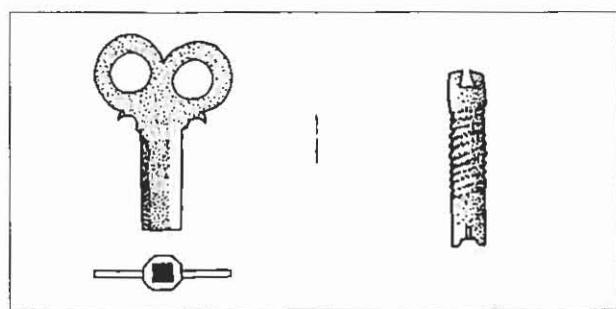
## MISCELLANEOUS AND UNIDENTIFIED MATERIAL

Brass fittings  
BAT 3717



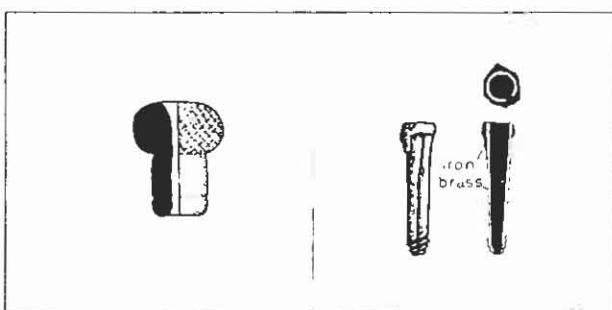
BAT 3716

BAT 3712



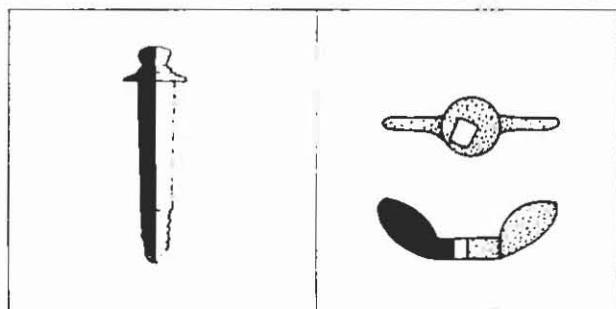
These two items could be part of a screw-lock similar to that shown in Pitt-Rivers (1883:Fig. 82C-83C).

BAT 3580 (SCALE 1:1) BAT 3104

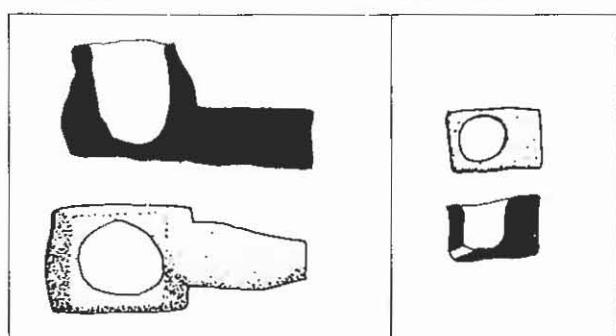


BAT 3362

BAT 3595 (SCALE 1:1)



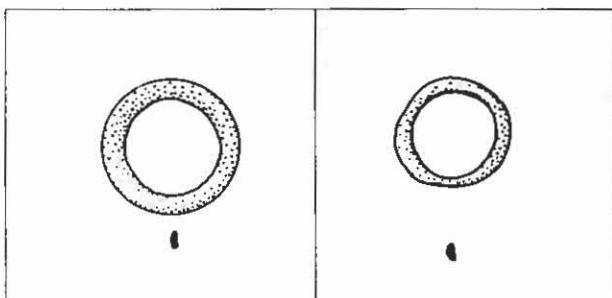
Lead fittings  
BAT 3041



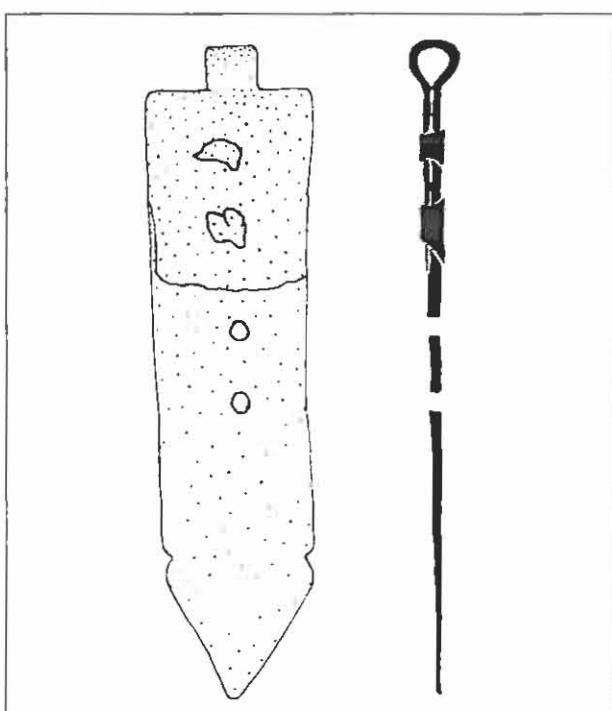
BAT 668

Rings  
BAT 3618

BAT 3224

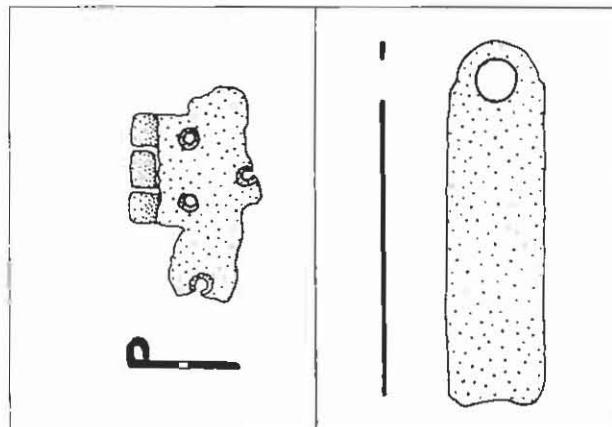


Hinge mechanisms  
BAT 3134



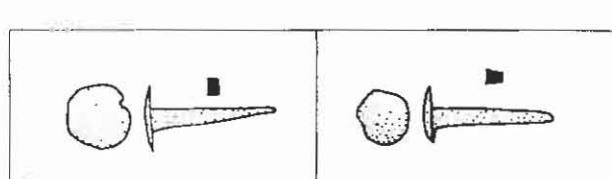
BAT 3480

BAT 3598

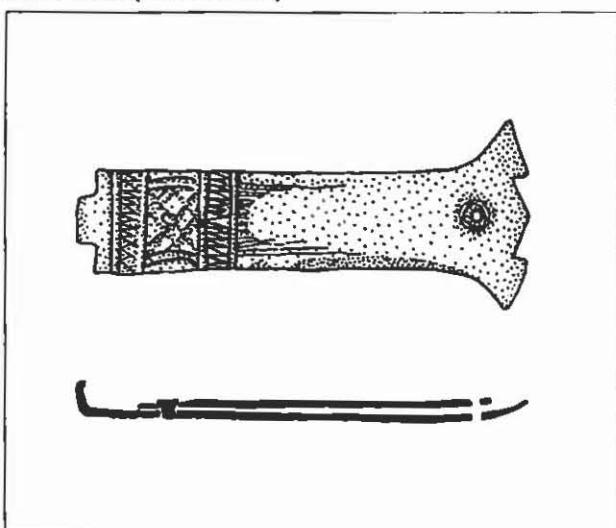


Copper tacks  
BAT 3484

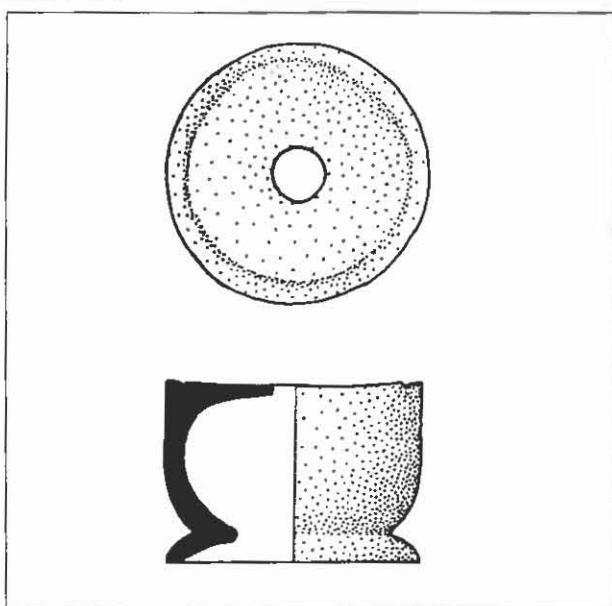
BAT 3465



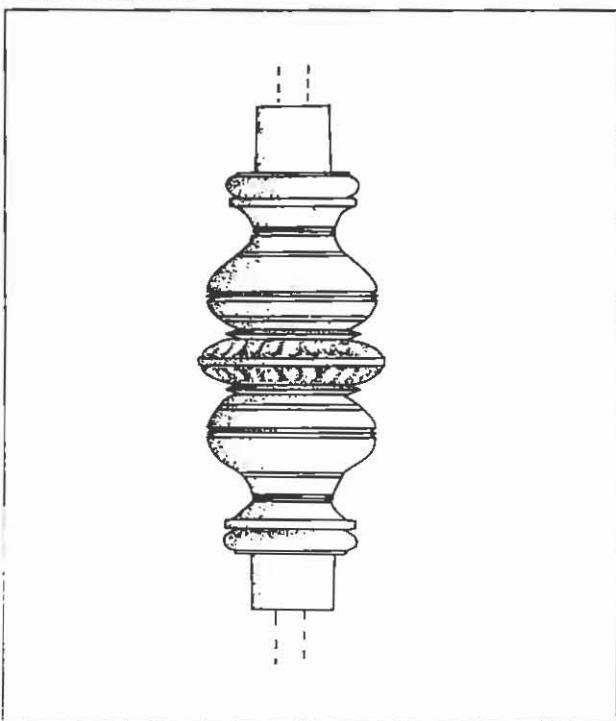
**Book clasp**  
BAT 3631 (SCALE 1:1)



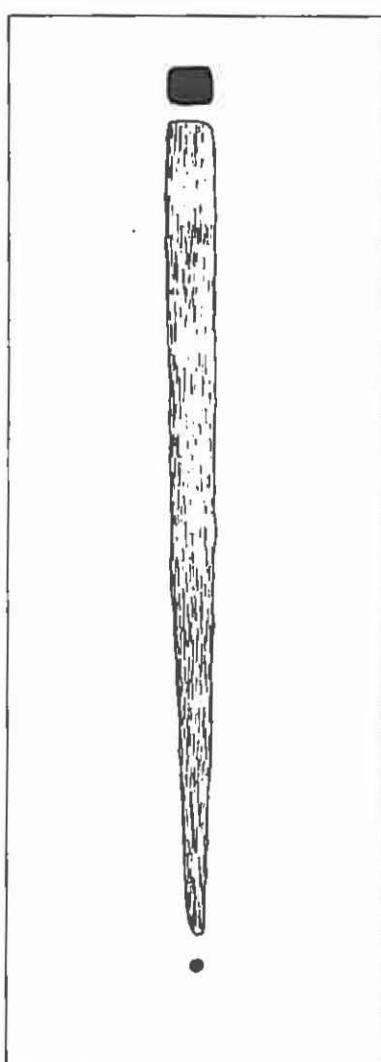
**Wooden object of uncertain purpose**  
BAT 4401



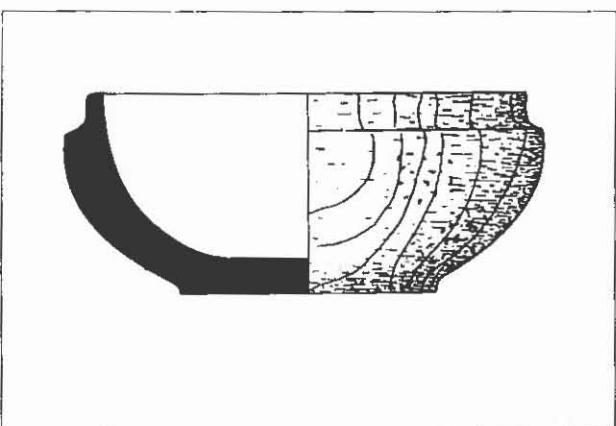
**Wooden turned and decorated object**  
BAT No number



**Wooden pin**  
BAT 4211



**Wooden bowl**  
BAT 6445



## Ship's supplies

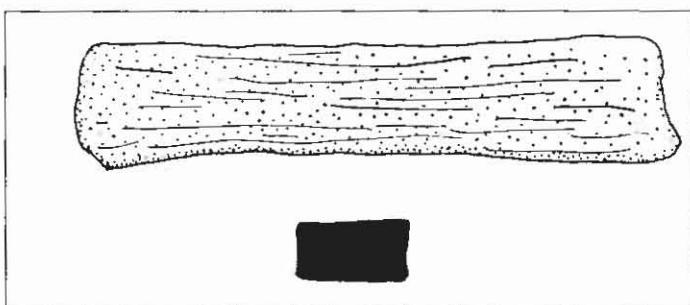
Whetstones and sharpening stones

BAT 4086

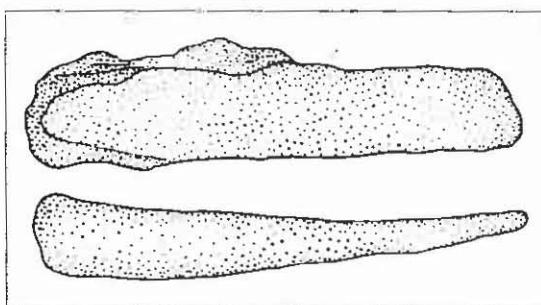


Possibly argillite semi-circular shaped. Engraved markings.

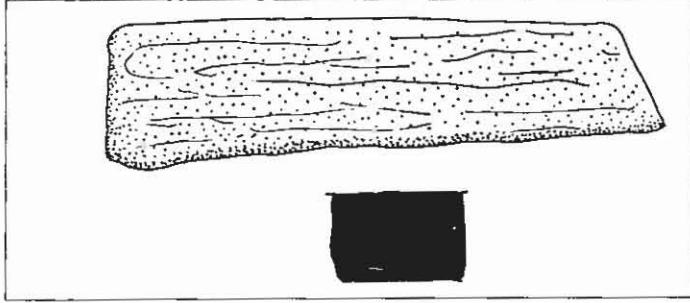
BAT 498A



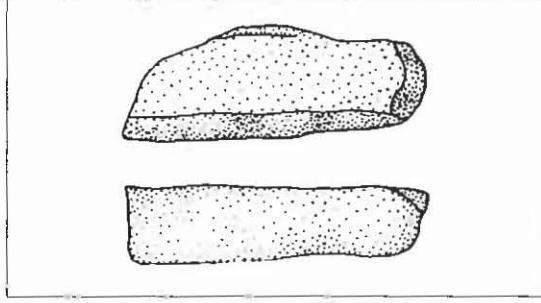
BAT 4061



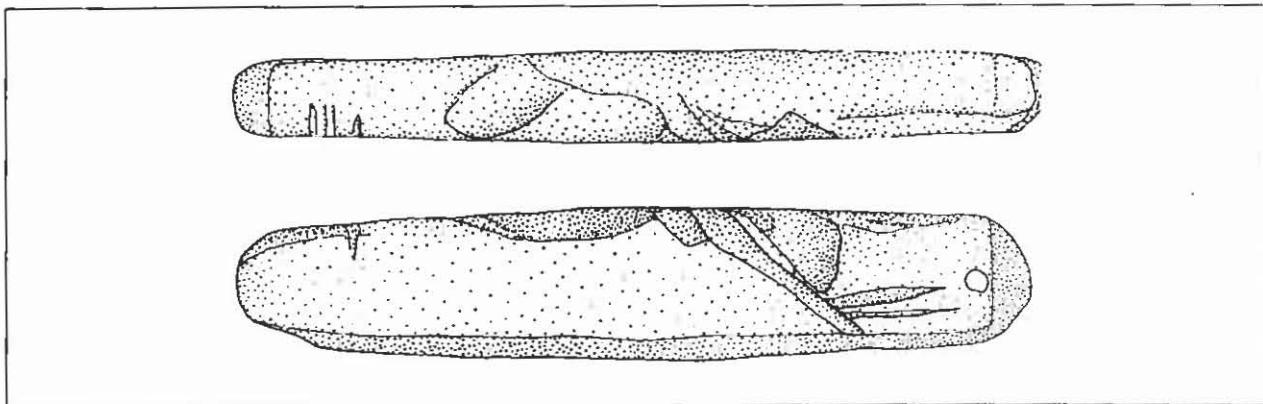
BAT 498B



BAT 4191



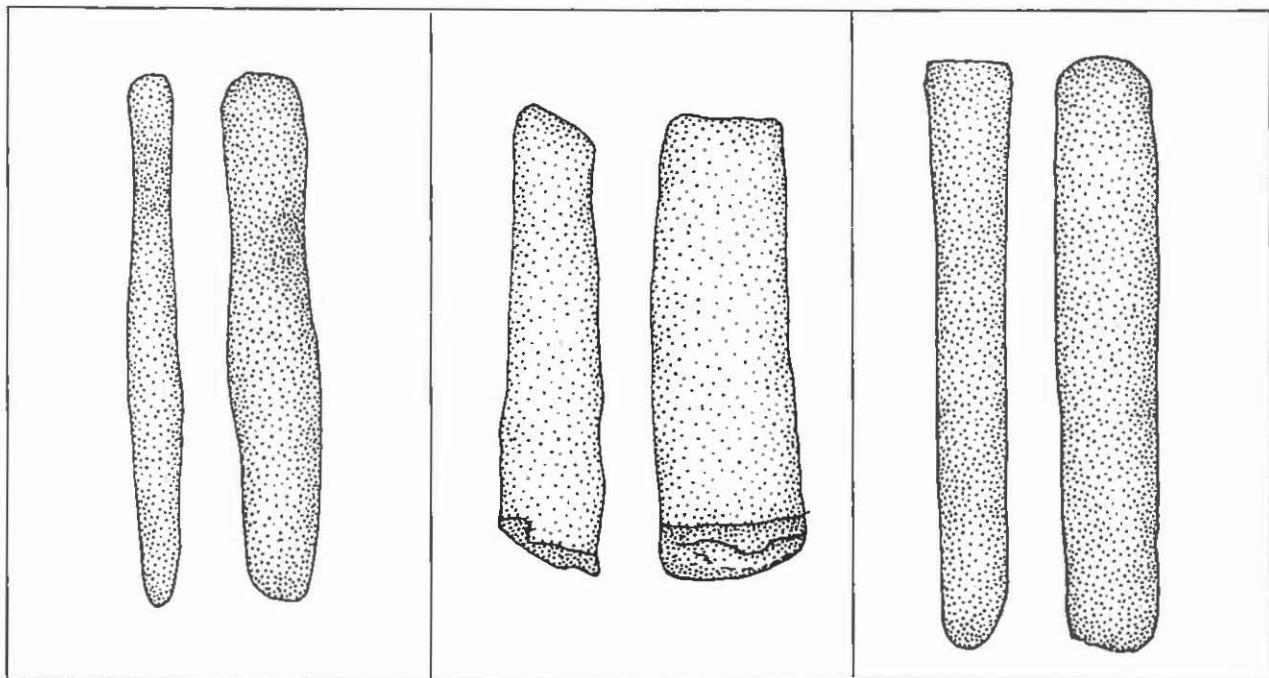
BAT 4029



BAT 4094A

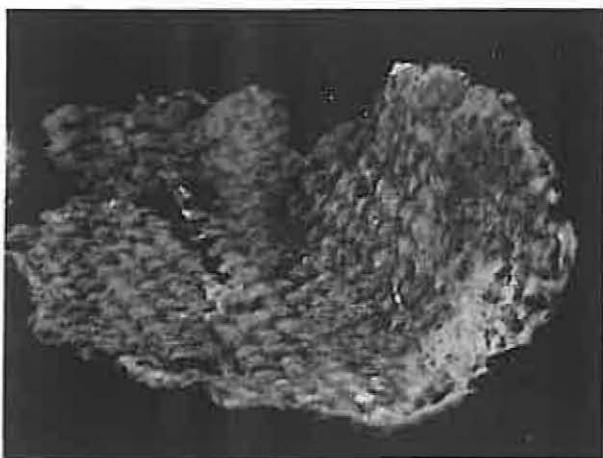
BAT 4175

BAT 4030



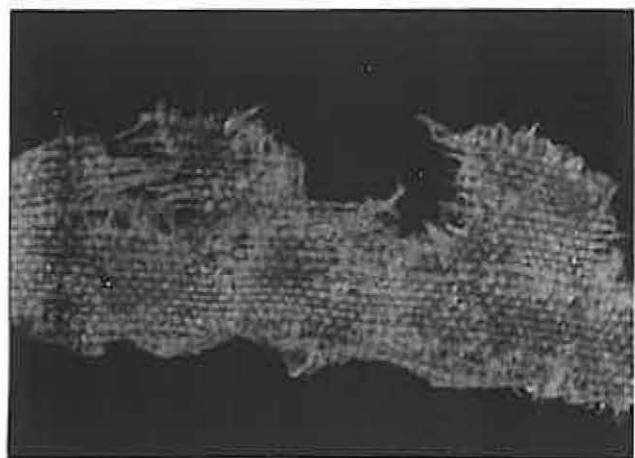
Sailcloth

BAT 4515 (SCALE 3.5:1 approx.)



Fragment of jute sailcloth in plain weave.

BAT 4460A (SCALE 1:1)



Fragment of jute sailcloth in plain weave.

The author is grateful to Rinske Car for the identification of this material.

