The Loss of the *Verenigde Oostindische Compagnie Jacht* VERGULDE DRAECK, Western Australia 1656

An historical background and excavation report with an appendix on similar loss of the *fluit* LASTDRAGER

Part ii

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2: Unidentified (On a grave in Steenwijck, Groote Kerk).
3: Unidentified (On a grave in Rotterdam's Groote Kerk).
4: Unidentified (On a grave in Oude Kerk cemetery, Amsterdam).
5: Thomas Janszoon, 1640. (On a tombstone in de Oude Kerk cemetery of Amsterdam (Grafboek O.K. 75).
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9. COINAGE

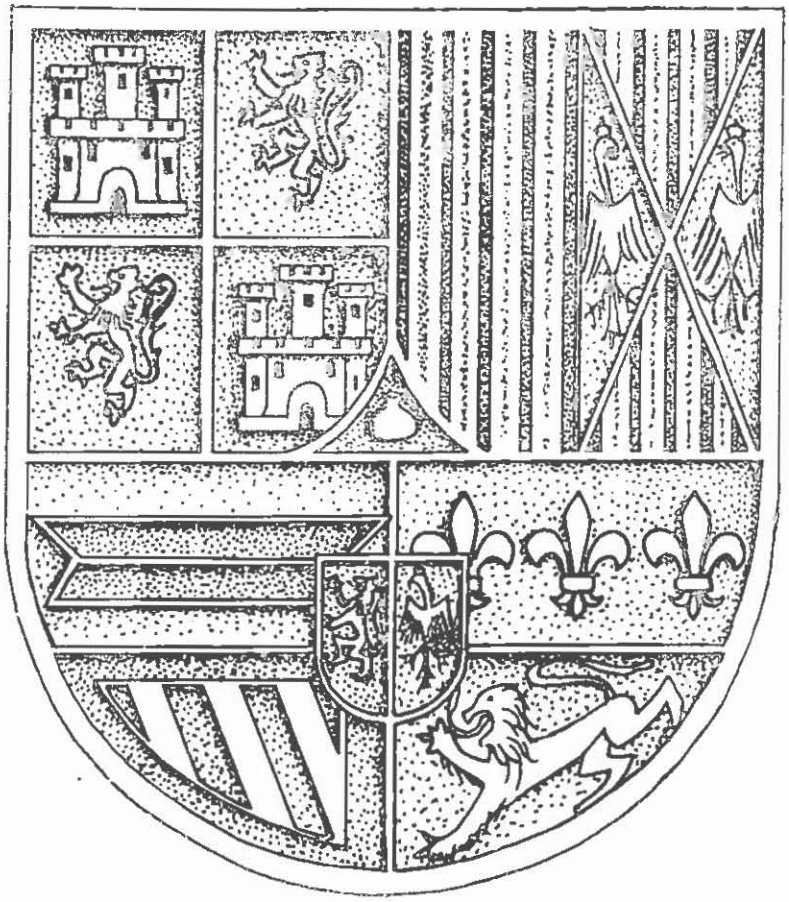
S.J.Wilson, Fellow Royal Numismatic Society.
Curator Numismatics, Western Australian Museum.

The silver pieces of eight recovered from the wreck of the VERGULDE DRAECK have an intrinsic value in the romance of 17th century sea power, trade and commerce which far outweigh their value as silver bullion. Although it is beyond the scope of this work to deal with the complexities of the monetary and economic history of Spain and Europe in the period under study here; a brief description of the circumstances that brought the ship and the coins together is necessary.

During the reign of Charles I (1516-1556), the first eight *reales* with their subdivisions of four, two, one and one-half were issued in Spain. These coins were first produced in Spanish America in 1536 at the Mexico mint, and later at the other New World mints. At first the colonial mints produced the rather crude cobs or *cabo de barra* (end of the bar) pieces; the round milled coins produced by the screw press were not introduced into Spanish America until the 18th century. However in the first two decades that the Mexico Mint produced the *reales*, almost perfectly round hand-made coins were made and most mints produced sample coins for presentation to the King, that were perfectly round. The crude cobs were produced from flat bars or strips of silver, beaten approximately to the thickness of the coin. Sections were cut from the bar to give slightly more than the correct weight for the required denomination. These were then trimmed to the correct weight, and struck between two dies with a hammer. The resulting coin often had only part of the impression on it, due to the irregularities in the original bar, and thus each coin has a unique appearance. Generally an attempt was made by the mint to ensure that at least the mint mark and assayer's initial were legible, as they were responsible for the purity of the silver and weight of the coin.

The metropolitan mints also produced the cob but after 1586 German machinery and technicians using roller dies were introduced at the Segovia mint (and later elsewhere), which produce much better quality and more regular pieces than the die and hammer.

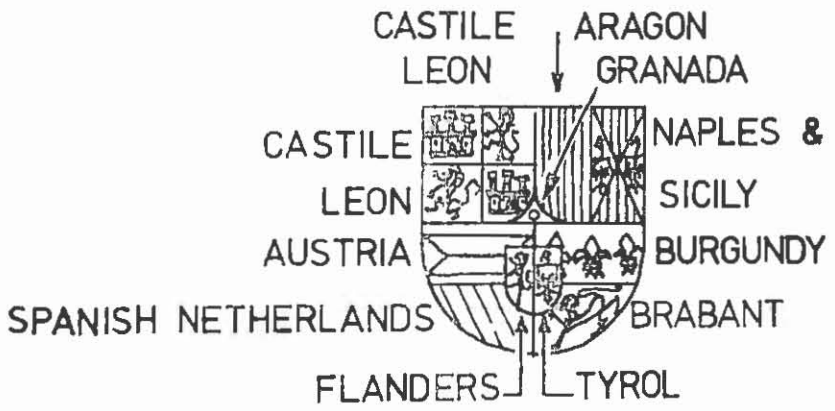
Fig. 70 shows the Arms of the House of Hapsburg, first introduced onto the coinage by Philip II. These Arms are a measure of complexity of the dynastic background of the Spanish royal family and there are many subtle nuances here. In this form they show the Arms of eleven different provinces under the Spanish crown either by fact or pretence.



(70) The Great Shield.

In the first quarter (see fig. 71), are the quartered Arms of Castile and Leon (one and four: castles, two and three: lions rampant); in the second quarter per pale are dexter, the Arms of Aragon (pallets); sinister, Naples and Sicily (per cross pallets and Imperial eagle displayed); in the third quarter per fess are chief, the Arms of Austria (fess) and base, the Spanish Netherlands (bendlets); in

the fourth quarter per fess are chief, the Arms of Burgundy (*fleur de lis*) and base, Brabant (lion passant). The escutcheon of pretence is per pale dexter, the Arms of Flanders (Lion rampant) and sinister, Tyrol (Imperial eagle displayed). In a small engrailment between the first and second quarter is the pomegranate of Grenada.



(71) The Origin of the Arms.

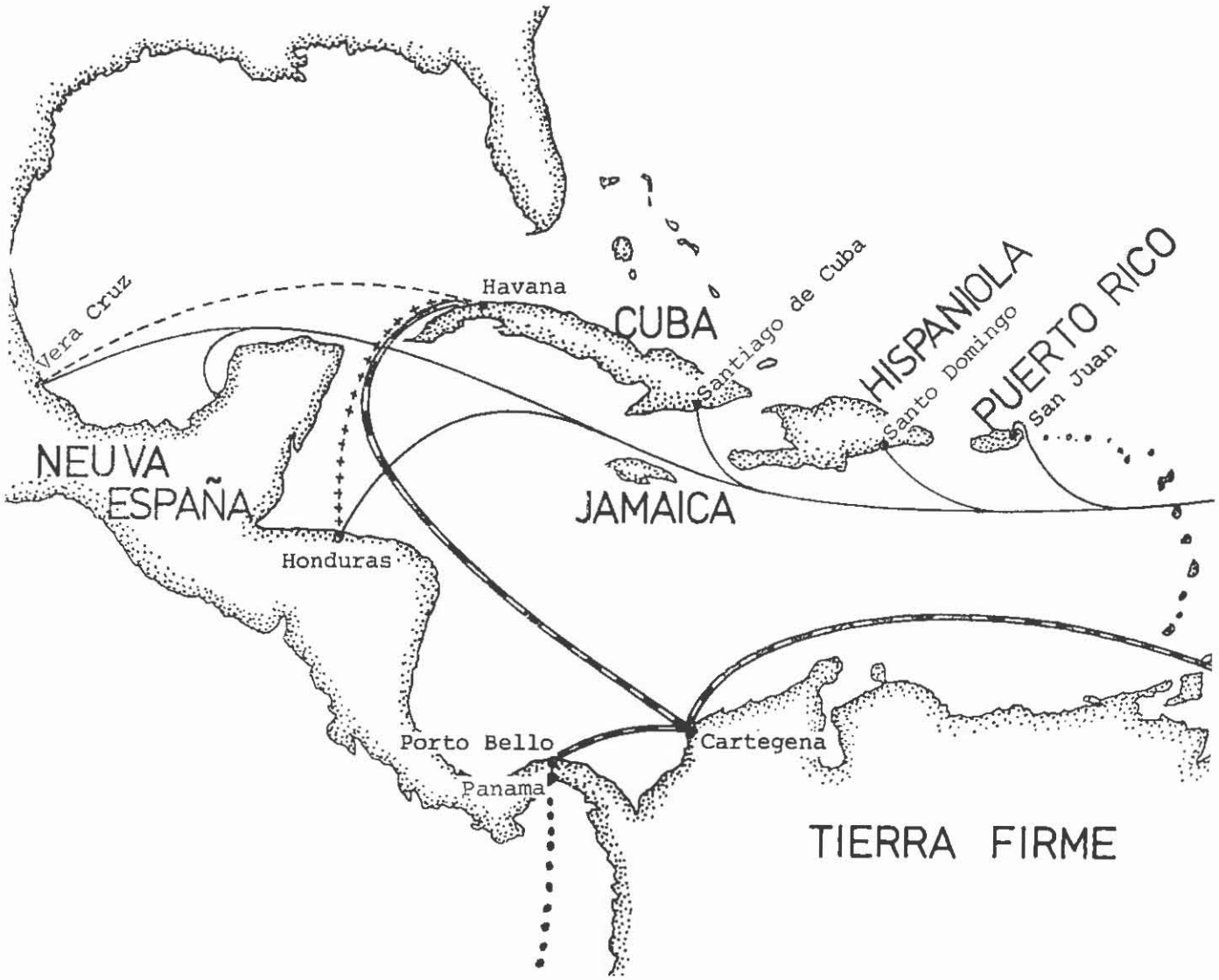
In the 16th century there were several Spains. Isabella I's Castile and Leon and Ferdinand's Aragon were united in their marriage, and this was the first step towards unity in the Iberian peninsular. Later in 1492, the last of the Moorish Emirs surrendered the Kingdom of Granada to Ferdinand and Isabella. By a series of dynastic accidents, their eldest great grandson Philip II inherited not only the Spanish lands and the Aragonese possessions of Naples and Sicily in Italy, but also, through his great grandmother Mary, daughter of Charles the Bold, who had married the future Hapsburg emperor Maximilian, came the inheritance of the old fragmented middle Kingdom of Burgundy, comprising the Netherlands and the county Burgundy, the Franche Comte, along with a more shadowy claim to the duchy of Burgundy, which Charles had for years vainly tried to reclaim from France. The indirect dynastic ties were almost as impressive: Mary Tudor, the daughter of Henry VIII and Catherine of Aragon, was engaged to Charles V and as an ageing spinster married Philip II. Portugal was inex-

tricably bound to Spain through a network of marriages. Philip's first wife was Portuguese, and in the end he inherited the crown of Portugal. His sister Maria married Maximilian the Holy Roman Emperor. His aunt married the King of France, and he himself was to wed a daughter of France and try to put the child of that union on the throne in Paris, Grierson (1974).

Movements of Silver from Spanish America.

A vast amount of silver from the American colonies was being coined in a crude form and shipped back to Spain where it was used to enhance the wealth and splendour of the Spanish Royal Court and the households of the nobility and merchants. Twenty per cent of the silver was taken as the "King's Fifth", but by the time Philip II's grandson, Philip IV, came to the throne in 1621, the economic and political situation in Spain deteriorated considerably. The United Provinces was winning the war with Spain, the Eighty Years War ended in 1648 with the Treaty of Münster, and there were other political problems. A more ominous problem existed in the New World; whereas in every decade between 1580 and 1630 at least 50 million *pesos* of bullion from Peru and Mexico had been registered in Seville, in the period 1641 to 1650 the amount dropped to 25.5 millions and did not rise above 10.7 in 1651-60. This caused considerable economic problems in Spain, and seriously affected her foreign policy.

The process of moving this vast amount of money from the New World was complex. From 1596 the Spanish had regularized the sailing of the fleets from Spain to the New World and back. Each year two fleets sailed from San Lucar, the port of Seville, and from Cadiz; both fleets, at different times of the year, sailed to the Canary Islands and from there across the Atlantic to the Lesser Antilles, fig. 72. In 1623 for example, the Tierra Firme Fleet was to sail from the Canaries to the Galleon's Passage between Tobago and Trinidad and enter the Carribean in that way. This fleet, called the *galeones*, ordinarily left Spain in April escorted by eight galleons, six of which were large Spanish Navy ships known as the 'silver-galleons'. They measured more than 600 tons, were armed with 24 to 28 pieces, had crews of 250 to 300 and often up to 100 soldiers. These eight galleons convoyed twenty or more merchantmen to Tierra Firme. The fleet also dispatched boats to notify



(72) The routes of the Treasure Fleets in the Caribbean.

officials in Margarita, Porto Cabello, Rio Hacha, and Santa Marta of its forthcoming arrival.

Sailing along Tierra Firme it paused at Cartagena to disembark passengers and cargo for the area; it then proceeded to Porto Bello, where it arrived in June. On the arrival of the fleet in Cartagena, the president of Panama was informed, who in turn informed the Viceroy of Peru, that the Tierra Firme Flota or *galeones* had arrived. All the Peruvian treasure was then landed on the *Armadilla de Mar del Sur* in Callao. The vessels making up this fleet had gathered goods from Concepción, Valparaiso, Antofagasta and Africa in Chile. The fleet then sailed north to Panama, stopping at Guayaquil and Buena Ventura, picking up the Columbian treasure. At Panama the treasure was transported by mules on the *Camino Real* to Porto Bello, where it was loaded on the waiting Tierra Firme Fleet.

This fleet returned to Cartagena to load further goods. Towards the middle of July the fleet now worth an estimated ten million guilders, Goslinga (1971), sailed through the Yucatan Channel to Havana. It passed Cape San Antonio on about 10 August, although sometimes eight days sooner or later.

The second fleet called the *flota* or the *flota de San Juan* consisted of four galleons. Two were destined for Honduras, two for New Spain. They were part of a convoy of fifteen or more merchantmen destined for the Greater Antilles, Honduras and Mexico. This fleet sailed later in the year and entered the Carribean between Guadeloupe and Dominica usually in August. In that neighbourhood it anchored and refreshed. From the Lesser Antilles the *flota* set course to Cape San Antonio, sending despatch boats to San Juan de Puerto Rico, Santo Domingo, Jamaica, Santiago de Cuba and Campeche. Two of its four galleons sailed then to Trujillo. After the *flota* had passed Cuba's west point, it changed course, and proceeded more to the west, and proceeded to the fortress of San Juan de Alua. Once the fleet was in that harbour, it was moored to the iron rings embedded in the fort walls. The fleet ordinarily reached San Juan de Alua in early September. It unloaded its cargo (valued at 8 million guilders, Goslinga (1971)), and remained

there during the winter, until June. During this time it was loaded with gold, silver, cochineal, indigo, hides, tobacco, compechewood, and other products (valued at 14 to 15 million guilders).

In June the *flota*, now sailing without two of its escort galleons that had been sent to Honduras, proceeded to Havana, passing Cape San Antonio for the second time in early July.

The two Honduras galleons ordinarily passed Cape San Antonio shortly afterwards. In its wake the Tierra Firme Fleet would also pass this strategic outpost. Usually the ships arrived at Havana in this order. From here, under the protection of twelve galleons, the fleet proceeded at the end of August through the Bahama Channel to the Azores, and from there to San Lucar, then up the Guadalquivir River to the *Puerto de las Malas* where the officials of the *Casa de Contratación* took charge.

It is interesting to note how often these fleets were destroyed, either by acts of piracy and war or storm and shipwreck. An exceptionally outstanding example of the former is the capture of the whole of the *flota* of St. John in the Bay of Matanzas by Piet Heyn in 1628, the treasure was valued at between 11.5 million and 14 million guilders, Goslinga (1971). In the case of the latter, shipwreck was the fate of one of the two galleons of the *Armadilla de Mar del Sur* which departed from Callao in October 1654, with ten million *pesos*, and only one reached Panama. The *galeones* were therefore delayed in Cartagena until March until 2-8 million *pesos* had been salvaged from the wreck. The fleet collected this at Porto Bello and then returned to Cartagena. In May, just as the *galeones* were about to sail from Cartagena for Havana, warning of an English fleet arrived, and the sailing was postponed. In July an advice boat from Spain arrived with orders from Philip IV, that the fleet must sail as soon as possible, regardless of the dangers. The fleet sailed, but news of 27 English warships caused the fleet to be diverted to Vera Cruz. After the danger had passed the fleet sailed to Havana arriving there in October, and not departing till January 1,1656. Thus the fleet had been in the Carribean from August 1654. According to Marx (1975) only two small vessels ever

reached Spain, so that it is likely that much of the 1653-1654 mintage of coin carried by this fleet would have been lost.

The Spanish Eight *Reale* piece and its parts were well received in Asia and trusted as a trade coin of good silver content and weight. The Eight *Reale* piece was used either in its original form or by being counter-stamped by countries who were short of their own coinage. In fact the Netherlands itself, during such a shortage in the early 1650's, over-struck a number of Mexico Mint pieces of eight with a representation of the Jewel of the Order of the Golden Fleece to show that they were to be accepted for circulation.

Coins from the VERGULDE DRAECK range in date from about 1590 to 1654, and the latter date is significant in helping to identify the ship. To follow through the sequence of events that would put a Mexican Spanish coin of 1654 on this ship we must start with its minting at the Mexico Mint. The dies would have been authorised by the Spanish King (Philip IV), prepared in Spain and shipped out to Mexico probably in the first quarter of 1654. The new coinage would have been sent to Spain in one of the regular silver fleets (*Flota*) crossing the Spanish Main. During the next twelve months it would have been used in trade with the Dutch and by October 1655 been available for the V.O.C. to send it to Batavia on the VERGULDE DRAECK. An interesting point is illustrated by the fact that the coins on an earlier ship the BATAVIA (1629) were almost entirely of German states and cities, indicating that an extensive trade was carried on by the Dutch with the other parts of Europe. There was such a quantity of foreign coin circulating in the Netherlands that the States General (The Netherlands Parliament) issued in 1626 a coin tariff catalogue, illustrating a very wide range of coins and their weights, and the exchange rate at which they were permitted to circulate in the country, Anon (1626).

The VERGULDE DRAECK coinage, while being mostly of Mexican origin, contained a percentage of other Spanish American Mints and some from metropolitan Spain itself. The following list gives the composition of the total coinage.

Percentage distribution of coins in VERGULDE DRAECK Hoard from records of 10,792 coins

Mexico Mint		
1590 - 1654	2 *Reals*	11%
	4 *Reals*	17%
	8 *Reals*	54%
Potosi Mint (Peru now Bolivia)	8 *Reals*	3%
Seville Mint (Spain)	8 *Reals*	3%
All others	Various Values	12%
		100%

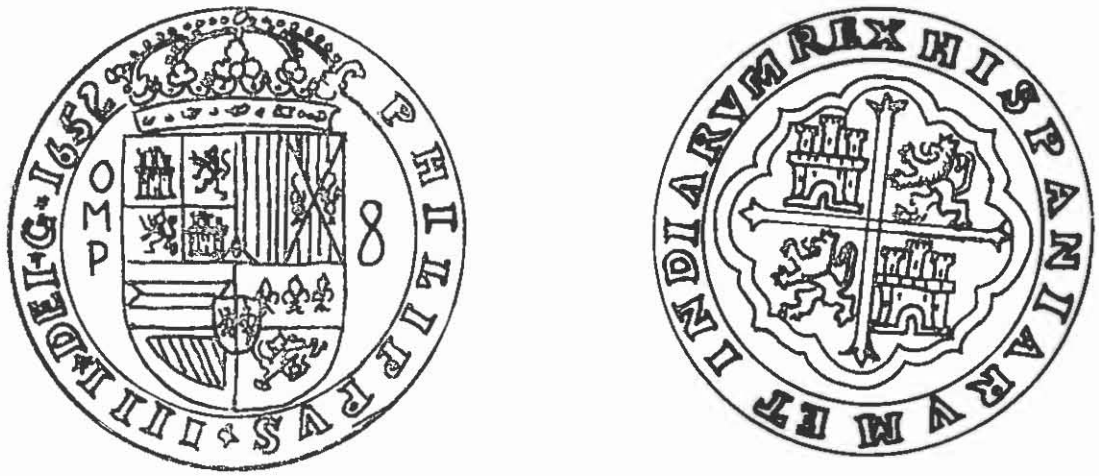
The total cash on the ship from the V.O.C. records is known to have been 78,600 guilders in 8 chests. From our knowledge of the contemporary value of the Guilder compared to the eight *real* piece and knowing the percentage break up of coins as above it has been possible to deduce that about 40,000 individual coins were in the chests. Almost half of these have been recovered or accounted for, as will be seen from the following lists and catalogue.

The coins have been classified basically by their Spanish or Spanish American origins, and there are examples from ten different mints. The material is divided into two main sections, one being the coins recovered by private persons before the passage of the controlling Act of Parliament and subsequently registered by the Western Australian Museum, and the other being the material recovered by the Museum's own Maritime Archaeology Department. A small sub-section shows six coins which have apparently come from the personal possessions of the crew.

It must be realised that a major proportion of these coins are badly corroded from 320 years exposure to the sea, and a further division has been made to show the number of pieces which are of collectable condition and those which, although identifiable, are too poor to be of numismatic value. There is also a quantity of unidentifiable scrap silver against which an estimate of the original number of coins which it represents has been made. The 897 unrecorded private coins are those known to be in private hands although the details of these are not known at present.

From the following summary, it will be seen that there are over twenty thousand coins still unaccounted for. Possibly these are spread between recoveries by the survivors in 1656, which were subsequently lost, further material recovered by private persons prior to the passing of the relevant amendments to the Museum Act, and material still on the wreck site but not discovered.

After the main listing an attempt has been made to describe and illustrate key pieces from each mint where they are available to be photographed.



(73) Typical 8 *reale*.

Inscriptions and devices of the *Reale* coinage of Spain circa 1650.

The pieces of two, four, and eight *reales* of the Mexico mint of the first half of the 17th century are typical of the Spanish Coinage of the period and represent 92% of the coin recovered from the VERGULDE DRAECK. The majority of the coins are of the reign of Philip IV 1621-1665. The Latin legend on the obverse or shield side of coins of 1652, as illustrated in fig. 70, is:

PHILIPPUS.IIII.DEI.G.1652

i.e. Philip the fourth by the Grace of God (Dei-Gratia) 1652.

The mint mark $\overset{8}{M}$ (Mexico) and assayer's initial P are to the left, and the value 8 (*Reales*) to the right.

On the reverse or cross side is the legend.

HISPANIARUM.ET.INDIARUM.REX

i.e. King of Spain and India.

The India refers to the West Indies and Spanish colonies in central and South America, together with the Spanish claim to the East Indies.

The cross on the Mexico coins is the Jerusalem or Flory cross and has four equal arms each capped by a rough representation of a *Fleur de lis* (Lily flower). In the areas between the arms are two lions and two castles diagonally opposite representing the combined kingdoms of Castile and Leon and the whole enclosed in a double line border with the legend between two circles of dots around the edge of the coin face.

CATALOGUE OF MAIN COIN TYPES FROM VERGULDE DRAECK

The following numbering systems and standard catalogue references have been used in the description of coins in this catalogue.

WAM No.	Western Australian Museum registration number.
P.R. No.	Private registration material number.
Yriarte	Yriarte Oliva Jose - Catalogo de los Reales de a Ocho Madrid 1965.
Vicenti	Vicenti Jose A. Catalogo General de la Moneda Espanola 1475-1974, Madrid 1975.
Lorente	Lorente Rodriguez J.J. - Catalogo de los Reales de a dos Espanoles Madrid 1965.
Calbeto de Grau	Gabriel. - Compendium of Eight Reales, Puerto Rico 1970.

Total recorded material recovered from VERGULDE DRAECK including W.A. Museum, Privately owned, coins and scrap silver.