Lead sinkers

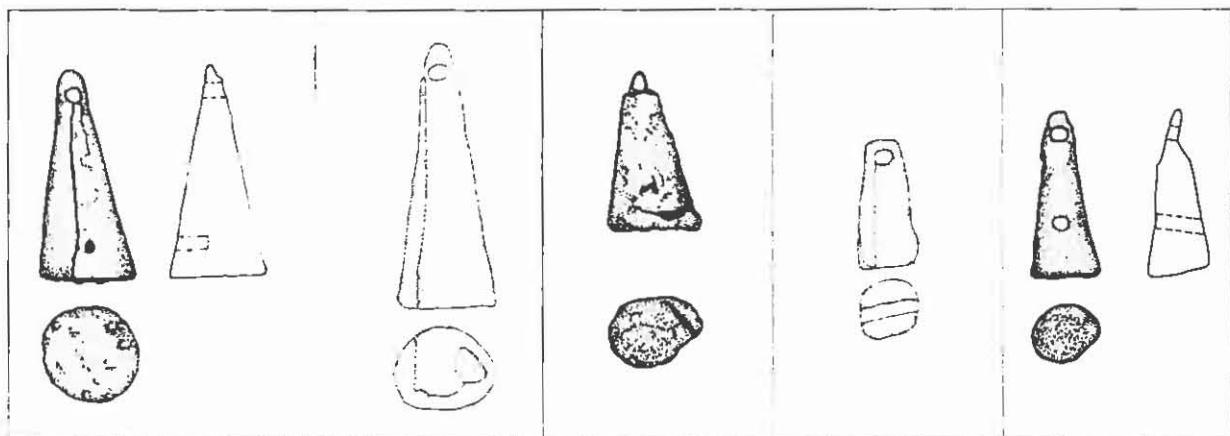
BAT 3692

BAT 3038

BAT 3721

BAT 7108

BAT 607



BAT No number

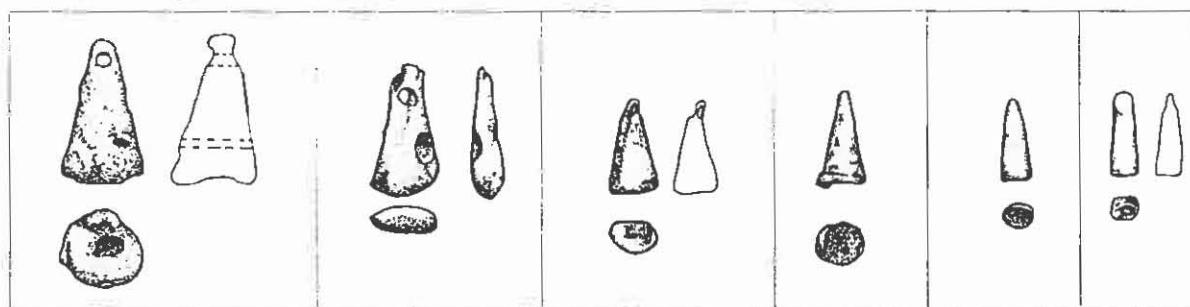
BAT 607A

BAT 3483

BAT 415A

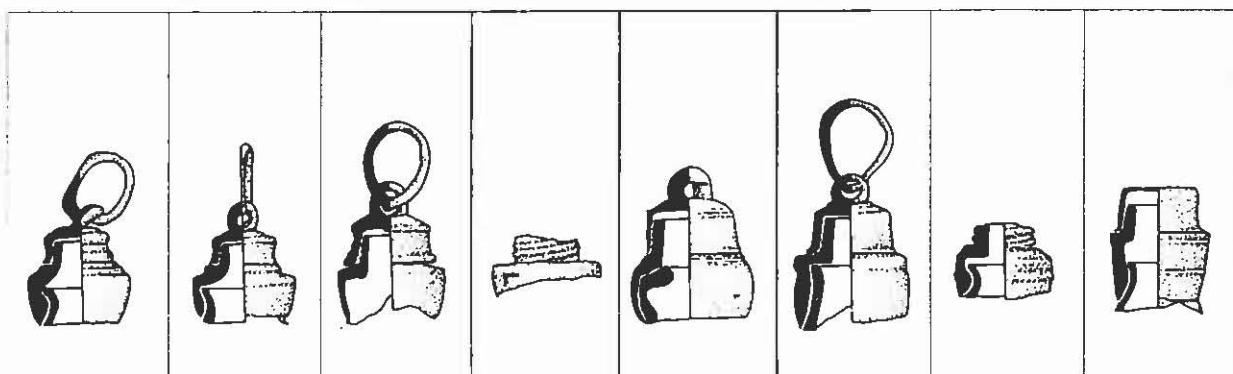
BAT 528

BAT 614



Pewter bottle-tops

BAT 3344 BAT 3421 BAT 3445 BAT 3466 BAT 3314 BAT 3466 BAT 3172 BAT 3299



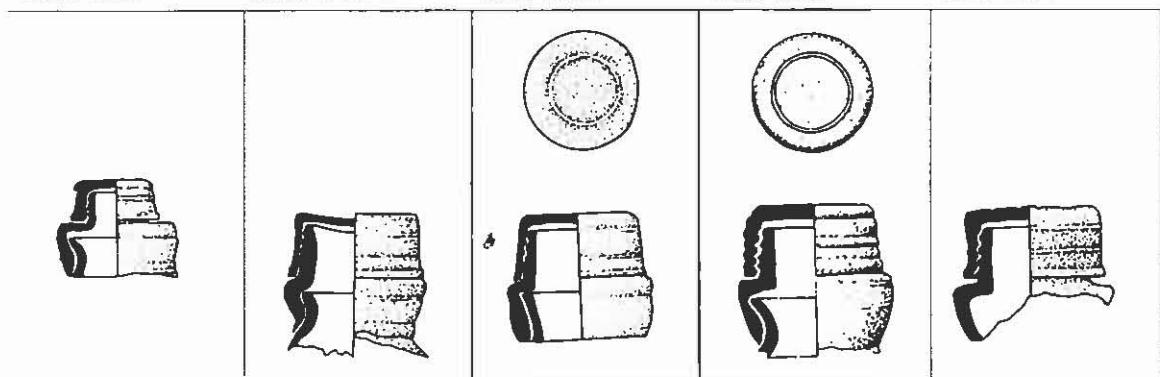
BAT 3255

BAT 3285

BAT 3286

BAT 3319

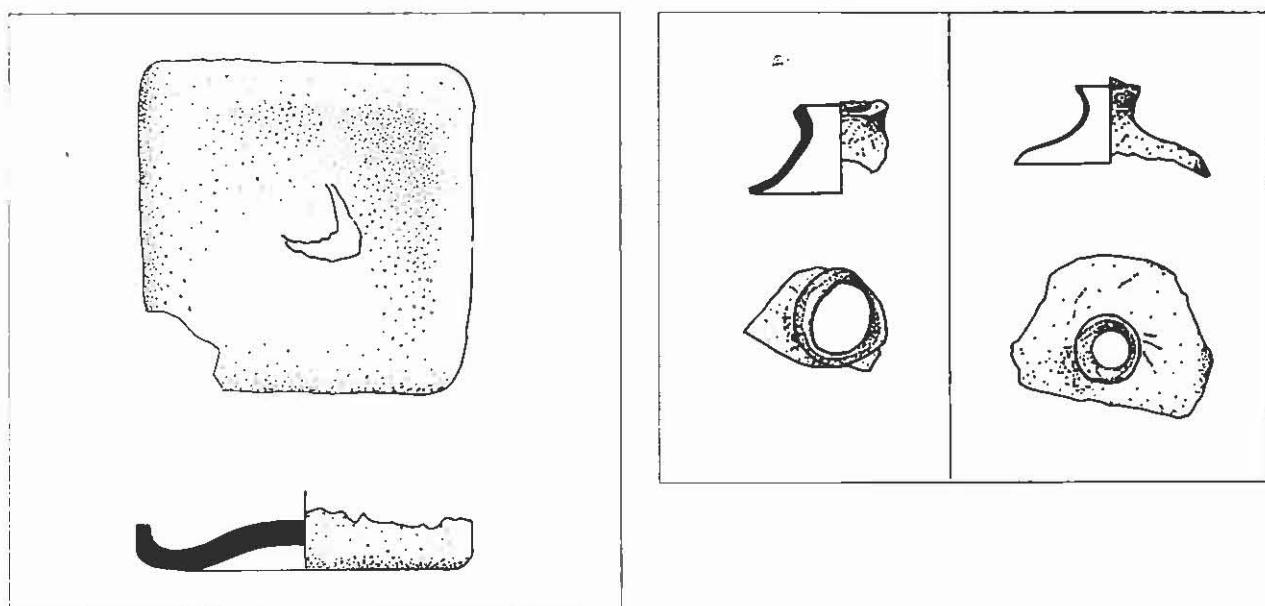
BAT 3374



Case bottle base  
BAT 356

Bottle necks  
BAT 4092

BAT 4004

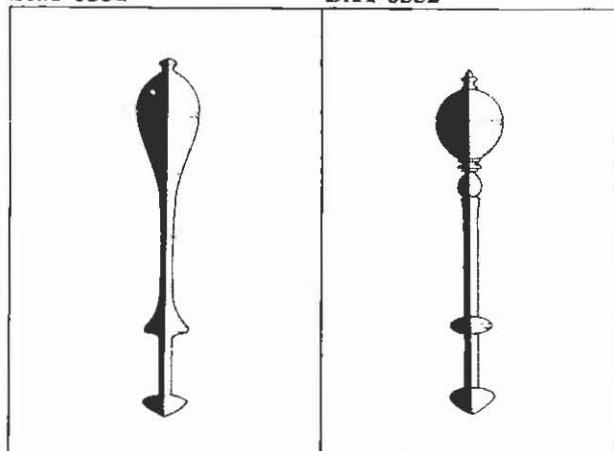


## Personal items

Lace bobbins (see also lace under clothing p. 177)

BAT 6351

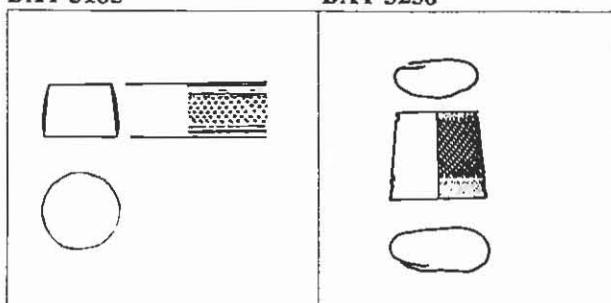
BAT 6352



Sewing thimbles

BAT 3183

BAT 3238



Pins

BAT 3377



BAT 3632



Lace ends

BAT 3074



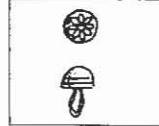
These brass fittings, or *nestels*, were used to finish the

ends of lacework. They can be seen in many contemporary

paintings of people's dress.

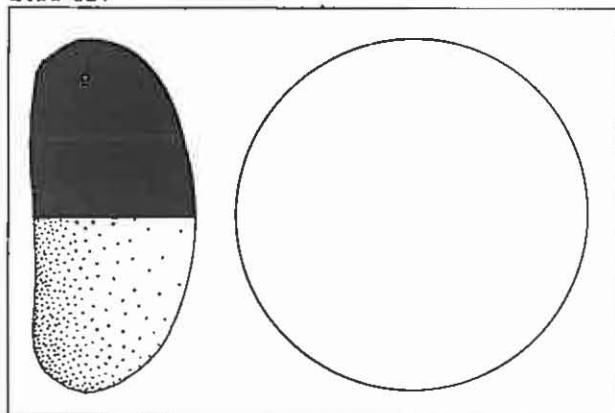
Buttons

BAT 565A



Lace iron

BAT 657

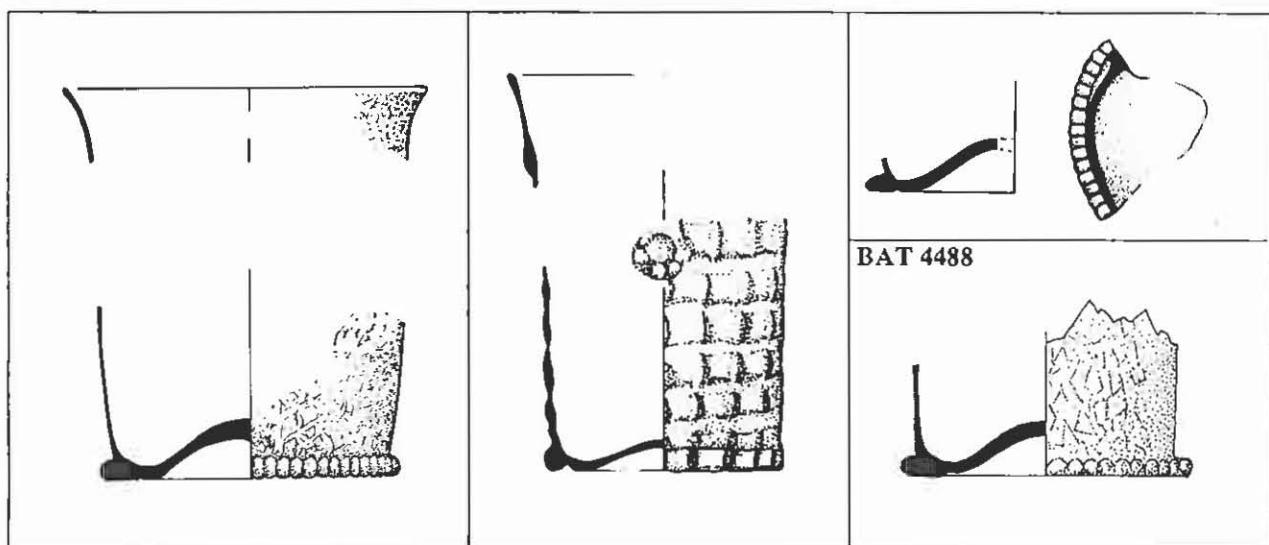


Drinking beakers

BAT 4497 and BAT 4498

BAT 4148

BAT 4581



These beakers are similar to the beakers described by Tait (1967) from the South Netherlands. The beaker BAT 4148 has the same chequer-pattern and the distinctive 'kick-up' and a milled edge to the base. The pattern of BAT 4488 is less regular than some of the examples given by Tait. It may also be that the small glass prunt in the form of a lion's head (?) surrounded by dots BAT 4078 belongs to these beakers.

BAT 4078 (SCALE 1:1)



**Plain buckles**

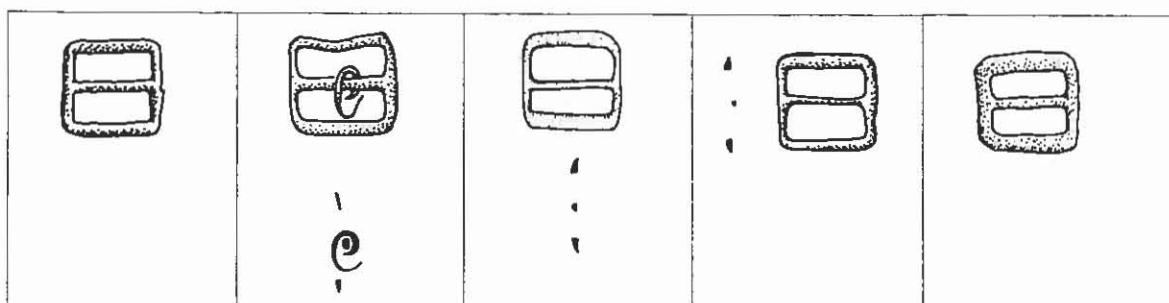
BAT 561

BAT 3346

BAT 3566

BAT 3199

BAT 495



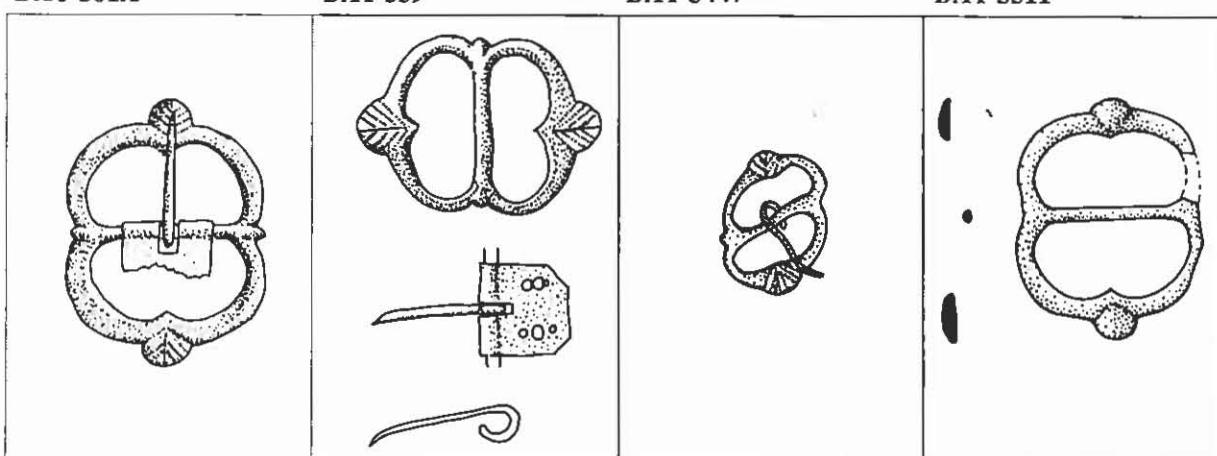
**Decorated buckles**

BAT 561A

BAT 339

BAT 3447

BAT 3511



**Slides and belt ends**

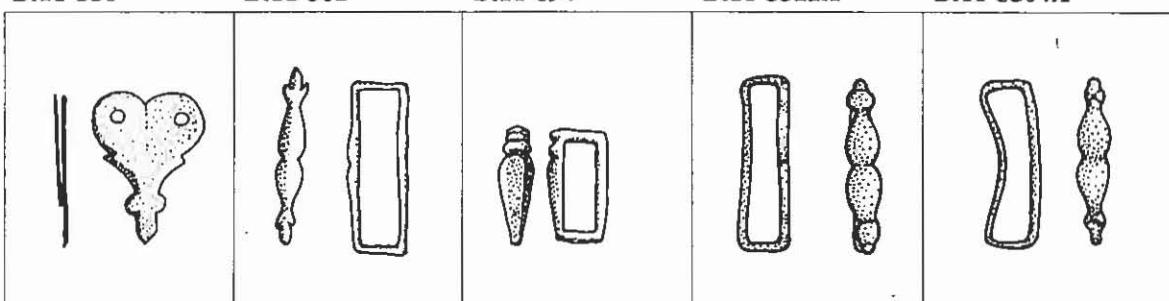
BAT 350

BAT 561

BAT 694

BAT 3511A

BAT 3504A

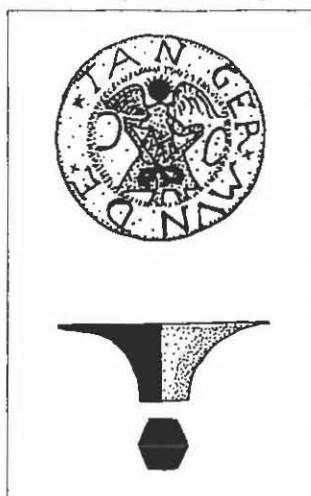


BAT 3594



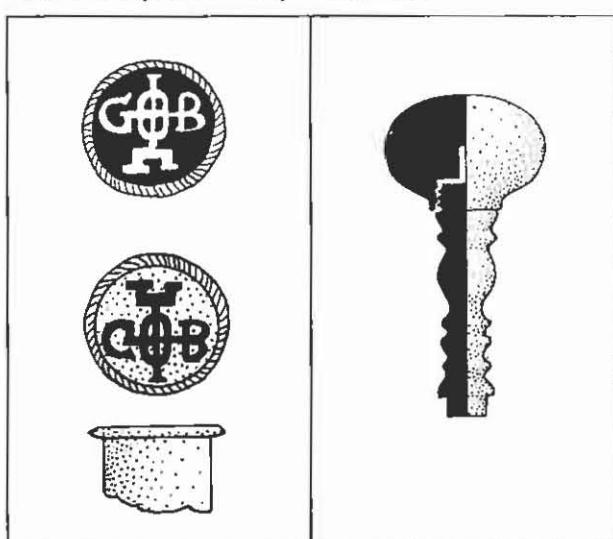
This silver belt end is similar to one illustrated in the painting of Jan Pieterz. Coen in the Westfries Museum, Hoorn. In the painting the silver belt end is attached to a baldric or shoulder strap helping to support the sword and scabbard.

Seals  
BAT 342 (SCALE 1:1)



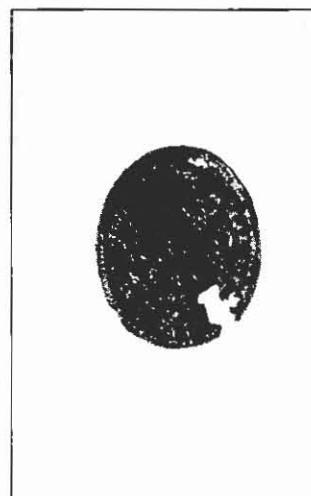
Brass seal with the inscription TANGER-MUNDE and the representation of an angel. It is questionable if this is, in fact, a seal at all, as the letters are not in reverse. The shape and style is similar to a seal. The meaning of Tanger Munde is obscure.

BAT 3274 (SCALE 1:1) BAT 4239



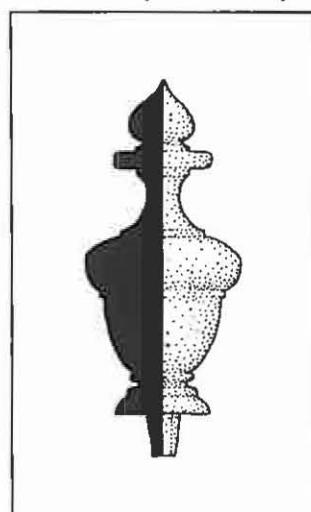
This seal is possibly one belonging to the *predikant*, Gijsbert Bastiaens, on board the *Batavia*. The inscription GOB is in reverse and there is an encircled cross between the letters. The ivory, or bone, handle (BAT 4239) is probably a seal holder for this, or for a similar seal. The seal would have been attached to the lower end of the holder, the screw-fitting knob at the top may have held wax or pigment that was used in conjunction with the seal. (Note that the scales of the two illustrations are different.)

Medallion  
BAT 3429



Brass badge, possibly a hat badge from one of the soldiers uniforms, with Coat of Arms of Prince Maurice Nassau of the House of Orange.

Chess piece  
BAT 4452 (SCALE 1:1)

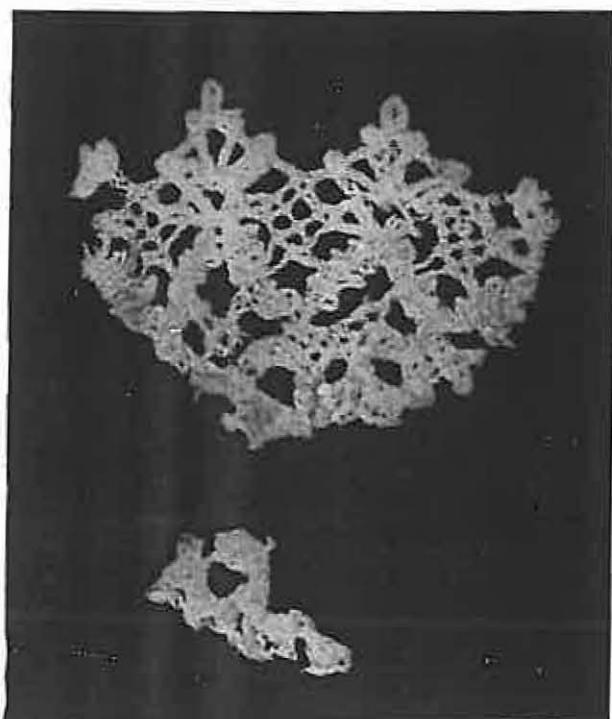
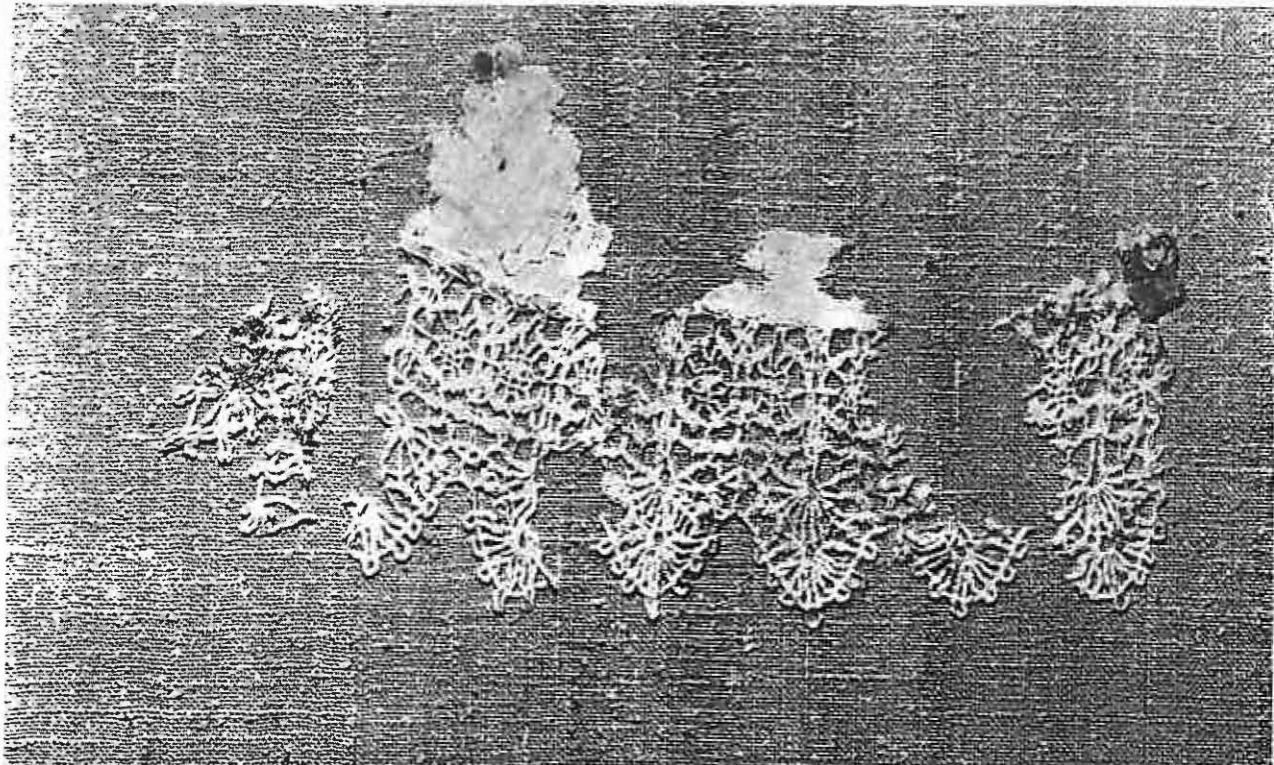


Wooden, turned object, possibly a chess piece or some other gaming piece.

## Clothing

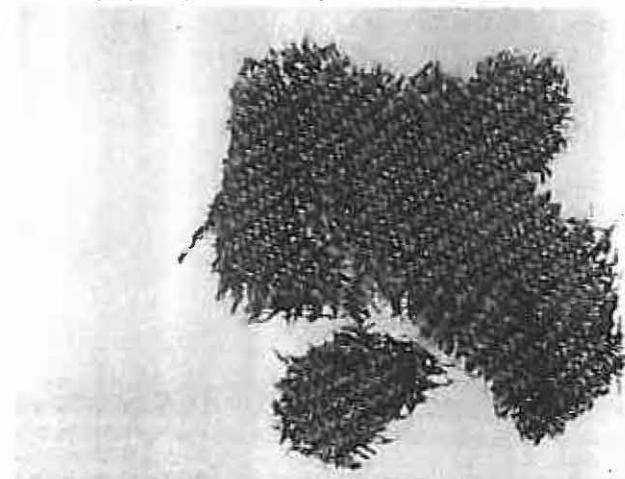
The author is grateful to Rinske Car for the identification of the clothing material.

BAT 4492 (SCALE 1:1)



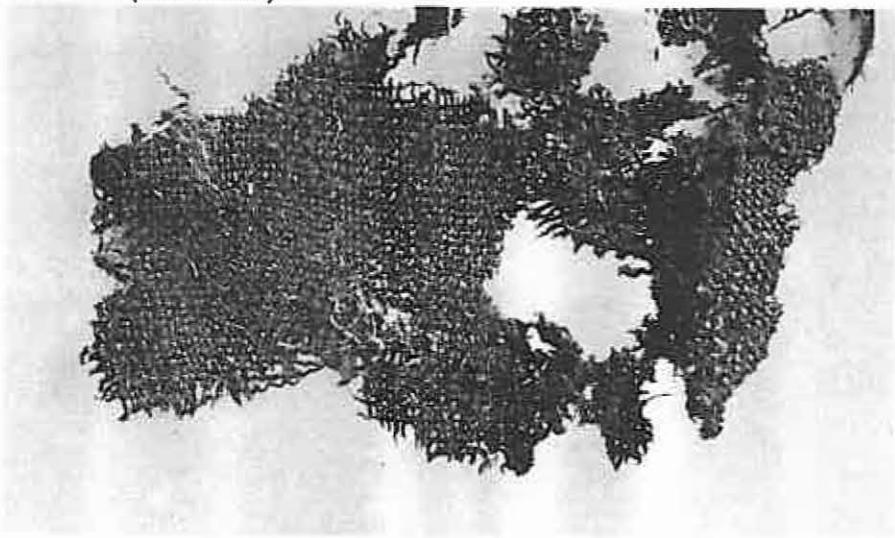
Lace fragments found in iron concretion. The lace has been identified as Italian bobbin lace made from linen fibre. The lace was first found protruding from a piece of concretion, located inside the barber's bowls. The lace was freed from the concretion by careful mechanical excavation. It was heavily stained with dirt and other corrosion products. It was cleaned by hand under a microscope using a fine probe, entomological pins and de-ionized water to remove the particles and then soaked in 7% dilute oxalic acid solution and finally neutralized with de-ionized water.

BAT (B) 55 (SCALE 2:1)



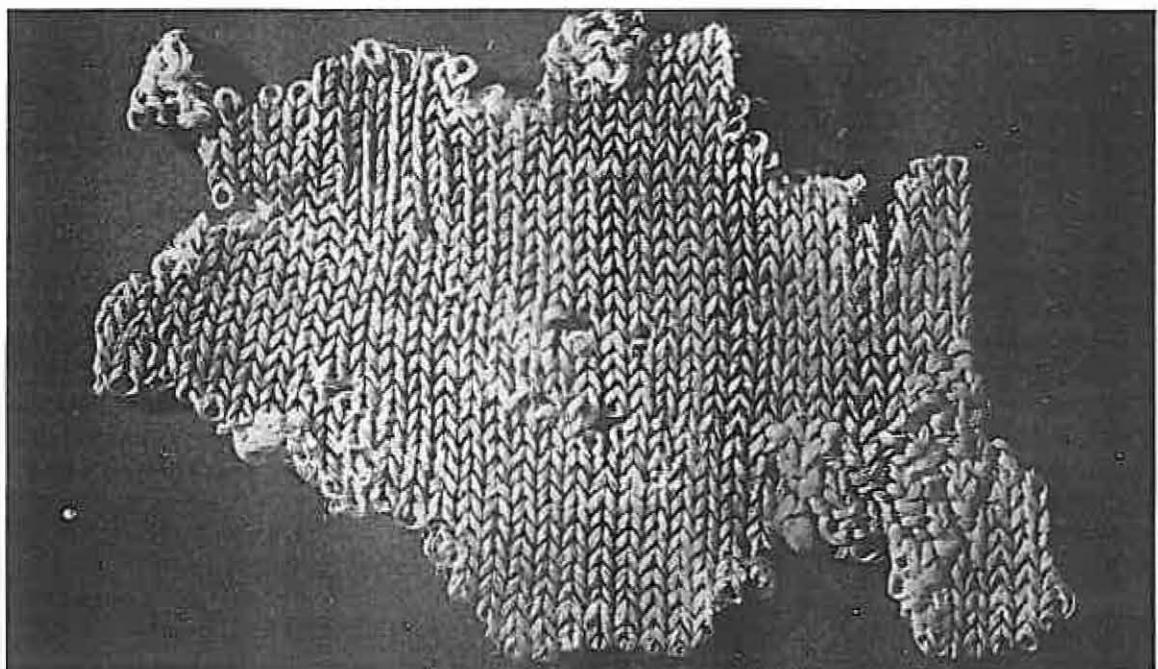
Clothing fragment of navy-coloured wool twill from land site on Beacon Island. This fragment is identical to BAT 3131 from the patch box.

BAT 4460 (SCALE 3:1)



Fragment of lawn (a fine linen resembling cambric). Plain weave, unidentifiable fibre.

BAT 4447 (SCALE 3:1)



Fragments of silk knitting with fragments of purl pattern. Fragment (right) is possibly a stocking showing the seam next to the heel.

## Supplies for the Company in the Indies

### The *Batavia* portico



Figure 43. One of the building blocks lying on the edge of the exposed hull timbers, note the mason's mark 'B 6'.

#### The excavation of the portico façade

When the *Batavia* site was first discovered in 1963, one of the first groups of items observed on the site was a number of shaped stone building blocks. It was suggested, at the time, that the blocks were a 'façade for an important building in the East Indies and they were shipping it out to Java as ballast aboard the *Batavia*' (Edwards, 1966). This observation was remarkably astute, as later work showed that these blocks did, indeed, make up a façade for an important building in Batavia.

During the 1972-76 excavation, 137 shaped sandstone building blocks were recovered from the site. Each block was raised by winch from the wreck site, onto the expedition workboat. The blocks were then transported to the Museum's base camp on a nearby island, where they were unloaded for storage until the end of the excavation. In all, 37 tonnes of blocks were raised. It soon became apparent that the blocks formed part of a portico façade. Matching bases and capitals and half drums for the columns showed a classic Tuscan order. Parts of the pediment were also identified. Because the individual blocks were so heavy, initial attempts on the islands to match the blocks and make a theoretical reconstruction were disappointing. However, when the blocks were brought to the Maritime Archaeology Department at Fremantle, a fork-lift truck was used to handle the blocks. With this, it was possible to erect small sections of the facade (Fig. 45), and try out various approaches, to determine how the portico was constructed. Masons' marks (B2 to B8) on the drums indicated the sequence for the columns, and it became obvious that the columns consisted of alternating layers of half-drums with two flanking blocks and quarter-blocks with the flanking blocks attached. Thus, the layers of the columns alternated between one with a vertical split down the centre of the drum and one without a split. The pediment, however, was unmarked and had to be fitted by trial and error. Once the size of the pediment was determined, it was possible to fit

the semi-circular arch between the columns. As work progressed, it became obvious that a full reconstruction was possible.

Six strange, bronze objects were found on the wreck site. These are thought to be door pintles that would have been set between the layers of the portico, at the top, in the middle and at the bottom, to act as hinges for the massive wooden doors. As no matching gimbals were found, it is likely that sockets would have been cut into the wood of the doors themselves.

At the time that work was progressing on the reconstruction of the portico, a new Maritime Museum was in the planning stage. The old, historic Commissariat Building in Fremantle, dating from 1851, was being renovated to house a reconstruction of the *Batavia* timbers and to act as a museum, in association with offices for the Maritime Archaeology Department and Conservation Laboratory. It was, therefore, decided to rebuild the portico façade on the inside wall of the gallery which was to house the *Batavia*. Here, on the south wall, the proportions of the façade would match the wall of the building and pleasantly frame an existing doorway (Fig. 46).

There was, however, a structural problem. There was concern that the blocks may not stand up to bearing weight, particularly as the sandstone was rather soft. It was decided that each block should be individually supported. A complex, steel, supporting framework was constructed, with two double pillars supporting the whole portico. Each half-column drum was mounted on a steel plate, which, in turn, was welded to the columns. The arch under the pediment was supported in a similar manner. In most cases, the blocks that were secure were simply placed in the supporting framework, but blocks that were loose or insecure were pinned to the steel support for additional security. Thus, no block was weight-bearing, the load of the block above being taken by the steel plates.

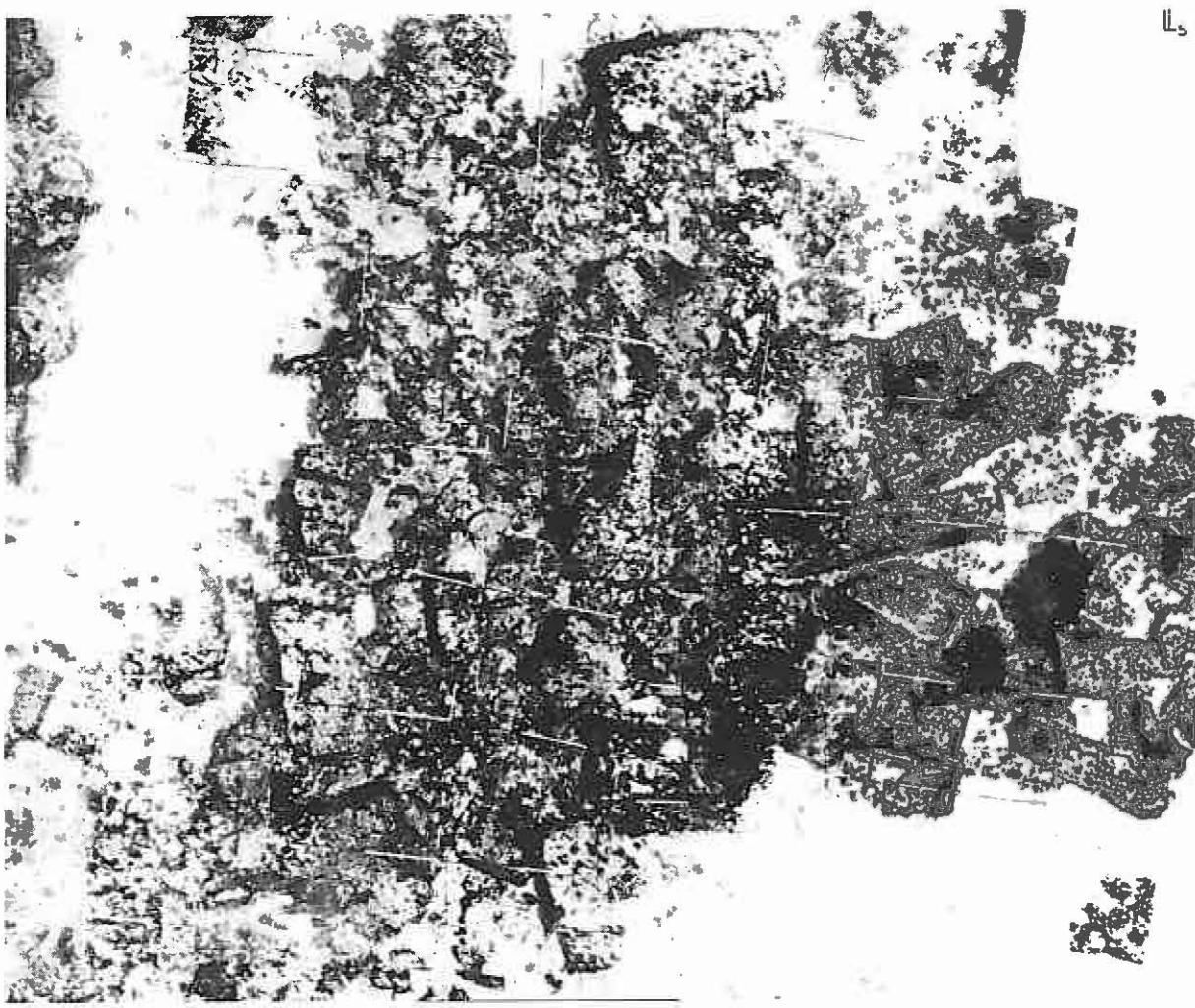


Figure 44. A detail of the site photomosaic showing the building block area prior to excavation.

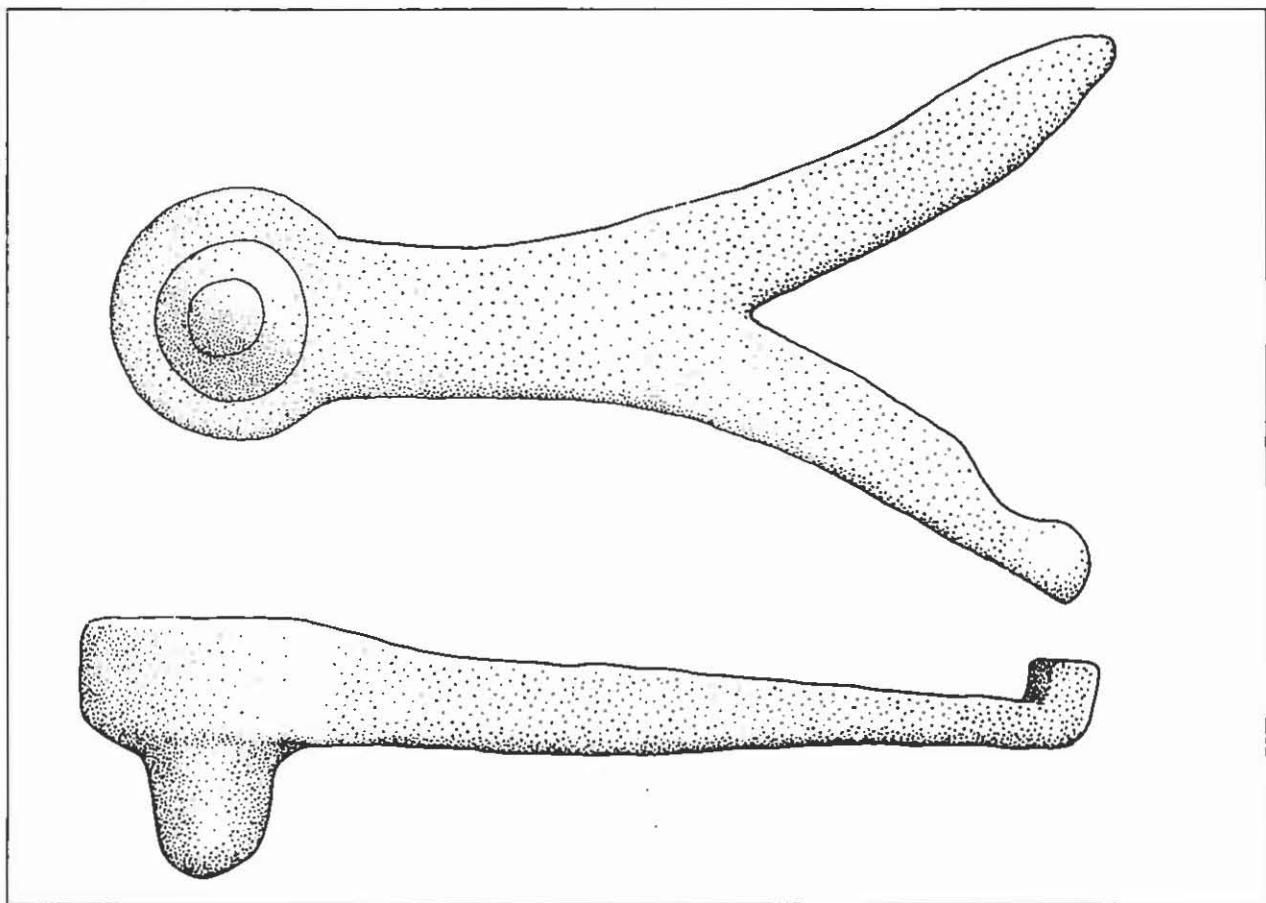


Figure 45. Experimental reconstruction work on the columns prior to the main reconstruction.

**Portico door pintles**

The following show two of the six sets of bronze pintles from the site, thought to be for the doors for the portico.

BAT 3861 (SCALE 1:4)



BAT 3860 (SCALE 1:4)

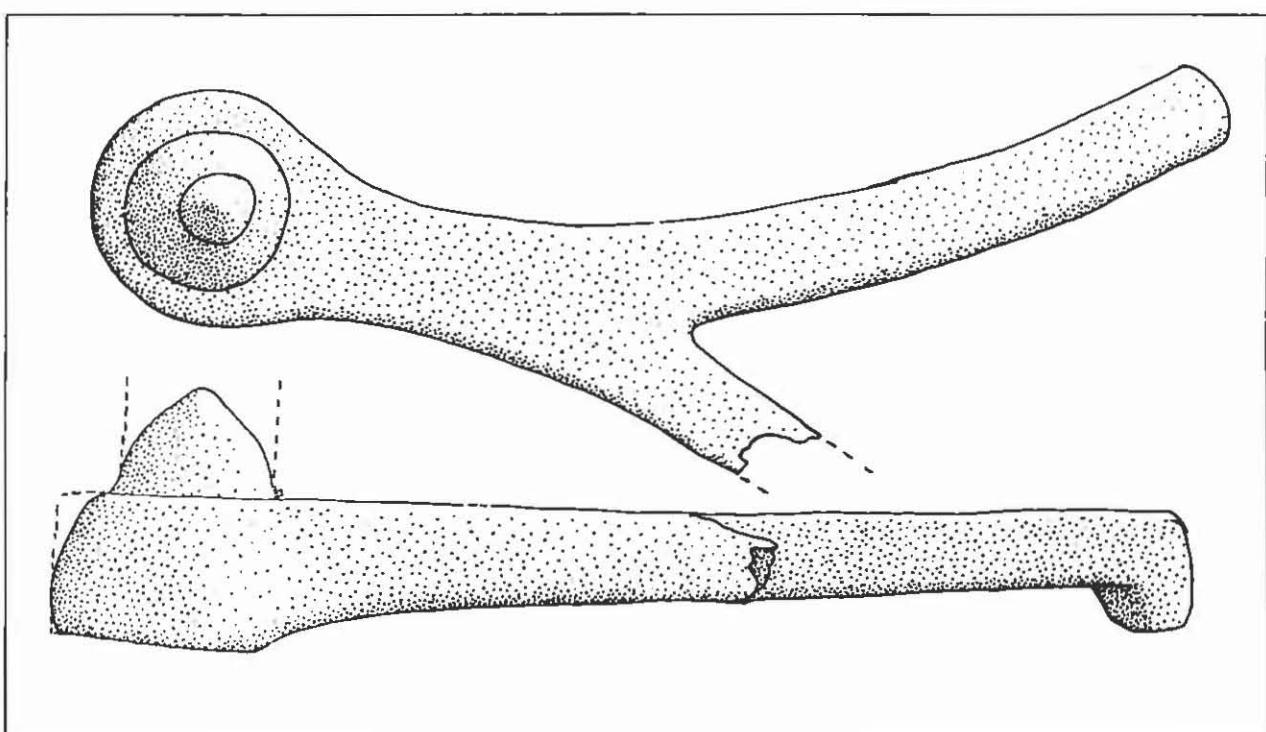




Figure 46. The portico façade reconstructed in the *Batavia* Gallery with the reconstruction team in the foreground.

#### The history of the portico

Archival research was carried out to determine what the façade was intended for in the Indies. The most important document which provides this information is the journal of the voyages of Pieter van den Broecke in Asia (Coolhaas, 1963). Van den Broecke arrived in Batavia on the 19 June 1629, and, on the 7 July, records the arrival of Pelsaert in the ship's boat. While Pelsaert was away effecting the rescue of the survivors of the *Batavia*, the city of Batavia was attacked by an army from Matram. Additionally, on the 20 September, the Governor General Jan Pietersz. Coen died. When Pelsaert and the survivors of the *Batavia* finally arrived back at Batavia on 5 December, 1629, the war was over. All these events were recorded by Pieter van den Broecke in his journal, and he departed for the Netherlands on the 18 December. Following his return to the Netherlands, van den Broecke published, in 1634, a journal of his voyages. This featured a number of illustrations engraved by A. Matham, from van den Broecke's original sketches. One of these depicts a bird's-eye view of the castle and town of Batavia in late 1629, showing the *Waterpoort* or sea-gate incomplete, with scaffolding and a ladder in place (Fig. 47). This is extremely enlightening, since the scene shows the city at the time of the siege. Clearly, no one would have an unfinished gateway without a reason, and it suggests that the portico could have been destined for this gateway.

The castle has an interesting history and there are a number of plans that show the development of the city as well as the castle. In October, 1618, Coen decided to relocate the Company's headquarters from Bantam to Jacatra where it already had a stone packhouse named Nassau. Here, a new, more solid construction was built, named Mauritius. Following problems with the English, who had an establishment on the west side of the river, and the Matramese, Coen proposed to the *Heeren XVII* that a new castle should be built. His plan, dated 1619, survives (Algemeen Rijksarchief VEL-1176-G79204 and Vereniging Koloniaal Instituut, 1919: No.1) and gives the proposed new extensions. Another map, dating from around 1623, shows the new castle with the land-gate facing south towards the main part of the new walled city. It is clear from the map that the north, seaward walls of the castle are unfinished (Universiteitsbibliotheek Leiden, Collectie Bodel Nijenhuis, II-10-34 and Vereniging Koloniaal Instituut, 1919: No.2). By 1627, the city had expanded southwards, as can be seen in the heavily restored plan of the city in the Westfries Museum at Hoorn. The old castle or fort of 1616 can be seen attached to the west side of the new castle. The four bastions Saphier (NE), Robijn (SE), Diamant (SW) and Paarl (NW) are joined by earth curtain walls, with the exception of the north side, between Paarl and Saphier, where there is no obvious wall, but a palisade.