Note: C = Collectable condition

NC = Not collectable condition

Mint	Denomination	Private Material	W.A. Mus. Material	W.A. Mus. Condition	Total
Burgos	4 *Reals*		3	C	3
	8 *Reals*	1		C	1
Granada	2 *Reals*	1		C	1
	4 *Reals*	2	1	C	3
	8 *Reals*	5		C	5
Madrid	2 *Reals*	3	13	C	16
	4 *Reals*	8	3	C	11
	8 *Reals*	11	10	C	21
	8 *Reals* (C/S Jewel of Golden Fleece)	1		C	1

Mexico	1 *Reals*	4	2	C	6
	2 *Reals*	540	631	C - 311 NC- 320	1171
	4 *Reals*	793	1039	C - 480 NC- 559	1831
	4 *Reals* (C/S Siam)		1	C	1
	8 *Reals*	1508	4289	C - 1384 NC- 2905	5797
	8 *Reals* (Jewel of Golden Fleece) c/s	1		C	1
Pamplona	8 *Reals*		1	C	1
Potosi	2 *Reals*	6	1	C	7
	4 *Reals*	17	6	C	23
	8 *Reals*	144	126	C - 85 NC- 41	270
	8 *Reals* (C/S with crown)		1	C	1
Santa Fe	2 *Reals*	2		C	2
	4 *Reals*	7	1	C	8
	8 *Reals*	17	12	C - 9 NC- 3	29
Segovia	1 *Reals*		1	C	1
	2 *Reals*	18	3	C	21
	4 *Reals*	12	1	C	13
	8 *Reals*	20	11	C - 9 NC- 2	31
Seville	2 *Reals*	17	11	C	28
	4 *Reals*	49	92	C	141
	8 *Reals*	73	232	C - 210 NC- 22	305

Toledo	6 *Maravedi* (C/S Madrid 8 maravedi)	1		C	1
	2 *Reals*	5	1	C	6
	4 *Reals*	5	1	C	6
	8 *Reals*	6	5	C	11
Mint Unidentifiable					
	2 *Reals*	24		C	24
	4 *Reals*	35		C	35
	8 *Reals*	55		C	55
Beach Material & Sailors Personal Property					
Zeeland	Rix Dollar		1		1
Brabant	Cross Dollar		1		1
Japan	Mameita Gin		1		1
Flanders	Patagon		1		1
Holland	Two Stuyvers		1		1
Groningen	Two Stuyvers		1		1
Unrecorded private coins		897			897
		4288	6504	C - 2652 NC- 3852	10,792 10,79
Scrap Silver showing weight and estimated number of coins		7618 (139.5kg)	690 (11.5kg)		8,308
Total recovered		11,906	7194		19,100
Still to be recovered or recorded					20,900
Total Value of coin on ship 78,600 Guilders (Estimated number of coins) Approx.					40,000

ILLUSTRATED CATALOGUE

OF

THE MAIN COIN TYPES

All illustrations at 1:1 scale.

BURGOS MINT SPAIN

Mint Mark B

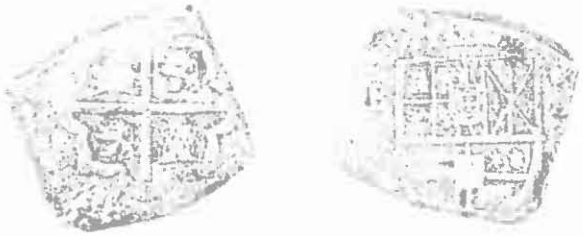
Situated about 200 Km. north of Madrid. One of the early royal mints of Castile. Struck coinage from the thirteenth to the seventeenth century.

Four *Reals*

WAM No. 3077
Type of Yriarte 5
Assayer R? Circa 1651

WAM No. 6329
Type of Yriarte 5
Assayer B circa 1651
Wt. 13.31 gm.

Eight *Reals*



PR No. 4037
Type of Yriarte 5
Assayer ? circa 1651
Wt. 25.25 gm.

GRANADA MINT SPAIN

Mint Mark G

Two hundred and thirty kilometres south of Madrid and forty kilometres from the Mediterranean Coast. Struck 2 *Real* and 4 *Real* pieces from Ferdinand and Isabella to Philip IV last issue of 2 *Reals* struck in 1621. 8 *Real* pieces Philip II to Charles II.

Two *Reals*


PR No. 2962
Type of Lorente 109
Assayer M. circa 1603
Wt. 5.75 gm.

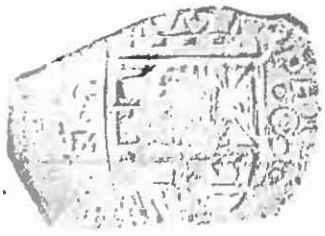
Note: Triplelined border to cross, suggests 1603 issue.

Four *Reals*


PR No. 1742
Type of Vicenti 870
Assayer N (Inverted N)
Circa 1651
Wt. 12.49gm.


WAM No. 3995
Type of Vicenti 870
Assayer N (Inverted N)
Circa 1651
Wt. 12.92gm.

Eight *Reals*

PR No. 4039
Type of Yriarte 16
Assayer N (Inverted N)
Circa 1651
Wt. 26.87gm.

Eight *Reals*


PR No. 4041
Type of Yriarte 16 or 17
Shows mint mark on side ↻
Assayer N (inverted)
Circa 1651
Wt. 24.87gm.

MADRID MINT SPAIN

crown
Mint Mark M-MD-M

Main Spanish mint at Capital city from 1614 to date

Two *Reals*


WAM No. 6494
Type of Lorente 122
Assayer A - Augustin Mayens
Circa 1641
Value II
2 *Fleur-de-lis*
Wt. 6.46 gm.


WAM No. 6501
Lorente No. 127
Assayer A - Augustin
Mayens
1651
3 *Fleur-de-lis*
Wt. 6.58 gm.

Four *Reals*


PR No. 4045
Type of Vicenti 884
Assayer? circa 1643
Value IIII
2 *Fleur-de-lis*
Wt. 13.13 gm.

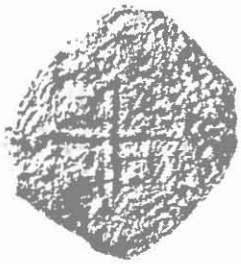
Four *Reals*


PR No. 4047
Type of Vicenti 890
Assayer A - Augustin Mayens 1651
M. Mark MD
Wt. 12.93 gm.

Eight *Reals*


PR No. 163
Type of Yriarte 300
Assayer B.I. - Bernardo Pedrera and Hipolito de Santo Domingo
Circa 1639
Wt. 25.40 gm.

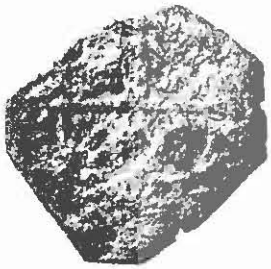

PR No. 4042
Type of Yriarte 302
Assayer B. M. Mark M
1642
Value = 8
Wt. 26.85 gm.

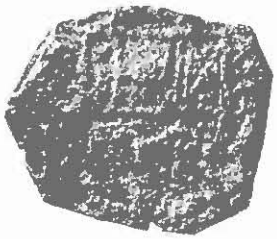



WAM No. 3612
Type of Yriarte 304
Assayer B - Bernardo Pedrera
Mint Mark MD circa 1643
Wt. 23.63 gm.

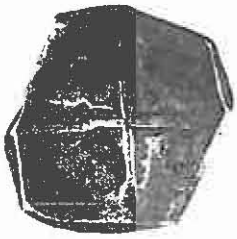

PR No. 4043
Type of Yriarte 307 (?)
Assayer A - Augustin Mayens
Mint Mark MD 164 (?)
Value VIII not 8
Wt. 26.07 gm.

Eight *Reals*





WAM No. 3631
Type of Yriarte 308
Assayer A - Augustin Mayens
Mint Mark M circa 1651
Value = 8
Wt. 24.38 gm.



PR No. 5339
Madrid Mint?
Circa 1650
Counter struck with Jewel
of the Golden Fleece
Wt. 26.18 gm.

MEXICO MINT
Mint Mark M̊

Mexico as the Vice-royalty of New Spain was captured by Cortes in 1519. The Viceroy, Antonio de Mendoza, was given authority by royal decree in 1531 to strike coins from one quarter *real* to three *reals*, and in 1537 to strike four and eight *real* pieces; no eight *real* coins are known to exist until the reign of Philip II. These show the Hapsburg shield on the obverse with the King's name in the legend around the perimeter of the coin and a cross with a *Fleur-de-lis* on the end of each of the four arms with diagonally opposed lions and castles in the quarters. This characteristic cross was in use on the coins of Spanish Mexico until the advent of the Pillar Dollar in 1732 and is the main distinguishing mark of all of the Mexico coins from the VERGULDE DRAECK wreck except WAM No. 3624 of Philip II which has a plain ended cross.

The first coins with a date included in the legend were issued in 1600 under King Philip III. This rough C.O.B. type of coin as described in the general section on minting methods constitutes the whole of the Mexico mint coins in this particular ship.

One *Real*


PR No. 4025
Type of Yriarte 477
Circa 1598
Value = I
Wt. 2.99 gm.


PR No. 4818
Circa 1650
Mint Mark M°
Wt. 3.55 gm.

Two *Reals*

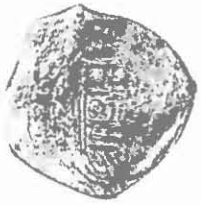

PR No. 4015
Type of Yriarte 477 - Lorente 903
Assayer O
Wt. 6.20 gm


PR No. 4021
Type of Lorente 903
Assayer O
Value = II
Wt. 6.34 gm.


PR No. 4445
Type of Lorente 911
Circa 1610-1613
Assayer F
Value = II
Wt. 6.37 gm.


PR No. 4711
Circa 1618-21
Assayer D
Wt. 6.24 gm.


PR No. 3913
Type of Lorente 914
1644
Assayer P
Wt. 6.61 gm.

PR No. 1747
Type of Lorente 914
164 (?)
Assayer P
Wt. 6.52 gm.


PR No. 3563
Type of Lorente 915
1648
Assayer P
Wt. 6.68 gm.


PR No. 2798
Type of Lorente 915
1649
Assayer P
Wt. 7.01 gm.

Two *Reals*


PR No. 1728
Type of Lorente 915
1652
Assayer P
Wt. 6.45 gm.


WAM No. 6417
Type of Lorente 914
1651
Assayer P
Wt. 6.02 gm.


PR No. 4750
Type of Lorente 915
1653
Assayer P
Wt. 6.63 gm.


PR No. 4615
Type of Lorente 915
1654
Assayer P
Wt. 6.20 gm..

Four *Reals*


PR No. 3661
Type of Yriarte 513
Circa 1629
Assayer D
Wt. 13.05 gm.


PR 2917
Type of Yriarte 492
160 (?)
Assayer A
Wt. 12.33 gm.


PR No. 5217
Flowery Cross
Circ 1620
Assayer D
Wt. 12.14 gm.


PR No. 5213
Circa 1606
Assayer F
Wt. 12.47 gm.


PR No. 5271
Type of Yriarte 525
1649
Assayer P
Wt. 13.22 gm.


PR No. 4447
Type of Yriarte 506
Circa 1621
Assayer D
Wt. 13.19 gm.

Four *Reals*


PR No. 4785
Type of Yriarte 528
1652
Assayer P
Wt. 13.80 gm.


WAM No. 6414
Type of Yriarte 527
1651
Assayer P
Wt. 11.16 gm.


PR No. 5285
1653/2
Wt. 12.55 gm.


PR No. 4698
Type of Yriarte 529
1653
Wt. 13.29 gm.


PR No. 10
Type of Yriarte 530
1654
Wt. 12.43 gm.

Four *Reals*


WAM No. 2409
Type of Yriarte 526
16(?)0
Wt. 13.48 gm.
Counterstamped with
Siam Mark.

Eight *Reals*


WAM No. 3624
Type of Yriarte 475
Circa 1580
Plain Cross
Assayer O
Wt. 23.53 gm.


WAM No. 6325
Type of Yriarte 483
Circa 1590
Assayer F
Wt. 25.26 gm.


PR No. 3987
Type of Yriarte 490
1608
Assayer A
Wt. 26.30 gm.


WAM No. 6326
Type of Yriarte 492
1609
Assayer A
Wt. 24.25 gm.

Eight *Reals*


PR No. 5412
Type of Yriarte 494
Circa 1610
Assayer F
Wt. 26.37 gm.


PR No. 3490
Type of Yriarte 504
1620
Assayer D
Wt. 22.00 gm.

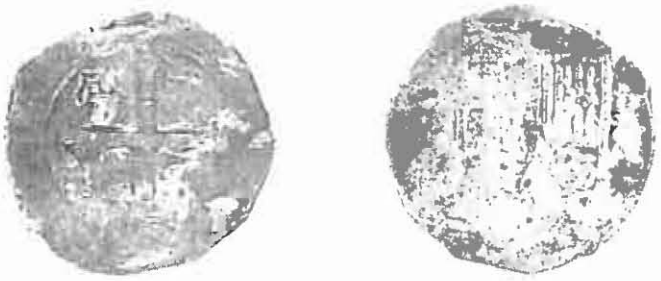

PR No. 2763
Type of Yriarte 504/5
162(?)
Assayer D
Wt. 25.75 gm.


PR No. 3991
Type of Yriarte 513-4-5
1629-1632
Assayer D
Wt. 26.33 gm.


PR No. 3301
Type of Yriarte 503
Circa 1619-1621
Assayer D
Wt. 26.88 gm.

Eight *Reals*

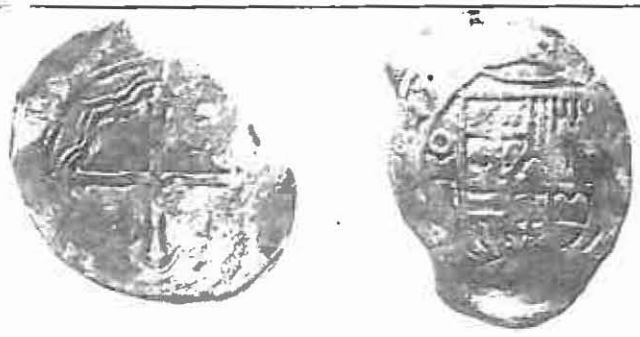
PR No. 4598
Type of Yriarte 518
1640
Assayer P
Wt. 26.13 gm.



PR No. 5019
Type of Yriarte 519
(16)41
Assayer P
Wt. 26.38 gm.

PR No. 1810
Type of Yriarte 520
1642
Assayer P
Wt. 25.98 gm.

PR No. 3993
Type of Yriarte 522
1646
Assayer P
Wt. 26.88 gm.

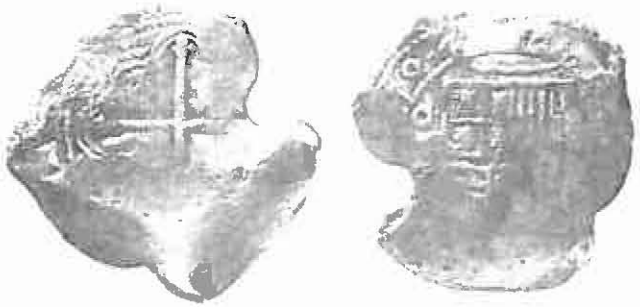


WAM No. 6424
Type of Yriarte 523
1647
Assayer P
Wt. 25.60 gm.

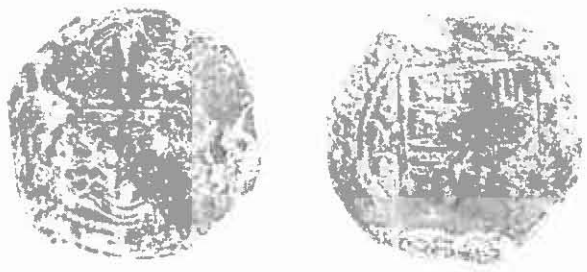
Eight *Reals*

WAM No. 2541
Type of Yriarte 524
1648
Assayer P
Wt. 26.06 gm.

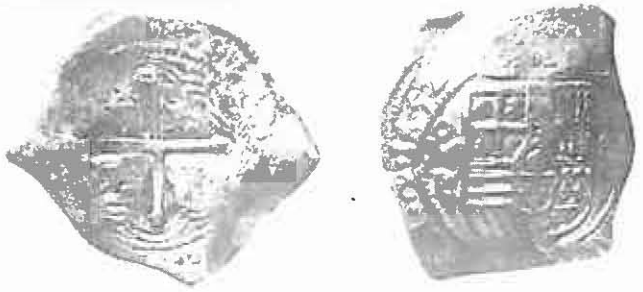
PR No. 3994
Type of Yriarte 525
1649
Assayer P
Wt. 26.86 gm.



WAM No. 7
Type of Yriarte 526
(16)50
Assayer P
Wt. 25.90 gm.



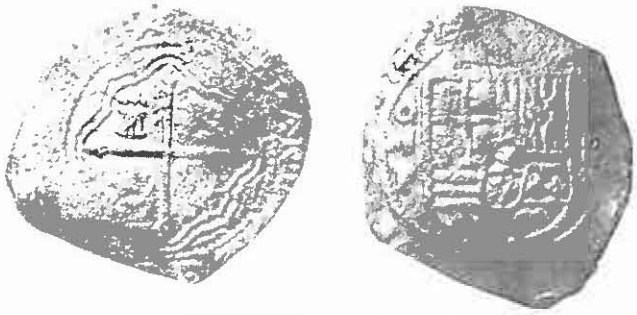
WAM No. 2545
Type of Yriarte 527
1651
Assayer P
Wt. 25.15 gm.



WAM No. 6
Type of Yriarte 528
1652
Assayer P
Wt. 25.04 gm.

Eight *Reals*

WAM No. 6426
Type of Yriarte 529
1653
Assayer P



WAM No. 6425
Type of Yriarte 530
1654
Assayer P
Wt. 24.69 gm.

WAM No. 2596
Type of Yriarte 530
1654
Assayer P
Wt. 22.44 gm.

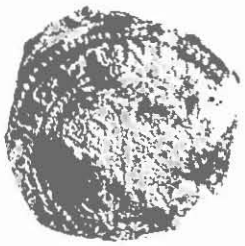
PR No. 13
Type of Yriarte 528
Circa 1652
Assayer P
Wt. 26.28 gm.
Counter struck with
Jewel of the Golden Fleece

PAMPLONA MINT SPAIN

Mint Mark P

A small mint in the province of Navarra about 70 km south of the Bay of Biscay. Eight *Real* pieces struck under Philip IV are extremely rare.

Eight *Reals*



WAM No. 6443

Type of Yriarte 891

1651 & 1652

Assayer A

Value VIII

Wt. 21.51 gm.

Arms of Navarra on Obverse

POTOSI MINT (Spanish America)

Mint Mark P

The town of Potosi was founded by a Spanish soldier Villarroel in 1546. The mint was built by the Viceroy Don Francisco de Toledo in 1574 to mint coins from the vast amount of silver mined from the so called "Mountain of Silver". Up to 1649 the coinage was very crudely struck and in many cases debased. The assayer Felipe Ramirez de Arellano was condemned to death for his part in the adulteration of the coinage. By royal decree of February 17th 1651 the designs were changed to the quartered castles and lions for the obverse and two crowned pillars of Hercules standing on the waves on the reverse. These new Coins were produced from 1652 onwards and a large number of varieties of different dies are evident in the coinage from the VERGULDE DRAECK. The modern town of Potosi is in the state of Bolivia which formed part of the old Spanish Vice-royalty of Peru.

Two *Reals*

PR No. 5332

164 (?)

Assayer R

Wt. 7.03 gm.


PR No. 5348
(1)652
Value 2
Wt. 6.48 gm.

Four *Reals*


PR No. 2923
Type of Yriarte 942
Circa 1640
Cross & Shield
Wt. 12.54 gm.


PR No. 1
Type of Yriarte 967
1652
Assayer E
Wt. 11.77 gm.


PR No. 2018
Type of Yriarte 970
1652 (3 dates)
Assayer E
Wt. 13.71 gm.


PR No. 3020
1652
Value reversed
between pillars
Wt. 12.75 gm.

Four *Reals*

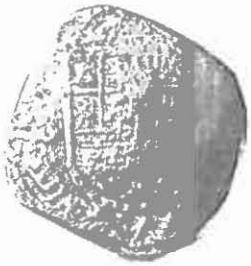

PR No. 5349
Type of Yriarte 971
1653 (3 dates)
Assayer E
Wt. 13.88 gm.


R. Reg. No. 5347
Type of Yriarte 972
1654
Assayer E
Wt. 12.47 gm.

Eight *Reals*

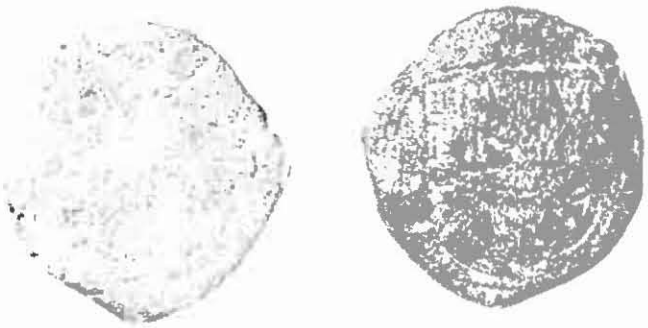

PR No. 1857
Type of Yriarte 908
1555-1598
Assayer R or B
Wt. 24.42 gm.


PR No. 2821
Type of Yriarte 942
Circa 1640
Wt. 25.84 gm.

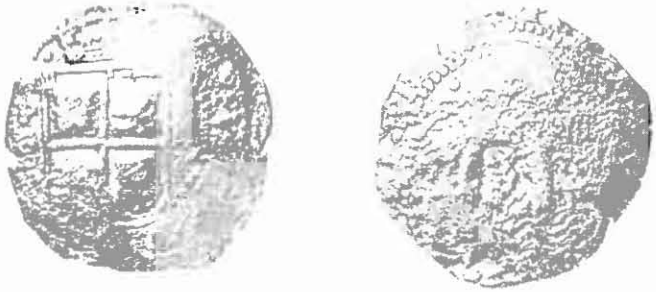



PR No. 1899
Yriarte 955/6 Type VII
Circa 1649
Assayer O or Q
Wt. 20.56 gm.

Eight *Reals*



PR 1919
Yriarte 962
Circa 1650
Wt. 25.65 gm.



WAM No. 6354
Yriarte 966
1652
Assayer E
Wt. 25.92 gm.

PR No. 2
Yriarte 967
1652
Assayer E
Wt. 26.39 gm.

PR No. 2702
Yriarte 968 type XI
1652
Assayer E
Wt. 24.95 gm.

PR No. 2752
Yriarte 969
1652 (Two dates)
Assayer E
Wt. 26.68 gm.

Eight *Reals*

PR No. 2700
Yriarte 970
1652 (3 dates)
Wt. 26.25 gm.

PR No. 1533
Yriarte 971
1653 (3 dates)
Wt. 25.00 gm.

PR No. 3305
Type of Yriarte 965
Circa 1652
Wt. 26.15 gm.
Counter stamped with Crown.

SANTA FE MINT (Nuevo Reino)

Mint Marks NR N R

Philip III ordered the establishment of a mint at Santa Fe in the Vice-royalty of the new kingdom of Granada (Nuevo Reino de Granada) and it came into production about 1622 under Philip IV. As this mint was established close to an area of gold mines most of its coinage was gold and the rare silver pieces of eight were struck from the silver obtained as an impurity in the refining of gold.

Two *Reals*

PR No. 1201
Type of Yriarte 1193
Not recorded in Lorente
Circa 1623
Mint Mark N over R
Wt. 6.59 gm.

PR No. 4057
Lorente 1037
?1653
Assayer P
Mint Mark $\overset{o}{NR}$
Wt. 6.37 gm.

Four *Reals*

PR No. 4972
1645
Mint Mark $\overset{o}{NR}$
Value IIII
Wt. 11.17 gm.

Four *Reals*

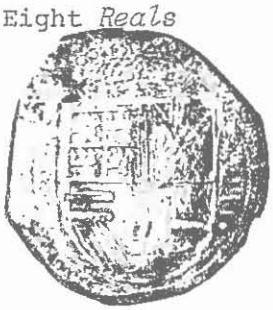

PR No. 5330
165(?)
Mint Mark $\overset{o}{NR}$
Assayer PR
Wt. 12.92 gm.


PR No. 4055
Yriarte 1198
1651
Wt. 13.12 gm.


PR No. 5323
?1652
Mint Mark $\overset{o}{NR}$
Assayer PR
Wt. 13.27 gm.


PR No. 4056
Type of Yriarte 1198
1653
Assayer PM
Value IIII
Wt. 12.81 gm.

Eight *Reals*

PR No. 4051
Type of Yriarte 1195
Circa 1625
Mint Mark N over R
Assayer R
Castles & Lions reversed
Wt. 25.34 gm.

Eight *Reals*

PR No. 4053
Yriarte 1198
1651
Assayer PRM
Value VIII
Wt. 27.29 gm.

PR No. 3286
Type of Yriarte 1198
1652
Assayer PRM
Wt. 25.65 gm.

PR No. 1259
Type of Yriarte 1200
1653
Assayer PRS
Wt. 26.28 gm.

SEGOVIA MINT

Mint Mark an Aquaduct

All the coinage struck at the Old Mint was of the COB type from Charles I to Philip IV.

New Royal Mint struck round machine made coins from Philip II to Philip V. in 1585 Philip II imported machinery and skilled workers from Germany to strike the round pieces for which this mint is so well known and which so resemble the contemporary coinage of the German states. The coining machines consisted of a pair of cylindrical rollers one with a series of obverse dies and the other with reverse dies. A previously rolled strip of silver plate was passed between the rollers and came out with the design of the dies deeply impressed. These round planchets were then punched out of the plate. Some variation in thickness was produced by this process and some-

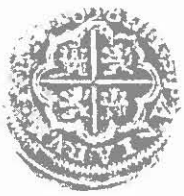
times the dies slightly overlapped the end of the strip of plate. Examples of such coins with one flat side have been noticed in the coins from the VERGULDE DRAECK.

Segovia was a mint town from Roman times and its distinctive Aquaduct mint mark comes from its famous Roman Aquaduct which still stands.

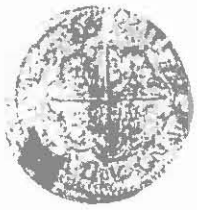
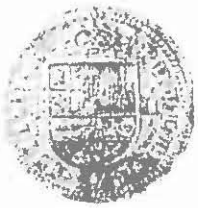
Two *Reals*


PR No. 4033
Lorente 379
1621
Assayer A - Andres Pedrera
Wt. 5.21 gm.


PR No. 82
Lorente 383
1627
Assayer P - Estaban Pedrera
Wt. 6.15 gm.




PR No. 218
Lorente 384
1628
Assayer P
Wt. 5.74 gm.

PR No. 2934
Type of Yriarte 1360
165(?)
Assayer I - Hipolito Santo Domingo
This assayer only during 1650-51
Wt. 4.81 gm.

Two *Reals*


PR No. 2795
Lorente 385
1652
Assayer B.
Bernardo Pedrera
Value II
Wt. 6.60 gm.


PR No. 3265
Lorente 385
1652
?B. Pedrera & Rafael Salv
Wt. 6.61 gm.

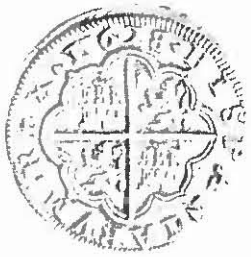
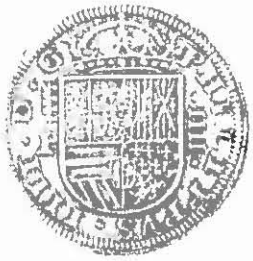
Four *Reals*


PR No. 5327
Type of Lorente 374
Circa 1597
Value IIII
3 *Fleur-de-lis*
Wt. 13.77 gm.

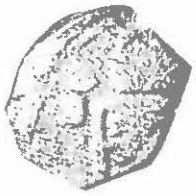

PR No. 4533
Type of Yriarte 1344
1621
Assayer A - Andres Pedrera
Wt. 11.92 gm.


PR No. 3264
Type of Yriarte 1345
1628
Assayer P -
Estaban Pedrera
Value IIII
Wt. 12.47 gm.

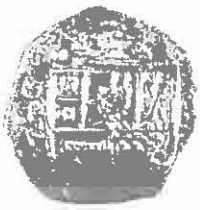
Four *Reals*

PR No. 4032
Type of Yriarte 1346
1628
Assayer P
Wt. 13.24 gm.

PR No. 341
Type of Yriarte 1299
1648
COB from Old Mint
Wt. 11.34 gm.

PR No. 5328
165 (?)
Assayer A- (?)
Wt. 12.33 gm.

Eight *Reals*


PR No. 4026
Yriarte 1304
1586
No Assayer
Wt. 26.70 gm.


PR No. 4027
Yriarte 1322
1590
Wt. 25.79 gm.

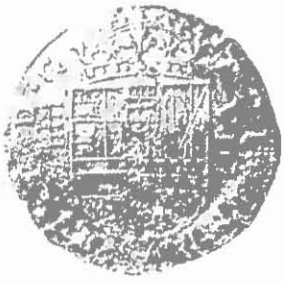
Eight *Reals*


WAM No. 3082
Yriarte 1329
1597
Old Mint COB


PR No. 1847
Yriarte 1339
1617
Assayer A -
Andres Pedrera


PR No. 4028
Yriarte 1340
Assayer A
Value VIII
Wt. 25.30 gm.


PR No. 2446
Yriarte 1343
1620
Assayer A
Wt. 25.57 gm.

WAM No. 6346
Yriarte 1345/6
1630
Assayer P -
Estaban Pedrera
Value VIII
Wt. 15.90 gm.

Eight *Reals*


PR No. 2738
Yriarte 1347
1632
Assayer R - Rafael Salvan
Wt. 27.32 gm.


PR No. 2737
Yriarte 1350/51
1635
Assayer R
Wt. 26.29 gm.
? Contemporary forgery.


PR No. 4526
Yriarte 1352/3
1636
Assayer R
Value 8
Wt. 25.79 gm.


PR No. 4030
Yriarte 1358
1651
Assayer I -
Hipolito de Santo Domingo
Value VIII
Wt. 27.51 gm.


PR No. 4530
Yriarte 1360
1651
Assayer I
Value 8
Wt. 26.96 gm.

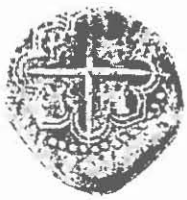
SEVILLE MINT

Mint Mark S

One of the most prolific of Spanish mints which struck coins from Roman times. Ferdinand and Isabella made the city their capital until 1478 and coins were struck regularly until 1863.

The coins from this mint are mainly poorly struck COB issues until the reign of Philip V about 1700. The Seville coins from the VERGULDE DRAECK are very rough lumps of silver and dates and other details are very difficult to decipher.

Two *Reals*



PR No. 2036
Lorente 429
?1588
Assayer P
Mint Mark S
Value II
Wt. 5.82 gm.

PR No. 2038
Lorente 438
1596
Assayer B Juan Vincente Bravo
Wt. 6.21 gm.

Two *Reals*


PR No. 4036
Lorente 442
1600
Assayer B
Value II
Wt. 5.81 gm.


WAM No. 3027
Lorente 476
?1643


PR No. 3605
Vicenti 836
1652
Value 11
Wt. 6.58 gm.

Four *Reals*


PR No. 5013
Type of Yriarte 1431
1652
Wt. 11.89 gm.


WAM No. 6340
Circa 1650
Mint Mark S
Assayer R - Revas
Wt. 12.61 gm.

Four *Reals*


WAM No. 6444
Circa 1650
Value VIII
4 *Real* Weight struck
With 8 *Real* die
Wt. 13.47 gm.


WAM No. 6445
Circa 1650
Value 8
Full size 4 *Real* flan
but low weight (8.12 gms)
Struck with 8 *Real* die
? Contemporary forgery
Wt. 8.12 gm.

Eight *Reals*


PR No. 2575
Type of Yriarte 1431
1643
Mint Mark S
Assayer R (Rivas)
Wt. 25.92 gm.


PR 2824
Yriarte 1432
1644
Assayer R (Rivas)
Wt. 26.97 gm.


WAM No. 3992
Type of Yriarte 1432
1649
Wt. 25.56 gm.

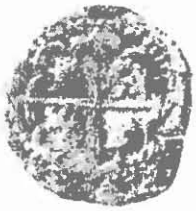
Eight *Reals*


WAM No. 2952
Type of Yriarte 1432
1652
Mint Mark S
Assayer R (Rivas)
Wt. 24.87 gm.

TOLEDO MINT
Mint Mark ♀T

Located in central Spain and was a mint town from Gothic times. The *Real* Coinage was struck from Philip II to Philip IV. The first dated coins were produced in 1590 and the last in 1662.

Two *Reals*




PR No. 2796
Lorente 606
1596
Mint Mark ♀T
Assayer C (Castillo)
Wt. 5.74 gm.


WAM No. 6493
Phillip III
Circ 1598-1621
Wt. 5.44 gm.

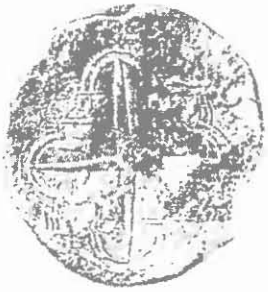
Four *Reals*


PR No. 4038
Type of Yriarte 1542
1610
Mint Mark ♀T
Assayer C (del Castillo)
Wt. 13.23 gm.

Four *Reals*

WAM No. 6330
Type of Yriarte 1551
1651
Wt. 12.03 gm.

Eight *Reals*



PR No. 4143
Philip II 1555-98
Mint Mark ♀T
Assayer M (Manzanas)

PR No. 1855
Yriarte 1550
1651
Assayer Y
Wt. 25.42 gm.

PR No. 4159
Yriarte 1551
1652
Mint Mark ♀T
Wt. 25.65 gm.

The above catalogue will undoubtedly contain some errors in the text and identification, and any corrections and suggestions for improvement in future editions will be warmly welcomed.
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Curator Numismatics, Western Australian Museum, Francis Street, Perth.

CHAPTER VI

The Requisition Lists and the Artefacts

Jeremy Green

Some authors have attempted to classify artefacts according to their use or purpose on-board ship. Thus Marsden (1972) divided the objects recovered from the V.O.C. ship AMSTERDAM into five classifications: parts of the ship; ship's stores, equipment officially issued by the V.O.C. for use on-board; the personal belongings of individuals on-board; and the cargo. However this type of classification is not always possible, as in the case of the V.O.C. ship HOLLANDIA, Marsden (in Cowan *et al.*, 1975), classified the finds into more general catagories due to the interpretive difficulty of differentiating between trade goods and personal possessions.

Little has been published on the material carried on-board V.O.C. ships, and therefore it is felt that attempts to attribute ownership of material at present can only be very tentative. Translations of contemporary documents relating to material carried on-board ships have been made here to list the main items that would have been carried by the VERGULDE DRAECK. From these lists the duplication of items in ship's supplies, and provisions for the Indies may be seen. The vast complexity of trade, supplies, provisions and ship's equipment, clearly demonstrates that far more study is required before items can be simplistically attributed to these classifications.

In broad terms a ship was made up of, and carried the following groups of items:

1. The ship itself: its hull, masts, yards, rigging and sails.

2. The ship's equipment and stores: including armament, spare equipment and materials for the maintenance of the ship during her voyage.

3. The ship's provisions: these were used solely for feeding and keeping the crew, officers and passengers fit and healthy during the voyage.

4. The cargo carried on the ship for the V.O.C., this can be divided into three groups: specie; trade goods; and supplies for the Company in the Indies.

5. Personal possessions of individuals allowed by the V.O.C. to be taken to the Indies, and also illegal goods.

No bills of lading exist for the VERGULDE DRAECK so it is impossible to determine exactly what she was carrying on her last voyage. However there are numerous secondary sources which may be used to help to give a better idea of the ship and what she carried. Also as will be seen below, the provisions and requirements carried to the Indies in 1653 by the ship, are known. Therefore we have some idea of what the VERGULDE DRAECK may have carried in 1656, and this year has been used as a case study.

VI.1 The Ship

The VERGULDE DRAECK is referred to as a *jacht*, 137 *voet* long, 32 *voet* wide, 13½ *voet* in the hold, 7 *voet* above, and of a capacity of 130 *lasten* (see Part 1, Chapter III, above), the *voet* being probably of Amsterdam and thus 0.283m and the *last*, a complex measure of cargo capacity approximately 2 tonnes per *last*.

There are no contemporary illustrations of the VERGULDE DRAECK; fig. 3 is taken from a contemporary illustration by Reinier Nooms (circ. 1623-1664) of a *straets-vaerder* the VERGULDE DOLPHIJN (see Nooms, 1970), a *pinas* of about 32 guns said to have been sunk in the battle of Ter Heide on 10 August 1653. Witsen (1690) gives the specifications for a *pynas-schip* of the 1670s as 134 *voet* long and 35 *voet* wide, which is close to the size of the VERGULDE DRAECK. However Elias (1933) lists DE GOUDEN DOLPHIJN of 32 guns, built in 1633, as 110 *voet* long, 25½ *voet* broad, and 12½ *voeten* in the hold. This ship was in the States Fleet under the Admiralty of Rotterdam in July 1655. From the illustration fifteen

gunports can be seen, not counting those on the stern which would give the ship a total of 32 guns, and from the size of the man on the forecastle the ship would be about the correct size for DE GOUDEN DOLPHIJN. Often in this period the terms (VER)GULDE AND GOUDE were interchangeable, and as it is unlikely that there were two ships of this name so similar in size, it is possible that Nooms has illustrated the GOUDE DOLPHIJN listed by Elias (1933) and that the modern note that the VERGULDE DOLPHIJN sunk in 1653 at Ter Heide is incorrect. If this is the case, then this illustration is of a ship slightly smaller than the VERGULDE DRAECK.

Witsen (1690) refers to several *jachten*, and describes them as small vessels. The *speel-jacht* is the forerunner of the modern pleasure yacht and is 40 *voeten* long, a large *jacht* of the West India Company is only 66 *voeten* long, and the largest is an *Advijs-jagt* of 115 *voeten* long, 27 *voeten* 5½ *duim* wide, and with a hold of 11 *voeten* 5½ *duim*.

The first V.O.C. *jacht* was chartered by the Company in 1606, and through the years many others were used. Table 6-1, is taken from Van Dam (1701), 17, and lists the various *jachten* and other medium class ships of the 17th century. The large *jacht* seems to have been replaced by the *pinas* and *fregat* ships in the latter half of the 17th century, and the term seems to have been reserved for a class of vessel rather like the royal yacht.

It is felt that it is unnecessary to describe in detail all the parts of the ship, as they should be self evident. Extensive lists of the parts of a ship are published in Van Dam (1701), 17, and Witsen (1690), 8.

VI.2 The Ship's Equipment and Stores

There are no contemporary details available for the armament of the VERGULDE DRAECK. We know from the wreck site that she originally carried eighteen cannon, but apart from the three raised so far, nothing else is known of their type or size. Van Dam (1701) notes that in 1632 large *jagten* of 120 *voet* length were

TABLE 6-1

JACHT SIZES TAKEN FROM VAN DAM, 1701

	Lasten	Length *Voeten*	Width *Voeten*	*hol* *Voeten*	above *Voeten*	Date
Jacht	80	96	25	10		1606
Ondiep gaend Jacht		100	26	10		1606
Jacht		80	19	9		1608
Jacht		70	16	8		1608
Jacht		81	20	9	5 3/4	1610
Jacht		74	19	8	5 3/4	1610
Schip or jacht		130	32	12		1616
Kleyn jacht		100	20	7½	5½	1628
Groot jacht	150	135	27½ to 28	10½		1628
Kleyn jacht	48-50	100	20	7½		1628
Groot jacht		120	25	10½	6 1/3	1632
Kleyn jacht		100	20	7½	5½	1632
Groot oorloghs jacht		122	78	11½	6 3/4	1636
Groot jacht		128-130	28	11½		1639
Kleyn jacht		105-106	24	9		1639
Groot jacht		116	27	11½	6½	1644
Minder jacht		106	24	10	6½	1644
Kleyn jacht		83	20	8	5½	1644
Groot oorloghs jacht		130	32	13		1652
Groot oorloghs jacht		134	33	13½	7½	1653
Koop vaard jacht		126	28	12	6½	1653
Klein jacht		116	26	10	5½	1653
Jacht or pinas		126	28	12½	6	1662
Klein jacht or pinas		116	26	10	5½	1662

armed with 12 iron guns of 5 to 6 lb shot, and that in times of war this was increased. Unfortunately Van Dam gives little detailed information on the sizes of guns and the amounts of ammunition. Witsen (1690) however gives a description on the armament and equipment of a 134 *voet vinas-schip*, used for short journeys to Curaçao, Aleppo and Guinea in the 1670s . This gives an insight into the complexity of this aspect of the ship's equipment. Table 6-15 gives Witsen's munitions list. It is interesting to note that 8 out of 24 of the cannon are bronze, and that two are chamber pieces. Van der Tollen (1734), illustrates *kamer* (chamber), *klock wijs* (bell) and *recht-loopent* (parallel) boring. Together with the cannon, are other small arms, musket, *donderbus*, sabres, boarding axe, pistols, pikes and a snaphans gun, together with 3000 lbs of gun powder and 400 lb of lead. There is a strong emphasis on the heavier shot, and a remarkably small proportion of bar shot.

Other items of the ship's equipment listed by the *Heeren XVII* in their resolution of the 11 October 1656 (KA 187) include: the *bottelierskist* (steward chest), Table 6-2; *Tinwerk voor de bottelier van een retourschip*, (pewter for the steward of a *retourschip*), Table 6-3; *back voor een retourschip van* 350 *koppen*, (mess for a retourship of 350 crew), Table 6-4; *lijste van de constapelskist* (gunner's chest), Table 6-5; *lijste van de kuijpersgereetschappen* (cooper's requirements), Table 6-7; *lijste van de kockgereetschappen* (cook's requirements), Table 6-8; *voor de cajuijt van een retourschip, bijden schipper te verantwoorden* (for the cabin of a retourship, for the responsibility of the skipper), Table 6-9; *tin voor de cajuijt* (pewter for the cabin), Table 6-10.

Unfortunately this is all that was recorded by the V.O.C. so for the sake of completeness additional equipment lists have been added from Witsen (1690): *Uit de lijn-baan* (from the rope yard), Table 6-11; *van de zeil-maker* (sailmaker), Table 6-12; *andere kleinigheden* (other small items), Table 6-13; *losse block-werk* (loose-blocks), Table 6-14; *kryghs-tuigh* (military equipment), Table 6-15; *behalven dit heeft men op het schip noch noodigh* (additional equipment), Table 6-16.

These tables give a good idea of what would have been carried on-board the VERGULDE DRAECK as part of the ship's equipment. However identification of a particular item on the wreck site does not mean that it necessarily came from the ship's equipment. This will be seen from the lists of requisitions from the Indies below.

VI.3 Ship's Provisions

Table 6-17 taken from the *Resoluties* of the *Heren XVII*, KA 187, gives the list of provisions for a *retourschip* for a voyage of 15 months, except for bread which was for 10 months. It is quite extraordinary to see the quantity of food and provisions required for a journey, although when the daily ration is worked out it is not much per man. For example bread worked out at about 0.3 kg bread per man per day, 0.18 kg meat per man per day and 0.11 kg legumes per man per day.

VI.4 Requisitions from the Indies

Each year the *Gouverneur Generaal* and *Raad* in the Indies sent lists of requisitions to the Company in Netherlands. Extensive volumes of these requisitions exist in the Algemeen Rijksarchief in 's-Gravenhage. The requisitions exist for the year 1636 to 1664, KA 10061. In addition there are lists of the demands arriving in Batavia (*Eisen*) with accounts of what ships brought what items, what was short, what was extra, and what was damaged. It initially had been hoped that the cargo lost on the VERGULDE DRAECK could be obtained by simply subtracting the lists of material that arrived at Batavia in 1656 from the requisitions for that year. However, the problem is far more complex, often the company sent more or less than was originally requested, so this is not possible.

The year 1653 has been selected to illustrate the requisitions, KA 10061, and the *Eisen* arriving at Batavia, KA 10072. Since this was the year of the first voyage of the VERGULDE DRAECK, it shows what was carried to the Indies in that year. It is not unreason-

able to assume that the ship would have carried a similar cargo in her following voyage.

The list of requisitions for the year 1653 is given in Table 6-20, whilst the alphabetical list of provisions and needs for the year 1653 arriving in Batavia, together with what was recorded arriving on the VERGULDE DRAECK is given in Table 6-21. It is interesting to note for example that on her first voyage the ship carried over 21 tons of bricks, and only one other ship the VREDE carried 15,000 *vries klinckerts*.

The most widely requested items for the Indies, came under trade items. Table 6-18 gives the quantities of lead, mercury, vermillion, elephant tusks, sulphur and amber sent to the Indies between the years, KA 10061. The specie is recorded together with the value of the cargo, and the number of ships in each year's fleet, from Van Dam (1701), 12.
In the 1653 fleet the tonnage for the major heavy trade items and provisions for the Indies for the year, was 2904 tons, Table 6-19, which averages 171 tons per ship. If this is compared with the tonnage of provisions for the ship, assuming that she carried about 200 people, and was thus approximately the size of the VERGULDE DRAECK, then the total when calculated from the figures in Table 6-17 would have been about 175 tons. Added to this figure would have been the armament and shot supplies, which approximately, assuming half the guns were the large 3200 A. lbs class and the others the 1700 A. lbs class, gives 22 tons for the guns and 2.5 tons of shot, by proportion from Table 6-15. Thus it is possible in a superficial manner to work out the proportion of weights of cargo, stores provisions, etc. It is clear that more work is required in this area, but it reveals an unexpected and interesting aspect of the V.O.C. trade. Perhaps the most significant factor is that in 1653 and 1656 the specie carried to the Indies was only about 10% of the value of the total cargo, and thus the cargo deserves more attention than it is normally accorded.

VI.5 Personal Possessions

According to the *artyckel brief* of the V.O.C. there was a limit to the personal possessions that could be taken to the Indies. The resolution of 1671, Van Dam (1701), 22, states that the following items were allowed to the senior officers in addition to their sea chests:

1	*halfepijp mom*	(spruce beer)
3	*halve amen wijn*	(wine)
4	*fleskelders*	
12	*hammen*	(hams)
6	*stucken geroockt vleesch*	(smoked meat)
12	*soetemelcx kaesen*	(cheese)
2	*achtendeeltjes boter*	(butter)
1	*voetge salm of ¼ tonne*	(salmon)
1	*voetge haringh*	(herring)
1	*geroockte salm*	(smoked salmon)

These items were allowed for the *commandeur*, *opperkoopman* (upper merchant), *koopman*, *schipper*, *predicant* (priest), *onderkoopman*, *luytenant*, *assistent*, *sergeant*, *opperchirurgijns* (upper surgeon), *opperstuyrman* (upper steersman), *onderstuyrman* and *derdewaeck* (third mate). The *hooghbootsman*, *schieman*, *bottelier*, *constapel*, *kock* (cook), *opperzeylmaker* (upper sailmaker), *onderbarbier*, *derde barbier*, *opperkuyper* and *oppertimmerman*, were allowed their sea chests and two *fleskelders*. (The *kelder* or *fleskelder*, were small wooden chests holding 15 square case bottles (Van Dale)). All other officers were allowed one *kelder* in addition to their sea chests. The maid was allowed a sea chest for cloths, four *voet* long and two *voet* broad and high. All others on-board the ship were allowed only a standard sea chest.

In 1656 it had been decided that the *schipper*, *onderkoopman* and *predikant* were allowed two sea chests, five *voet* long, 2 *voeten* broad and high. The other officers were allowed one chest, and crew smaller and smaller size sea chests in proportion to their rank, Van Dam (1701), 22.

No one was allowed to take to the Indies any other items, chests, barrels of baggage without permission, than those permitted above. There is little doubt that there was considerable private trade, but at the same time in view of the fact that the *Bewinthebberen* confiscated all illegal goods, this was controlled. It is of course difficult to estimate how much illegal trade was conducted.

TABLE 6-2

LIJSTE VANDE BOTTELIERS KISTE (STEWARD'S CHEST)
Resoluties van ordinaris en extraordinaris vergaderingen van der Heren XVII woensdach den 11 October 1656, KA 187

2	*Nijptangen*	pincers
2	*Booghtangen*	pliers
2	*Isere hamerkens*	small iron hammers
12	*Kopere bierkranen*	bronze beer taps
2	*Kopere wijn kranen*	bronze wine taps
2 lb	*Kooper draet) in de Constabels en sloote*	brass wire
1 lb	*Iser draet) maeckers kist*	iron wire
2	*Dubbelde fretten*	double wimble (Röding)
2	*Enckelde fretten*	single wimble
2	*Tap boors*	tap boorers
4	*Lepels*	spoons
3	*Boor isers*	bits
2	*Houte ommeslagen*	braces (wooden)
8	*Dosijn koopere kanhaecken*	cup hooks (bronze)
3	*Dosijn nagelkens daertoe*	small nails for above
1	*Paer houte schalen met de balcken*	wooden scales with beam
30 lbs	*Gewicht*	weights
2	*Slonsjens*	dark lantern (Röding)
1	*Vismes*	fish knife
1	*Vleeschmes*	meat knife
6	*Sijecken lampen*	lamps for the sick
4	*Compas lampen*	compass lamps
4	*Driekante lampen*	3 cornered lamps
6	*Pijpkens daertoe*	chimneys for above
6	*Houte pompen) met haer Kopere pomp) toebehoren*	wooden pumps) with their bronze pump) accessories

TABLE 6-3

TINNEWERCK VOOR DE BOTTELIER VAN EEN RETOURSCHIP

(smaller ships by proportion)

Resoluties van ordinaris en extraordinaris vergaderingen van der Heren XVII woensdach den 11 October 1656, KA 187.

4	*Flapkannen*	small lidded can, also a measure.
3	*Maet kannen sonder decksel*	measuring can without lid
3	*Maet pinten sonder decksel*	pint measure without lid
3	*Maet pinten gedeckt*	pint measure with lid
4	*Haelf maet pinten ongedeckt*	half pint measure without lid
2	*Haelf maet pinten gedeckt*	half pint measure with lid
8	*Muddekens*	is '*mutsjens*' - 1 *mutsje* = approx. 0.15 litres
6	*half*	
8	*quart*	
3	*Platte kroesen met ringen*	flat cups with rings
6	*Brandewijn kroesen*	brandy wine cups
2	*Bier beeckers*	beer beakers

TABLE 6-4

BACX (MESS) *VOOR EEN RETOURSCHIP VAN* 350 *KOPPEN*

(for smaller ships by proportion)

Resoluties van ordinaris en extraordinaris vergaderingen van der Heren XVII woensdach den 11 October 1656, KA 187

100	*Holle bacx*	hollow dishes
100	*Vlacke bacx*	flat dishes
100	*Botter loggen*	butter boxes
75	*Sout loggen*	salt boxes
50	*Botter tinne*	butter tins
6	*Schaft lepels*	eating spoons
400	*Houte lepels*	wooden spoons
4	*Mouden*	corn measures
2	*Houte blaesbalcken met isere pijpen*	wooden bellows with iron pipes
12	*Diepe houte lantarens*	dark lanterns? wooden
36	*Witte tellioren*	white eating board (Van Dale)
2	*Seeven*	sieves
2	*Teemsen*	large hair sieve
1	*Wan*	winnow
12	*Houte kranen*	wooden taps
	Groote bacx a 5 schreef	large dish of 5*schreef*

TABLE 6-5

LIST VAN DE CONSTAPELSKIST

Resoluties van ordinaris en extraordinaris vergaderingen van der Heren XVII woensdach den 11 October 1656, KA 187

2 lb	*Koper draet*	bronze-brass wire
2 lb	*Iser draet*	iron wire
8	*Kruythorns*	powder horns
8	*Laetpriemen*	priming iron (Röding)
3	*Tashaecken*	type of hook with three or four tongs and a long handle (Van Dale)
8	*Lontstokken*	lintstock
3	*Stale boren*	steel borers or auger
6	*Boorysers*	boring irons or bits
1	*Houte ommeslagh*	wooden brace (Röding)
2	*Nijp tangen*	pincers
2	*Boogh tangen*	pliers
100	*Naalden*	needles
12	*Vingerhoeden*	thimbles
3 lb	*Graeuw garen*	grey thread
2	*Strengen zeylgaeren*	skeins of sail thread
1	*Koper regelpasser*	brass straight (?) compasses
1	*Loot lepel*	large iron spoon for ladeling lead out of crucible (Van Dale)
3	*Houte mosquytjes*	wooden musket-ball mould (Stapel)
8	*Soo vylen als raspen*	files and rasps
1	*Paar kopere schalen en balck*	brass scales and beam
36 lb	*Gewigt*	weights
1	*Kopere talstok*	brass tally-stick
100	*Wissernagels*	little nails for attaching cloths to cannon sponge (Stapel)
1	*Kopere dissel*	Adze, bronze (Röding)

TABLE 6-5 (CONT.)