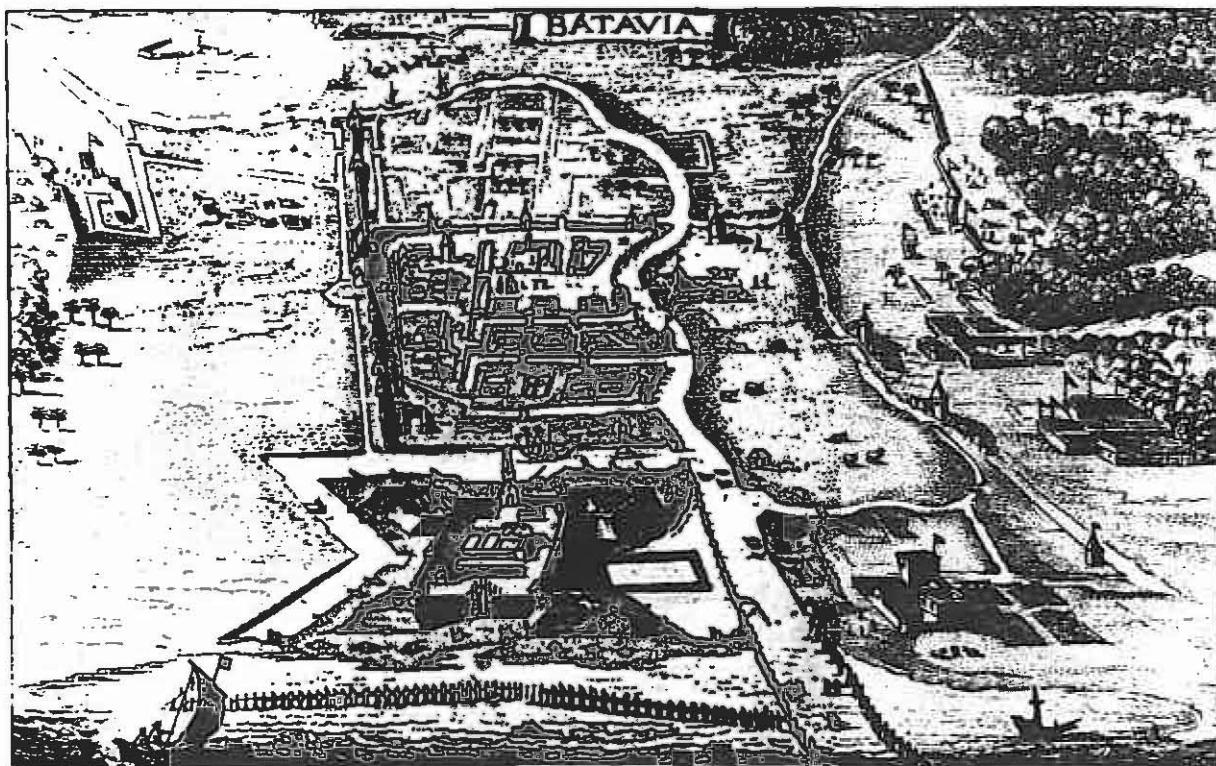


Figure 47. View of the town of Batavia from Pieter van den Broecke drawn in 1629 and published in his journal.

It was intended that a substantial stone building would connect the bastions Saphier and Paarl. The land bastions were built of coral limestone and it is clear that the castle was initially designed for defense from land attack. The seaward bastions were strengthened just prior to the war with the Matramese, and a wooden fence or light palisade was erected in the sea running from the river mouth to the NE corner of the castle. The situation during the war is shown in a number of maps: Floris Berkeroode 3 March, 1629 (Algemeen Rijksarchief VEL-1178-G79204, Vereniging Koloniaal Instituut, 1919: No. 4), Jacob Cuyck, 1629 (two maps, Algemeen Rijksarchief VEL-1179a-G79204, Vereniging Koloniaal Instituut, 1919: No. 5), van den Broecke, 1629 (Coolhaas, 1963) and G. Venant, 1629 (Vereeniging Koloniaal Instituut, 1919: No. 9). As intimated above, there is strong evidence to suggest that the façade was destined for the *Waterpoort* of the castle of Batavia. A gold pendant (Fig. 48), made to commemorate the Chinese contribution to the defeat of the army of Matram, clearly shows the completed *Waterpoort* (de Haan, 1919: G8). The pendant was dated 25 November 1632 which gives an indication of the date for the comple-

tion of the *Waterpoort*. Valentijn (1724-6:242) describes the castle in great detail and, interestingly, states that the *Waterpoort* was inscribed on the inside of the gate with ANNO MDCXXX, indicating that it was completed within a year of the loss of the *Batavia*. The *Landpoort* or land-gate was dated ANNO MDCXXXI. It is obvious that a new portico could not have been ordered in Batavia and delivered within thirteen months; Pelsaert did not return to Batavia until December. It is possible, though unlikely, that the Governor General might have guessed that the portico was lost when Pelsaert first brought the news of the loss in July. A more reasonable explanation is that two porticos were sent to the Indies, one for the *Waterpoort* and one, on another ship, for the *Landpoort*. From Valentijn's dates, it seems that the *Waterpoort* was the first to be built and, it may be conjectured, that another was re-ordered for the *Landpoort*, which according to Valentijn was completed in 1631. Thus the portico on the *Batavia* could have been for the *Landpoort* or the *Waterpoort*. The markings 'B' on the columns, also suggest that there may have been two porticos, and that the other would have had the prefix 'A'.

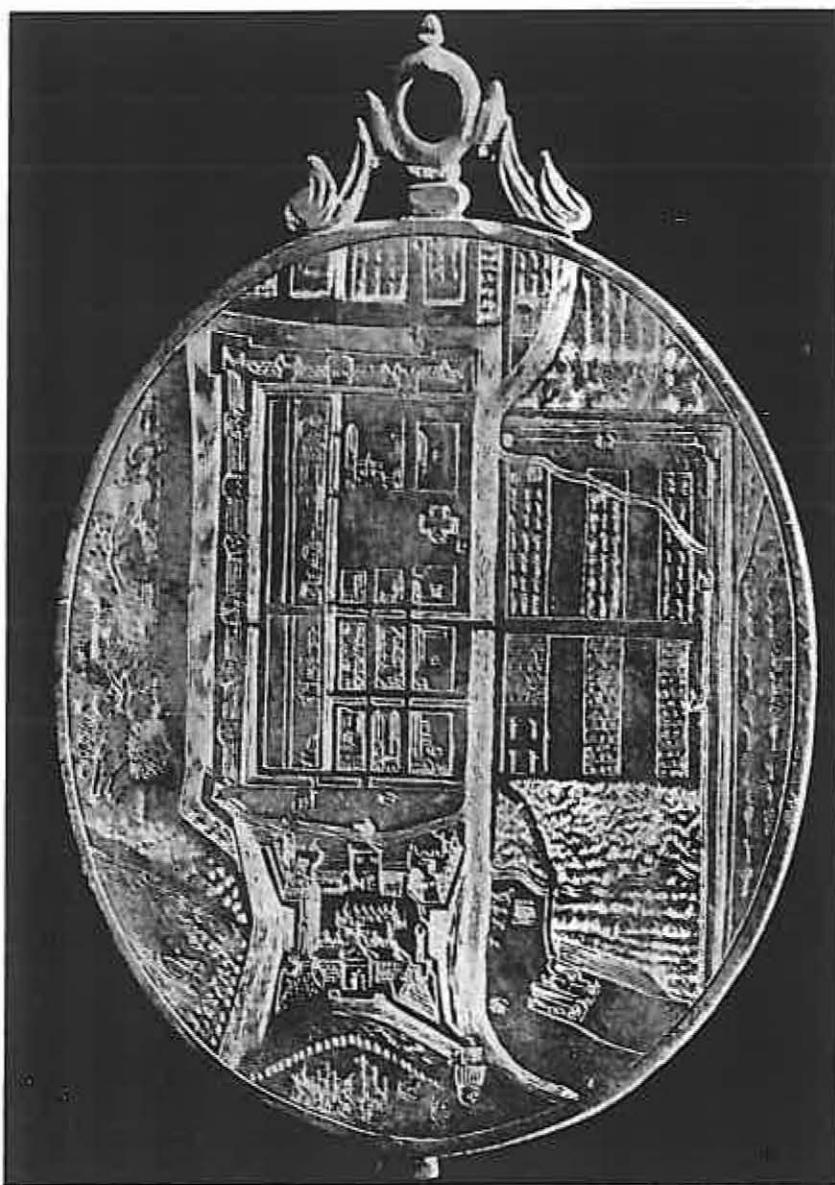


Figure 48. A medallion struck in 1630 to commemorate the assistance of the Chinese in the construction of the defensive walls of Batavia during the siege of 1629, note the Waterpoort is complete (de Haan, 1919: G8).

There are, additionally, a number of blocks that do not fit into the reconstruction. In particular, there are eight small blocks that form two annuli. These are possibly windows for the entrance. There is an excellent illustration of the north face of the castle of Batavia in the Vingbooms Atlas (Fig. 49), of uncertain date but possibly 1630-1640, showing the *Waterpoort* with portico façade of almost identical design to the façade from the wreck of the *Batavia* (Algemeen Rijksarchief VELH-619-32-G79204). On the exterior east side of the *Waterpoort* may be seen four windows, two to each floor, indicating that there was a room, possibly a guard-house, flanking the tunnel that would have formed the entrance. It may be that these annuli were for an observation window or a gunport.

In later years, the *Waterpoort* became the main entrance to the castle and the city of Batavia, possibly because the access to the *Landpoort* via the river became more difficult as the seashore silted up. In 1629, the sea

reached the north wall of the castle. By 1780, the river mouth was nearly a kilometre away. The Vingbooms Atlas (Fig. 49) clearly shows that the crane had been moved from the south side of the castle to the north and that a canal had been dug through from the river to provide access to the *Waterpoort*. The old *Landpoort* was eventually demolished, together with the south wall of the castle since the city walls and fortifications made the defences on the south side of the castle redundant. The *Waterpoort* was rebuilt in 1756 in a more magnificent style as illustrated in Fig. 50 (de Haan, 1922: K9) and the castle walls were finally dismantled in 1809, so that today nothing remains of the castle or *Waterpoort*. The V.O.C. built many castles and forts throughout the Indies. One of the most famous was the Castle Nieuwe Victoria at Amboin, where a *Waterpoort* still survives today. The design of the Amboin *Waterpoort* is very similar to the *Landpoort* at Batavia, described by Valentijn (1724-6) as having the Arms of Batavia at the

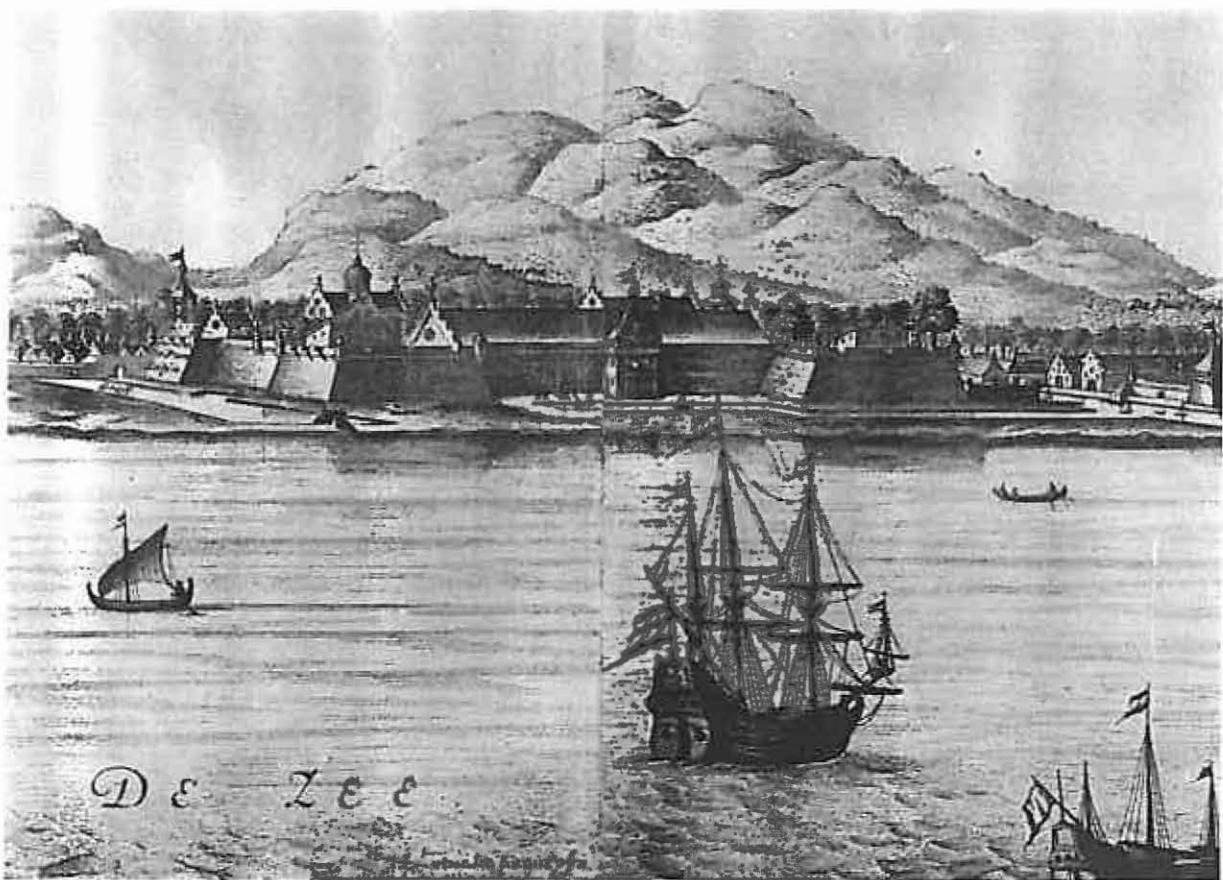


Figure 49. View of the town of Batavia from the Vingboom's Atlas dated from the mid-1630s, showing the Waterpoort with the completed portico, note that the crane has been moved to the seaward side of the castle and a small canal has been dug to enable small vessels to be unloaded in front of the gateway (Algemeen Rijksarchief VELH-619-32-G79204).

centre and surrounded by the Arms of the Chambers of the V.O.C. (Delft, Rotterdam, Amsterdam, Middleburg, Hoorn and Enkhuisen).

More than ten thousand new arrivals from the homeland are said to have disembarked in front of the *Waterpoort* at Batavia and marched through it, into the castle. For many, it was the gateway to a miserable existence, but for some to a glorious future. For officials and Company servants returning home, it was a time for celebrations, festivities, toasts, and cannon salutes. It has been said that the *Waterpoort* saw the arrival of many thousands of 'green' recruits, and the departure of considerably less 'veterans', many with extremely florid complexions.

On the following pages, a selection of the column blocks are illustrated, showing the various mason's marks that indicate the respective levels on the column. In many cases, there are scour marks on the blocks which were almost certainly caused by sand abrasion on the wreck site. The constant movement of sand backwards and forwards across the surface of the blocks caused, in some cases, deep gouges. It is obviously beyond the scope of this work to illustrate each block individually.

BAT 1047 (SCALE 1:5)



1047

BAT 1050 (SCALE 1:5)



10

BAT 1058 (SCALE 1:5)



BAT 1114 (SCALE 1:5)



BAT 1039 (SCALE 1:5)



BAT 1037 (SCALE 1:5)



BAT 1057 (SCALE 1:5)



BAT 1035 (SCALE 1:5)



BAT 1052 (SCALE 1:5)



BAT 1020 (SCALE 1:5)



BAT 1000 (SCALE 1:5)



BAT 1066 (SCALE 1:5)



BAT 1113 (SCALE 1:5)



BAT 1043 (SCALE 1:5)



BAT 1079 (SCALE 1:5)



BAT 1069 (SCALE 1:5)





Figure 50. The new Waterpoort built in the 18th century to replace the original (de Haan, 1922: K9).

### Bricks

About 8,000 small building bricks were recovered from the wreck site and the inside reef area. The bricks varied in colour, ranging in three basic types: a pale yellow, a pink-brown and a grey. Within the three groups there was considerable variation in the colour range and in some cases the body of the bricks had a mixture of the three colours, as if the clay had not been properly mixed. The size of the bricks averaged  $182 \pm 5$  mm long by  $84 \pm 3$  mm wide by  $37 \pm 1$  mm thick. These measurements are slightly larger than the bricks recovered from the *Vergulde Draeck* wreck site where the same dimensions were 176 mm by 76 mm by 34 mm. The *Vergulde Draeck* bricks were all of the yellow-bodied type and were tentatively identified as *IJselsteen* or *Goudsesteen*. Large quantities of bricks were sent each year to the Indies. In 1653, 300,000 bricks were requested and these orders included *Vries clijkert*, *grauwe leijts moppen*, *leijts clijne grauwe clijkert* and *Goutse clijkert*. The bricks made an excellent paying ballast and would, no doubt, have been used in the various building programmes taking place in Batavia during this period.

## Trade items

### UNCERTAIN TRADE

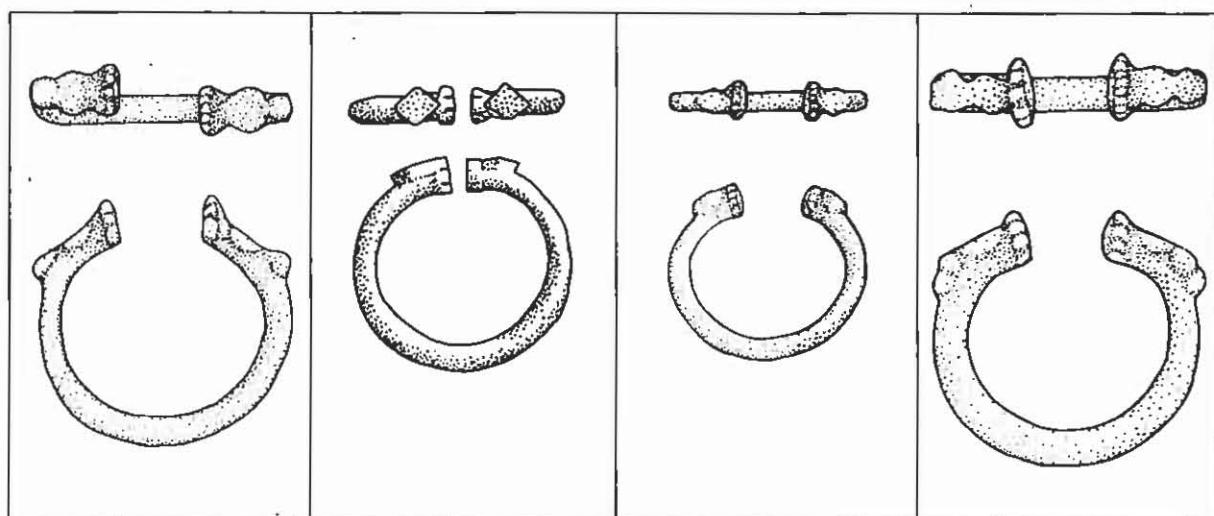
#### Bronze manillas

BAT 3583

BAT 3257

BAT 3259

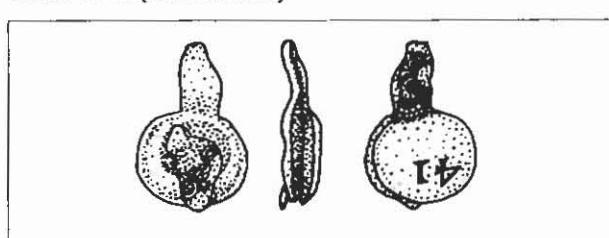
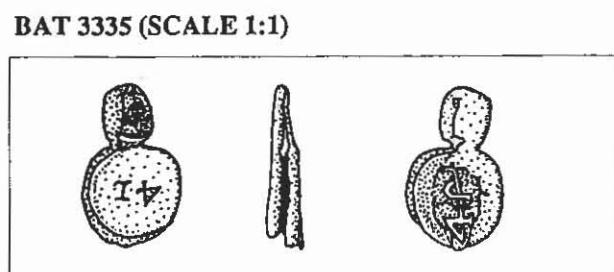
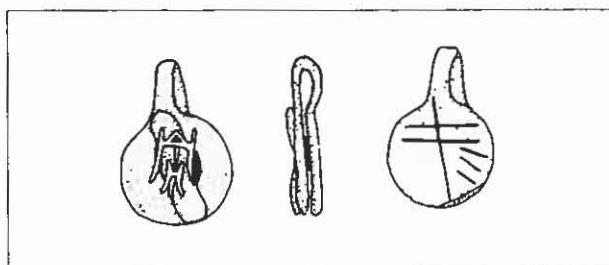
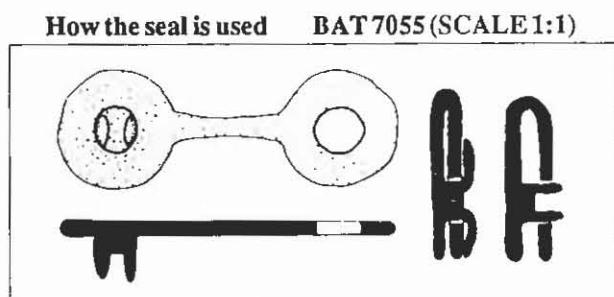
BAT 3399



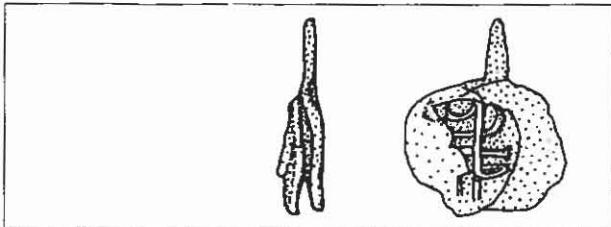
These objects are thought to be manillas, originally a slave token or unit of money. They are known to have been used as tokens in the late 18th and 19th centuries in West Africa. Their presence on the *Batavia* cannot be explained. They do resemble examples of manillas, although the West African examples have a different treatment of the ends, having a trumpet-shaped ends, without ornamentation and they are also larger. In some cases, they were large enough to wear. It is difficult to explain what a V.O.C. ship of the early 17th century would be doing with West African slave tokens; V.O.C. ships did visit the West African coast, and there is mention that the *Batavia* visited Sierra Leone (although it is not certain that the ship stopped there). The numbers found on the site suggest that they were not merely curios collected by the crew. On the other hand, they are not recorded on other V.O.C. shipwrecks, nor are they mentioned in the requisition lists of the time. It is possible that they are not slave tokens at all, but have some other purpose. The ornate and intricate treatment of the end suggests a decorative function, since it resembles an animal's foot.