	Kruytmaten, tot ieder soort van 't geschut	powder measure for each sort of gun
1	*Mate tot ieder soorte van 't geschut*	measure for each sort of gun
2	*Slonsjes*	dark lantern (Röding) safety lantern (Stapel)
2	*Kopere kruytlantaens*	brass powder lanterns (Röding, fig. 582a)
2	*Grote) kopere kruyt-tregters*	large brass powder funnels
2	*Kleyne)*	small brass powder funnels
1	*Cogelvorm*	bullet mould
2	*Kleermakersscharen*	tailor's scissors
1	*Koper panneken*	brass small pan
3	*Siften, daeronder 1 van haer*	sieve, 1 made of hair
1	*Tonneken salpeter*	saltpeter
1	*Tonneken swavel*	sulphur
1	*Tonneken kolen*	coal
1	*Tonneken kalck*	lime
1	*Kan met een stoop lijnoly*	can of linseed oil, 1 *stoop* (+ 2 *kannen*, about 2 litres, Van Dale)
1	*Kan met 2 lbs terpentijnoly*	turpentine
1 lb	*Rootaerde (roodaarde)*	ruddle - red ochre
3	*Beursvaetjes*	powder barrel with leather neck (Stapel)

TABLE 6-6

LIJST VAN DE KUIJPERS GEREETSCHAPPEN (COOPER'S REQUIREMENTS)
Resoluties van ordinaris en extraordinaris vergaderingen van der Heren XVII woensdach den 11 October 1656, KA 187.

1	*Baers*	cooper's axe (Stapel)
1	*Schroot en veth boor*	screw auger and small cooper's drill (Stapel)
1	*Strijck banck en beijtel*	plane and chistle
2	*Snijmessen*	cutting knife
1	*Omhouwer*	type of hand adz
2	*Dissels*	adzes
1	*Groote houweel*	large mattock
1	*Kleene houweel*	small mattock
1	*Hand saegh en heft*	hand saw and handle
1	*Kraan boor en 2 ijsers*	tap drill and 2 bits (Van Dale)
1	*Groote kroos*	large groover (Stapel)
1	*Kleene kroos*	small groover
1	*Half ronde en 1 staert schact*	half round and rat-tailed file (Stapel)
2	*Blaespijpen*	bellows pipes
2	*Boor houten en 2 deuvel boor isers*	wood brace and dowel bits (Röding)
2	*Fretten*	wimble
2	*Mesvijlen*	knife files
1	*Dissel steel*	adze handle
1	*Drijfthout*	tool for applying hoops to barrels
2	*Wetsteen*	whetstones
1	*Bos biesen*	bundle of reeds

TABLE 6-7

LIJSTE VAN DE SCHEEPSCOPORAALSKIST
Resoluties van ordinaris en extra-ordinaris vergaderingen van der Heren XVII woensdach den 11 October, 1656, KA 187

2	*Isere swonge en spitsboor*	drills
1 lb	*Koper*)	copper wire
1 lb	*Iser*) *draat*	iron wire
8	*Vylen gesorteert*	assorted files
2	*Nijptangen*	pincers
2	*Boogh tangen*	pliers
3	*Arm*)	large heavy file (Van Dale)
3	*Hant*)	hand file
	) *vylen*	
3	*Sny*)	dull or knife file (Van Dale)
2	*Soet*)	fine file (Van Dale)
1	*Wringhiser*	iron lever (Stapel)
2	*Snyysers 3 tappen*	taps and dies
1	*Gaetschijf*	pulley block (?) (Stapel)
1	*Bruinerr staal*	burnishing steel
1	*Schrap staal*	scraping iron
2	*Drillen, klossen en snaren*	drill, bow and string (Stapel)
5	*Deurslagen en houbeytels*	slot punches and cutting chisel
2	*Vijlbeytels*	file chisels
2 lb	*Ammaril*	scouring powder
2	*Isere stampers en kritsers*	pounders and claspknife with curved blade (Stapel)
2	*Souvereyntangen*	jaws of vice (?) (Stapel)
2	*Hant hamers*	hand hammers
2	*Banck hamers*	bench hammer
2	*Kap hamers*	hammer with longhead and a long small sharpened edge?

TABLE 6-7 (CONT.)

25	*Vijlkens*	small files
20	*Haecken*	hooks
20	*Pannen*	pans
20	*Decksels*	lids
20	*Gardefu of deckselpannen*	lidded pans
20	*Stangels*	bars (?)
20	*Trechters*	funnels
20	*Tuymelaars*	tumbler
20	*Hanen*	cocking mechanism (flint-lock Van Dale)
25	*Hanthaven*	?
25	*Lontveren*	match-lock
25	*Siften*	sieves

TABLE 6-8

LIJSTE VAN DE KOCXGEREETSCHAPPEN (COOK'S REQUIREMENTS), *ALS NAMENLIJCK KOCXKETELWERCK, VERSTAANDE VOOR EEN RETOURSCHIP.*

Resoluties van ordinaris en extraordinaris vergaderingen van der Heren XVII woensdach den 11 October 1656, KA 187.

1	*Ketel van 26 en 29 duym diep met sijn decksel*	kettle with lid
2	*Ketels a 20 en 22 duym*) *met*	
2	*Ketels a 18 en 20 duym*) *hunne*	
1	*Ketels a 15 en 17 duym*) *deck-sels*	
1	*Beckenketel a 15 en 15 duym*	kettle
1	*Peck ketel van 13 en 15 duym*	kettle
2	*Schuymspanen*	skimmers
2	*Lepels met gaten*	spoons with holes
2	*Lepels sonder gaten*	spoons without holes
2	*Boterlepels*	butter spoons
1	*Vertinde pot en decksel*	tinned pot and lid
1	*Smoorpan en decksel*	stewing pan
3	*Grote botterpannen en decksels*	large butter pans and lids
4	*Kopere pannen*	copper/brass pans
1	*Kopere braetpan*	brass casserole
1	*Stuck lapkoper*	brass for repairs

TABLE 6-9

VOOR DE CAJUIT (CABIN) *VAN EEN RETOURSCHIP, BY DEN SCHIPPER TE VERANTWOORDEN* (FOR THE RESPONSIBILITY OF THE SKIPPER)

Resoluties van ordinaris en extraordinaris vergaderingen van der Heren XVII woensdach den 11 October 1656, KA 187.

	Tafelkleet	table cloth
	Gardynen tot de koyen en galderyen	curtains for berths and gallery
	Lywaat (linen) *voor dito schip*	
2	*Ammelakens 8/4 breet, laugh 4½ a.*	table linen (a is *aune* (French) for el)
6	" " " *van... 3½a*	
42	*Servetten*	napkins
12	*Kantdoecken*	hand towels
9	*Sittekussens*	cushions

TABLE 6-10

TIN VOOR DE CAJUYT VAN EEN RETOURSCHIP

2	*Schotels van 3 lb*	plates
2	*Schotels van 2½ lb*	
2	*Schotels van 2 lb*	
2	*Schotels van 1½ lb*	
1	*Lampeth en schotel*	jug and plate
20	*Tinne lepels*	spoons
18	*Telliooren*	eating boards
2	*Soutevaten*	salt pots
2	*Mostertpotten en 4 lepeltjes*	mustard pots and small spoons
3	*Holle commen*	hollow bowls
2	*Pintskannen met tuyten*	pint cans with spouts
1	*Pintskannen sonder tuyten*	pint cans without spout
2	*Halfpintjes*	
4	*Mutsjens*	measure (1 *mutsje* = 0.15 l)
4	*Halfmutsjes*	
2	*Waterpotten*	chamber pots
2	*Olykannetjes*	oil cans
2	*Brandewijnspimpeltjes*	brandy wine measures
6	*Tinne kopjes*	cups
4	*Gesorteerde tregters*	assorted funnels
4	*Flapkannen*	lidded cans (measure)
4	*Beeckers*	beakers
4	*Saucieren*	sauce boat (Stapel)

TABLE 6-11

UIT DE LYN-BAAN (FROM THE ROPE YARD)

Van de losse Werk-tuigen te scheep, Witsen (1690), 350.

	Schiemans garen	boatswain's mate's thread (lit.) or spun-yard (Röding)
84	*Bos huising*	bundles housing, house-line (Röding)
84	*Bos marling*	bundles marlin (Röding)
3	*Paar schooten*	sheets (Röding)
3	*Paar smyten*	tacks (Röding)
6	*Ysere trossen*	strong hauser (Röding)
3	*Kabel-touwen*	stream cable (Röding)
1	*Paerde-lyn*	hawser or small cable (Röding)
3	*Reeps*	rope (Röding)
1	*Jein*	winding tackle (Röding)
24	*Bos witte lynen*	white line (litt.)
8	*Loot-lynen*	lead line (Röding)
2	*Zegen-lynen*	drag-net line (litt.)
12	*Visch-lynen en 12 stuk-lynen*	fishing line (litt.)
2	*Trossen*	hauser (Röding)
1	*Boots touw*	mooring rope of a boat (Röding)
	Rak-touwen	parrel-rope or truss (Röding)
	Portuur-en wees-lynen	cat-head stopper or ? line (Röding)
	Vallen	falls (Röding)
	Mantels	tye (Röding)
	Boei-reeps	buoy-rope (Röding)

TABLE 6-12

VAN DE ZEIL-MAKER

Van de losse Werk-tuigen te scheep, Witsen (1690), 350.

20	*Lynen van twaalven*		
6	*Bos huizing*	housing	(Röding)
18	*Pondt zeil-garen*	sail twine	(Röding)
30	*Naalden*	needles	(Röding)
100	*Ellen oudt doek*	100 ells old sail cloth	(Röding)
2	*Zeil-vaten*	sail barrels (?)	(litt.)
20	*Kousjes*	small thimbles	(Röding)
	Een party los klaveren hair-doek	loose ? and bunt-lines	(Röding)
	Poort-zeilen	sails in front of gunports ?	
	Geteerde prezenning	tarpaulin	(Röding)
	Mantering	canvas or leather hose	(Röding)
	Hang-makken	hammocks	(Röding)

TABLE 6-13

VAN ANDERE KLEINIGHEDEN (OTHER SMALL ITEMS)

Van de losse Werk-tuigen te scheep, Witsen (1690), 350.

7	*Tonnen pek*	pitch
24	*Tonnen teer*	tar
200	*Pondt talk*	tallow
8	*Pondt reuzel*	lard
60	*Vadems brandt-hout*	fire wood
1	*Huidt pomp-leer*	skin pump-leather
5	*Huiden dek-leer*	skin deck-leather
26	*Kleine mamieringen*	small hoses
6	*Groote mamieringen*	large hoses
2	*Join-bloks, 9 schuyven 4 nagels*	winding tackle blocks with 2 or 3 sheaves, 9 sheaves, 4 pins
50	*Pondt swavel*	sulphur
200	*Kluwens werk*	? ball work (litt.)
4000	*Pondt harpuis*	resin (Röding)
10	*Splits-hoorens*	splicing fid (Röding)
15	*Marrel-priemen*	marling spike (Röding)
	Krab-yzers	possibly racing knife or timber scarbe (Salaman) scrapers ?
	Teer en pek-ketels	tar and pitch kettles
10	*Putzen*	bucket (Röding)
24	*Pomp-platen*	pump-pistons
10	*Pomp-bouts*	pump-bolts
6	*Pomp-huizen*	pump-casings
4	*Pomp-haken*	pump-hooks
1	*Penter-haak*	fish-hook for anchor (Röding)
24	*Onderscheide haken*	assorted hooks
6	*Groote spylen*	fore-locks (Röding)
15	*Boots-haken*	boat-hooks
2	*Schinkel-haaks.*	can-hooks (Röding)
30	*Onderscheide koussen*	different thimbles (Röding)
1	*Kruk met een stel*	crank ?

TABLE 6-13 (CONT.)

2	*Mikken tot de boot*	rowlocks
2	*Dreggen, wegende 94 pondt*	grapnel (Röding)
1	*Enter-dreg, wegende 236 pondt*	a hand grapnel (Röding)
3	*Vleugel spillen*	vane spindle (Röding)
100	*Raa-krammen*	yard staple
200	*Raa-ringen*	yard-rings
2	*Klokken*	bell
	Hoeken, en koper draat	set squares and brasswire
6	*Bylen*	hatchet
2	*Slooten*	locks
4	*Elgers*	fish-gig or trident (Röding)
2	*Harpoenen*	harpoon
2	*Hey-hoeken*	?
1	*Trek-zaagh*	cross-cutsaw (Röding)
1	*Kraan-zaagh*	two-handed saw (Röding)
	Kandelaren	candlesticks
	Timmermans dregh	carpenters grapnel
	Verscheide poort-en ree-ringen	various port and yard rings
	Vzers om lantaerens aan te hangen	irons to hang lanterns on
	Brandt-haken	fire-booms (Röding)
1	*Domme-kracht*	hand screw jack (Röding)
10	*Beslagh-puttings*	iron chains (Röding)
7	*Diep-looden, wegende 150 pondt*	deep-sea sounding leads
12	*Servings*	?
2	*Spoel-gieters*	skeet (Röding) for throwing water over side of ship (S.OED.)
12	*Teer-quasten*	tar-brush (Röding)
3	*Lantaerens om achter opte staan*	stern lanterns
36	*Vadem oude touw*	old rope

TABLE 6-13 (CONT.)

12	*Harten*	(possibly) upper pump valve (Röding)
12	*Emmers*	lower pump valve (Röding)
300	*Pondt zwavel*	sulphur
18	*Kompassen*	compasses
1	*Peil-kompas*	amplitude or azimuth compass (Röding)
1	*Doos met losse rozen en glazen*	box with loose roses and glass
18	*Uur-glazen*	hour-glass
1	*Quartiers-glas*	quarter-hour glass
3	*Vleugel-houten*	mast for vanes (?)
3	*Vergulde klooten*	gilt parrel trucks (Röding)
4	*Schrapers*	scrapers
	Grof linnen tot schroot-zakken	linen for shot
	Koe-voeten	crowbars
	Kettings tot de kombuis, en ree platten	galley chains and top chains
	Smeer-hoorens	grease or tallow horns
	Vuur-steenen	flints
	Schaeren	scissors
	Pak-naalden	needle
	Bezems, styfzel, lym, kryt	brooms, starch, lime, powder.
	Koper en Yzer-draat	brass and iron wire
	Een of twee Zee-uurwerken	sea-clocks
12	*Bossen dreumels*	wooden part of tarbrush
3/4	*Pondt Moscovisch glas*	muscovy glass
12	*Schoppen*	spades
1	*Slyp-steen*	whet-stone
1	*Roode vlagh van 8 kleedt*	red flag
1	*Witte vlagh van kleedt*	white flag
1	*Staten vlagh van 9 kleedt*	States flag
1	*Staten vlagh van 7½ kleedt*	States flag
1	*Staten vlagh van 6 kleedt*	States flag

TABLE 6-13 (CONT.)

1	*Geusje van 4½ kleedt*	Jack (Röding)
1	*Top-stander*	broad pendant (Röding)
6	*Nieuw vleugels*	new vanes (Röding)
1	*Kolder-bril*	whipstaff bearing? (Röding)
4	*Harten en emmertjens tot de pomp*	upper and lower pump valves (Röding)
2	*Moskuils*	commander (Röding) beetle (Salaman)
36	*Karviel-nagels*	belaying pins (Röding)
1	*Dubbelt en 1 enkelt blok tot de stag*	double and single blocks for flagstaff
1	*Klamp-blok*	type of block with cleat
10	*Juffers tot de boot*	dead-eye for shrouds (Röding)
2	*Geboorde spie-bossen*	bored pin wood

TABLE 6-14

VOLGHT HET LOSSE BLOK-WERK, OM TE DIENEN,
ALS HET GEVALT DAT ANDERE REDDELOOS WORDEN OF WEGH RAKEN

BLOCKS AND OTHER REQUIREMENTS (SPARES)

Van de losse Werk-tuigen te scheep, Witsen (1690), 350.

2	*Dubbelde Mars-fchoote-bloks*	double topsail sheet blocks (Röding)
2	*Hangers van 15 duim*	rope pendant of 15 *duim* (Röding)
4	*Takel-bloks van 15 duim*	tackle blocks 15 *duim* (litt.)
2	*Dubbelde takel-bloks van 3 voet*	double tackle blocks 3 *voet* (litt.)
6	*Bloks van 11 duim*	Blocks
6	*Bloks van 9 duim*	Blocks
12	*Bloks van 8 duim*	Blocks
12	*Bloks van 7 duim*	Blocks
18	*Bloks van 6 duim*	Blocks
1	*Kinnebaks-blok van 2½ voet*	snatch block (Röding)
24	*Braam-bloks*	top gallant blocks
42	*Karviel-nagels*	belaying pins (Röding)
2	*Moskuils*	commander (Röding) = beetle (Salaman)
1	*Groot rak met drie regels Klooten*	main parrel with 3 trucks (Röding)
1	*Marsse Rak*	mast parrel (Röding)
24	*Wandt-klooten*	shroud trucks (Röding)
40	*Losse Schuyven*	loose sheaves
60	*Losse Nagels*	loose pins
12	*Bloks van 10 duim*	blocks
6	*Bloks van 12 duim*	blocks
2	*Dubbelde Trys-bloks*	?
5	*Schyven, en 2 Nagels tot de Gei-bloks*	5 sheaves, 2 pins of careening block (Röding)
4	*Schyven, en 2 Nagels*	4 sheaves, 2 pins
5	*Juffers, wel beslagen met yzere hoepen*	dead eyes with iron hoops (Röding)

TABLE 6-14

	Kardiel-en Jein-bloks	gear and winding tackle block (Röding)
	Sleeden en Klooten tot de Raks	ribs and truck of parrels
	Zalingen. Doodts-hoofden	Cross trees-dead block
	Emmertjes. Lantaeren-tonnen	? lantern
	Hoos-vaten na eisch	scoop (Röding)
	Hekjes	vane stock (Röding)
	Zwartzel-quasten	blacking mop
	Groote riemen, tot leder poort een, om in tydt van stilte jacht te maken, of te vlughten; deeze werden buiten boort tusschen de puttings geberght	large oars, one to each port
	Eenige Scheeps-ladders	ship's ladder
	Vis-netten	fish nets
	Handt-moolens	hand mills
	Bak-ovens	ovens

TABLE 6-15

VOLGHT NU HET KRYGHS-TUIGH, DAT MEN DEEZE HONDERDT MANNEN KONDE TOEVOEGEN, OM ZICH BEQUAMELYK OP EENE DER VOOR GESTELDE REIZEN, IN GEVAL VAN VYANDTLYKE ONTMOETING, TE KONNEN VERWEEREN

MILITARY EQUIPMENT

Van de losse Werk-tuigen te scheep, Witsen (1690), 350.

2	*Metale Stukken van 12 pondt, kamers-wys, wegende*	1525p. 1572	2 bronze guns of 12 lb bored with chamber, weighing	1525 lb 1572 lb
4	*Metale Stukken van 12 pondt, recht uit, wegende*	2470 2540 2480 2470	4 bronze guns of 12 lb parallel bored, weighing	2470 2540 2480 2470
2	*Metale Draken van 6 pondt, wegende*	670 664	2 bronze Drakes of 6 lb weighing	670 664
		14391p.		14391 lb
	Alle deeze Stukken dienen te leggen op bequame Rampaerden, die met touwen, door gaten, welke in de midden zyn, aan het Schip vast gesort werden, wanneer men in vreede zeilt. De zwaarste stukken zet men midden in 't Schip, om dat het zelfde daar meest verdragen magh.		All these guns are mounted on good carriages, (...). The heaviest guns in the middle of the ship.	
25	*Handt bussen, of Musketten, die vry zwaarder te Scheep moogen zyn als te lande*		25 hand guns or muskets, rather heavier for ships than those for land	
4	*Kopere musketten, of Donderbussen*		4 bronze muskets or blunderbusses	

TABLE 6-15 (CONT.)

25	*Sabels*	sword or sabre
25	*Sabels met hengzels*	sword or sabre with guard
12	*Enter-bylen*	battle axe
1	*Snaphaans-roer*	flintlock
10	*Scheeps-pistoolen*	ships pistols
7	*Heele Pieken*	whole pike
21	*Halve Pieken*	half pike
14	*Drielings Pieken*	triple pike
3000	*Pondt Bus-polver*	3000 lb gun powder
400	*Pondt Lont eenige handt-brazeletten, en een Helle-baart of twee*	400 lb fuse and some halberds
250	*Kogels van 12 pont, wegende* 3000 p	250 shot of 12 lb
200	*Van 8 pont, wegende* 1600	200 shot of 8 lb
50	*Van 6 pont, wegende* 300	50 shot of 6 lb
100	*Van 4 pont, wegende* 400	100 shot of 4 lb
600	*Kogels, en wegen te zamen* 5300 p	
	Een party groote en kleine steenen, om zich daar van in onderscheide-lyke voor-vallen te konnen dienen	Large and small flints
40	*Schiet-bouts van 12 pondt, wegende* 480 p	40 barshot of 12 lb
40	*Van 8 pondt, wegende* 320	40 barshot of 8 lb
20	*Van 6 pondt, wegende* 120	20 barshot of 6 lb
20	*Van 4 pondt, wegende* 80	20 barshot of 4 lb
120	*Schiet-bouts, wegen 't zamen* 1000 p	
	Hier plaght men voormaals Stale bogen, Rondassen, en Panoizen by te doen; doch deeze zyn nu niet meer in't gebruik	

TABLE 6-15 (CONT.)

12	*Braat-spitten*	spits or spears
20	*Losse maten*	?
20	*Handt-granaden*	hand grenades
8	*Scheeps-bylen*	ship's axe
2	*Beflagen Schoppen, en 2 spaden*	shovel fillings and spades
10	*Vuur-steenen*	flint stones
200	*Pondt Schroot*	grape shot
200	*Pondt Musket-kogels*	musket shot
25	*Pondt Staaf-loot*	bar lead
25	*Pondt Draat-kogels*	wire spring shot
1	*Rol Plat-loot, wagende 150 pondt*	roll of flat lead
24	*Yzere Koe-voeten*	iron crow bars
60	*Ringen en Krammen tot de Stukken*	rings and staples for the pieces
10	*Poort-hengzels*	gun port hinges
20	*Talie-haaks*	Tackle hooks
10	*Losse Bouts*	loose bolts
90	*Lunssen tot Ropaerden*	forelocks
10	*Varken staerten*	?
1	*Moker*	sledge hammer
24	*Ringen en Krammen tot de poorten*	rings and staples for the gun ports
30	*Sluit-ringen*	shutting rings
20	*Spylen*	bars
8	*Haken tot Ropaerden*	hooks for gun carriages
6	*Platen tot de zelve*	plates for same
40	*Yzere Lovers*	? Spangles ?
2	*Splits-horens*	splicing lids (Röding)
3	*Marrel priemen*	marling - pike
3	*Platte Hang-floten*	flat padlock
5	*Ronde Neurenburger floten*	round Neurenberg lock
1	*Bout van 5 voet, met 8 Voet-beugels*	bolt of 5 *voet* with 8 washers
2	*Bouts van 4 voet, met 6 Voet-beugels*	bolt of 4 *voet* with 6 washers
1	*Bout van 1 voet, met 2 Voet-beugels*	bolt of 1 *voet* with 2 washers

TABLE 6-15 (CONT.)

	Enter-en Penter-dreggen, waar van de eerste kromme weer-haken aan de handen hebbe, en de tweede kort van schacht zyn	Grapnels and hooks

TABLE 6-16

BEHALVEN DIT HEEFT MEN OP HET SCHIP NOCH NOODIGH

(ADDITIONAL EQUIPMENT)

Van de losse Werk-tuigen te scheep, Witsen (1690), 350

80	*Vadem opgeslagen Wandt*	stored shrouds
30	*Vadem opstaande Wandt*	standing rigging (shrouds)
4	*Opgeslagen Trossen*	stores hauser
½	*Fyne Tros tot Poort-touwen*	fine hauser port ropes
12	*Bos Huizing*	seizing
10	*Bos Marling*	marline
1	*Lyn van zessen*	line of six
2	*Stuk-lynen*	lines
10	*Ledere Brandt-emmers*	leather fire buckets
3	*Huiden om't kruit te dekken*	plating for decking the cabin
2	*Beurs-vaatjes van 50 pondt*	powder barrels 50 lb
1	*Beurs-vaatje van 25 pondt*	powder barrels 25 lb
1	*Bos Kurk, om proppen te maken*	cork for bungs
1	*Provoosts Lantaeren*	provost lantern
2	*Toe Lantaerens*	closed lantern
1	*Open Lantaeren*	open lantern
1	*Kruit-slons*	powder lantern
1	*Trechter tot het vullen der Bandeliers*	funnel for filling bandoliers
1	*Trechter om Kardoezen te vullen*	funnel for filling cartridges
1	*Kruit-maat van een pondt*	1 lb powder weight
1	*Kruit-maat van een half pondt*	½ lb powder weight
1	*Kruit-maat van een vier-endeel pondts*	¼ lb powder weight
24	*Handt-spaken*	hand spikes
10	*Kardoes-stokken*	cartridge former
24	*Stel-houten*	wedge or quoin
24	*Wiggen*	quoin
10	*Dubbelde Talie-bloks*	double tackle blocks
12	*Enkelde Talie-bloks*	single tackle blocks
2	*Lange Talie-bloks*	long tackle blocks

TABLE 6-16 (CONT.)

6	*Lepel-klossen*	ladle chock
10	*Aanzetters Klossen*	rammer chock
10	*Touw-aanzetters Klossen*	rope rammer chock
10	*Touw-wissers Klossen*	rope sponge
10	*Groote Ropaerts-wielen*	large gun carriage wheels
10	*Kleine Ropaerts-wielen*	small gun carriage wheels
2	*Moskels voor de Konstapel*	beetle for the constabel
2	*Houte hamers*	wooden hammers
16	*Houte wisschers*	wooden sponges
20	*Touwe wisschers*	rope sponges
1	*Pondt roode Verwe*	1 lb red paint
1	*Pondt witte Verwe*	1 lb white paint
1	*Pondt blaauwe Verwe*	1 lb blue paint
80	*Lantaerens tot de stukken*	lanterns for the guns
20	*Schaaps-vaghten tot wisschers*	sheepskins for the sponges
8	*Wisscher-stokken*	sponge handles
16	*Kruit-lepels*	powder ladle
10	*Lont-stokken*	lint stock
32	*Kardoes-kokers*	cartridge box
16	*Hoeken*	hook
10	*Draap-looden*	?

TABLE 6-17

PROVISIONS FOR 15 MONTHS FOR A *RETOURSCHIP*,
BREAD FOR 10 MONTHS

Resoluties van ordinaris en extraordinaris vergaderingen van der Heren XVII woensdach den 11 October 1656, KA 187

17800	lbs	bread for 100 men
20	*Vaten*	of 550 lbs *vleesch* (meat) for 100 men
16	*Tonnen*	of 350 lbs *speck* (pork) for 100 men
1500	lb	*Stockvis* (stockfish) $\frac{2}{3}$ *lang* $\frac{1}{3}$ *rondt* for 100 men
400		*Kaes* (cheese) 4 at 7 to 8 lbs for 100 men
30	*Toelaster*	water (1 *flapkan* daily) for 100 men
6	*Pijpen*	*cocx water* (cooking water) for 100 men
100	*Tonnen*	*bier* (beer) for 100 men
4	Half *leggers*	of 256 *mengelen Fransche wijn* (wine) for whole ship
5	*Toelasten*	of 512 *mengelen Spaensche wijn* for 100 men
5	*Toelasten*	*brandewijn* or 40 half *amen* of 64 *mengelen* for 100 men
4	*Tonnen*	of 300 lb *boter* (butter) for 100 men
12	*Halve amen*	of 64 *mengelen Olie* (oil) for 100 men
4	*Verckers*	or half *leggers Asijn* (vinegar) for 100 men
1	*Aem*	of 128 *mengelen limoensap* (lemon juice) for 100 men
6	*Pijpen*	or *quartelen* of 700 lb *Ronde Pruijmen* (prunes) for 100 men
50	*Sacken*	36 *sacken a last Gort* (groats) for 100 men
20	*Sacken*	36 *sacken a last Grauwe Erten* (grey peas) for 100 men
20	*Sacken*	36 *sacken a last Witte Erten* (white peas) for 100 men
1		*Gròfften mostertsaet* (mustard) for whole ship
2		*Groffton moredickwortel* (horse-radish extract)
10	*Smalton*	*groff sout* (coarse salt) for every 100 *tonnen Vleesche*

TABLE 6-17 (CONT.)

3	*Smalton*	*wit sout* (white salt) for eating for whole ship
80	lb	*Ronte kaerssen* (candle) for whole ship
80	lb	*Heel wasse* (whole wax) *kaerssen* (candle) for whole ship
80	lb	*Haelf wasse* (half wax) *kaerssen* (candle) for whole ship
4	*Halve amen*	of 64 *mengelen wijntint* (red wine) (Stapel) for whole ship
2	*Vaetjens*	of 22 *mengelen Jopenbier* (Danzig spruce beer) for whole ship
9	*Halve amen*	of 64 *mengelen traen* (train) for lamps for whole ship
30	lbs	*Talck* (tallow) for whole ship
2		*Seugen* (live pigs) for whole ship
2		*Smaltonnen reusel* (pig's dripping) for whole ship
4		*Grofftonnen gerst* (barley) for the swine keeper, and also for the chickens which are kept for eggs for the sick, for the (Cabin) for the whole ship
6		*Comijne kasen* (cumin cheese)
6		*Smaltonne wit beschuijt* (white biscuits)
8	*Tonnen*	*goet bier* (good beer)
16	*Stucx*	*geroockte hamme* (smoked ham)
16	*Stucx*	*geroockte vleesche* (smoked meat)
24	*Stucx*	*geroockte tongen* (smoked tongue)

TABLE 6-18

ANNUAL REQUISITIONS FOR SELECTED ITEMS

Taken from *Verdeelingh vanden Eysch voor India tegens den Jaren* 1634-1664, KA 10061

Year	Lead lbs.	Quicksilver lbs.	Vermillion lbs.	Elephants Tusks lbs.	Sulphur lbs.	Amber lbs.	Specie Fl	Cargo Value Fl	No. of ships
1634	570,000	75,000	70,000	60,000	10,000				
1636	600,000			80,000					
1637/8	300,000	20/25,000	8/10,000	80,000		3/400			
1637	1,000,000	40/50,000	8/10,000	90,000					
1640	10,000,000	50,000	30,000	30,000	120,000		800,000	5,212,135	17
1641	800,000			6,000	200,000	2,000	1,200,000	5,330,642	21
1642	800,000	20,000	15,000	10,000	150,000	2,000	1,600,000	6,012,150	14
1643					10,000	800	1,000,000	4,734,825	20
1644	200/250,000	6,000	10,000	10,000	50,000	1,500	1,000,000	3,821,419	19
1645			6,000		800		1,000,000	3,771,561	18
1646	800,000						600,000	3,716,177	14
1647	1,000,000		6,000	2,000		2,000	400,000	3,319,188	13
1648	1,000,000	20,000	20,000	14,000		3,000	800,000	3,451,222	14
1649	200,000	25,000	30,000	14/20,000		3/5,000	400,000	3,309,146	13
1650							400,000	5,559,688	14
1651	200,000	50,000	50,000	20,000		5/6,000	500,000	6,343,803	19
1652							400,000	7,097,605	26
1653	1,200,000	60,000	100,000	40,000		6,000	800,000	7,899,413	17
1654	1,600,000	50,000	100,000	20,000		6,000	1,000,000	8,608,480	21
1655	1,000,000	50,000	30,000	10,000		4,000	1,000,000	8,033,940	27
1656	1,600,000	50,000	60,000	10,000		6,000	1,000,000	7,103,401	15
1657	1,000,000	70,000	30,000	20,000		10,000	1,200,000	6,074,630	14
1658		30,000					1,700,000	7,787,594	18
1659		40/50,000				9/10,000	400,000	6,264,680	16
1660		15/20,000				5/ 6,000	1,200,000	8,509,965	18
1661							1,000,000	7,612,553	15
1662	5/6,000						1,000,000	7,060,070	27
1663	5/6,000	30,000	30/40,000			3/ 4,000	1,200,000	7,619,208	13
1664	5/6,000	40/50,000	40/50,000				1,400,000	6,512,004	19

TABLE 6-19

WEIGHT OF HEAVY CARGO SENT TO THE; INPIES IN 1653

Taken from *Verdeelingh vanden Eysch voor India tegens den Jaren 1634-1664*, KA 10061

Item	Total	Unit		Value in Kg	Tonnage
Lead	1,200,000	Ibs	0.494	kg/lb	592
Specie	800,000	*guldens*	11.4	*g/gulden*	9
Merqury	60,000	1bs	0.494	kg/lb	29
vermillion	100,000	Ibs	0.494	kg/1b	49
Tusks	40,000	Ibs	0.494	kg/1b	19
Amber	6,000	1bs	0.494	kg/lb	3
Coral	4,000	1bs	0.494	kg/lb	2
Bricks	400,000	-	0.825	kg each	330
Wine	300	*leggers*	614	litres/legger	184
Mom	2,000	*vaten*	164	*kg/vaten* (ton)	329
Red wine *(wijntint)*	20	*amen*	154	*litre/amen*	3
Meat	2,000	*vaten*	270	*kg/vaten*	543
Butter	500	*vaten*	148	*'kg/vaten* (ton)	74
Olive Oil	200	*amen*	154	litre/amen	31
Whale Oil	100	*amen*	154	litre/amen	15
Vinegar	100	*leggers*	164	*litre/legger*	61
Pitch	130	*vaten*)			
Tar	200	*vaten*)		approx.	80
Resin	200	*vaten*)			
Assorted Nails	515	*vaten*	750	*kg/vaten* (approx)	386
Anchors					98
Shot					67
					\2904

TABLE 6-20

Verdeelingh vanden Eysch voor India tegens den jare 1653, KA 10061. *Generalen Eysch voor India; soo van coopmanschappen, contanten, provisien, scheeps gereetschappen, Ammonitie van oorlogh als andersints ingestelt by den Gouverneur Generael ende Raden van India. In Batavia den 24 January A° 1652. Verdeelt over de Respective Cameren om bij de selve te versorgenals volcht te weten*

DISTRIBUTION OF THE REQUISITIONS FOR INDIA FOR THE YEAR 1653

1,200,000	lbs	*Loot*	lead
6,000	lbs	*Barnsteen*	amber
40,000	lbs	*Oliphants tanden*	elephant tusks
470	*stucx*	*Laeckenen*	crimson
Constanten			
200,000		*Guldens aen schellingen dubbel en enckelde stuijvers*	
600,000		*Guldens aen realen in specie rijcxdaelders en croon*	
100,000	lb	*Fermilioen*	vermillion
60,000	lb	*Quicksilver*	mercury
1,000	*stucx*	*Lange roode mutsen*	long red caps
250	*oncen*	*Ronde schoone bloet corael*	blood coral
4,000	lbs	*Row root corael*	rough blood coral
150	*stucx*	*Huijden vael soolleer*	shoe leather
1,400	*vellen*	*Swart spaens leer*	black spanish leather

TABLE 6-20 (CONT.)

200	*vellen*	*Witte spaens leer*	white spanish leather
100		*Moscovische juchten*	chamois leather
250	*stucx*	*Kroon rassen*	shaved woollen cloth (Eng.: Crown-rash) (Stapel)
60	*stucx*	*Stametten*	thinly woven wollen material (several other types of material)
4	*cassen*	*Boeck spiegels*	book mirrors
2,000	*paer*	*Spaens lere schoenen*	spanish leather shoes
3,000	*paer*	*Droogh leere schoenen*	dried leather shoes
8	*tonnen*	*Clatergout*	tinsel
		Voor Tonkin en Quinam	
2		*Isere stucken canon van groote als de nevensgaende koogel*	Iron gun as big as the enclosed shot
3		*Tonkinse mortiers volgens nevensgaende model*	Tonkin mortar as model
20	*stucx*	*Ijsere harnassen*	iron armour
3		*Schoone laeckenen*	woollen material
20		*Hoeden op de hollandsche wijse*	hats Hollands style
200	*stucx*	*Alamber kettings*	amber necklaces
100	*stucx*	*Chiapdoosjens van alamber*	boxes of amber
100	*stucx*	*Ofte paer waijer stelen*	fan-sticks

TABLE 6-20 (CONT.)

100	*stucx*	*Alamber meshechjens*	amber knife-handles
100	*stucx*	*Barnsteen*	amber
Voorden Commisseries Tsickin Godonne en Verscheijde andere grooten in Japan			For Commissioner Tsickin Godonne and various important persons
5	*stucx*	*Verscheijde rare drinck kopjens van glas en aerdewerck*	sundry rare drinking cups of glass and pottery
1		*Annatomie nevens de besdrijving*	anatomy including a history
		Parthije glase instrumenten	glass instruments
15	*stucx*	*Verrekijckers*	telescopes
2a3		*Extraordinarij schoone heldere kijckers*	very fine glasses
		Eeenhoorn	unicorn
3	*stucx*	*Dreum deeckens*	type of blankets
2	*stucx*	*Langh pluijs*	
6	*stucx*	*Leesglase*	reading glasses
2a3	*stucx*	*Extraordinarij veerkijckers parthije exkise neusbrillen*	extraordinary telescopes some exquisite 'nose glasses'
Voorden Heer van Ouwarij			
1		*Dreumdeecken*	type of blanket
2		*Veere bedden*	feather spring bed
2		*Cleene hondekens*	little dogs

TABLE 6-20 (CONT.)

Voorden Hartogh Salilchan ende Princesse Sahebebegam in Suratte			
		Roode en groene fluwelen	red and green velvet
2		*Cleyn hondekens*	little dogs
150		*Cassen lont*	fuses or matches
200		*Rollen plat loot*	rolls flat lead
400,000		*Klinckert steen*	bricks
600		*Riemen goet schrijff papier*	reams good writing paper
160		*Riemen pampier*	
150		*Potloot pennen*	pencil pens
60,000		*Schafften oft schrijff pennen*	writing pens
500	*stucx*	*Pennemessen*	pen knives
2a3	*stucx*	*Corecte goutschalen*	correct gold scales
20	*stucx*	*Vaderlandsche phelpen*	home felts
20	*cassen*	*Vensterglas*	window glass
		Geslepen vloerstenen	sharp floorstone
		Alderhande thuijnsaden	vegetable seeds (in sacks, not in bottles)
		Caelkoense hanen en hennen	turkey cocks and chickens
		Swanen en ander raer gevogelte	swans and other rare birds
Provisien voorden Gouverneur Generael ende Raden van India			
140		*Ongelinieerde schrijffboucken*	unlined writing books

TABLE 6-20 (CONT.)

400		*Stel tot de scheeps boucken*	ships logbooks
40	lb	*Goet segel garen*	sealing string
200		*Fijne tunne francijne vellekens*	thin parchment
Provisien voor India			
250	*leggers*	*Spaens wijn*	Spanish wine
50	*leggers*	*France wijn*	French wine
2,000	*vaten*	*Bronswijckse mom*	Brunswick mom
20	*amen*	*Wijntint*	red Spanish wine (Stapel)
30	*vaetjens*	*Jopenbier*	spruce beer
2,000	*vaten*	*Vleesch en speck*	meat and pork
500	*vaten*	*Boter*	butter
200	*amen*	*Olie van Olijven*	Olive oil
100	*leggers*	*Asyn*	vinegar
100	*amen*	*Traen*	train oil
Voor den Coningh van Siam en India te weten			
3		*Geamiljeerde goude kettinge curieuswerck eenige Rariteijten*	gold chains of ornate work litt. curiosities (bric-a-brac)
Ten behoeven van s'Compagnies Equippagie en Dependentie van dien			
50		*Swaret ouwen* 11-14 *duijm*	heavy ropes
20		*Swaret ouwen* 7-10 *duijm*	heavy ropes
40		*Cabel swaret ouwen* 4-6 *duijm*	cables

TABLE 6-20 (CONT.)

60		*Gesort. paerdelij-nen*	hawser
40	*paer*	*Smijten*	tacks
40	*paer*	*Schooten*	sheets
350		*Ijsere trossen*	strong hauser
450		*Wields*	hauser laid rope
40	*stucx*	*Wand 6 duijmen*	shrouds
2,500	*gesort*	*Lijnen*	assorted linens
2,000	*bossen*	*Marlijn*	marline
1,500	*bossen*	*Huijssingh*	housing
4,000	*strengen*	*Seijlgaren*	skeins sailmakers thread
600		*Loot lijnen*	lead lines
80	*stucx*	*Gesort. lijcken meest cleijn*	leech lines
150	*balen*	*Hollants doeck*	holland sailcloth
80	*balen*	*Frans doeck*	french sailcloth
10	*balen*	*Graeuw*	grey sailcloth
25	*balen*	*Ever*	type of sailcloth (Van Dale)
25		*Claver*	lighter type of canvas (Van Dale)
15		*Carrel*	type of sailcloth (a bit heavier)
25		*Breet frans*	wide french
40	*stagen*	*Van 8-14 duijm*	stays
130	*vaten*	*Peck*	pitch
200	*vaten*	*Teer*	tar
200	*vaten*	*Arpuijs*	resin
10	*vaten*	*Roet*	soot
400	*vaten*	*Spijckers 5, 6, 7 and 8 duijm*	nails
25	*vaten*	*Lasijsers*	type of nail
12	*vaten*	*Schot spijckers*	1 inch nail
6	*vaten*	*Gesort. duijckers*	springs
6	*vaten*	*Pompspijkers*	½ inch nail

TABLE 6-20 (CONT.)

6	*vaten*	*Plathoofden*	scupper nails
30	*vaten*	*Enckelde middelnagels*	single medium nails
30	*vaten*	*Dubbelde middelnagels*	double medium nails
4	*vaetjens*	*Blick*	tin
20	*vaten*	*Seep totsmeren van de ijsers*	soap for smearing on iron
25	*vaten*	*Haijr*	hair
12	*vaten*	*Mosch*	moss
12	*vaten*	*Krijt*	gun powder
200	lb	*Lijm*	lime
300	lb	*Verw*	paint
12		*Anckers* 15 to 1600 lb	anchors
50		*Anckers* 800 to 1400 lb	anchors
36		*Werp Anckers* 300 to 700 lb	stream anchor
50		*Dreggen* 75 to 150 lb	grapnel anchor
20		*Deijne lichters*	small lighter
25		*Kruijt lantarens*	powder room lantern
60		*Blicke lantarens*	signal lanterns
100		*Koe lantarens*	?
50		*Slonsjens*	dark lantern
20		*Huijden pomleer*	pumpleather
300		*Kocx bijlen*	cooks axes
1,000	*stucx*	*Hoorens tot lantarens*	horn for lanterns
2,500	*stucx*	*Lijcknaelden*	bolt rope needles
200		*Platen en ringen*	plates and rings
200		*Platte sloten*	flat locks
150		*Ronde compassen*	round compass
25		*Peijl compassen*	azimuth compass
30		*Uijrglasen*	hour-glass
200		*Halff uijrs glasen*	half hour glass

TABLE 6-20 (CONT.)

100		*Nacht huijs lampen*	binnacle lamp
150		*Ronde huijs lampen*	round lamp
200		*Vaste als schuij-vende roosen*	fixed and adjust-able cards
20		*Stel caerten vande noort*	sets of charts of the North
15		*Stel caerten vande moluccos*	sets of charts of Moluccas
1,000		*Copere compas spij-ckertjens*	brass compass pins
1,000		*Loode spijckers omde lantarens te versien*	lead nails for the lanterns
150		*Compas glase*	compass glass
		Parthije moscovisch glas	packets of Mosko-vian glass
50		*Ketels*	kettles
60		*Lepels met gaten*	spoons with holes
50		*Lepels sonder gaten*	spoons without holes
50		*Copere potten*	brass pots
50		*Ijsere potten*	iron pots
100		*Vlacke pannen*	flat pans
30		*Stooffpanne*	stewing pans
100		*Botteliers pompen*	bottlers pumps
50		*Flapkannen*	mug with lid (a measure)
150		*Arracq ketels*	arack kettles
100		*Copere cranen*	brass taps
50		*Tinne trechters*	pewter funnel
50		*Blicke trechters*	tin funnel
200		*Muddetjes*	type measure (0.15 l)
50		*Masten* 16 to 18 *palm*	masts
50		*Masten* 12 to 16 *palm*	masts
200		*Spieren* 5 to 12 *palm*	spars
40		*Slijpsteenen*	whetstone
20		*Dommecrachten*	screwjack
20		*Dosijn vijlen half rondt halfplat*	files, half flat half round

TABLE 6-20 (CONT.)

10		*Vijssels*	jack
200	*gesort.*	*Avegaers*	auger
12		*Treck sagen*	pit saw
200		*Timmerbijlen*	timber axes
100		*Dissels*	adze
150		*Drijffhamers*	chasing hammer
300	*gesort.*	*Drijff ijsers*	driving bolt
100		*Moscuijls*	beetles
200		*Omslagen*	braces
500	*gesort.*	*Boorijsers*	bits
300		*Riemen*	oars
200		*Sparren*	spars
100		*Kopravens*	
100		*Schuijte plancken*	planks
50	*stucx*	*Wagenschot*	wainscote
2,000	*stucx*	*Noortse deelen*	north planks
1,500	*stucx*	*Balck deelen*	beams
80		*Hamburger plancken*	Hamburg planks
60		*Coningberger plancken*	Koningsberg planks
100		*Vaetjens swartsel*	lamp-black
200		*Soo teer als wit quas-ten*	tar and whitewash brushes
200	*gesort.*	*Dieplooden*	sounding leads
50	*gesort.*	*Gieters*	watering cans
Ten behoeven van de Wapen Camer			
6		*Banck schroeven*	bench vice
2		*Cleijne schroeven*	small vice
24		*Hant schroeven*	hand vice
50		*Halff ronde vijlen voorde swart vegers*	half round files
30		*Halff ronde soet vijlen voorde cleijn vegers*	half round smooth files

TABLE 6-20 (CONT.)

30		*Handt vijlen van* 1 to 1½ lb	hand files
30		*Platte vijlen van* ¾ to 1 lb	flat files
6		*Olij steenen*	oil stones
24		*Blaeuwe steenen*	bluestone
10,000		*Ijsere harnas platnagels*	iron armour flatnails
10,000		*Ijsere harnas nagels met ronde hoofden*	round headed iron armour flatnails
1,600		*Vuijr en snaphaen steenen*	gun - flints
4,000	*stucx*	*Schoennaeckers naelden*	shoemakers needles
25	lb	*Glase gal*	glass gall
25	lb	*Frippel*	?
3		*Schellijten van* 7, 8 and 12 *marck*	?
6		*Ronde treckijsers*	round claw
6		*Cantige treckijsers*	bent claw
3		*Goede treck tangen*	pincers
60	lb	*Antomonij ofte spitsglas*	antimony
100	lb	*Gips of pleijster*	gypsum or plaster
3	*tonnen*	*Brussels sant*	brussels sand
60	lb	*Spade*	?
200	*gesort.*	*Deurbreeck vijlen*	files
24		*Kres borstels*	brushes
24		*Fijne borstels*	
24		*Buijgh tangen*	pliers
24		*Platte tangen*	flat pliers
4		*Schalen om silver te wegen*	silver scales
1		*Peijlgewicht van* 6 a 7 lb	measuring weights (for silversmith)
25	lb	*Neurenburger brendels*	nurenberg fire tools
30		*Banck hamers*	bench hammers

TABLE 6-20 (CONT.)

400	lb	*Lijm*	lime
20	lb	*Veneetse booracx*	venetian borax
200	*gesort.*	*Tuijgers*	?
1		*Gout caraet gewicht*	gold carat weight
8	*oft* 10	*Glase colven om te scheyden het gout vant silver*	glass to separate the gold from the silver
100		*Plat loot pennen*	lead pencils?
10		*Cannen sterckwater*	aqua fortis
½	*riem*	*Blaeuw bleeck pampier*	pale blue paper
6	lb	*Pottaij oft thinassen*	calcium carbonate
200	lb	*Quicksilver*	mercury
300	lb	*Dick en dun ijser-draet*	thick and thin iron wire
8		*Hantschroeven*	hand vices
18		*Schaeren*	scissors
10	*gesort.*	*Ijsere flessen*	iron bottles
3		*Goede gietschroeven*	scoop
20	lb	*Smelt glas*	bottle glass
1,000		*Smelt kroese*	crucible
60	lb	*Witte wijnsteen*	white tartar
200		*Teijckenpenceeltjens*	drawing brushes
1		*Cooperen stamp voor de silversmit*	bronze stamp for silversmith
6		*Goede toetsteenen*	touchstones
6-8		*Allerhande cunst-boeckjens*	artbooks
400	*stucx*	*Gesmeede hanen tot musquets*	wrought iron cock-mechanisms
400	*stucx*	*Stangen sloot schr-oeven, pan ende haenschroeven*	locks and screws for the muskets
400	*stucx*	*Tuijmelaers oft treckers-steet schroeven*	
100		*Boeck geslagen sterck gout*	gold leaf

TABLE 6-20 (CONT.)

50		*Boeck geslagen silver*	silver leaf
50	lb	*Coper en ijser draet*	brass and iron wire
2,000		*Vuijren snaphaen steenen*	gun flints
20	*paer*	*Stangen en stijghbeugels*	stirrups
60		*Hellebaerden*	halberds
30		*Partisanen*	short pike
60		*Lang snaphaenroers*	long flint-lock guns
200		*Spanders tot vuijrroers en pistolen*	cocking mechanisms for guns and pistols
25	*paer*	*Goede pistolen*	good pistols
30	*paer*	*Nieuwe holsters tot pistolen*	new holsters for pistols
25	*stucx*	*Vergult steenen*	gilding stones
40		*Blaeuwe steenen*	bluestone
20		*Fijne stormhoeden*	litt.: Stormhats. Morion
25		*Trommels*	drums
400		*Calijbers*	caliver
500		*Bandeliers*	bandoliers
800		*Draegbanden*	slings
30		*Vergulde vuijrroers en snaphanen*	gilt guns and snaphance
20		*Fijn vergulde sabellemmers*	file gilt sabre guards
500		*Fijne lange piecken*	fine long pikes
500		*Halve piecken*	half pikes
600		*Patroontassen*	cartridge pouch
4		*Riemen cardoes pampier*	cartridge paper
2		*Bossen lange stamper*	long wooden rammers
100		*Halve slachswaert lemmers*	half-sword guards
25		*Gesmede gevesten*	wrought iron hilts
10		*Vergulde ringhkragen*	gilt collar

TABLE 6-20 (CONT.)