#### Lead bale seals

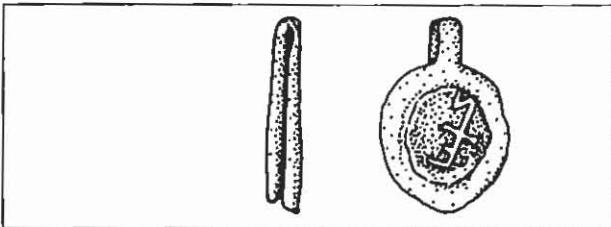
Lead bale seals were widely used to seal bales of cloth to give an approval or quality mark to the goods. They consisted of two disks that could be clipped through the cloth and fastened together and then stamped on both sides. The manufacture of fabrics involved a number of different processes from the weaving to the final washing. Each stage was subject to the supervision of inspectors of the cloth guild. When approved, these small bale seals were attached to the cloth, and could denote quality, length, town of origin or the shipper (in this case the V.O.C.) The length of the roll was occasionally stamped on the seal; there are two examples of '4L' (BAT 3335 and BAT 7042) which would show that



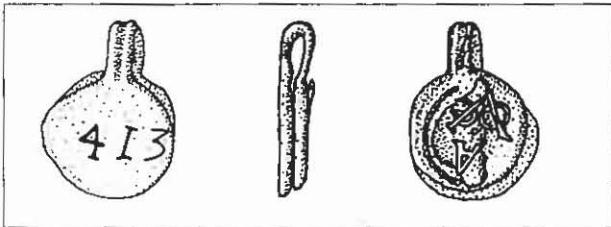
BAT 3037 (SCALE 1:1)



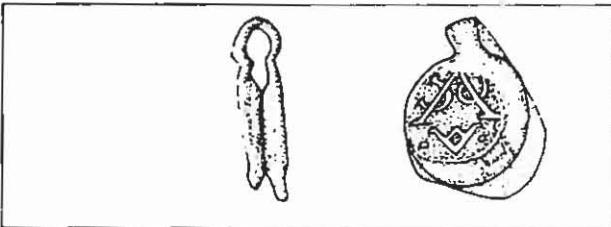
BAT 3216 (SCALE 1:1)



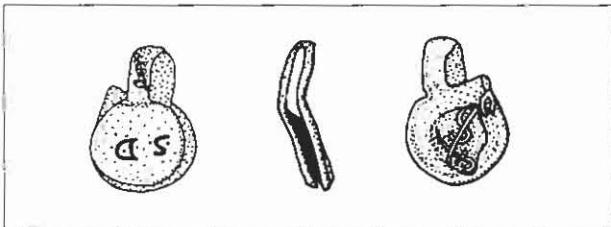
BAT 3313 (SCALE 1:1)



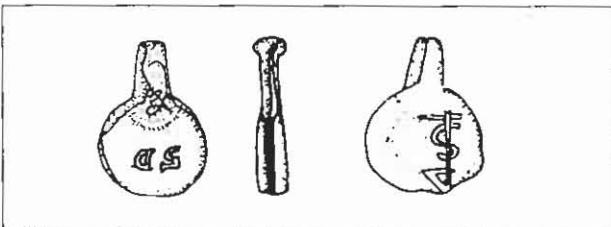
BAT 3305 (SCALE 1:1)



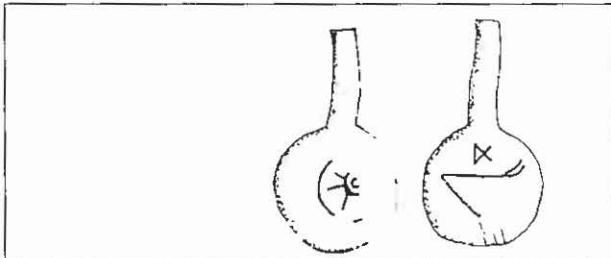
BAT 7096 (SCALE 1:1)



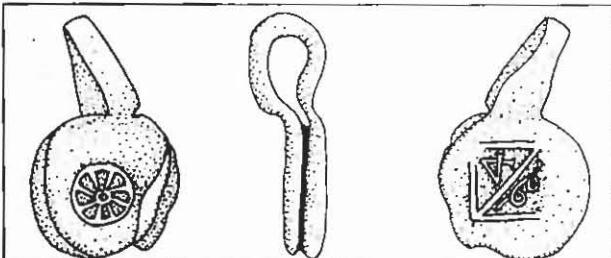
BAT 3037A (SCALE 1:1)



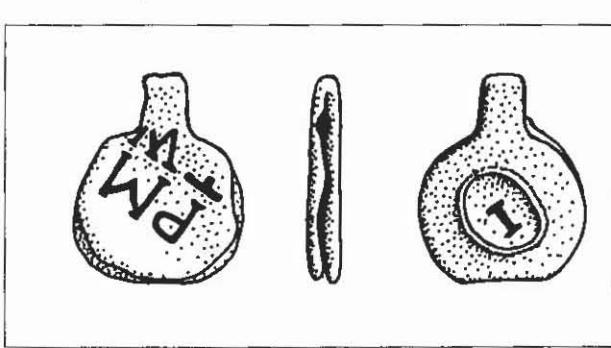
BAT 3824 (SCALE 1:1)



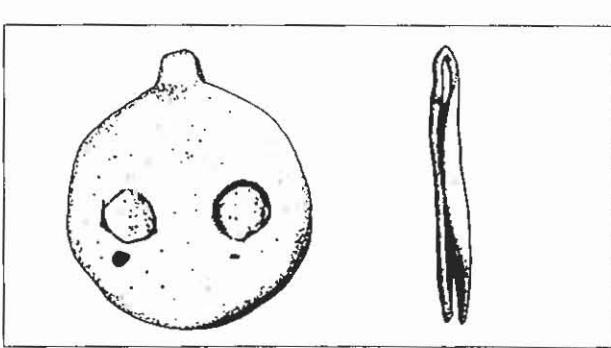
BAT 7003 (SCALE 1:1)



BAT 7056 (SCALE 1:1)



BAT 3237



the length was four *ells*. BAT 7055 has inscribed lines suggesting the number 23 (made up of lines representing 10+10+1+1+1). BAT 7056 has the traces of the words 'LONDON STALL' around the edge of the side with the number '1' and a madder bag in the centre. The 'stall' or *staal* mark was the final Guild mark affixed to the cloth indicating its degree or rank; the '1' meant that it had been washed once in woad, a pale blue dye. The figures 'PM T(?)W' were possibly a person's initials, the dyer perhaps. BAT 7096 and BAT 3037A have the figures '5D' stamped on them indicating the *dun* or fineness or thickness of the material. There are two examples, BAT 3313 and BAT 3305, stamped with AVOC, indicating that the quality was set, or the material was owned, by the Amsterdam Chamber of the V.O.C. There are also two examples, BAT 3824 and BAT 7003, which, it is suggested, have been stamped with a wheel, the mark of the Guild of Cloth Dyers of St Martin's, London. However, this could also be a sun, and thus the mark of the *linnenblekers* or linen bleachers.

## MISCELLANEOUS

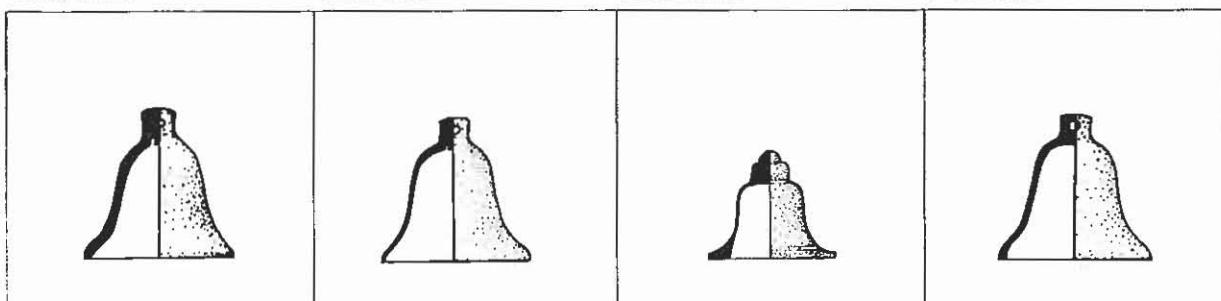
### Bells

BAT 3258

BAT 3448

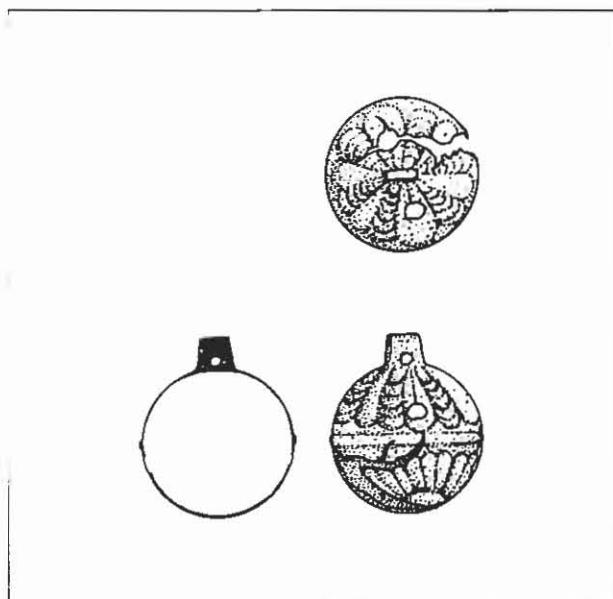
BAT 3575

BAT 3297



Rumble bell

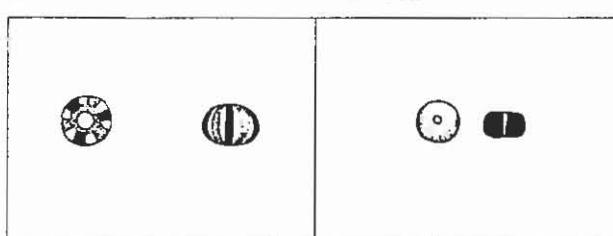
BAT 3264



Beads

BAT 681

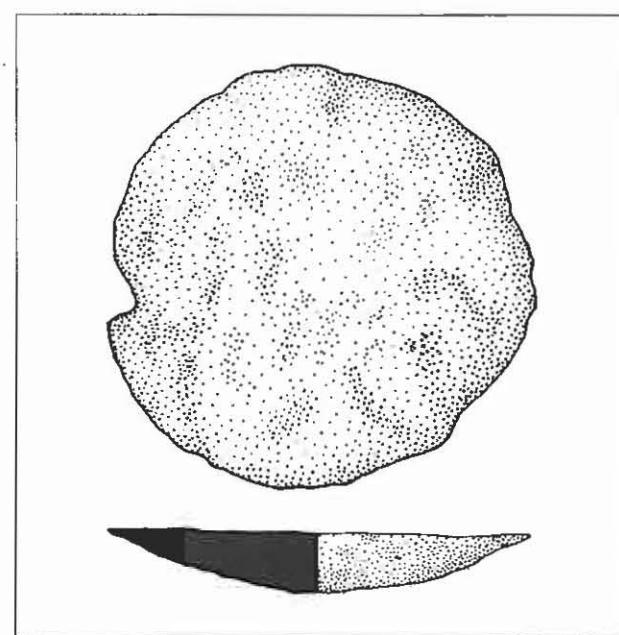
BAT 655



Bells have been included with trade goods because it is known that such items were used for barter purposes at the Cape of Good Hope to trade with the local inhabitants for cattle. However, the items may also have had other, as yet unknown, purposes.

Copper bun-shaped ingot

BAT 3225



Copper plate was widely used for barter purposes at the Cape of Good Hope; it was reported by Coen in 1627, that thick copper plate was preferred for barter. Again, these bun-shaped ingots may well have had other uses on the *Batavia*, in particular they may have been used as a source of copper for one of the tradesmen on the ship, such as the smith.

### Red coral beads

A total of 46 red coral beads were recovered from the site. These items were a common trade item in the 17th century; for example, in the *Eysch* for 1653, 4000 *pont* of red coral was ordered for the Indies (Green, 1977). However, the beads have various diameters which when arranged in order, make quite a reasonably proportioned necklace (Fig. 51). Red coral necklaces were used as a talisman to protect the wearer against evil and, particularly, to ward off the incursion of demonic forces (Schama, 1987).

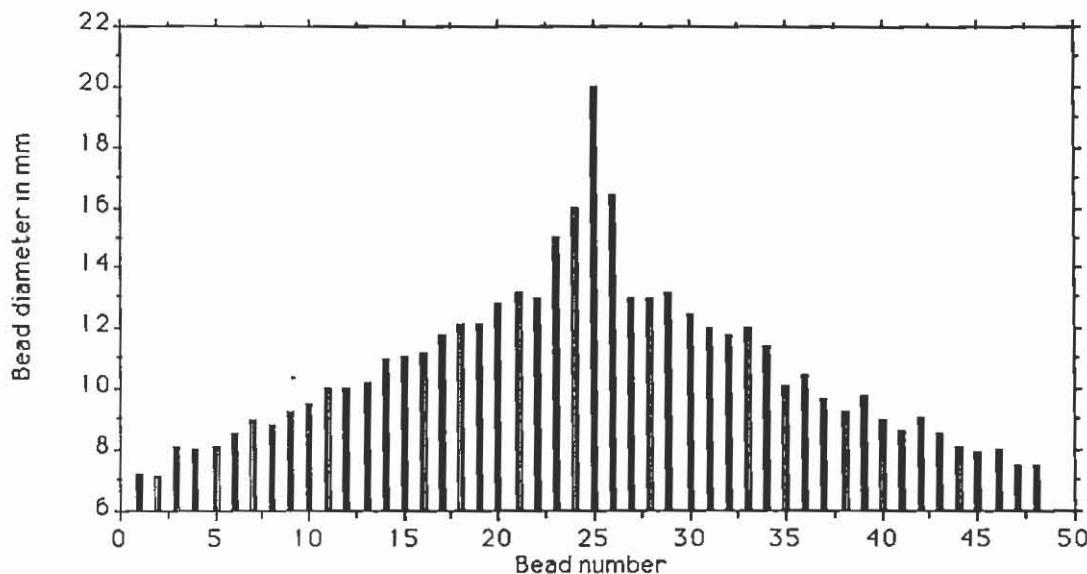


Figure 51. A bar chart showing the distribution of the bead diameter in mm for 46 red coral beads.

### Amber beads

About seventeen amber beads were recovered, in varying sizes, shapes and colours. All beads were observed to accumulate electrostatic charge and they have been identified as amber. Like coral, amber was imported to the Indies in large quantities. Between 1634 and 1664, a maximum of 10,000 *pont* (1657 and 1658) and a minimum of 800 *pont* (1643) was ordered.

### Lead rolls

Lead was requisitioned for the Indies in very large quantities (see Green, 1977). In 1640, for example, 10,000,000 *pont* of lead was ordered and annual orders often exceeded one million *pont*. Three lead rolls were recovered from the site. The rolls weighed approximately 200 kg each and were 865 mm or about 3 voet long.

## TRADE SILVERWARE

During the excavation of the *Batavia*, a remarkable collection of unusual silver objects was recovered. There seems little doubt that this material was part of the speculative trade that Pelsaert had advocated in his *Remonstrantie* or Report which he presented to the *Heren XVII* in 1627 (Moreland, 1925). Pelsaert, while upper-merchant or factor at Agra, had written the *Remonstrantie* with the intention of advising the Company on India and the trade prospects there. He advocated the development of a number of new types of trade; of particular relevance here is his note that:

Many of the great men express surprise that we do not have gold and silver (coined and uncoined), which we import in large quantities, manufactured by us into articles that are in common use..... It would be well therefore, for the first trial, to manufacture such goods as the following to the value of 8000 to 10000 reals-of-eight, and to the same amount in gold: Feet for *katels*, or bedsteads, hollow, and as light as possible, but artistically wrought.

*Aftabas*, or ewers used by Moslems for washing their hands.

Betel boxes

Fan handles

Handles for fly-switches.

Dishes and cups with covers.

If necessary, the style or fashion of these items should be explained.

It is believed that after his return to the Netherlands in June 1628, Pelsaert was given permission by the *Heren XVII* to pursue these ideas and he was allowed to commission items that would be taken to the Indies in the *Batavia* for this trade.

When Pelsaert returned from Batavia to the wreck site in the *Sardam* to rescue the survivors, he was able to recover much of the bullion and goods from the ship using the divers from Gujarat. Pelsaert records:

They fished up the Box [Casse] with the Tinsel, as well as 4 silver Moorish fruit-dishes, with a ditto hand-basin [*lam-petschotel*], weighing all together, by guessing \_\_\_\_ Silver Marks.

After Pelsaert's return to Batavia, van Diemen, the Governor General, recorded in December 1629 that:

ten chests of cash, amongst them the chest No. 33 with nine sacks of ducats. Item, the cash with the jewels to the value of f. 58000 and some wrought silverwork, three barrels of cochineal and other baggage...

were recovered from the site and returned in the *Sardam* to Batavia.

A letter dated April 1629 written by the *Heren XVII* in Amsterdam to the Governor General, J.P Coen, contained the following information (Coen was dead by the time the letter arrived in Batavia):

Herewith goes a case numbered as No. 4, in which are four posts for a bed, a chamber pot, a ewer, and a big dish, all made from pure gold, which was made to order and on the advice of the merchant Francisco Pelsaert, to be sent to Surate and from there to the land of the Great Magor to be sold to that person or to the mighty men of the same realm.

Thus it would seem that the silverware found on the wreck site was part of a consignment which Pelsaert was to use to explore the new trade possibilities. Obviously, much of the silverware was recovered, but what remain on the site is of great interest.

It is difficult to determine if the *Batavia* silverware is the work of one silversmith since only one maker's mark, together with the year mark, survives on the plate (BAT 3432). It bears the town mark of Amsterdam, the date letter 'S' representing the year 1628, and the maker's mark of Abraham van der Plaetsen (Citroen, 1975:14). Another object, the so-called candelabra (BAT 3643), has the same date mark, unfortunately the other marks are obscure. Most of the silverware is executed in a similar fashion, with finely crafted engravings, only the candelabra is different, having applied cast mouldings. Several of the objects have markings showing where the silver had been assayed (Fig. 52). This process involved taking a small scraping of silver which was tested for purity. If this passed assay, the object would then be stamped.

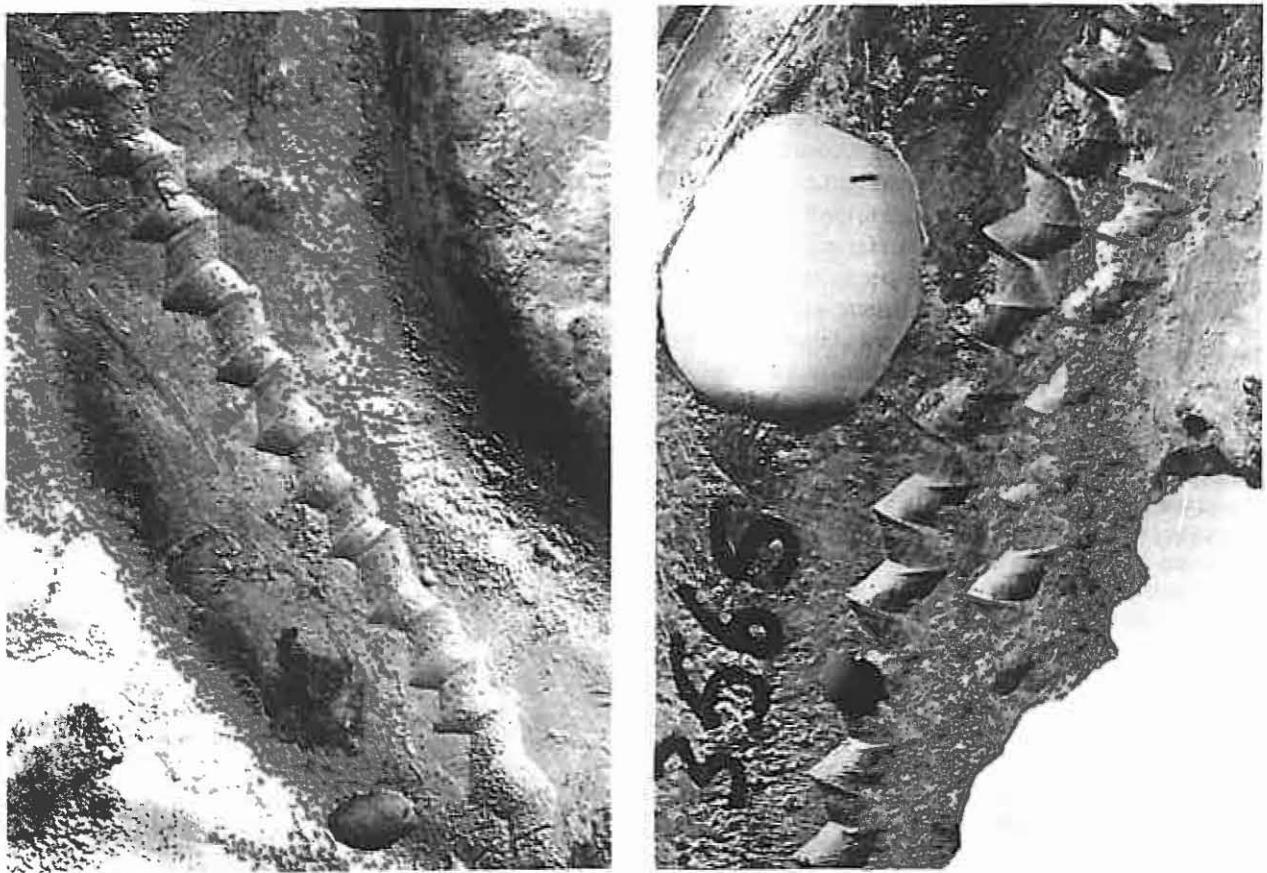


Figure 52. Assay marks on the silver objects showing where the silver sample was taken.

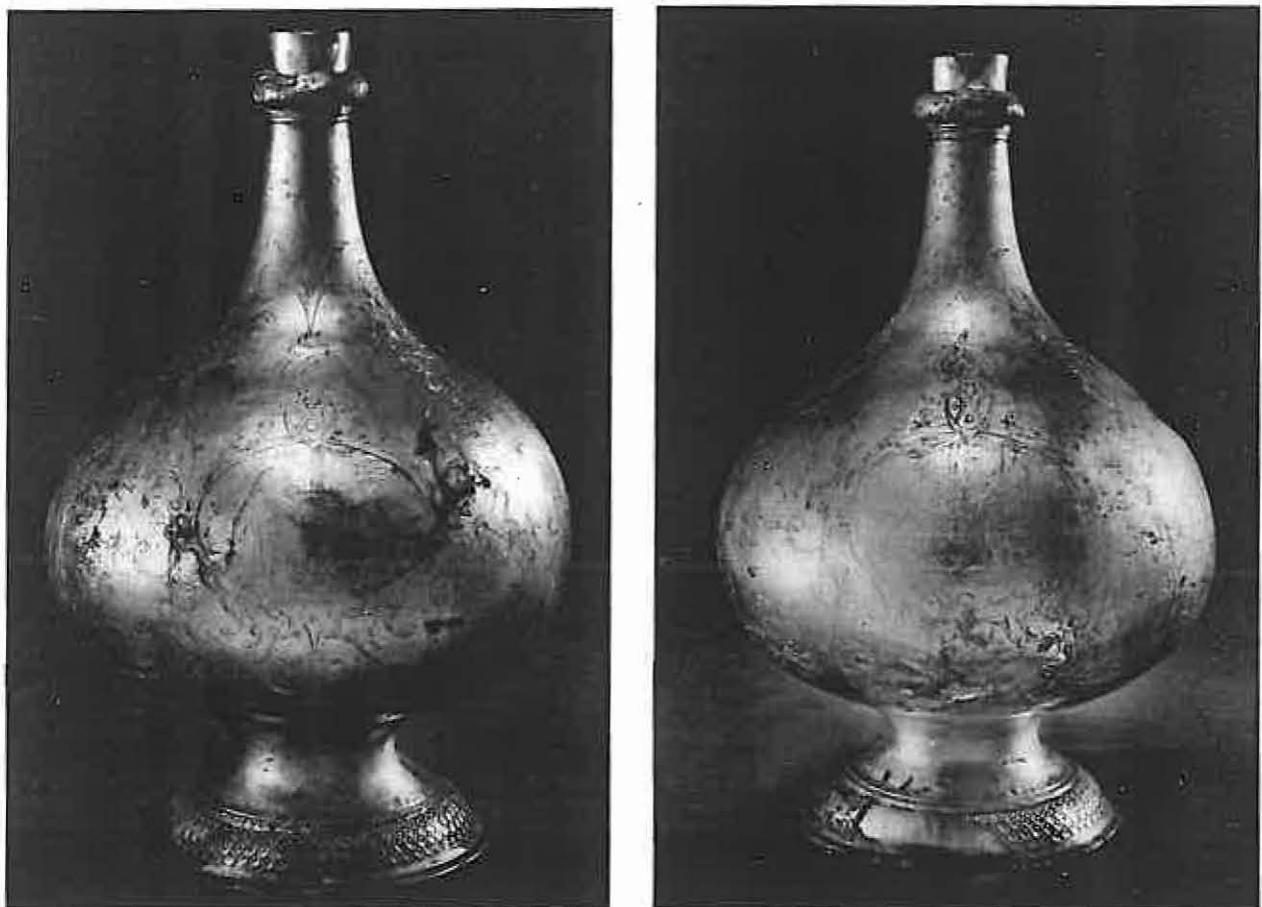
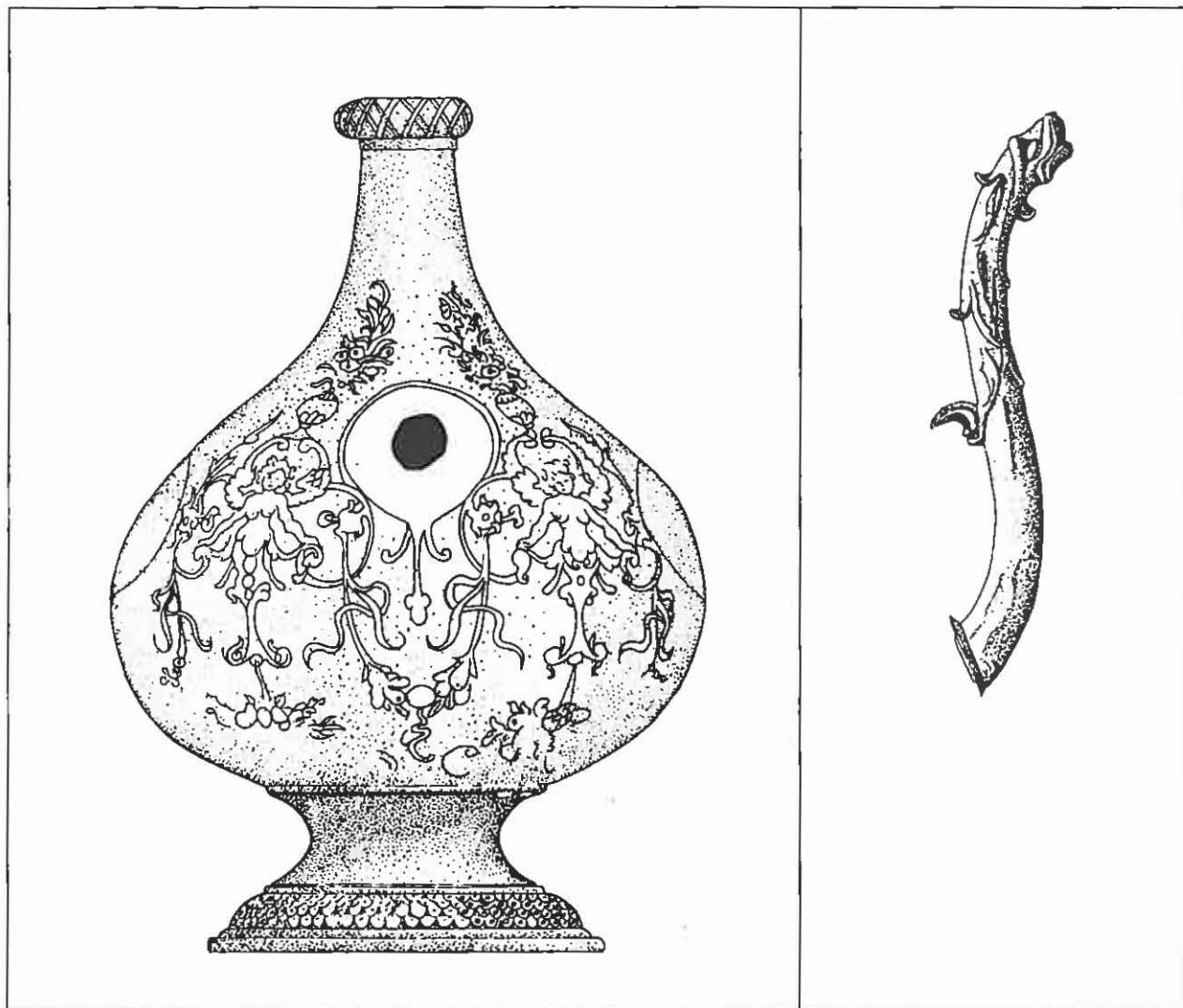


Figure 53. Two views of the ewer BAT 3035 showing the cartouches and the engraved decoration. The left-hand view shows the servant offering the seated gentleman a covered bowl. In the right-hand view, the servant carries a ewer.