6		*Heele ruijters*	riders whole
		curassen	cuirasses
20		*Bossen spaen tot*	wooden cheeks for
		scheden	sheaths
500		*Fijnehouwers*	fine broadswords
500		*Fijne deegens*	fine swords
200	*stucx*	*Lange vuijrroers*	long guns
Voorde Meester Cuijper			For the Master Cooper
40	*gesort.*	*Houte passers*	wooden compasses
12		*Heet ijsers*	heating irons
150		*Fretten*	ferret saw
18	*leggers*	*Houwelen*	barrel axes
200		*Deuvel booren*	dowl drills
12		*Rits off wijntangen*	tongs
8		*Ringh schroeven*	
18		*Strijckbancken*	plane benches
100		*Houte leggers*	wooden legger hoops
		beslach	
12		*Houte halve leggers*	wooden half
		beslach	legger hoops
4	*dosijn*	*Ijsers beslach*	iron hoops
2	*dosijn*	*Baersen*	coopers axe
100		*Halve leggers*	half legger
		schoven	staves
50		*Verckens schooven*	vercken staves
10		*Tonnen krjt*	chalk
Voor de meester blockmaecker			Master block-maker
1	*doosijn*	*Kerffbijlen*	axes
6	*doosijn*	*Hant bijlen*	hand axes
1	*doosijn*	*Dissils*	adzes
1	*doosijn*	*Steeckmessen*	butchers knife
1	*doosijn*	*Haelmessen*	draw knife
8	*doosijn*	*Dobgudsen*	gauges
12	*doosijn*	*Draeijbaijtels*	turning chisels
12	*doosijn*	*Draeijgudsen*	turning gauges

TABLE 6-20 (CONT.)

6		*Treck sagen*	pit saw
6		*Hant sagen*	hand saw
100	*duijm*	*Avegaers*	auger
100	*half duijm*	*Avegaers*	auger
100	*3/4 duijm*	*Avegaers*	auger
6	*dosijn*	*Mars schooten*	topsail sheets
4	*dosijn*	*Cardeel*	gears
8	*dosijn*	*Dubbelde Taeckels*	double tackles
8	*dosijn*	*Enckelde Taeckels*	single tackles
8	*dosijn*	*Schoote*	sheets
32	*dosijn*	*Dubbelde frise*	double brace blocks
32	*dosijn*	*Dubbelde talij*	double tong tackle
16	*dosijn*	*Hangers*	
8	*dosijn*	*Racx*	parrel
Voor de Kistemakers winckel			Cabinet Maker
12	*belagh*	*Schaven*)	types of planes
12	*krusier*	*Schaven*)	
36		*Ronde en holle Schaven*)	round and hollow plane
24	*boor*	*Schaven*	rabbet-plane
24		*Hant bijlen*	hand axe
36		*Driekante vijltjens*	three cornered files
36		*Gaet beijtels*	chisels
36		*Odjeft schaven*	.... planes
36		*Ijsere hamers*	iron hammers
36		*Dreuvels*	punches
12		*Bossen biesen*	bundles reed
30		*Passers*	compasses
12		*Strijck blocken*	planes
12		*Steijl blockjens*	small planes
200	lb	*Goede lijm*	good lime
200		*Fijne boorijsers*	fine drill bits

TABLE 6-20 (CONT.)

Voor de timmermans winckel			Carpenter
100		*Boor schaven*	rabbet-plane
200		*Rabat ploegen*	rabbet-gauge
100		*Voor lopers*	heavy smoothing plane
100		*Heeschaven*	jack-plane
200		*Schaeff beijtels*	plane-iron
500		*Slach lijnen*	spiral line?
200		*Copere passers*	brass compasses
200		*Kerff bijlen*	cutting axes
200		*Dissels*	adze
200		*Duijmbeijtels*	duim chisels
200		*Steeckbeijtels*	paring chisels
200		*Houte omslagen*	wooden braces
200		*Fermoors*	heavy axes
100		*Moockers*	sledgehammer
200		*Gudsen en vermoort-jens*	chisels and hatchet
100		*Ijsere hamers*	iron hammers
100		*Winckel haecken*	squares
200		*Hant sagen*	hand-saw
500		*Mesch vijlen*	knife file
200	*vaten*	*Vijff duijmen*	5 *duim* (nails?)
200	*vaten*	*Duijmen*	*duim* (nails?)
100	*vaten*	*Lasijsers*	nails
20	*vaten*	4 lb *duijckers*	sprigs
20	*vaten*	6 lb *duijckers*	sprigs
Voor de Metselaers en steenhouwers			Masons or stonecutter
400		*Trossels*	triangular curved blade on wooden handle
1,000		*Metshamers*	masons hammer
1,000		*Steen houwers ijsers*	stone cutting iron
500		*Calckschoppen*	limestone spade
500		*Kalck houwers*	limestone cutter
500		*Schiet looden*	plumb bob

TABLE 6-20 (CONT.)

Voor de Smits Winckel			Smith
500	*staven*	*Ijsers 1 duim 4 cant*	iron staves 1 *duim* square
300	*staven*	*Achte lompen*	eight sided?
200	*staven*	*Vier cant lompen*	square ?
1,000		*Platte staven*	flat bars swedish
		sweets ijser	iron
500	*staven*	*Stelijser*	? iron
1,000	*staven*	*Haersijser*	? iron
500	*staven*	*Plat spaensijser*	flat spanish iron
600	*staven*	*Viercant spaensi-jser*	square spanish iron
2	*dosijn*	*Banckschroeven*	bench-vice
2	*dosijn*	*Hant schroeven*	hand-vice
6		*Spijcker maeckers*	nail-makers
		ambeelden	anvils
3	*dosijn*	*Soet vijlen*	rat-tailed file
200	*cassen*	*Halve aemshoep*	cases half aum hoops
500	*cassen*	*Leggers hoepen*	legger hoops
30	*bossen*	*Stael*	bundles steel
12	*gesort.*	*Speer haecke*	anvils
200		*Platen*	plates
400		*Geel en roode copere-platen*	copper plate
500	*gesort.*	*Bosseroede*	wooden rods
200		*Hoed smits coolen*	charcoal
6		*Dubbelde blaesbalcken*	double bellows
2	*paer*	*Enckelde blaesbalcken*	single bellows
12		*Coperslagers stale*	coppersmith's samples
12		*Stalen voor de smits winckel*	samples for the smith

TABLE 6-20 (CONT.)

Voor den Constapel			
20		*Kruijt lantarens*	powder lanterns
4,000		*Cogels van* 10 lb	shot
3,000		*Cogels van* 8 lb	shot
4,000		*Cogels van* 6 lb	shot
4,000		*Cogels van* 5 lb	shot
8,000		*Cogels van* 3-4 lb	shot
20	*riemen*	*Cardoes pampier*	reams cartridge paper
12		*Prince stucken van* 3-4 lb - 330-330 lb	Prince guns
12		*Nieuwe steenstucken*	new perrier
200		*Houten koockers van* 24-18 lb	wooden cartridge box
Voor de Boeckbinder			For the Bookbinder
20	*stucx*	*Kesnij parsse*	cutting presses
20	*stucx*	*Gemeene parsse*	ordinary presses
2	*stucx*	*Besnij ploege*	knives to cut the edges
40		*Ijvooren voubeenen*	ivory folder
20	*dosijn*	*Boeckbindersnaels*	bookbinders needles
25		*Hant parskens*	small handpresses
25		*Hant messen*	hand-knife
25		*Boeckbinders scharen*	bookbinders scissors

TABLE 6-21

ALPHABET VAN D'NAER VOLGENDE PROVISIEN GEREET SCHAPPEN ENDE NOOTS WENDICHEDEN VOOR INDIJA (1653, KA 10072) (BY VERGULDE DRAECK)

A		
asijn	6	*leggers*
avegaers	106	
ameril		
aembeelden		
A fijne houte hamers		
anckers diversch	1	*sware*
	3	*stream*
arpuijs	1	*vat*
arpuijs pannen		
B		
booter	11	*vaten*
beslagh hoepen		
baersen	12	
banck haecks		
breeck bijle		
biesbossen		
boorijsers	150	
blocx		
banck schroeven		
banck speer hoecken		
blauw steenen		
brussels druck sant		
bossen snaren		
bossen spaan		
boucken beslagengout		
boucken beslagen silver		
bossen stael		
blaesbalcken	2	
breeck bijlen		
breeckijsers		
bortijsers		
beslagen schoppen		
balck deelen		
bottelier pompen		
blick		
bijlen		
C		
craen booren		
croosen		
copere als blicke pennen		
copere linialen		
clemhaecken		
craensagen		
coogels		
cruijt lantaerens		
cruijt hoorens		
cardoes papier	2	*riem*
crats borsten		
cooper draet		
cogel houwen		
calck schoppen		
cabel touwen	3	
clocken		
cocx bijlen		
cap havens		
coninxberger plancken		
compas glas		
compas spijckerties		
caerten divers		
coopere als ijsere potten		
craenen		
cooper gewicht		
D		
deuvel booren	70	
dissels	129	
dopgudsien	60	
dommecrachten		
duijm beijtels		
draijgudsien		
draij beijtels	8	
draegbanden tot trommels	2	
draegbanden tot degens		
degen lemmers		
dobbele balcken		
dreggen		
drijfhamers		
drijffijsers	130	
duijmbladen		
doppen tot compassen		
dieplijnnen		
E		
engels lijm		
enquel blick		
F		
fransewijn		
fretten		
flap kannen		

TABLE 6-21 (CONT.)

G		
gerfschaven		
gudsien en vermoors		
gaet beijtels		
gieters		
H		
houte passers		
heeijsers		
heele en halve leggers in schooven		
houte hamers		
handt sagen	98	
hechten tot beijtels gudsien en vermoors		
heele en halve steeck beytels		
handtbijlen	30	
hael messen		
houte kokers		
hamer slagh		
helle baerden		
houwers		
halve slag swaert lemmers		
harmas plaeten		
huijsinghs		
huijden leer		
hoorn tot lantearens		
haijr		
houte schoppen		
heele on halve mutsjes		
houweelen voord cuijpers		
I		
isere hamers		
iserdraet		
iserdraetse hantgrepen		
isere hoepen in cassen		
isere lootlepels		
isere trossen	7	
J		
Joren bier	2	*vatiens*
K		
krijt		
kerff bijllen	91	
kant of duijmbels (beytels)		
klinckersteen	26,000	
koevoeten		
kylen		
ketels en dexsels	3	
L		
leggers houwelen		
leijtse moppen		
lootleppels		
linnen	30	
lording	78	*bossen*
lijcken		
lantaerens divers	1	
lichters		
lijnsaet olij		
loot als dieplijnnen		
lijnialen		
lijm		
M		
musquets		
musquets maten		
moppen		
metshamers		
moockers	48	
marlijn	2	*palmen*
masten		
mos		
metale schijven		
moscuils		
N		
nijptangen		
noorse delen		
nacht glasen	6	
nacht huijs als ronde lampen		
naelden tot compassen		
O		
olijven	33½	*vaten*
ophaelders		
omslagen		
oor isers		
ooch isere		

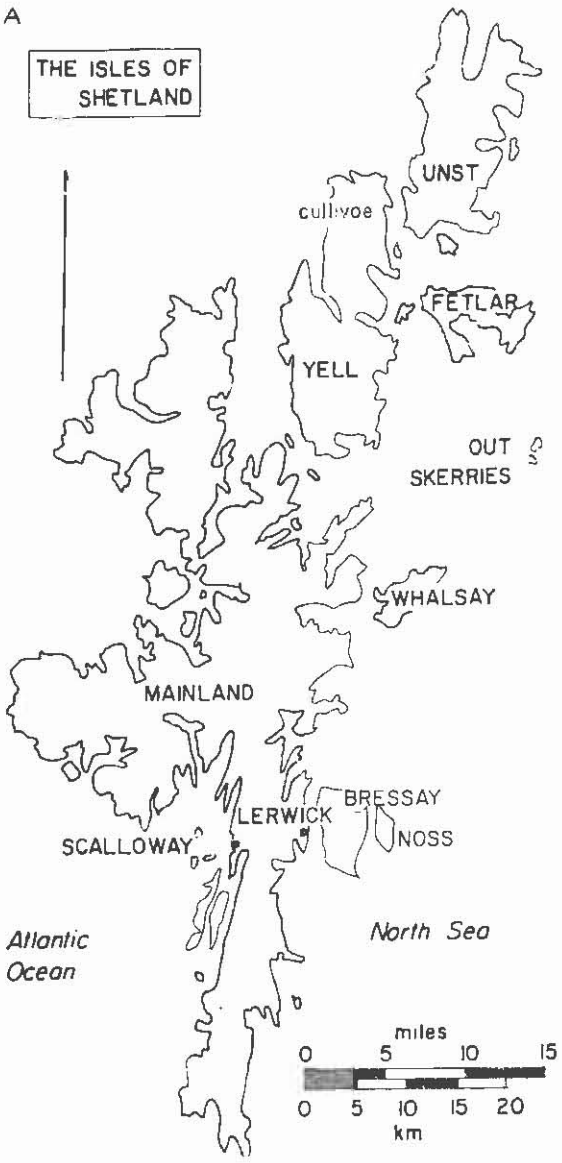
TABLE 6-21 (CONT.)

P		
penseelen		
parquement		
pertisanen		
pistoolen		
piecken heel en halve		
patroon tassen		
passers		
pleijster ongebrandt		
paerde lijnen	1	
platen en ringen		
pompleer		
peck		
platte slooten		
peijl compassen		
pannen		
potten		
R		
rits oft wijtangen		
ringh schroeven		
roer cratsers		
ringen		
roet		
riemen		
ronde compassen		
ronde lampen		
rantsoen beeckers		
S		
spaense wijn	13	*leggers*
speck		
strijck bancken		
schaven		
snijmessen	11	
schroot booren		
schaven gesort.		
schaeff bancken		
siucken als breebijllen		
schaef beijtels	108	
slagh lijnties		
schijff off gaet beijtels		
schulpen stellingh sagen		
steeck beijtels		
speer haecken		
snijdisers		
snaren tot trommels	2	
snaphaen roers		
snaphaen steenen		
staven iser		
smee kolen		
sement		
schiet looden		
steen houwers isers		
spits isers		
saseleen bord isers		
swaeijer		
sware touwen	1	
stagen		
smijten	1	*paer*
schooten		
seijldouck	24 2/3	*balen*
seijl garen		
seijl en lijck naelden		
spijckers	25	*vaten*
swavel		
slijpsteenen		
schoppen		
slonsjes		
schuijte plancken		
sparren		
schuijvende roosen		
schuijm spaanen		
schaff lepels		
schooven		
slag swaert lemmers		
stael		
T		
traen	1½	*leggers*
treck sagen		
treck messen		
trommels	2	
troffels		
teer	8	*vaten*
teerquasten		
trechters		
V		
vleesch	27	*vaten*
varckens in schooven		
veruw fijn en groff		
vijllen		
vergult steenen		
vellen tot trommels	1/6	*bos*
vier roers		
vier roersteenen		
vier en musquets stampers		
vier spanders		

TABLE 6-21 (CONT.)

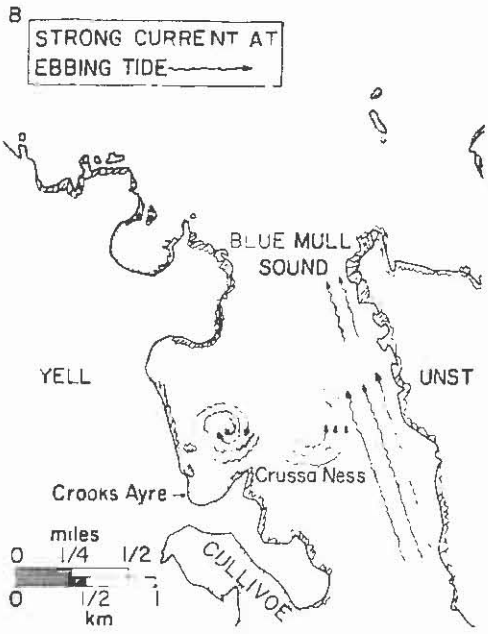
W		
wintint		
wielen tot rampaerden		
winckel haecken		
wandt	2	
wiel trossen	6	
wagen schotten		
wint boomen		
X		
Y		
Z		
zeep		

APPENDICES



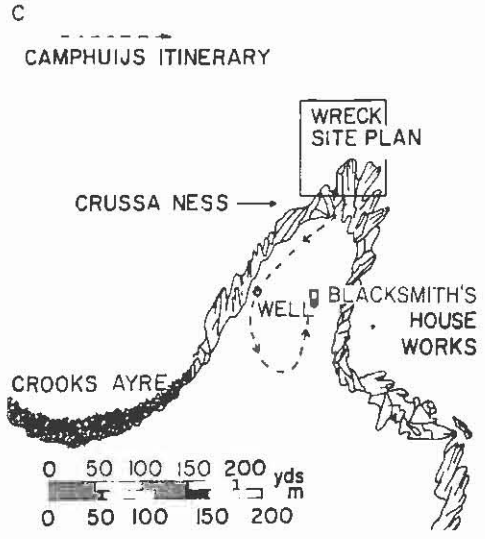
(74)A

Map of the Shetland Isles



(74)B

Map of Blue Mull Sound showing local current patterns at ebb tide. Presumably the drifting stern-half of the LASTDRAGER was carried out to sea by the current at the turn of the tide.



(74)C

Map of Crussa Ness showing the approximate itinerary of the naked, wounded survivor, Jan Camphuijs.

APPENDIX ONE

THE WRECK OF THE V.O.C. *FLUIT* LASTDRAGER LOST OFF YELL, (SHETLAND) 1653

Robert Sténuit

INTRODUCTION

The history of the trade and shipping of the V.O.C. is still not known in as much detail up to the mid-17th century as during later times. The reasons seem two-fold:

(a) fewer written documents have survived destruction

(b) only seven 17th century Dutch East-Indiamen have been excavated, as against eleven for the 18th century (at the time of writing the following wrecks of Dutch East-Indiamen are known to have been discovered and excavated: WITTE LEEUW (1613), St. Helena; BATAVIA (1629), Western Australia; LASTDRAGER (1653), Yell (Shetland); VERGULDE DRAECK (1656), Western Australia; KENNEMERLAND (1664), Shetland (Out Skerries, U.K.); PRINSES MARIA (1686), Scilly Isles, U.K.; 'T HUIS TE KRAIJENSTEIN (1698), South Africa Cape (West Coast); MEERESTIJN (1702), South Africa (Saldanha Bay); ZUYTDORP (1711), Western Australia; LIEFDE (1711), Shetland (Out Skerries, U.K.); SLOT DER HOOGE (1724), Madeira Is. (Porto Santo); AKERENDAM (1725), Norway (Runde); ZEEWIJK (1727), Western Australia; ADELAAR (1728), Hebrides (Barra) U.K.; HOLLANDIA (1743), Scilly Isles, U.K.; AMSTERDAM (1749), Hastings, U.K.; NIEUW RHOON (1776), South Africa (Cape Town); MIDDELBURG (1781), South Africa (Saldanha Bay); and another recently located wreck in Mauritius may possibly be of a V.O.C. ship. Thus for the earlier period, new contributions from underwater archaeology would seem most important.

The author had become aware of the above when retracing the exploratory and trading voyages of all V.O.C. ships before he directed, in 1971 and 1972, expeditions to the site of what is the oldest wreck of a Dutch East-Indiaman discovered in European waters, the V.O.C. *fluitschip* LASTDRAGER (Amsterdam Chamber). The LASTDRAGER was lost March 2, 1653, off the isle of Yell in Shetland, U.K. Both expeditions were sponscred by the well-known French pioneer of underwater engineering, Henry Delauze, of COMEX, Marseilles.

Research in Dutch, English and Scottish records had yielded precise clues to the exact point where the *fluit* was lost during her third outward voyage from Texel to Batavia. The expedition aimed to locate, record, excavate and study the remains of the ship and its cargo; it arrived in Yell on May 19, 1971. Diving operations began on May 20 on the north-east coast of the island, and the wreckage was located on May 21 off the tip of Crussa Ness, east of the beach of Crooks Ayre, north of Cullivoe ($60^{o}42'20"N$ and $0^{o}59'45"W$), (fig. 74 A.B.). Mapping, recording and excavating operations continued until July 31.

It is believed that only the remains of the bow half of the broken *fluit* have been located. The stern half was unsuccessfully searched for in deep water in 1971, and again with the aid of a marine magnetometer in May and June 1972, but is assumed to have drifted away. Among the 2746 artefacts or fragments recovered, is an important collection of navigational instruments, including a piece of a Dutch mariner's *astrolabum catholicum* (of which no complete example survives), various types of navigational dividers, pocket sundials, etc. Also a surgical instrument, 407 coins, some of them rare, finger rings with merchants' marks or coat of arms, jewels, etc. Other significant finds include linked shot for small arms, not before connected with non-Spanish ships, quicksilver, and many fragments of artefacts of every-day use, some stamped with marks, which are valuable as new dating reference material.

HISTORICAL

The V.O.C. fleets in 1652-1653

It had been resolved by the *Heren XVII* (the 17 directors on the company board) that the six chambers should send a total of 17 ships to arrive in the East Indies in 1653, manned by 4,200 people and carrying 800,000 guilders worth of specie and goods, Van Dam (1701), 364.

On September 28, 1652, it was resolved by the *Heren XVII* that half of this amount, or 400,000 guilders worth, was to be in specie; (also that six clergymen and six school-teachers would be sent), unless stated otherwise, sources utilized are mainly the *Resoluties van de Heren XVII* and *Resoluties Kamer Amsterdam* (also *secrete resoluties*), *Uitloopboekjes*, KA 4389 and KA 4390B, *Dagregister van de Kaap*, *Dagregister Batavia*, *Generale Missieven* (from the Indies) published by Coolhaas (1960-68), *Generale Brieven* from the *Heren XVII*, and from *Kamer Amsterdam* to Batavia (also *secrete brieven*). These and most other surviving V.O.C. records are now in the Algemeen Rijksarchief in The Hague).

On October 17, the Amsterdam Chamber resolved to send three ships forthwith to carry 25,000 guilders in specie.

On November 1, the *schip* (ship) DIAMANT, the *jacht* WINTHONDT and the *fluitschip* (flute) LASTDRAGER, left Texel (Texel is the southernmost island of the West Friesian Islands) for Goeree roads, (Goeree is the northernmost island in the Maas estuary) there to join a convoy of some 600 sails under the protection of Tromp's fleet (the first Dutch war was raging).

At their meeting on November 7, the directors were informed that: "the vessels DIAMANT, LASTDRAGER, and WINTHONDT are presently lying in Goeree to go to the Indies".

On December 6, the three ships sailed from Goeree but "on the 9th in a gale of wind, she (the WINTHONDT) was blown towards the sand banks off Schouwen, (the island just south of Goeree), and, utterly helpless, came aground in front of the village of Heemslede." After the gale, the *jacht* was unloaded on the spot, and on December 21 declared a total loss and abandoned.

The DIAMANT lost her rudder in the same gale, was "stranded on the Schotse Banken by Hameland" (one of the north-west Friesian Islands) and also became a total loss.

The LASTDRAGER, a helpless witness to the end of the DIAMANT, herself drifted back towards the Schouwen Banks, touched bottom repeatedly, managed to pass the sandy bars and, leaking badly, waited at anchor for three days in deeper water before limping back to Texel in calmer weather. A junior bookkeeper by the name of Jan Camphuijs, aged 19, and a passenger to Batavia where he was to enter the service of the V.O.C., was put ashore at Camperduin and hastily went and broke the news to the directors of the Amsterdam Chamber. (Jan or Johannes Camphijs, (1634-1695), shipwrecked in 1653 on the LASTDRAGER, sailed again on the DRAECK in 1653, and arrived safely in the Indies where he made a successful career and became Governor General. He had the reputation, somewhat uncommon for a Governor, of being a scrupulously honest man. Rarer still he was a humanist, genuinely and actively interested in the culture, arts and sciences of the East Indian people, and also in natural sciences. A French missionary, who resided briefly in Batavia in 1684, reported: "The present General is named Mr de Campich, a good-looking man, aged 50, liberal and having never cared in all his different employments for nothing but the good of the Company", Pere Tachard. For detailed bibliographies and portraits, see Valentijn (1724-6), IV, 316-323, du Bois (243-252), and *Levenbeschrijving van eenige voorname meest Nederlandsche Mannen en Vrouwen*, Amsterdam en Haarlem (1781), 1X, 275-290).

On Sunday December 15, an extraordinary meeting was called at which "... it was resolved ... to appoint the *Heren* Cruijsvoet *en* van de Cappelle to proceed to Texel ... to go aboard ship to take all necessary immediate measures ... and to make their report ..."

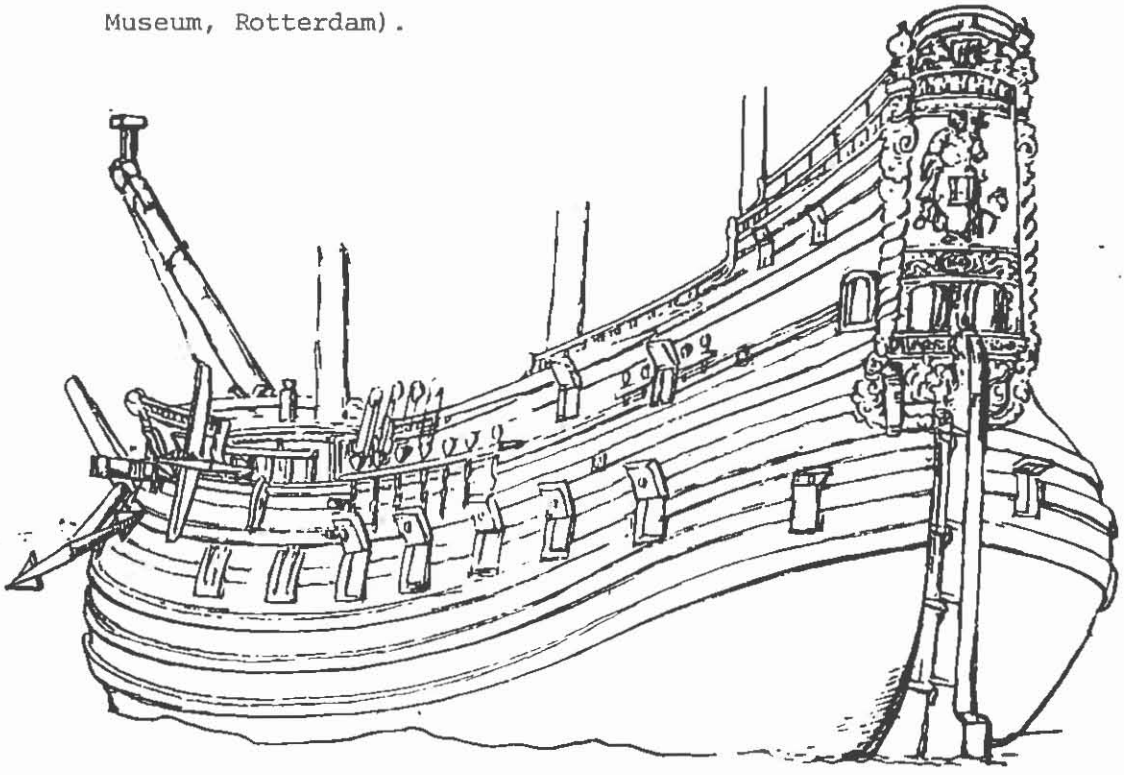
On December 19, it was written (to the Governor General at the Cape) that the deputies "... found less damage ... and less water ... in the ship than was expected ..."

In the meantime, the LASTDRAGER was being partially unloaded - a difficult task since the River IJ iced-up - in order to make the leaking parts of the hull accessible from inside.

On December 23, "*Heer* Cruijsvoet ... made his report ... and it appearing that the said ship is already so repaired and refitted that, in the opinion of the captain and officers, she is in a proper condition again to resume her voyage, it was decided with the verbal agreement of captain Jacob Struijck and approved that the said ship should be re-supplied with all necessaries and that 20 people, now missing, should be sent aboard tomorrow."

On January 23, 1653, it was resolved that the seamen who had stayed with the ship should be paid full wages, but reference to the others "the 20 people now missing", may well give a hint to one of the causes of the final loss of the LASTDRAGER. Camphuijs explains: "... the sailors had left the ship, and did not want to sail on her anymore because, so they said, she was not fit and the trip, on top of that, was via Hitland. New hands were hired but few of them knew about the dangerous sea. When the ice melted down those fellows joined ship on barges and so did I on February 4 ..."

(75) A. A contemporary model of a common *fluitschip* or Dutch *fluit*. No pictures or models of a large V.O.C. *fluit*, specially equipped, modified and armed for the Indies are known to the writer. (Model in Prins Hendrik Maritime Museum, Rotterdam).



(75) B. A contemporary drawing of a Netherlands *fluit* of 28 cannons by an anonymous artist. (Nederlandsch Historisch Scheepvaart Museum, Amsterdam).

Other news apparently leaked to the press, for a confused and inaccurate story in the *Hollantse Mercurius* for September, 1653, later hinted at another cause: "... the directors ordered that she be unloaded but the master who had a good deal of merchandise of his own on-board, prevented it, fearing that this would make it known and he claimed that the ship ran no risk, that he would bring her across safely, and that where he was venturing his own life, others could well venture their property ..."

The *fluit* left Texel again, for good on February 9, 1653.

The next fleet to leave *Patria* (Homeland) consisted of two ships, the SALAMANDER and the VOGEL PHENIX, and one *fluit*, the KONING DAVID. They sailed on April 10, 1653, and arrived safely in Batavia in October.

The following year, apparently in order to replace tonnage lost off Holland and Shetland, the Chamber of Amsterdam chartered two *fluiten* of 250 *lasten* (500 tons) each.

The *Fluitschip* LASTDRAGER

LASTDRAGER (literally: loadcarrier) means porter or beast of burden. Had she been built in the V.O.C. yards, her dimensions and characteristics would be recorded. She was not. We know only that, in April 1648, for 20,300 guilder, the Company had acquired a "*kloeke fluit* (large *fluit*) named the LASTDRAGER ... of 120 men ... to be used as a cruiser first and next to be sent to the Indies with the first outgoing fleet ...", Van Dam (1927), I:567. She was of 320 *lasten* or 640 tons, gross burden, an important tonnage indeed which suggests the following estimated hull dimensions (extrapolations based on Aubin (1702), Van Dam (1927), Fournier (1679), and Witsen (1690): length - 140 to 145 ft. (42.67-44.19m); width - 27 to 28 ft. (8.23-8.53m); height - 14 ft. (4.27m).

Fluiten were of a typically Dutch design: high narrow poop, moderately high forecastle, buttocked round stern, flat bottom and longer and narrower than most other types (L/B ratio 4.5 to 5). However, they looked truly pear-shaped when seen from astern, on account of their sides sharply sloping inwards towards an extremely narrow upper bridge. Sloping sides made boarding difficult for attackers, but their main purpose was customs duty evasion. As Witsen explained (in 1690), the Dutch *fluiten* carried most of the Baltic trade, and the toll-rate based on tonnage, levied by the King of Denmark at the Øresund, was mainly calculated, up to 1669, by the width of the upper deck amidship; so the shape minimized the rating of the duty. Furthermore, the centre of gravity being lower, masts could be higher and carry more sail with fewer seamen. The Dutch *fluit* had the reputation of carrying more goods more cheaply, and faster than other nations' ships.

The iconography of Dutch 17th century *fluiten* is rich; see prints by or after Wenceslas Hollaer, Reinier Nooms (alias Zeeman), Salomon Savery, etc (see fig. 75B). Also drawings by Simon de Vlieger, paintings by Van de Velde, etc. Landström's drawing in Sailing

Ships is, as usual, excellent also Landström (1969), 144. There are in existence three fine contemporary models (in Nederlandsch Historisch Scheepvaart Museum, Amsterdam; in Prins Hendrik Museum, Rotterdam; in Handels og Söfartsmuseet pa Krønborg, Helsingor) (fig. 75A). Witsen has described in detail how the rigging and accommodation of the *fluiten* were specially converted for the long voyages to the Indies, Witsen (1690), I: 178-9. The origin of the word "*fluit*" is controversial. There are two possible origins: a. the analogy between the musical instrument and a new ship which first struck mariners as being extraordinarily long and narrow, Puijpe (1971), 7; b. the geographical origin. It is believed that the first *fluit* was built in Hoorn, in 1595, to the then revolutionary plans of P.J. Lioorne (*Chronicle of Velius* - see *Catalog of Nederlandsch Historische Scheepvaart Museum*, 1969: 89), on the design of a local coaster of 40 to 140 tons called *Vlieboot* (fly boat or Flibot), writes De Jonge, 1858-62, I:101, a type which originated in the Zuijderzee. "Its name seems to have come from the Vlie, which was frequented by boats of the kind", E. van Konijnenburg (1905), I:48: writes. (The "Vliestroom" is the channel between Vlieland and Terschelling). *Vliet boot* could have been altered to *Fluijt-boot*.

The previous career of the LASTDRAGER, after she had cruised as a convoy ship with Admiralty ships for some months to protect merchant shipping, can be pieced together as follows. She:

left Texel, January 17, 1649, in company with the ROBIJN and arrived in Batavia, August 21;

left Batavia for *Patria* on January 11, 1650, with a cargo valued at 162,246 guilders cost price (she should have been part of a *retourvloot* of nine ships under Arent Barentsen, but was delayed several days by the loading of pepper) and arrived in Texel on July 22, 1650;

left Texel on March 2, 1651, with the DIAMANT and the LEEUWARDEN, and arrived in Batavia August 29, 1651;

left Batavia January 25, 1652, part of a *retourvloot* of five ships under Dirck Ogel that included the SALAMANDER and the KONING DAVID, and with a cargo valued at 200,262 guilders cost price; she joined, off Shetland on August 6 or 7, 1652, a Dutch fleet under Admiral Maerten Harpertzoon Tromp, and arrived safely in Texel on August 15, 1652.

On her last voyage, the *fluit* again followed a route northwards around Scotland. The V.O.C. rules, varying according to the period of the year, had directed ships either to sail west through the English Channel (the short, safe way) or north around Scotland and Shetland (the long, dangerous way) or either way depending on wind, but these had been modified and adapted by many successive *resolutiën*, see Van Dam (1701), 23. In 1653, however, the First Anglo-Dutch War was raging and the Channel to be avoided; when the V.O.C. planned wintertime departures, it was felt by Nordic and other pilots that from January onwards "... the North route could be used, provided that in case of a persistently strong contrary winds, the ship could run

for a port South and not North of 't land van Stad" (Stadt or Stadtväs is on the Norwegian coast at c. 62°N), "and there await a favourable wind ..." (There are indeed several ports around Bergen and no iceberg danger).

On February 4, Johannes Camphuijs embarked again and, on February 9, the LASTDRAGER, carrying 206 people, sailed in company with the *jacht* AVENHOORN of the Hoorn Chamber.

On February 13, it was reported to the directors of the Amsterdam Chamber that incoming ships had met the two vessels "... which would now be *achter* (i.e. past) Scotland." Thanks were conveyed for the information.

THE SHIPWRECK

a. Secondary Sources. News of the loss first reached the continent in April. A letter (now in the P.R.O., London; State Papers 18/35), gives an early but badly garbled account brought by some incoming ship: "Richard Bradshaw to John Turloe, Hamburg 26 April 1653 ... that Dutch fleet of 18 sails convoyed some East India and other merchants ships by the North ... and two of the East-Indiamen rich and full of men, were cast away upon Shetland in a storm and one forced back with a leak ..."

The confusion between the early accidents on the Dutch coast (see above), and the one and only recent one in Shetland seems obvious, for it is recorded that the yacht of the Hoorn Chamber reached the Indies safely.

A late, also inaccurate version was published by the *Hollantse Mercurius* of September, 1653, (already quoted) " ... off Fair Isle, the ship sprang a heavy leak. He (the master) made all haste to Hitland", (Dutch for "Shetland" or "Zetland", "Hjaltland" (old Norse), "Schetlandia" (17th century Latin) or "Sheatland" 17th-18th century), "he beached her for a few weeks, and recaulked her. Being ready, he set sail but went not far before being thrown on the coast by a violent storm. Forty seven sailors could, however, save themselves and came back ... very miserably in a small fishing boat ..." The figure forty seven is inaccurate; Camphuijs lists the names, rank and place of birth of all of the twenty six survivors. His account entirely disproves the recaulking episode, a completely inaccurate story which has been reproduced by De Balbiaan Verster (1922), 293-4, and other compilators.

b. Offical Records. The survivors had returned to Amsterdam with the news on April 25, and the entry in the V.O.C. *uitloop boekje* referring to the LASTDRAGER reads: "*opden 2 maert onder Hitlandt gebleven*" meaning: "... perished March 2 on or before Shetland".

A letter from the directors of the Amsterdam Chamber to the Governor of the Cape of Good Hope, dated May 31, gives the true summary: "The LASTDRAGER is sunk and lost in Hitland, only 26 people were saved as well as some money and a little gold ..."

c. Firsthand Source. It is fortunate that Johannes Camphuijs, at 19, was already the sound reliable man who was to become later one of the most strictly honest Governors of the East Indies and a true humanist. It is most fortunate that he survived the shipwreck and wrote with great accuracy and detail immediately afterwards, the 34-page long manuscript story of his adventure. *Ongelukkige Voyage gedaan met het fluitschip de Lastdrager in de jaren 1652 en 1653 door den Hoog-Edelen Heere Johannes Camphuis, ond Governeur-Generaal van Oost Indiën*, is the made-up title of an original manuscript which came into the possession of the noted Dutch collector, Jacobus Koning, and was published after his death by his son, G. van Enst Koning, in *Letters en Geschiedkundig allerlei*, Amsterdam (1835).

It is necessary to quote short extracts from it because these will be found relevant further on:

"... a favourable wind blew on February 9 ... we sailed so swiftly that on the 6th day we passed the snow-capped, inhospitable isle of Tairil (i.e. Fair Isle) ... but a fierce storm sprang up ... the intense cold and frightful gales made all inexperienced sailors tumble below deck ... much against our will, the terrifying tempest took us, all masts bare of sail near the bare isles of Fero (Faroe Islands) where ... the ship filled with so much water ... and so heeled ... that we should have perished there and then ... the pilots who had seen neither sun nor stars for so long ... were so confused in their esteem that they could not make sense of the chart any more. They headed one way, then another, hoping to keep away from land until a favourable wind would push us away from that dark climate, when ... on March 2 one of the pilots ran aghast, to the aft cabin to tell us we were but half a mile from the cliffs ... the rudder which had been made fast for many days was freed, we hoisted our main sail to try and give a wide berth to this still unidentified land ... but the wind ripped away the canvas ... the rudder pintle gave and we saw one of the helmsmen being thrown by the whipstaff onto the ship's rails where he lay, bathed in his blood ... meanwhile our LASTDRAGER was pushed on the rocks by the rollers ... the stern half of the ship was first severed by the seas and taken away from the bow part that was jammed on the rocks. This happened at dusk as the tide went down so that the bow half which could not now be attacked with so much strength by the seas remained some more time on the rocks ... we all congregated in the fore-castle ... the night had fallen ... and as the tide raised again ... the half ship began again to float ... and the pounding waves with full strength soon broke it to splinters ... I held on as long as I could to the broken wreckage ... a wave tore me from it ... I held to a beam ... I could hear the screams of the dying ... I was finally thrown onto a rock with my spar ..."

LOCATING THE WRECK SITE ON PAPER

Clues useful in the preliminary location of the wreck site were found in the following written sources.

A. General Geographical Location

1. *Uitloop boekje*: "... perished on or before Hitland".

2. Letter from the Amsterdam Chamber to Commander, Cape of Good Hope: "... lost on Hitland due to incompetence of chief pilot ..."

3. Camphuijs: "... the land in general was called Hitland and the island where we were Jalo (or Jallo (Norse dialect) or Iello, or Yel (18th century); today known as Yell).

   Once the island was identified, comparison of the map with Camphuijs' story clearly indicated that the shipwreck could only have occurred on the north coast.

B. Approximate Geographical Location

1. William Irvine, a wrackman (wrackman was the name chosen for themselves by the 18th century highly efficient English and Scottish salvors whose profession was to fish or drag for silver. The writer is presently preparing a detailed "History of Wracking" in book-form) carried out somewhat unsuccessful salvage operations on the wreck in 1736. (William Irvine, custom officer in Lerwick, had obtained from the Admiral of Shetland, Colonel George Douglas, an exclusive contract for rights over all wrecks in Shetland. This forced him to keep at all times an expensive little salvage fleet with dragging apparatus, diving barrel, crews, etc. He could never enforce his exclusive right against the local lairds. He is known to have worked on the WENDELA; between fresh shipwrecks he used to return to old ones like the LASTDRAGER, KENNEMERLAND, LIEFDE, warships at Burra, etc.). When reporting to the Admiral of Shetland, (Colonel George Douglas, successor since 1730 to his late brother Robert, 12th Earl of Morton, had a right to all wrecks in Orkney and Shetland as Donator or grantee of the Crown (letters quoted are now in the Scottish Record Office, Edinburgh)), Irvine wrote: "... my pitiful purchase at Cullavoe (or Cullivoe) off ye LASSENDRAGHER ..." (February 2, 1736-7), and " ... I have recovered one ducatoon and one sixpence more off the wreck at Cullavoe in the north part of this country lost in the year 1653 ..." (Lerwick, March 30, 1736).

2. R. Stuart Bruce (as a result of his life-long, active interest in the subject, the late Robert Stuart Bruce of

Symbister (Whalsey) had become a walking encyclopedia of Shetland wrecks. His papers, of enormous interest, are now carefully preserved in private hands) published in the Mariner's Mirror an obviously inaccurate story (the probable result of a mix-up in local tradition between two different shipwrecks) of the event in which however the reference to the site seemed (as was finally proved) correct: "... was wrecked at Crooks Ayre, Cullivoe Ness, Island of Yell" and "she struck the rocks at 'the back' of Cullivoe Ness".

C. Precise Geographical Location

The location, thus known to within a precision of about one quarter of a mile, was further pinpointed by clues in the survivor's story. Camphuijs: "... I was thrown on the rocks ... started to climb and crawl ... falling down again many times and finally reached the cliff top where my hands could feel grass ... Naked ... bleeding ... covered with the snow blown by the ice-cold wind ... I started walking ... suddenly I fell in a fresh water well which was so deep ... I almost drowned in it ... I resumed walking ... I saw sparks flying in the sky. I watched these and walking towards where they came from found a stone house ... with a blacksmith's shop ... house occupied in summertime when fishermen did come and lived in it while curing fish. There was no other house around."

A survey was made by the writer in the vicinity of Crooks Ayre, and various enquiries made into local tradition. As a result, the footsteps of Camphuijs were tentatively retraced, and all significant local topographical features tentatively identified, namely: a not easily climbed cliff with grass on top, a fresh-water well nearby (now unused and partly filled-in, but kept, deep and in use until recent years); an isolated stone house nearby (now a ruin) said to be the oldest known around Cullivoe, last occupied by Mrs. Henry of Cullivoe in 1913. It was formerly a summer shelter for fishermen who cured fish on the nearby stony beach. There was also a blacksmith's works (ruins remembered by Mrs. Henry), where, according to tradition, knives were forged for the use of the fishermen.

The wreck site having thus been located on paper with some precision and degree of reliability, the writer felt that it could now be usefully searched for on the sea-bed.

LOCATING THE WRECK ON THE SEA-BED

A. The Bow Half

A contract was signed between the present lawful owners of the LASTDRAGER and her cargo, the Government of the Netherlands (successors to the bankrupt V.O.C.), and the writer, granting the latter exclusive salvage rights. Furthermore, at the instigation of the active curator of the Zetland County Museum, Mr. T. Henderson, and in a commendable effort to prevent indiscrimate salvage operations, the County Council of Zetland had leased from the Crown Estate Commissioners a wide area of the sea-bed presumed to enclose the wreck site. An Authorization to excavate was kindly given to the writer.

The expedition arrived in Yell on May 19, 1971, took up its quarters in North Sandwick, began diving operations on the 20th and, on May 21, located some cannons, ammunition and miscellaneous wreckage off the very tip of Crussa Ness (fig. 74B). The depth of the site is 10 to 30 ft. (3.05-9.14m), the bottom rock thickly covered with kelp. Gullies and deeper holes are filled with sand, pebbles or boulders. The uneven bottom slopes slowly towards the deeper, coarse sand plain 80 to 150 ft. (24.35-45.72m) deep that lies about 150 yards (137.16m) from shore.

Mapping and excavating: mapping operations were carried out by rough trigonometry, using measuring lines and compass bearings. The underwater map was connected to the Ordnance Survey 25 ins. to the mile plan for the area, (first corrected in the field), with the aid of surface buoys moored over three main reference points. All observed items of wreckage were subsequently plotted on the map (fig. 72).

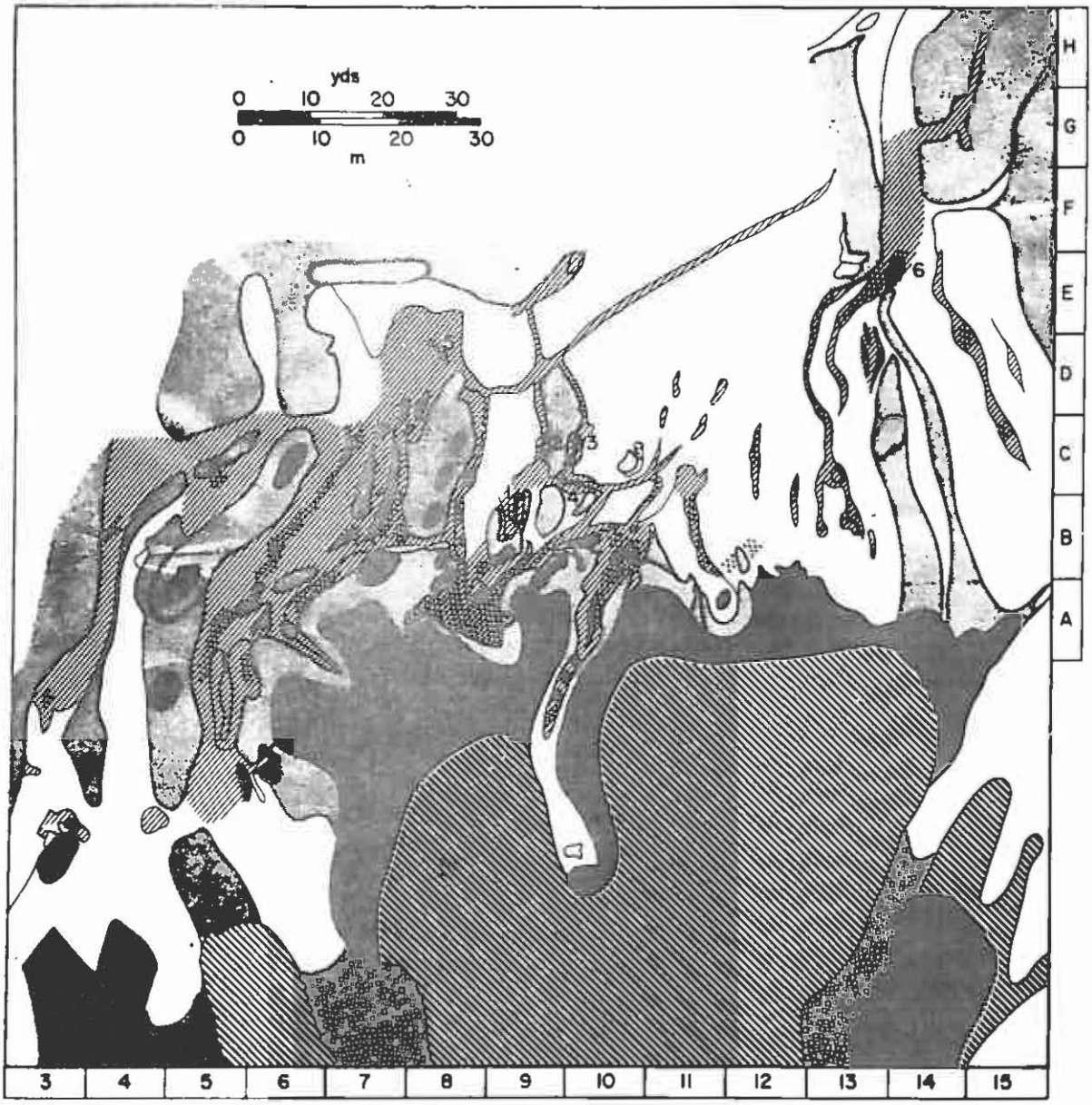
Because of the nature of the bottom, more detailed mapping operations were carried on simultaneously with the disposal of some of the kelp and the excavations. Few artefacts were readily apparent. Excavation work consisted mainly in breaking-up with crowbars or a hydraulic jack, the sedimentary layers (boulders and stones in gravel and sand) and displacing same until the bare rock or masses of artefact-bearing concreted magma were exposed. Inflated lifting bags removed boulders up to several tons weight, and a high pressure water-jet evacuated sand mounds which had previously been hand sifted. By and large, divers' hands were the basic and most reliable excavating tool.

The underwater work was carried on for five hours a day every day, when weather permitted, by a team of three to five experienced professional deep-sea divers, who had two or three years' experience of archaeological excavation with the writer. Depending on the nature and thickness of the sediments, the surface of bed rock actually exposed, varied from a half of a square yard (0.42 sq. m) to two or even three square yards (1.67-2.51 sq. m) per man/per day.

B. The Stern Half

From mid-June onwards, half of the diving time was devoted to further mapping and excavation, while the other half was spent systematically searching for the missing stern half of the wreck. All observations concurred with the Camphuijs records pointing to one half of the *fluit* only having been found. No further trace of the ship was found during exploratory dives in the whole of Crooks Ayre, or in the entire area north-west to south-east of Crussa Ness down to a water depth of about 100 ft. (30.48m) (fig. 74).