Ewer or spouted decanter  
BAT 3035

BAT 3069



This is a finely-made, tear-drop-shaped ewer or decanter, with the spout missing, standing on a well-proportioned base (Fig. 53). The body is decorated with a band of finely-executed engraving, including four oval-shaped cartouches (Fig. 54) which depict naturalistic scenes, surrounded by a symmetrical band of foliage, fruit and cherubs (Fig. 56). There is a hole on the mid-body where the missing spout would have fitted. A spout BAT 3069 was found on the site, near where the ewer was found, and this may belong to it.

One of the most interesting features of the ewer are the cartouches, one of which shows a Moorish figure, possibly a servant, bearing a similar ewer on a basin (Fig. 55). Seated in front of him is a more elegantly-dressed figure holding a towel or cloth, and this scene possibly depicts the washing of hands prior to eating. The engraving is thus exactly as Pelsaert had recommended. It is not clear if the scenes in the other cartouches are representative of the other objects belonging to this silver set; for example, one cartouche (Fig. 57) shows a similar scene, with the servant this time bearing a bowl with a covered lid, which might well be for food. The whole group of illustrations suggests the hand-washing ceremony, or lustration, carried out by Muslims prior to eating. There were fragments of other ewers found on the site, a neck fragment (BAT 3245) and a spout (BAT 3059), not illustrated.

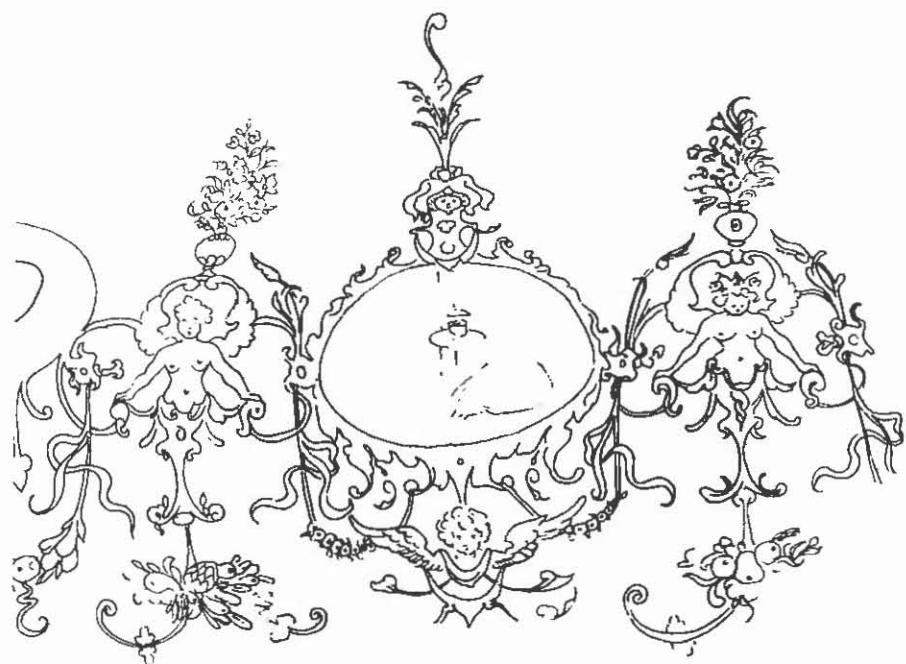




Figure 54. A detail of the engraving showing the cartouche and the floral and ribbon decorations.



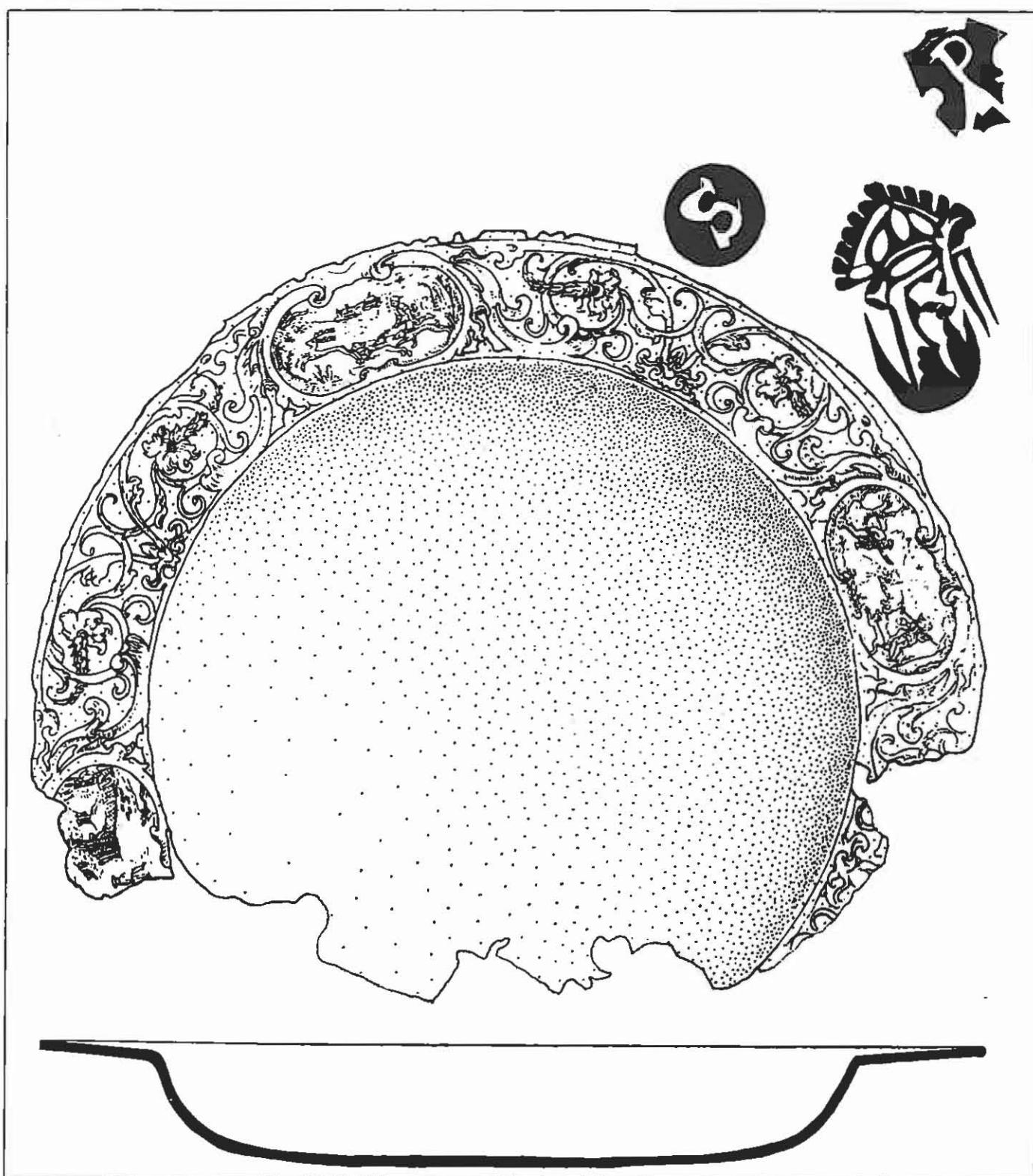
Figure 55. Detail of the servant with the ewer on the basin.



Figure 56. Engraved decorations above the cartouche.



Figure 57. The cartouche showing the covered bowl.



This silver plate is engraved around the rim in a similar style to the ewer, the cartouches in this case depicting hunting scenes. The three engraved cartouches that survive (there were originally four) depict a bear hunt (Fig. 58), a stag hunt (Fig. 59) and a fishing scene. A city can be seen in the background of the stag hunt, and the engraver has attempted to impart an Eastern flavour to the buildings. The dome-shaped building on the left may be an attempt to depict a mosque although the result is more reminiscent of a Buddhist *stupa* or *chedi*. The hunters are also strangely attired; possibly the whole scene was intended to interest the Mogul Emperor Jahangir who was a keen hunter and for whom these items were intended. The plate is also engraved with floral sprays (Fig. 60) similar to those of the ewer. The touch-mark or silversmith's mark consists of the Arms of the City of Amsterdam, with the date letter 'S' (1628) and stamp of the initials 'PA' of the maker, Abraham van der Plaetsen.



Figure 58. Plate BAT 3432 showing the bear hunt cartouche.



Figure 59. Plate BAT 3432 showing the deer hunt cartouche.



Figure 60. Plate BAT 3432 showing the decorated scroll-work and floral decoration.

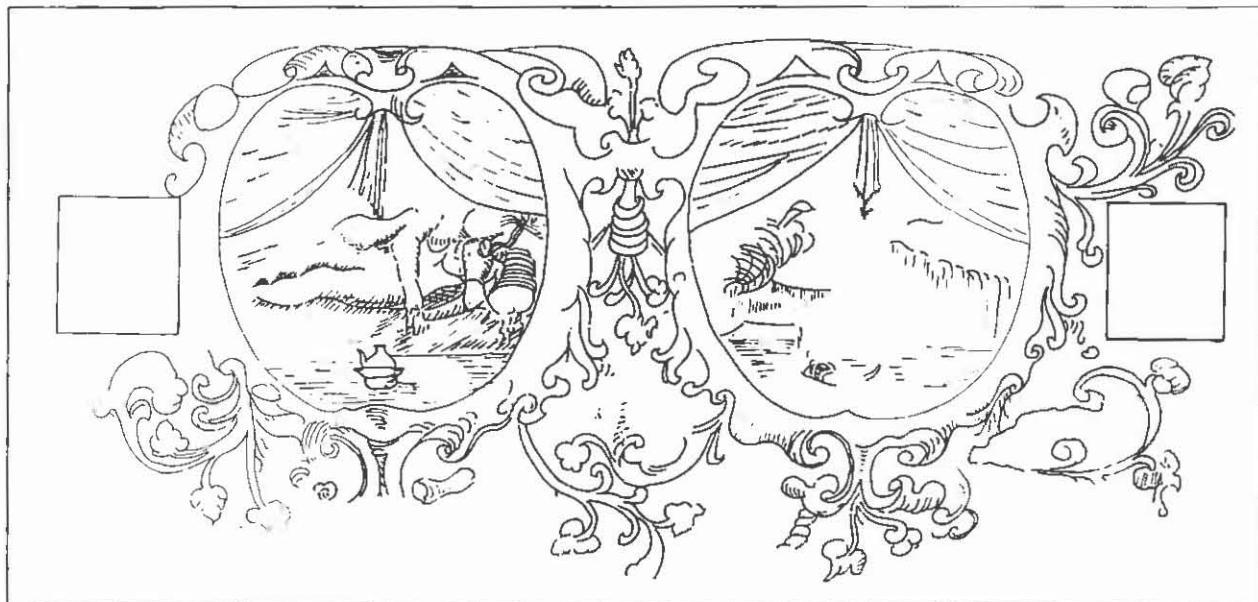
Objects of uncertain function  
BAT 3009



This is possibly a chalice or a ewer. There is a central cordon around the middle of the object. The upper part is missing, having been corroded or damaged on the site. The decoration is very similar to the plate BAT 3432, with four cartouches, one being the same stag hunt as on the plate. Another cartouche has a fox hunt, and was possibly the theme of the missing scene of the plate. The engraved surrounding decoration has what looks like a chimerical beast, possibly a wyvern or a cockatrice together with vegetal scrolled foliage.

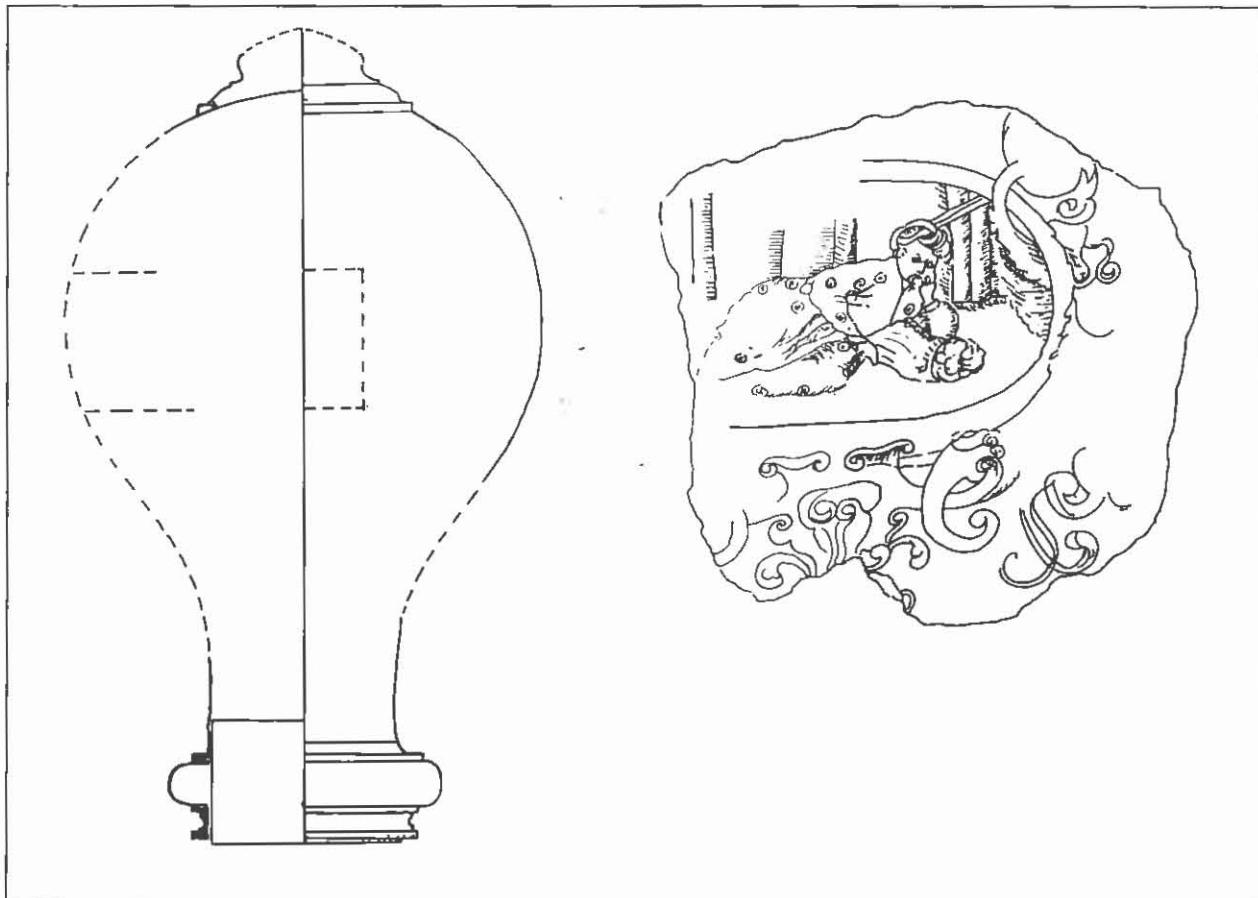


Bed-post  
BAT 3823

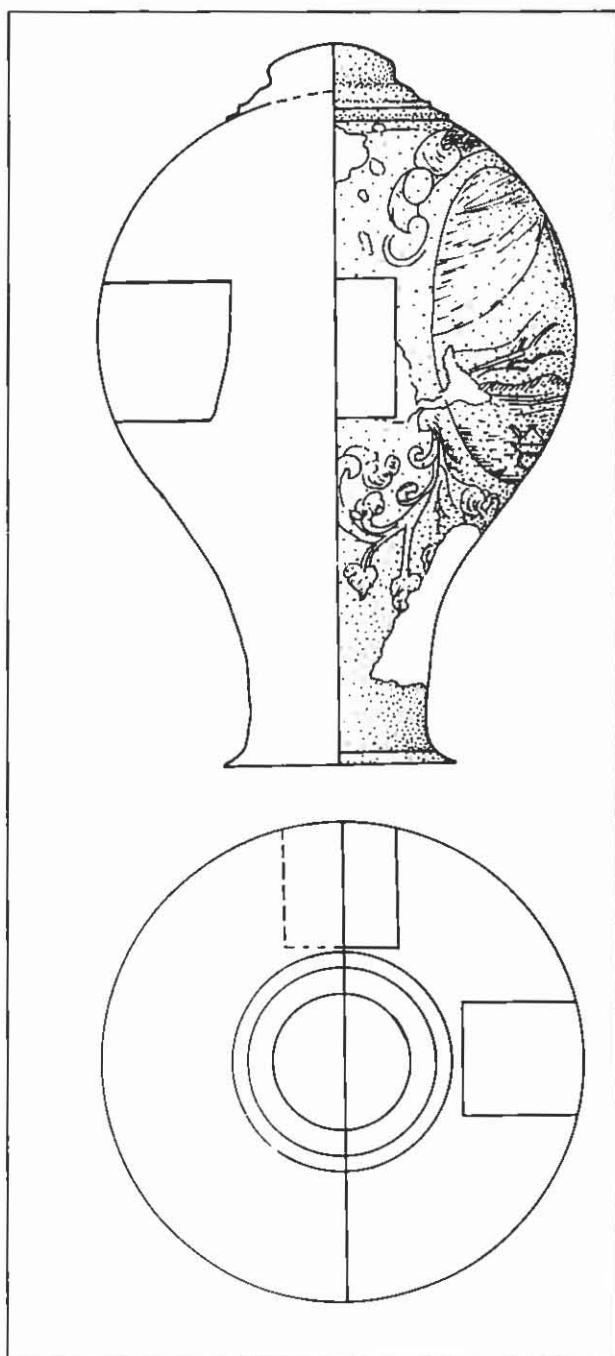


These are very unusual objects. Initially, when they were found we had no idea what they were. It was only through reading Pelsaert's Journals and Drake-Brockman (1966) that it became clear that these were the bed-posts mentioned by Pelsaert in his *Remonstrantie*. The cartouches on these items all depict a Moorish, Arabian or Indian person in a Middle Eastern or Indian scene, certainly not a Chinese or Oriental scene. The person is invariably reclining on a bed with pillars and drapes in the background. In one scene, a ewer and basin can be seen in the foreground. The engraved scroll-work is again similar to the other silverware.

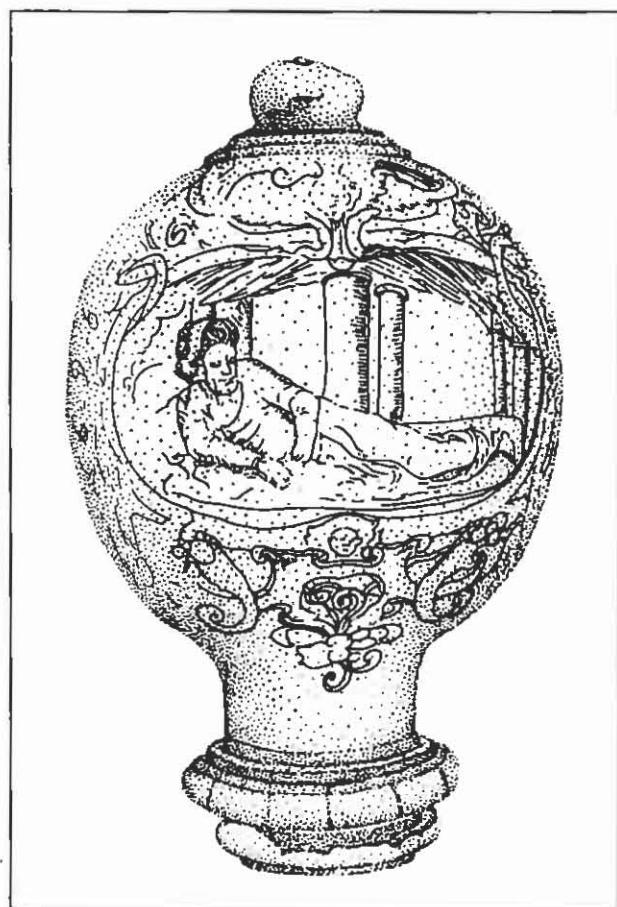
BAT 3177



BAT 3032

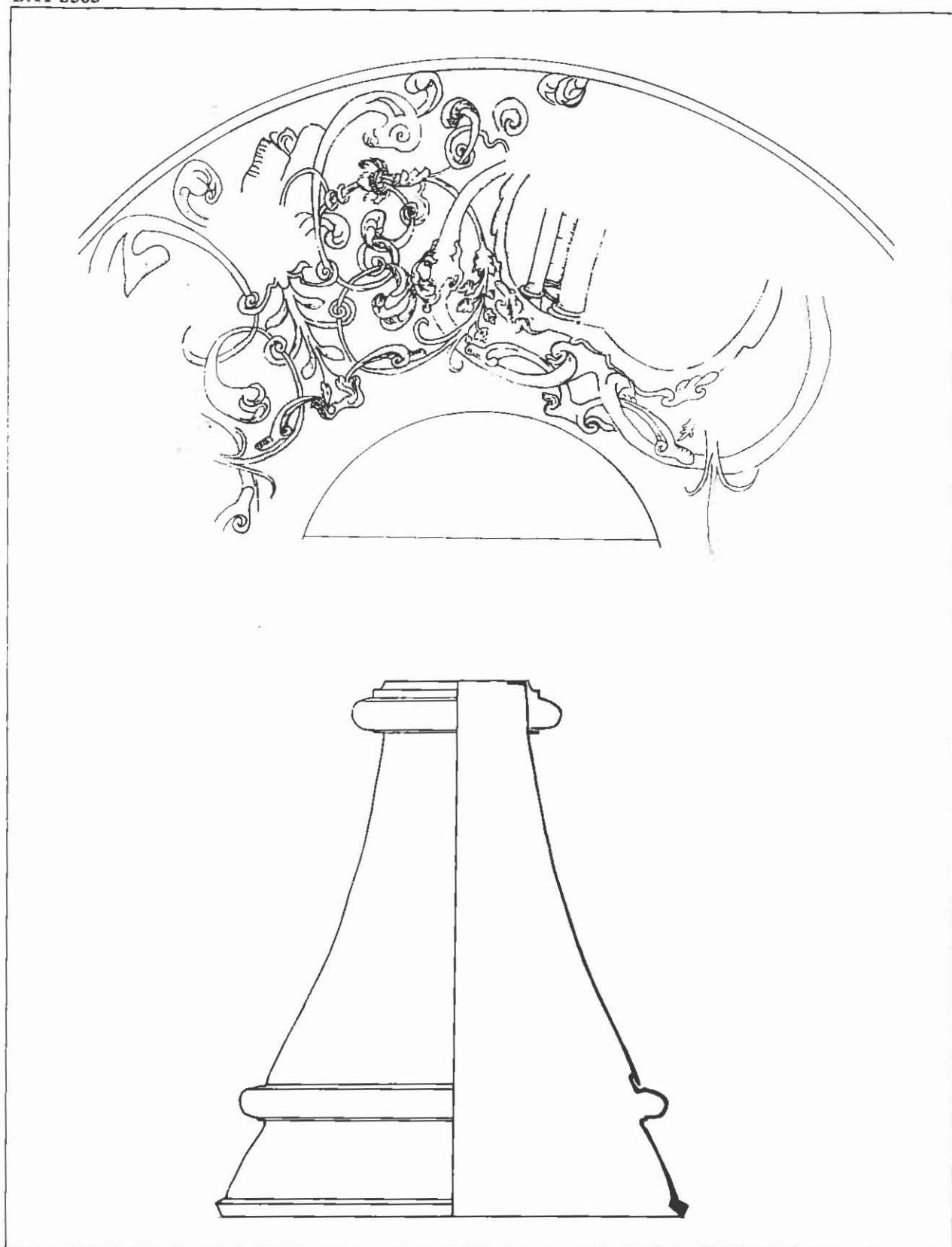


BAT 3245



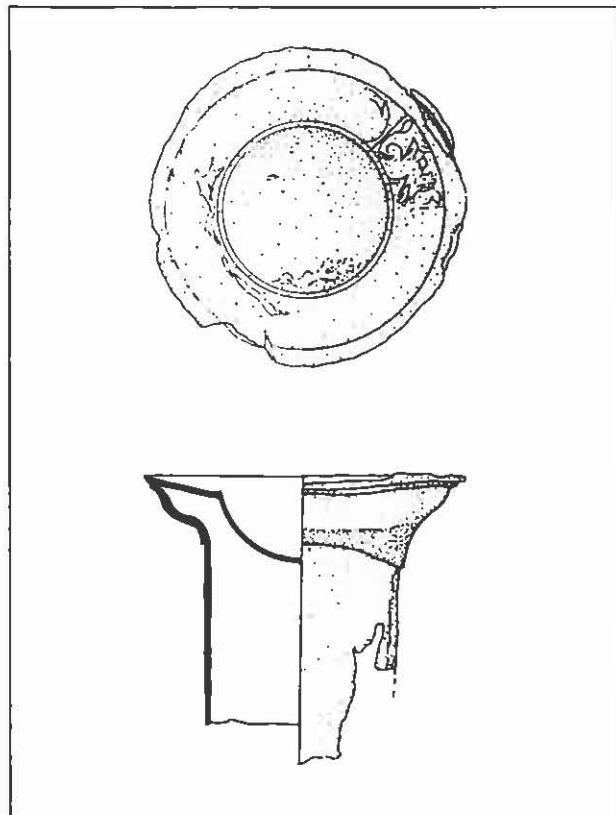
Each bed-post has two rectangular boxes set in the mid-body at a 90° angle. These boxes are all the same size (36 mm by 32 mm) and were presumably for a wooden railing that went around the top of the bed, assuming that these objects were in fact a sort of finial on the corner-posts of a bed. There is a separate, decorated, ferrule-like ring at the base of the object which would fit a round pole of 48 mm diameter. It is obvious that these are not the feet to bedsteads as suggested in the *Remonstrantie*.

Object possibly related to the bed-post  
BAT 3563



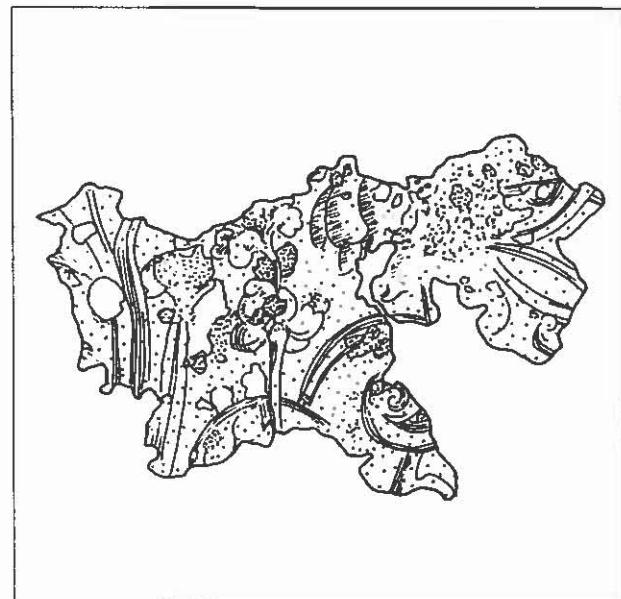
This object seems to belong to the bed-post as it has a similar scene and engravings. It is possible that this is a foot to the bed-post, since the decoration, although difficult to interpret because of the poor condition of the object, suggests that it should be viewed with the wide diameter opening downwards, as illustrated. The tops of the columns in the left-hand cartouche, are similar to those in BAT 3245, indicating that they were part of a group of objects belonging to a bed. The opening diameter at the top is the same as the bed post-heads (48 mm), another clue that these objects are all of the same group.

Unidentified object  
BAT Unnumbered



This is an engraved object of the same type as the items above. Although it is of complex structure, its functional purpose is uncertain. It consists of a broken tube 52 mm in diameter. At one end, there is a flange with a semi-circular bowl in the centre forming a sort of dish. Traces of engraving were noted around the rim of the dish.

Fragment  
BAT 3626



A small fragment of engraved silverware, possibly part of the rim of a plate.

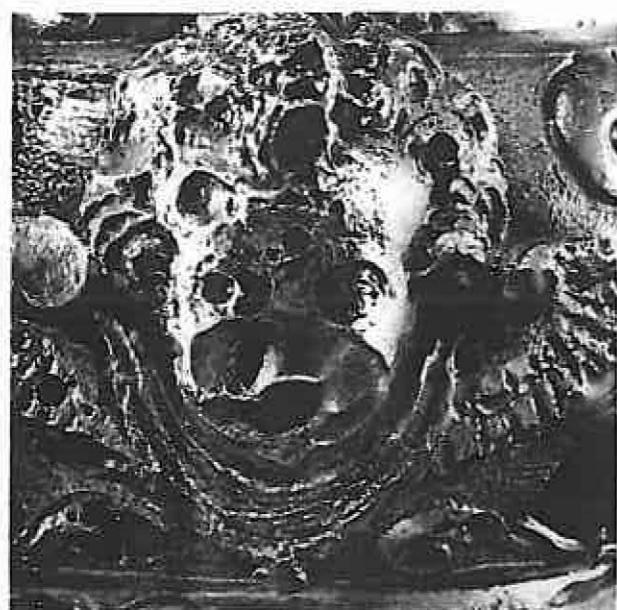


Figure 61. Cherub on the frieze of the 'Candelabra' BAT 3643.



Figure 62. Date stamp on the 'Candelabra' BAT 3643.

Candelabra

BAT 3643 (SCALE 1:4)

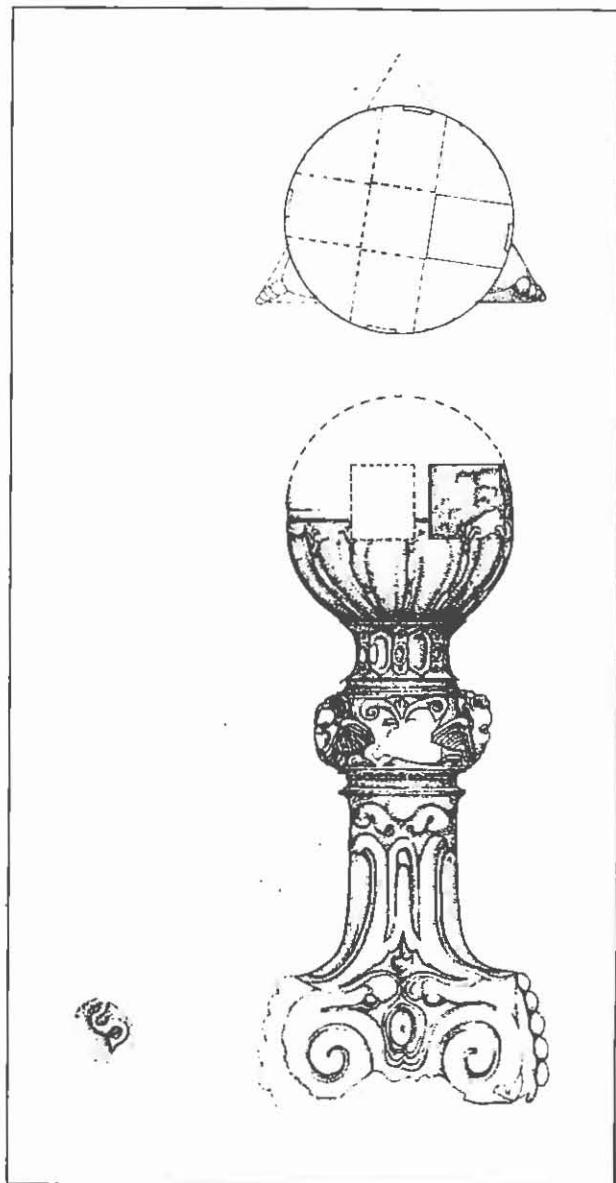
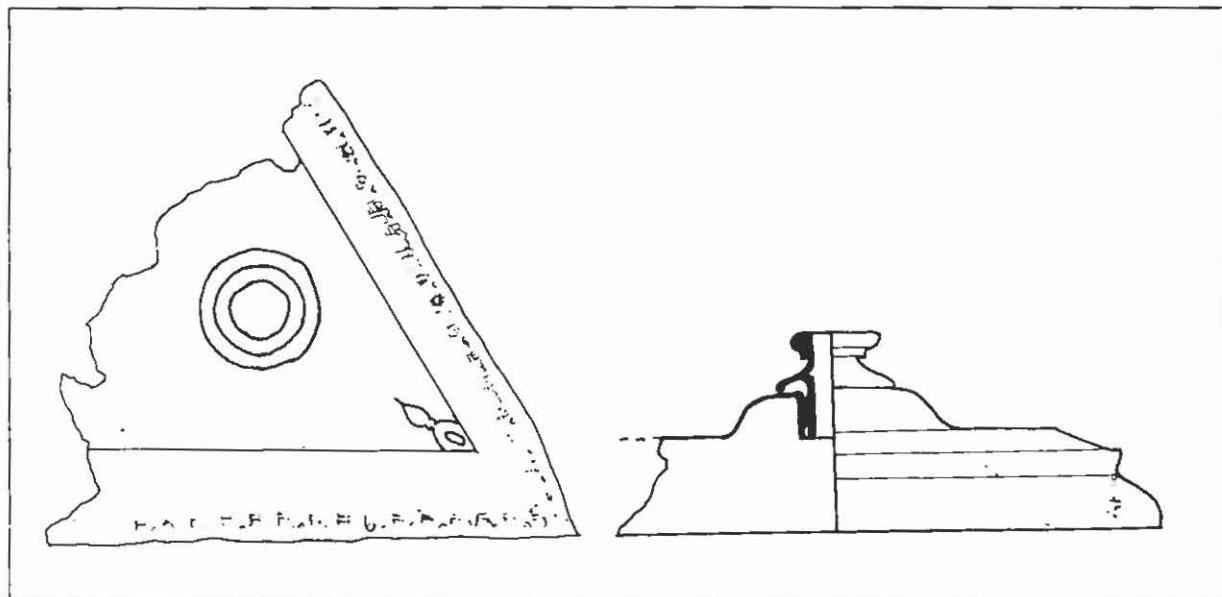


Figure 63. 'Candelabra' BAT 3643 after restoration.

This object was badly-corroded when first recovered and it has been very difficult to interpret its function. Initially, it was thought to be part of the bed-post group because of the similar-sized rectangular holes. However, careful study has shown that it differs both functionally and stylistically from the bed-post group, although its purpose has still not been defined. It is a pillar-shaped object standing on a narrow, triangular foot (Fig. 63). The top is spherical with four rectangular holes set symmetrically around the central waist. Below the sphere, at the top of the column, is a collar with three moulded, *appliquéd* cherubs (Fig. 61). The triangular foot has three small, oval depressions in the middle of the face. Each oval, it is thought, had a silversmith's mark. The 1628 date mark 'S' survives on one of the ovals (Fig 62), possibly the city mark and maker's initials would have been on the other two.

The whole style of this object is quite different from the other silverware. The decoration is not engraved, but cast and moulded onto the object. It is also constructed in a strange manner. Stylistically, for example, it would seem unusual to have a three-pointed symmetry in the lower part of the object and a four-pointed symmetry in the sphere above. The proportions are also peculiar, for unless the base was heavily-ballasted, the object would be very unstable. It was thought for a time that it was two separate objects, but careful inspection does not bear this out. The four square holes, therefore, may have been the sockets for the branches of a candelabrum, but it must be emphasized that this is not certain, particularly as the addition of the arms would make the object even more unstable.

Salt-cellar  
BAT 3644



This object has been identified by Myra Stanbury as a salt-cellar. Similar examples have been noted in 17th-century Netherlandish still-life paintings. It does not seem to belong to the bed-post-ewer group, nor the 'candelabra'. It is possibly a personal item.

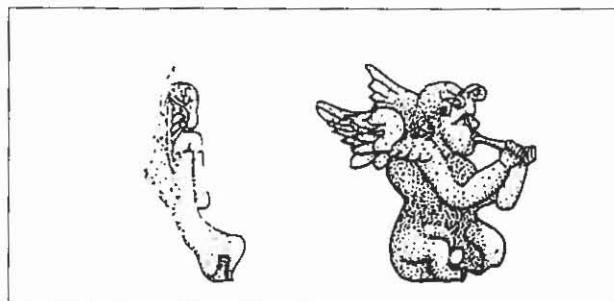


Figure 64. A triangular salt-cellar.

### Cherub

These two items would have been mounted on an object of gilt or of a mixture of gilt and silver. They are similar to the cherubs on the 'candelabra' and may belong to a group of similar sort of material. Note that the attachment method and the confirmation that these objects were attached to a larger object can be seen by the rivet in BAT 3568.

BAT 3603 (SCALE 1:1)

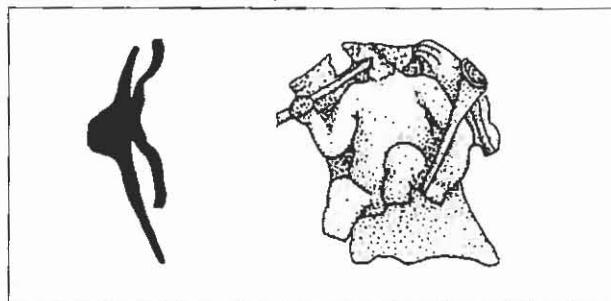


A silver-gilt cherub playing a flute or small horn.



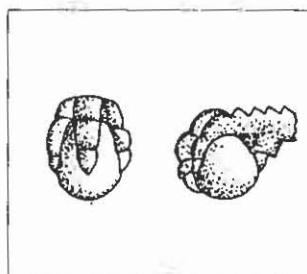
Figure 65. Silver-gilt cherub BAT 3603.

BAT 3568 (SCALE 1:1)



A silver-gilt cherub playing a flute (?) in the right hand and holding a horn in the left.

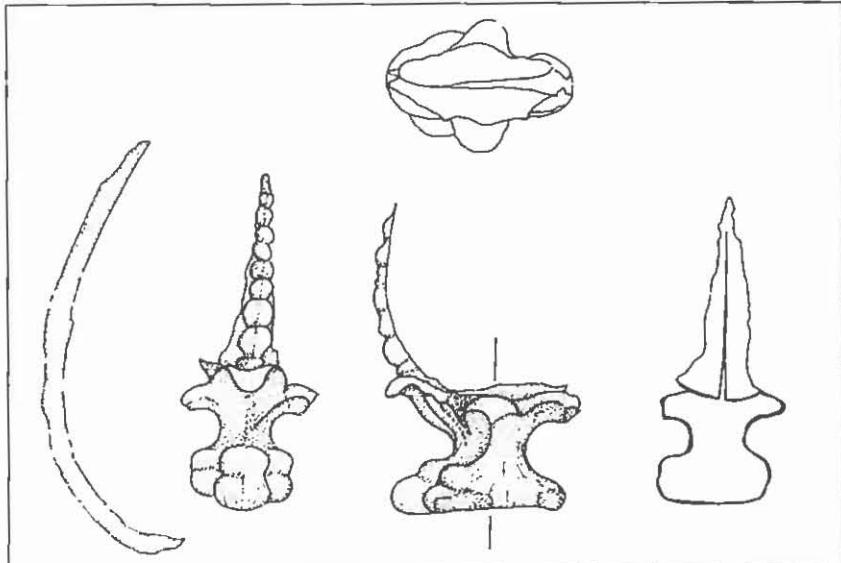
Claw  
BAT 3599



This is a bird's claw grasping a ball. It would have been part of the base of some ornamental object.

### Unidentified object

BAT 3744



This is a particularly badly-corroded object. It seems that it originally had a flower-like base with two symmetrical arms (one now missing) that framed an oval object of some sort. Similar sorts of stands were used to mount Pearly Nautilus shells (*N. pompilius*).

## ARCHAEOLOGICAL SIGNIFICANCE OF THE ARTEFACTS

### The classification scheme

The artefacts from the *Batavia* have a complicated significance. They reflect the life and times of an early 17th-century Dutch East India Company ship, and, as such, they serve as a social record of the shipboard society and its functions. As a whole, the artefacts may be used to further our knowledge of the trade patterns and of the equipage of the ships that carried out this trade. The artefacts, as individual objects, are imbued with the technological and scientific developments that went into their construction. They may also be seen in the broader context of the evolving patterns of trade throughout the world, and, in particular, in the age of European expansion. Additionally, their presence on the site holds the means to investigate the events that occurred as the ship broke up after the wreck, and the subsequent history of the site to the present day.

The first problem is, therefore, to identify these objects and interpret their significance. Although the archaeological excavation of a maritime site is technologically difficult, the archaeological interpretation of this material, through its identification and classification, is one of the most difficult problems facing historical maritime archaeology. The problem exists at a number of different levels and is particularly well-illustrated with the example of the V.O.C. ships. Owing to the extremely rich source of documentary evidence available in the archives, the archaeologist is faced with a completely different situation than is normally experienced in other forms of archaeology, both above and below the water. The very diversity and extent of the historical information compounds the problem; this may seem a contradiction, since one would normally expect that the archival information would simplify the archaeologist's work. However, it is the complexity of the archival material that creates the problem. It gives certain types of information at an unusually detailed level, requiring a far more thorough analysis than would otherwise be expected. Without historical documentation, the objects yielded by a shipwreck site may be identified only at a simple descriptive level, 'a hammer', for example. Where detailed historical records exist, as in the case of the V.O.C. wreck sites, it is possible to find out a great deal more about the identified objects. Using the example of the hammer, the historical records may enable it to be identified as a cooper's hammer. The records may also indicate that such hammers had a number of functions or purposes on board the ship i.e. belonging to the assistant cooper and used for driving hoops onto barrels; it may even have had a specialized name. On the other hand, the diverse functions of the object may be known, but the owner cannot be identified; thus, a pestle and mortar could belong to a number of people: the surgeon, the constable, the gunner, the cook, or it could be part of the supplies for the Company in the Indies. Here, the archaeological record may help, since if the mortar was found in association with other artefacts, this may help to determine its purpose on the ship. As the archaeologist's objective is to interpret these sorts of artefacts from an excavation, one must, therefore,

be completely familiar with this archival information.

A number of different approaches have been adopted by authors classifying material from the excavation of V.O.C. ships (see for example: Gawronski (1987), Gawronski and Kist (1984), Green (1977 and 1986), Ingleman-Sundberg (1977), Larn (1985), Marsden (1974 and 1978), Martin (1972 and 1977), Pijl-Ketel (1982), and Stéhuit (1974)). In an earlier publication dealing with the *Vergulde Draeck* material, the author classified the artefacts according to material composition (Green, 1977). The classification headings were divided into ceramic, ferrous, non-ferrous, organic, etc. Other authors have classified material from V.O.C. wreck sites according to various functions on the ship. The former approach has a number of advantages: the classification process is simple and straightforward, and can be applied from the moment of recovery, making it a very practical system for the management of a collection. The approach also suffers from a number of disadvantages. In particular, the system is completely arbitrary, so that artefacts having the same function are dissociated. For example, parts of the gunnery equipment could be separated into iron for the gun, organic for the carriage, non-ferrous for the gunner's equipment, and even stone for the flint from a flint-lock. There would also be a classification problem where an artefact is comprised of a number of materials, for example, the composite gun.

In applying the functional approach, there is the problem of disagreement between authors about the classification of the functions. Thus, it may be argued that gunnery is part of the ship as a whole, whereas another argument would hold that it is a separate group in its own right. This is a very complex issue, and requires a detailed understanding of the system used by the Company, a working knowledge of the disposition of the source material in *Algemeen Rijksarchief* and the ability to read the necessary manuscripts.

The approach taken in this publication has been to try to use the archival source material to help identify the artefacts. The material has been divided according to the following categories: equipment and materials related to the use on board the ship; ship's supplies and provisions; personal items; supplies for the Indies; trade items. Before any Company ship departed for the Indies, a complete list was made of the material that was taken on board the ship. On the ship's return from the Indies, there was a reconciliation with the equipage list. Every item that had been put on board prior to departure, had to be accounted for. Originally, these lists were hand-written, but later, as the Company became increasingly standardized, the lists were printed and the numbers of items filled in by hand and then signed for. The equipage lists, therefore, are itemized accounts of everything that would be required by the different specialist groups of people within the ship who were basically responsible for getting the ship to the Indies. Thus, the steersman would be supplied with charts and navigation equipment that would enable him to set the

course. The cook would be allotted the requisite utensils and equipment to cater for the crew, passengers and soldiers for the voyage. The constable would be responsible for the arms and ammunition necessary for the defence of the ship. These lists are, therefore, an important source of information about the material that was taken on board a ship for the voyage to the Indies. At the same time, they form a record of the complex society of trades and skills that were involved.

Additionally, there were the provisions with which the ship was supplied for the voyage. Usually, these were calculated for a crew of 100 persons for a period of 15 months. The supply of provisions was stipulated by a resolution of the *Heren XVII* and became standardized in the mid-17th century.

However, this was only a part of the total. There was, of course, the cargo that the ship carried, which may be divided into two parts: the supplies for the Company at the Cape of Good Hope and in the Indies; and the goods for trade in the Indies. None of this is easy to quantify. The archival sources do not have regular cargo lists of these items. Even though only a few equipage lists survive, we may assume that the equipage was virtually the same for each ship of a particular size, since the Company resolved that this would be standard each year. However, the supplies for the Indies and the trade goods varied considerably from year to year. The main source of information comes from the *Eisch* (or requisitions) from the Indies. Each year, the Governor General and the Council at Batavia sent to the Company in the Netherlands a list of requisitions for the following year. These requisitions included supplies for the Company in the Indies together with requests for money to conduct trade, and trade items that were deemed to be profitable for trade at that time. Unfortunately, only a few of these requisition lists survive, but they are useful for this study as they relate to the period of the mid-17th century. The requisition lists, however, were frequently disregarded by the Company at home and there are numerous instances of letters from the Governor General at Batavia complaining that the requisitions and requests had been ignored. Thus the lists only give an indication of the types of goods that were required in the Indies.

There is another group of documents from the same period that records the supplies that arrived in Batavia on particular ships. These are very helpful in indicating disposition of cargoes among the ships of the fleets. Finally, in the Resolutions of the *Heren XVII*, there are some lists of requisitions from the Indies and lists of goods shipped on the various fleets, but these tend to deal only with major items.

There is yet another component in the inventory of items to be found on a Company ship, perhaps the most difficult to estimate, and that is the private possessions that the crew, soldiers and passengers brought on board. Individuals going to the Indies were allowed by the *Heren XVII* to take with them a prescribed amount of goods. The volume of things was limited to a chest of dimensions specified by the *Artyckel Brief* of the V.O.C., and could

include food, a small amount of money and some trade goods. There may well have been a much larger quantity of smuggled goods and certainly the Company became very concerned about this illegal trade. However, as far as we are concerned, the quantity of trade goods of this nature would have been small in comparison with the overall cargo.

Finally, there is the ship itself, with its masts, rigging, sails, anchors, guns etc. Surprisingly little is known about the building and construction of ships for the Company. The Resolutions of the *Heren XVII* contain specifications for building a particular ship and defining its class; from time to time, the specifications for the various classes would change. This aspect will be discussed in a future publication on the *Batavia* hull structure.

Thus it can be seen that there is a complex group of documents available to study that may help to identify the type of items found on a shipwreck. The equipage lists are obviously the most helpful as they remained constant for many years; the requisition lists are less useful. For the *Batavia*, the problem is more difficult since the archives have less information for this period than is available for later years. By 1628, the Company was only just beginning to standardize the ships and their equipage, and the nature of trade was changing as the Company explored the trading possibilities in the East.

The *Batavia*, therefore, represents a complex relationship between the archival resource and the archaeological data. Both sources are limited. The archaeological record is confined to what was discovered on the wreck site. Much of the material from the ship, we know from Pelsaert's Journal, was washed over the reef. There are accounts of a variety of material being washed ashore on *Batavia's* Graveyard (modern Beacon Island). The perishable material would not have survived and this is, of course, true for nearly all wreck sites. For example, we can assume from the bale seals found on the site, that there was cloth material on board the ship. This is corroborated by the lists of requisitions, since various European cloths were a common trade item requested for the Indies. Furthermore, we know that when the mutineers were captured by Pelsaert, they were dressed in red *laken* embroidered with *passementerie*. Thus, from both archival and archaeological sources, we know that cloth was carried on board the ship, although in what quantity is uncertain.

At the archaeological level, the information recorded from the wreck site is important in interpreting the ship's structure and the arrangement of the ship's contents and various personal possessions on board. In the following section, a number of important findings that have resulted from the archaeology of the *Batavia* are discussed. It is interesting to note that the disposition of the major artefacts on the site reflect their original location on the ship, and the subsequent events that occurred after the wreck. Thus, the line of guns on the west side of the site indicates that the ship heeled over onto its port side and, as a result, the guns on the starboard side fell across the deck and ended in a pile on top of the ones on the port side, creating a single row of guns. This is corroborated by Pelsaert's

**Journal on the morning of the loss:**

Therefore we decided to put overboard the mainmast, in order that it would not immediately push into the ground. But when it was cut down, we found that it caused much damage, for we could not get it from aboard, so that we could not get the boat aboard through the big surf.....But God, the Lord, chastised us with many rods for in spite of all the devoir we made to cant the ship to leeward or to land, it turned out exactly the opposite because of the uneven rocks upon which the ship was set, which so caused it that the people could only come out of the ship very slowly.

This clearly states that the ship canted towards the prevailing sea, the SW, in other words, to the port. The section of the surviving hull structure was the stern port side of the ship which confirms this finding.

Thus the group of four iron anchors slightly aft of the middle part of the ship would have been anchors stored in the hold; possibly they would have been stored upright on the aft side of the main hatch against the mainmast. Their presence on the east side, together with the building blocks, suggests that they were stored low down in the ship. When the vessel canted over on its port side, the heavy cargo in the hold would have been deposited on the east side of the site.

One intriguing observation is that the site lies in a hole in the reef which, there can be little doubt, was caused by the ship rather than being a natural phenomenon. When the excavation of the site was finished, the bottom of the site at the stern was about five metres below the top of the reef. Pelsaert records that after the ship struck the reef, it was almost impossible to walk on the deck because of the bumping of the ship on the reef. In view of the fact that the *Batavia* was of about 600 tonnes displacement, there would have been a considerable force striking the reef. The reef in this area consists of coral fragments consolidated with coraline algae. Although it is hard on the surface, once the crust has been broken, the reef matrix below is loosely-packed and can easily be excavated. It is thought that the ship created the depression in the reef during the period when it was breaking up. Abrasion marks can be seen on the port side of the transom of the reconstruction of the *Batavia*, evidence of the considerable forces to which the ship was subjected after the wreck.

These findings suggest that most of the heavy objects have remained *in situ* on the site in a position corresponding to their location on board as the ship broke up. The explanation for two guns found to the west of the site and the anchor on top of the reef could be that this material was washed off the wreck, still attached to structural timbers,

and driven by the force of the sea to these outlying positions. Pelsaert mentions in his Journal that the fore-part of the ship and the starboard side of the poop had been washed onto the reef.

The curious means by which some of the lighter artefacts were dispersed from the site raises some interesting questions. The inside reef area, where a large number of bricks, stoneware jug fragments and ceramic shards were found, starts at about 450 m from the fore-part of the main wreck site and extends a further 200 m forming a rectangle 100 m wide. This area is about 2 – 3 m deep, compared with the 400 m area on the reef-top where, depending on the tide and the sea conditions, it can be dry or, at most, 1 m deep. The presence of bricks and shards at the start of the inside reef area could be explained as being material washed over the shallow reef by the high speed of the water, but finds of the same material 200 m further on in the deeper and calmer water could not be explained. In 1985, a series of experiments was carried out to investigate the movement of artefacts. A variety of marked material which included modern bricks, plates and replica bearded man jugs was placed on the wreck site and the movement over the reef was monitored. An additional group of material was placed at the start of the inside reef area to record the movement there. Within a week, during which period there was a severe storm, most of the material that had been placed on the main wreck site had been washed onto the top of the reef and it was monitored travelling across it. Since the beginning of the experiment, there has been virtually no movement of material on the inside reef area. This suggests that while the transport of light material, bricks and ceramics in particular, over the reef and into the calm waters of the inside reef area is quite plausible, the mechanism for the transport and distribution of this material over many hundreds of metres beyond the end of the reef-top is more difficult to explain. Possibly, it was the result of Pelsaert's salvage activities; the study of this still continues.

Another interesting finding is that Beacon Island was a fortuitous choice by the survivors for their main encampment. The survivors noted that at different times five *leggers* of water, one *legger* of French wine, four and a half *leggers* of Spanish wine and one *legger* of vinegar floated ashore from the site. On one occasion during our excavation of the site, a writing slate that had been lost on the site some months before, was found washed up on shore, confirming the view that Beacon Island was in a direct line for material that floated off the site.

## The artefacts in their context

### EQUIPMENT AND MATERIALS RELATED TO THE USE ON BOARD THE SHIP

#### Armament and military equipment

A group of material that has one of the most interesting associations is the gunnery material. We know already of the complex structure of the composite guns, and the other bronze and iron guns. However, what has not been discussed until now is the question of the location of the various classes of gun on board the ship. From the position of the guns on the wreck site, together with information given in Pelsaert's Journal, it is possible to get a reasonable idea of the original disposition of the guns on the *Batavia*.

The site plan indicates that there were 30 guns on the ship, two long, bronze guns in the very front part of the ship (one removed by Pelsaert), two shorter bronze in the fore part and two in the aft (but not at the very stern), two composite guns and the remaining ones made of iron (one of which was removed by Pelsaert). The two guns removed by Pelsaert, it is understood, were in the fore-part of the ship or in the *bak*. We may assume this from his Journal:

18 September: Towards evening we went to the Wreck, and found that the ship was lying in many pieces, that a piece of the keel, with the flat of the hold, all above water had been washed away except a small piece of the bulwark which was above water, it was almost exactly in the same place where the ship had first struck, - a piece of the front of the ship was broken off and thrown half on the shallow, there also were lying 2 Pieces of Cannon, one of brass and one of iron, fallen from the mounts [rampaarden], - By the foreship was lying also one side of the poop, broken off at the starboard part of the gunner's room. Then there were several pieces of a lesser or greater size that had drifted apart to various places, so that there did not look to be much hope of salvaging much of the money or the goods.....

5 October: Therefore went to the Wreck of the foreship in order to get a brass piece of cannon and one of iron, which were hanging on the Wreck, and towards night we got the brass cannon loose and have brought it to the Island. On 6 do. the Wind Southerly; in the morning I have sent the fore-mentioned piece of cannon on board; and have not been able to work at the poop of the Wreck on account of the hollow breakers, but have sent the little yawl to an island in order to see if there was anything to salvage.

On 9 do. the Wind as before. But a little quieter, therefore I have sent the boat to the Wreck to get the other iron piece of cannon, which they have brought towards evening.

We can therefore summarize that there was one iron and one bronze gun removed from the fore-part of the ship. Referring to the gun numbers in Fig. 25 (guns 1 to 28) and the details from the tables and records of the guns, the hypothetical disposition is given in the table below.

It is possible that the iron gun removed by Pelsaert was the pair to No. 19, since both the iron and bronze guns he recovered were on top of the reef and thus in the very fore-part of the ship. Certainly gun No. 28 was the pair to the bronze gun. This suggests that Nos 19 and 28, together with the matching guns that Pelsaert recovered, were located in the *bak*; it is clear from what Pelsaert wrote that these two guns came from the same general area on the ship. It is assumed that with the lighter construction of the *bak*, it is more likely that the guns could be dragged from the site while still attached to major timbers of the *bak*.

The evidence for the location of guns Nos 20 & 23 is gleaned from Pelsaert when he states that a section of the starboard side of the ship near the gunner's room was

Bronze guns No. 28 Nos 26 & 27 Nos 24 & 25	Conraet Antonisz long gun Arent van der Put medium gun Henricus Meurs medium gun	Located in the <i>bak</i> ? Either 1st or 2nd from bow (see below) Possibly 2nd from stern
Composite guns Nos 7 & 22	Composite guns	Above the main gundeck
Iron guns Nos 1 & 2 Nos 3 & 4 Nos 5 & 8 Nos 20 & 23	A matched pair (see decorations) A matched pair (see decorations) A matched pair (see decorations) A matched pair (see decorations)	Stern gunport 1st gunport from stern 3rd gunport from stern Possibly aft of composites above

This would then give the following pattern:

Gunport No.	Port-upper	Port-main	Starboard-main	Starboard-upper
Stern	-	1	2	-
1	-	3	4	-
2	23	24	25	20
3	7	8	5	22
4	-	9	6	-
5	-	10	21	-
6	-	11	12	-
7	-	NIL	NIL	-
8	-	14	13	-
9	-	15	16	-
10	-	17	18	-
11	19 ( <i>bak</i> )	26	27	Pelsaert ( <i>bak</i> )
Bow	28 ( <i>bak</i> )	-	-	Pelsaert ( <i>bak</i> )

broken off. Possibly this carried the guns with it. Note that the relative positions of the guns on the upper deck may be wrong and they may be closer to the waist.

Assuming that there were eleven gunports on each side of the ship on the gundeck, including the pair for the galley, and that the *Batavia* was 45 m between the stems and there was 4.5 m to the first aft gunport and, say, a bit less for the first fore gunport, that would leave 37 m for 11 gunports, giving a separation of 3.7 m for the guns, which seems reasonable. Alternatively, if we assume that there were no guns in the Bak, then there would have been 13 gunports giving a separation of approximately 3.1 m. However, there is not enough archaeological evidence available at present to resolve this question.

One other interesting finding was that the diameters of the smallest class of shot (85 mm see Fig. 33) do not correspond to any of the bores of the guns recovered to date (Table above Fig. 30). Until all the guns are recovered from the site and their bores measured, it will not be certain whether the shot were intended to match the guns on the *Batavia*. Some of the shot of this class were grenades, but certainly the majority were solid. The shot may have been supplies for the Indies, but one would have expected these to be carried in the hold. It was noted also that there was a second shot locker in the forward part of the ship near the position where the galley was thought to be.

#### Navigation equipment

The presence of the small astrolabe BAT 3400 in the stern part of the ship (grid reference 100108), close to the ship's bell BAT 3404, indicates that it had been left in the cabin of one of the senior officers. The other astrolabe BAT 3720 recovered during the excavation was found near the large coin concretion (grid reference 180108), suggesting that this had been moved into the waist of the ship with the chests of money. This was done at the time of the wreck in preparation for the abandonment of the ship.

#### The surgeon's equipment

During the excavation of the stern section of the ship, particularly between grid references 060105 and 080108, a large quantity of tin-glazed alberelli or drug jars were found. This material, which includes small lead-glazed earthenwares, is thought to be the typical contents of the surgeon's or apothecary's chest. Although most of the larger drug jars were found to be empty, one in particular was found to contain a bright, orange-red substance. The contents, on chemical analysis, was found to be mercuric oxide, a well-known chemical used in the treatment of skin ailments. While it cannot be certain that these jars were from such a chest, the fact that many of them were found within the same area suggests that they were associated.

#### Domestic ceramic material

There is a large quantity of ceramic material, including the beardman jugs that do not seem to fit into any clear group.

#### SHIP'S EQUIPMENT

##### Bronze bell

This bell was found in the stern part of the ship (grid reference 100108) and was mentioned above in relation to the astrolabe. The bell would have been, it is assumed, placed on the quarter-deck and used for signalling the watches.

##### Anchor

The presence of nine anchors on the site seems at first to be unusual. As discussed above, we know that four of them would have been stored in the hold and were probably either additional anchors or supplies for the Indies. Van Dam (1701) states '*Met een schip van 160 voet werden medegeven 9 anckers, wegen als volgt: 3600, 3500, 3400, 3300, 3200, 3100, 900, 850, and 180 pony*' suggesting that all the anchors could, in fact, have belonged to the *Batavia*.

## SHIP'S SUPPLIES

### Wines

There appears to be a surprising lack of wine bottles on the site, only a few fragments of glass bottles having been found and a few bottle-tops. Compared with the material from the *Vergulde Draeck*, the collection is quite small. This may be due to the fact that the conditions on the two sites were different. The *Vergulde Draeck* wreck site, although exposed on a reef, had an area at the base of the reef which gave protection to quite fragile material. Thus it is possible that the glass survived more readily on the *Vergulde Draeck* site. This does not explain why there was so few of the robust pewter bottle-tops, however; their lack of survival on the *Batavia* site may be that this material has been washed over the reef or, more likely, that it was only carried in small quantities on the ship.

### PERSONAL ITEMS

According to the *Artyckle Brief*, the V.O.C. allowed a certain amount of personal possessions that could be taken to the Indies in a sea-chest measuring 5 voet long, by 2 voet wide and high. Senior officers were allowed a second sea-chest as well as additional provisions and *fleskelders* (a *kelder* or *fleskelder* was a small, wooden case containing 15 case-bottles of wine). For further details, see Green (1977).

### Seal

The seal BAT 3274 is the only object from the excavation that can be associated, by the initials, with a person known to have been on board the *Batavia*. Of a family of nine, Gijsbert Bastiaensz, the *Predikant*, and his daughter, Judith, were the only survivors of the massacres on *Batavia*'s Graveyard.

### Ceramics

The great number and quantity of fine stonewares found on the site raises the question that they may have been personally owned. It would be surprising to find such high-quality ware destined as trade items, especially the fine Westerwalderware jug with the repaired pewter handle BAT 2358. Most of the complete stoneware items were found in the stern section of the ship and it is possible that they were being used for domestic purposes in the cabins of the officers and important passengers. It is, of course, unlikely that the personal ownership question will ever be resolved, but it is interesting to speculate.

## SUPPLIES FOR THE INDIES

### Bricks

See below for bricks and the outward transport of bricks to the Indies.

### TRADE ITEMS

#### Manillas

As discussed in the catalogue, these items are somewhat of a mystery. It is hoped that further research may be done, particularly on the significance of the fleets of this period calling in at Sierra Leone as it may provide a clue to the presence of manillas.

### Silverware

This group of material is one of the most interesting parts of the collection, since it is clearly associated with the recommendations that Pelsaert made to the Company in his *Remonstrantie*. The relationship of the silverware with the Great Cameo of Casbar Boudaen and the Rubens Vase is of particular interest as it reflects on such issues as the specialized nature of the trade in the Indies and the question of illegal trade. Drake-Brockman (1966) discusses the Cameo and the Vase. The Company was exploring methods of facilitating trade in the Indian sub-continent and Pelsaert's experience as factor in Agra prompted him to write the *Remonstrantie* in which he recommended specialized items of trade that would be profitable for the Company.

### THE SHIP

#### Evidence for the position of the end of the powder- and bread-rooms

It may be noted that the building blocks form a line across the site. On the site plan which has the grid (Fig. 5), this line is about 9 metres from the stern of the ship at the inside point of the gunport. The evidence of tin plate on the lower part of the ceiling planking below the *koebrug* (or orlop deck) suggests that the bread-room encompassed the powder-room on three sides, both rooms having a common boundary at the bulwark to the main hold. Access to the powder-room would have been through a hatch in the floor of the *koebrug* into the bread-room. Possibly, the bread-room extended down either side of the ship, with the powder-room in-between. Therefore, it is possible that the bread- and powder-rooms ended at a distance of 9 or 10 metres from the top of the stern-post. This matter will be discussed further in the forthcoming *Batavia* hull construction publication in this series.

### The galley and stove

The location of large numbers of bricks on the main wreck site concentrated around grid location 270105, around gun No. 14 (see Edwards Plan Fig. 24), suggests that they may have formed part of a galley area. This conclusion is supported by the fact that the disposition of the guns on the wreck site indicates that there was a discontinuity in the line of guns between No. 13 and No. 14. Thus, it may be assumed that there was a space in the gundeck to allow for the galley and bottler's room and, at this pair of gunports, the guns were not mounted. It is suggested that some of the bricks, at least, formed part of the ship's galley

and were not intended as supplies for the Indies as was common in the mid-17th century. The *Vergulde Draeck* was carrying bricks at the time she was wrecked and these were clearly the supplies that were requested in the *Eijsch* for 1656. On her first voyage to the Indies in 1653, the *Vergulde Draeck* unloaded 26000 *Vries clijnkert*, this was out of a total of 400000 *clijnkert* requested in the *Eijsch* for 1653. It is not clear at what point the V.O.C. started exporting bricks to the Indies. The intense building activity in Batavia as the city was expanding during the 1620s may have stimulated the transportation of bricks as a 'paying' ballast.

## CONCLUSIONS

The excavation of the *Batavia* has proved to be an extraordinarily challenging project. It was the second major excavation not only for the author, but also for the Department of Maritime Archaeology of the Western Australian Maritime Museum. It has been one of the most ambitious projects undertaken by the Department and was a natural progression from the earlier excavation of the *Vergulde Draeck* (Green, 1977). The experience gained through this work has led to a series of other excavations on post-settlement shipwreck sites in Western Australia. In 1980, a one-year, post-graduate diploma course in maritime archaeology was run for two consecutive years (and again in 1985) by the Western Australian Institute of Technology (now Curtin University). Graduates from this course have obtained positions in a number of institutions throughout Australia and, as a result, maritime archaeological programmes have now been initiated in each Australian State.

To some extent, therefore, the *Batavia* project has been the genesis of maritime archaeology within Australia. The author is not advocating, however, that this archaeology be used as a model for contemporary maritime archaeology. Rather, it should be considered as a starting-point for the development of maritime archaeological techniques related to the investigation of post-medieval shipwreck sites. In many ways, the invidious site conditions on the *Batavia* worked to our advantage. By limiting the amount of time that could be spent underwater, they created an ideal working environment. There was a large period of time that was free to be dedicated to the administration and study of the collection. This aspect of the archaeology of underwater sites is often under-estimated. Archaeologists working in the usual situation of shipwreck archaeology, rarely have the leisure to study the material in the field. Mostly, they have to rely on drawings, records and field-notes, sometimes many years later. On the *Batavia* site, this was not the case. During the periods of bad weather, when it was not possible to dive, staff were involved in the detailed recording and analysis of the material, at a time when it was fresh in their minds. This has resulted in a very thorough knowledge of the material and the interpretation that can be placed on it.

On the negative side, the archaeological methodology that was used on the site was far from satisfactory. Artefacts were unable to be accurately co-ordinated on the site and the excavation could not be conducted in a methodical manner. Again, the sea conditions were a major factor, often making it difficult to work and, at times, impossible to achieve our objectives. The exigencies of excavating in these sort of conditions have already been discussed, and it is still not clear, given the same site today, how one could improve on the methodology, with the techniques currently available for recording. There were, of course, some obvious lessons to be learned and they were mastered quickly as they arose during the course of the work. It is worth noting that a pragmatic approach to the excavation

of the *Batavia* was, in the author's opinion, far more effective than implementing preconceived ideas. Provided that the highest possible archaeological standards are maintained, then techniques can be developed, on site, to cope with the conditions.

It should also be appreciated that the work on the *Batavia* started at a time of relative economic prosperity. As a result, it was possible to carry out lengthy field excavations. The fact that the Western Australian Museum initiated a maritime archaeological programme in the late 1960s and subsequently established a conservation laboratory dedicated, largely, to the treatment of maritime archaeological material, indicates a far-sighted approach to the subject. These initiatives had been preceded by the enactment of the State legislation (*The Maritime Archaeology Act*) in 1964 by which the Western Australian State Government protected all sites of maritime archaeological significance. Today, this Act is still regarded as a pioneering piece of legislation and clearly, in the author's view, the foundation of any form of long-term maritime archaeological programme.

Finally, this first major archaeological report on the *Batavia* project has taken a long time to produce. It is in the nature of archaeological research; each individual artefact has to be thoroughly studied and, in many cases, this is difficult because material is also undergoing lengthy conservation procedures. Although the main phase of the excavation was completed in 1976, the research is far from finished. The hull structure is in the process of reconstruction at the Western Australian Maritime Museum in Fremantle and should be completed in 1990, twenty years after the start of the excavation programme. There is still on-going research related to many of the groups of material from the *Batavia* and on the site itself. New questions are arising all the time and, in the nature of scientific research, as these questions are addressed and in part answered, new questions will emerge.

It is perhaps noteworthy that the *Batavia* project is an example of a research programme which has had no preconceived notions about the direction that the research should take. The site has been studied using the basic scientific premise that the wreck is a phenomenon and, as such, should be studied carefully and thoroughly to be understood. Naturally, the progress of this study is a destructive process of the site itself and, therefore, the excavation has to be conducted in a careful and controlled manner. Mistakes will occur, however, for it is only through the process of excavation that it is possible to determine the correct archaeological method. As the excavation work is the method whereby the archaeological data is obtained, so the analysis of this archaeological data allows for the essential interpretation, and from that, further questions and research are generated. This is the scientific method. It is hoped that this first publication has helped to show the advantages of this approach.

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