By July 29, 1971, the site appeared to be reasonably well recorded, explored and excavated. Search and work were suspended until detecting instruments, thought to be more efficient in deep water, could be brought in. From May 25 to June 13 of the following year (1972), a magnetometer search was carried out under the expert guidance of Mr. Anthony Lonsdale. The magnetic anomalies considered as target were assumed to be caused by the presence of 12 scattered



(76) The wreck site: ▨ is dry land; black is rock exposed at very low tide; ⁘ are underwater heights; ▨ are excavated areas, mainly gullies; heavy dots indicate main concentrations of artefacts and fragments. Guns 1-5 and the main mound of shot 6 are drawn. The position of other individual artefacts is given in the text by reference to the grid square, for example B-9. To avoid overcrowding, grid squares are not drawn on the map.

iron cannons and one ton of iron cannon balls, which was the ship's estimated armament for the purposes of the survey. A preliminary, methodical echo-sounder survey of the area satisfactorily delineated the general bottom profiles. An arbitrary grid pattern was laid out, based on a pair of mobile beacons successively erected on the shore on two double rows of equi-distant and precisely determined points. The two beacons were clearly visible from the sea and, when kept in line, enabled the boatman to follow parallel lines 15 yards (13.72m) apart, back and forth in a regular grid pattern, first on 20°-200°, then later in a criss-crossing due east-west direction.

The consoles of the battery-powered, portable proton free precession magnetometer, as well as its reading and recording units, were installed in the cabin of a locally-chartered lobster potting boat. The marine sensor, or fish, was towed some 100 ft. (30m) behind the boat. It was kept at a pre-established distance from the sea-bed by a specially made deflecting device, or tow-vane. The actual depth of the sensor was checked by means of an air hose-type depth meter. The instrument was found to operate satisfactorily, but all early recorded anomalies proved, upon inspection by divers, to be outcrops of what must have been highly magnetic rocks emerging from the sand. The Shetland area is notorious for its many geological magnetic abnormalities, some of which are mentioned as a warning to mariners, on the Admiralty Charts and in the Pilot Books. There are spots in Shetland where compass needles point south or keep turning. To eliminate such signals, it was found necessary at all times to compare closely the readings of the echo-sounder with the readings of the immediately following magnetometer, so as to eliminate rock-indicating anomalies. An obvious degree of error was thereby introduced in the survey, now estimated to have been only 80% reliable. The instrument recorded over 40,000 measurements, and the boat travelled 120km to follow the 112 parallel beacon-marked lines and complete the additional saturation runs close to shore.

Although most of Blue Mull Sound (fig. 74) was searched (except the main tidal current running along Unst), no trace of the target was indicated or recognized. It is, therefore, assumed that the tidal current took the drifting half-ship either into the almost unworkable area of the main north-south stream, where the fluid, daily moving sand dunes would have deeply buried all wreckage, or more probably out to sea. There are no further plans at present to resume the search.

THE FINDS

The inventory of the finds lists 2,746 items, mostly fragments, a few of which are discussed below. References in the text are to the site map (fig. 76), and relate finds to the squares in which they were found.

The Ship

No remains of the hull structure were observed. Numerous fragments of lead strips of various lengths, width 0.04 to 0.05m, were found scattered about and identified as hull-sheeting, on account of a longitudinal indentation, and roughly regularly spaced rows

of square nail holes with traces of round heads. The use of five large, square iron nails (length 0.04-0.25m) protected by magma, in square B-7, is unknown.

A one-inch (0.25m) long fragment of spunyarn, diameter 0.009m (B-7) is all that remains of the rigging.

Ship's Inventory and Stores

No anchors were observed, but Irvine salvaged two anchors; the one 12 ft. (3.66m); the other 10 ft. (3.05m) long. He wrote: "the anchors being much rusted I cannot yet make any probable conjectures on their weight, but I have taken the first opportunity of sending them to the best market ..." (Irvine to Morton, March 30, 1736).

Five unmarked pewter spoons and many scattered fragments are of a type common at that period (fig. 77); and are similar to those found on most V.O.C. and Dutch wrecks, and in the Barentsz or Nova Zembla Collection, Rijksmuseum, Amsterdam. (The miscellaneous objects of every-day use abandoned by Willem Barentsz's party in Nova Zembla, in 1597, in the famous *Behouden Huis* where they had wintered before they sailed back home, were discovered in 1871. They constitute one of the few representative collections of precisely-dated groups of medieval antiquities now available to archaeologists for reference purposes). These are probably spoons issued to the crew for their daily use, Van Dam (1701), I: 648-52.

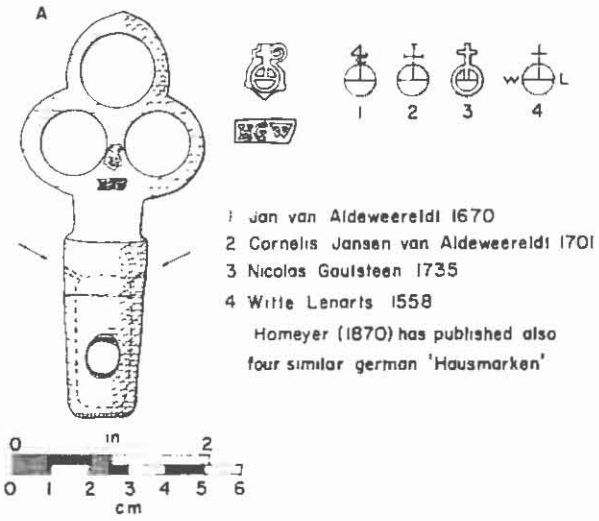
Small scattered fragments of copper or brass cooking utensils may have constituted a copper cauldron, a cylindrical bucket made of a single riveted copper sheet, and a cylindrical brass strainer. These vessels are found among the VERGULDE DRAECK finds, Green (1973), GT 286, and in the Barentsz Collection, and are possibly from the ship's galley. Many other fragments of cast brass or rolled copper handles, brass supports etc. could have been either cargo or from the ship's stores.

A brass revolving keg tap (fig. 78A) (B-11) showing traces of wear, was probably used on-board. The stamped maker's mark remains unidentified; two identical taps, complete with the brass cock in which they are seated, are known, one (unmarked) in the Barentsz Collection (fig. 78B). The other is from the VERGULDE DRAECK and bears the stamped mark of a *fleur-de-lis* under the initials AS (unidentified), GT 608 (A and B), Chapt. 5.3.2.2.

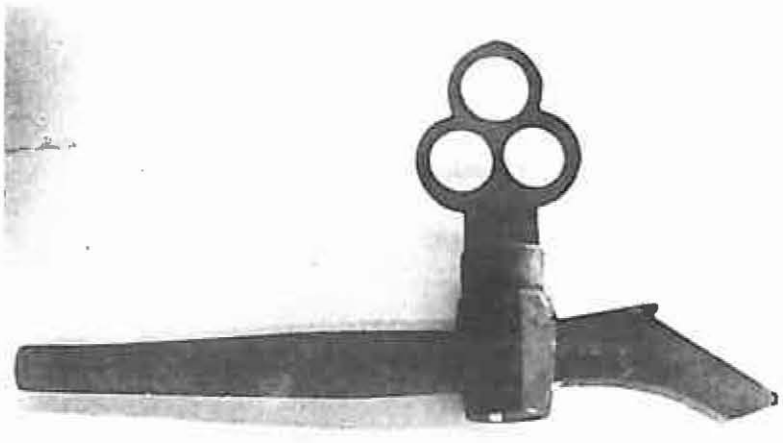
Other finds include small fragments of pottery and crockery, both coarse and fine, glazed and unglazed, decorated and undecorated, possibly from the galley shelves. Seven damaged lead folding stamps, marks unreadable, were possibly used to seal company property. A fine whetstone and two red, sanguine chalk sticks in perfect writing condition were also found.

The Ship's Armament

Only five iron guns were found on the site (fig. 76), three of them appear undamaged. All are heavily coated with the crust of rust-based concretion, which generally forms on submerged iron objects. They were not raised because proper facilities to treat



(77) A. Brass revolving keg tap. The narrow perforations (indicated by arrows) once received the locking pegs used in connections with the locking shoulders in the spigot (in order to ensure full opening and full shutting of tap). The maker's marks and initials are not identified. Marks 1, 2, 3, 4 are from tombstones in cemetery records of Amsterdam and Delft. Although similar, they have no connection but are given, with the maker's names, the better to illustrate the complexity of the problem of attribution. *Van Alderwereldt* means 'of the whole world', hence the choice of an *orbs mundi* symbol.

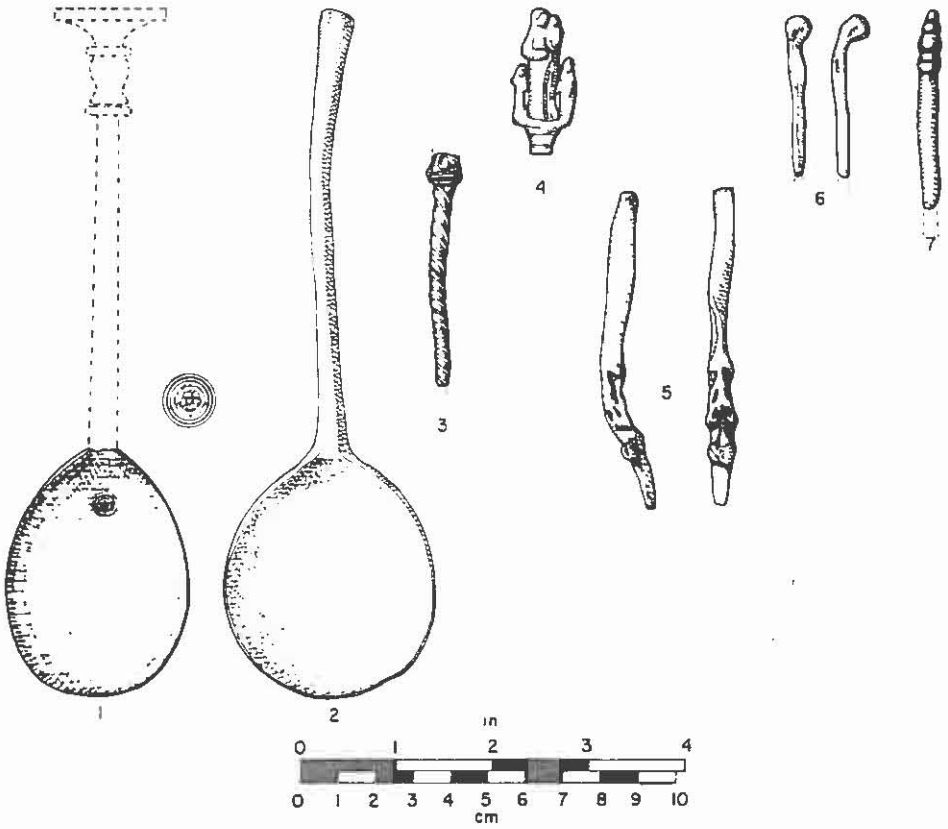


B. Unmarked, otherwise identical keg tap with piping, in the Barentsz collection, Rijksmuseum, Amsterdam.

and preserve large iron objects do not exist in Shetland. Underwater temptation to break away the three-centuries old, protective concretion in order to measure them accurately, and to check and record possible marks on the trunnions, was resisted. Such action would have caused the rapid, natural destruction of the artefact, the very existence of which, it was felt, would be of value to future archaeologists in times when local conservation problems may have been solved.

The following measurements are therefore most approximate:

	Guns Nos. 1-2-3-4	Gun No. 5
Total length	2.57m	2.20m
Max. Diam. of breech	0.51m	0.60m
Bore	0.095m	?



(78) Spoons and/or forks: 1. Copper spoon mark unidentified. Hypothetical reconstruction after a complete spoon with same unidentified mark, in the Historical Museum, Rotterdam; 2. Pewter spoon, one of 12 found, unmarked, common on Dutch wreck sites, probably the type issued to the crew (Van Dam, 1927, I: 648-52); 3-5. Fragments of silver spoons. Type 4 is common on 17th century Dutch silver spoons, symbolizing *moederliefde*, i.e. mother-love or charity; 6. Fragments of silver spoons or forks.

The armament of the LASTDRAGER is unrecorded. Iconographical sources give no definite information, for none is known specifically to depict a *fluit* equipped for the East India voyage, although other types of East-Indiamen of similar tonnage are shown carrying some 30 guns.

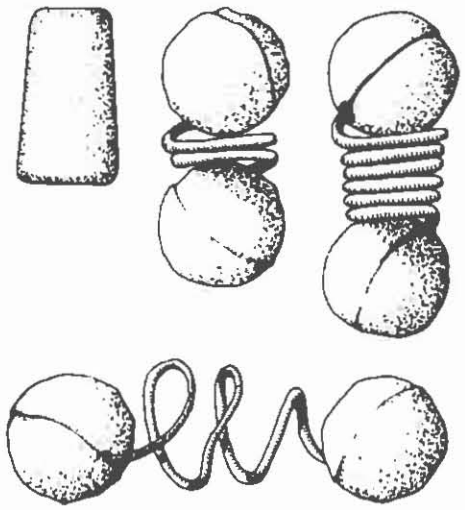
A rather vague V.O.C. rule of 1630 (still unchanged in 1653) was that all outgoing so-called larger ships should carry 32 guns, of which 24 were to be iron, six of brass, and two *minions*, either brass or iron; whereas so-called smaller ships would carry 20 iron guns and four brass guns. The brass guns were to be mounted nearer to the compass with a view to avoiding magnetic deviation. (A post-1653, more precise rule calls for only two brass guns aboard, Van Dam (1701)). As it is believed that the 320 *lasten* LASTDRAGER was then considered a large ship, her approximate armament may well have been from 26 to 32 guns and was certainly at least 24 guns.

A very precise and widespread local tradition tells of a 7½ ft. (2.29m) long gun found on shore or taken to shore by the locals. R. Stuart Bruce has noted that "in 1902, when the gun was prepared for firing a salute for a marriage, it was found to be loaded". In conversations with the writer, locals constantly refer to the later explosion of the gun in similar circumstances, adding that the amateur gunner was scalped. This would account for six guns only.

The divers of William Irvine did not recover guns: "I can discover no more of her guns, which I am apt to believe have been mostly saved while the ship stood whole", (Irvine to Morton, March 30, 1736). The author is led to believe that "no more" simply means none. The ship, of course, never stood whole. Kelp thickly growing on the guns, and the perfect natural camouflage of marine life, hiding form and colour, explains why five guns lying flat could not be seen by a man peering briefly from above, through the glass porthole of a suspended diving barrel. The writer believes in conclusion that the missing 18 to 26 guns are still in the missing stern half of the ship.

The Ammunition

A small number of eroded iron shot were found scattered over the whole site. In square E-13/E-14 is a mound of 100-200 cannon balls, well-preserved and concreted, which are believed to have spilled from the stern half drifting on its way to the north-east. The main shot hold would have been at the foot of the main mast i.e. at the spot where most wooden ships' hulls would break in two, partly because of the leverage action of the mast on the impaled hull (there is no indication, indeed, that the crew took the precaution, usual on a ship aground or on the rocks, of cutting away the mast). The calibre of the LASTDRAGER guns is not recorded either, but we know, as a comparison, that the *jacht* MUIJDEN, armed with 28 guns, *Resolutiën Kamer Amsterdam*, December, 1652, was to carry: 14 guns of 12 lbs., 4 of 8 lbs., and 10 of 6 lbs. (total 28), and the *jacht*, the WEESP, 14 of 12 lbs., 4 of 8 lbs., and 8 of 6 lbs. (total 26), *ibid.*



(79) Small arms ammunition. For doubtful bullet-shaped object, see above. Linked shot was found in large quantity.

A random sample from the mound gives the following measurements:

Shot diam. (m)	Number of shots in sample	Shot weight in 'Amsterdam' *ponden* (494g) according to Witsen's tables
0.107	1	10
0.10	1	
0.098	13	
0.097	2	8
0.095	1	
0.094	3	
0.089	4	5
0.086	1	

None of the shots were weighted, as part of their iron content had obviously been lost and transferred to the concretion, and Witsen's table for iron shot, Witsen (1690), II: 502, was used instead to estimate the original weights (one Amsterdam *duim* (inch) = $\frac{1}{11}$ *voet* = $\frac{0.28m}{11}$ = 0.0254m).

It is thus assumed that Gun No. 5 is a 10-pounder, and Guns Nos. 1-4, 8-pounders.

Small Arm Ammunition

No fragments of portable firearms were found, but lead bullets were thinly scattered over the whole site, and also concentrated in their thousands in the form of one long, thin amalgamated trail in B-13/C-13. For types see table as follows:

	Diameter	Weight	Remarks
Round lead shot: " "	0.017m 0.012 to 0.014m	29g 15 to 20g	in roughly equal numbers
Bullet-shaped object: (fig. 75)	0.012m and 0.014m	30g	Not unquestionably a projectile.
Linked or spring shot:	0.016 to 0.017m	26 to 29g x2	Length of copper wire very variable: 5 to 19cm extended, or 1½ to 5 joining spirals when coiled. Copper wire is 1½mm thick.
Small shot:	0.0025 to 0.004m	c̄ 0.25g	45 found

It is not known if the individual shot were ammunition intended for the ship's *Handtbussen* (heavy muskets), *Donderbussen* and/or pistols, Witsen (1690), I:352; or supplies of ammunition sent to the Indies; or grapeshot for gun 'cased ammunition'. Neither is it known if the tiny balls were for anti-personnel scatter shot, or for game shooting (and in that case private property). The wired shot or linked shot (probably for muskets) is an important discovery for, if the use of bar shot, chain shot, hinged shot, etc. is well-documented in artillery treatises and the projectiles common in museums, small arms linked shot, on the contrary, have been known only since 1955, and all published examples are from underwater sites (i.e. four Spanish wrecks 16th to 18th century) in Florida or Bermuda, Peterson (1965), one unidentified wreck (probably mid-17th century) in Cornwall, McBride, Larn & David (1972), the BATAVIA (1629).

Fournier (1643), Liv III: 136, when listing the "things necessary to properly supply a ship" mentions under the heading "arms and ammunitions": "... Lead in musket balls as well as to make linked shot" ... (*balles ramees*) and "copper wire (*fil de Richard*) to make linked shot ..."

Colin Martin (pers. comm) has pointed out the following references to the use of linked shot for sea warfare: Sir Jonas Moore, in his Modern Fortification (London 1673), speaks of: "Harquebus a croc ... charged with small cross-bar to cut sails and rigging ..." Also, Alsono de Chaves, in his Fighting Instructions of c. 1530 mentions "scorpions for sails and rigging".

It should be remembered that Peterson (1966), 84-6, has classified the three basic types (which are of various sizes) as follows:

1. Expanding - two balls joined by a coil of brass wire.

2. Sliding - two balls joined by two loops of brass wire sliding over each other.

3. Articulated - two balls joined with straight lengths of brass wire terminated by interlocking small rings.

The LASTDRAGER and the Cornish wreck wired shot are of type 1. The writer, in 1972, found a fragment of wired shot apparently of type 1. on the wreck of the Dutch convoy ship CURAÇAO (1729), of the Admiralty of Amsterdam, Sténuit (1977).

These anti-personnel projectiles would have started whirling on leaving the barrel of the musket, perhaps with little precision but with devastating effect during boarding actions. It is significant that they were nicknamed scorpions, and the English soldiers who, in 1858, were submitted to the effects of type 2. in Lucknow, found them dreadfully annoying in street actions, (see the Illustrated London News, April 3, 1858: 354). Reference kindly brought to the attention of the writer by Mr. Roy Davis (Ferdinand Research Group).

A single bullet-shaped object (fig. 79 and table) (B-5) was not found associated with other projectiles. Its diameter suggested possibly that it could be a small arms projectile. If so, it is vaguely like the cylindrical bullets (diameter 0.018m, length 0.021m) from the wreck of the Russian pink EVSTAFII (1780), Sténuit (1976).

Large brass and copper hooks with the ends flattened in a trefoil or other shape and pierced for fixing that were found scattered, were possibly carrying handles fastened to the boiled leather buckets used to carry gunpowder aboard.

Navigational Instruments

"Navigational Instruments of this period are exceedingly rare. Therefore, the recovery of any, no matter how rusted, eroded or barnacle-covered, is a matter of exceptional interest ..." Waters (1968), 505, on BATAVIA (1629).

The 85 navigational instruments found on the site may well therefore deserve some comments.

A fragment, recovered from square B-6, of what the author suggests calling a Dutch mariner's universal astrolabe, was to his knowledge, the second such fragment extant when found. There is no complete specimen known; the instrument is conspicuously absent from ancient and modern specialist treatises and only rarely described in practical or didactical works.

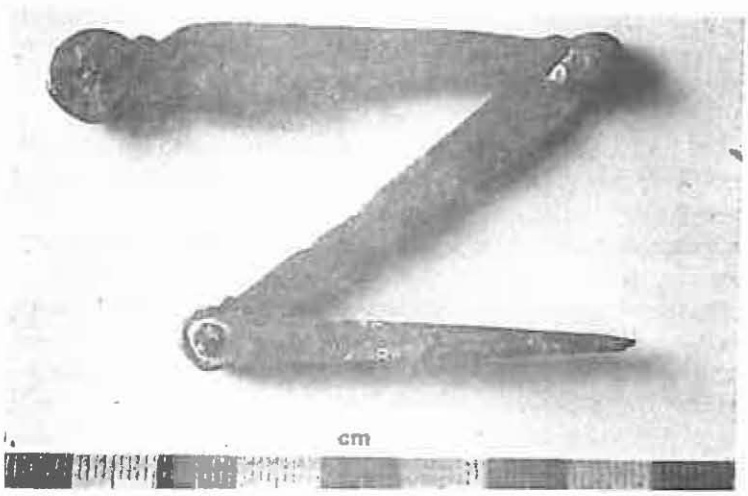
The fragment (fig. 80) is a *brachiolus* i.e. a flat articulated brass arm consisting of three hinged parts, terminating in a point. There are remains of a thin stirrup-shaped copper piece external to and angled on the first hinge; it is seemingly designed to limit elbow rotation (apparently shown also on an instrument in a painting of 1654 (fig. 81) where it looks like a clear dot). All the rest of the instrument is missing. Examination of the only known parallel, the so-called "*armken van Barentsz*", now in the Rijksmuseum, Amsterdam, (fig. 82) indicates that the shoulder, so to speak, of the *brachiolus* or small arm would have been hinged in a grooved wooden cursor. Iconographic sources indicate that the cursor slid along a graduated wooden rule, to which it could be pegged into specially drilled holes - note the holes in the groove of the cursor (fig. 82). The rule was equatorial to a round plate, with suspension ring, which was the body of the instrument and turned freely around its central axis. The round plate carried an engraved, painted, or printed net of meridians and parallels, reproduced in stereographical, equatorial projection.

According to Crone (1966), 2:71-85, the instrument made it possible to solve graphically (without calculation, spherical trigonometry or logarithms) all spherical triangular problems, namely the problems associated with taking into account the earth curvature when plotting a trans-oceanic course on a flat map. In other words, when three elements of a spherical triangle are known, then the three others can be worked out (not very accurately) simply by manipulating the instrument's parts (somewhat in the way calculations are made mechanically on a modern slide rule). For detailed operating instructions see Nanninghsoon (1967), part 2, mainly the chapter: "Of the catholic astrolabe and how to find out with its help how distant of each other two places are when their latitudes and longitudes are known," (fig. 83); for a summary see Crone (1966).

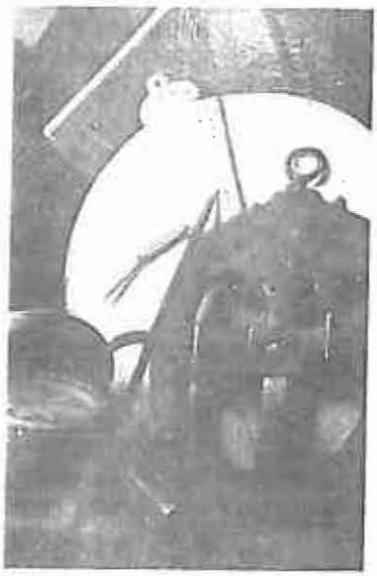
The instrument should not be confused with the rare wheel-type, sea or mariner's astrolabe (33 brass examples were extant in 1972; see Waters (1966), and Waters, quoted by Anderson (1972); Taylor (1956), etc.); nor with the common copper astronomical planispheric astrolabe of Arab origin, (see Michel (1968); Roias (1550); Franco (1945), etc.); nor with the elaborate, double-faced, multipurpose instruments, which with their numerous inter-changeable plates and parts constituted full sets or systems of mathematics (see Daumas (1953); Günther (1932), II; Michel (1947), etc. ...); nor even with the expensive, elaborate true universal astrolabes, masterfully cast in copper and artfully engraved, and used in their libraries by an elite of learned mathematicians, astronomers or geographers (see Appianus P. & Frisius G. (1584); Hetias (1627); Michel (1947); Günther (1932), II; Price, Derek and de Solla (1955); Garcia Franco (1945), etc.).

Astrolabum Catholicum meaning Universal Astrolabe (*catholikos* means universal), is a name given by the Belgian cosmographer and instruments maker Gemma Frisius, to an instrument he published, but did not invent, Frisius G. (1583), *de Astrolabo catholico liber*, Antwerp, etc. He calls it "univeral" because it can be used in latitudes, i.e. with any star, whereas the ordinary or "particular" astrolabe needs a special tracing for each latitude.

Petrus Plancius (also, it appears, in the last years of the 16th century) wrote a memory in three parts (now in A.R.A.), the first part of which, published in no. 32 of the publications of the *Linschoten Vereeniging* with excellent notes and comments by S.P. l'Honoré Naber, bears the following (translated) title: "About the Degrees of Longitude and the way to measure them through the deviation of the needle (of the compass) east or west of due North." While explaining his theory, he devotes some paragraphs to "the way to find the deviation of the fixed stars and of the sun with the help of the *Algemeijn Astrolabum*". (For a summary of Plancius' theory that deviation and longitude are closely correlated see the *"toelichtingen"* by S.P. l'Honoré Naber, in *Linschoten Vereeniging*, no. 32).

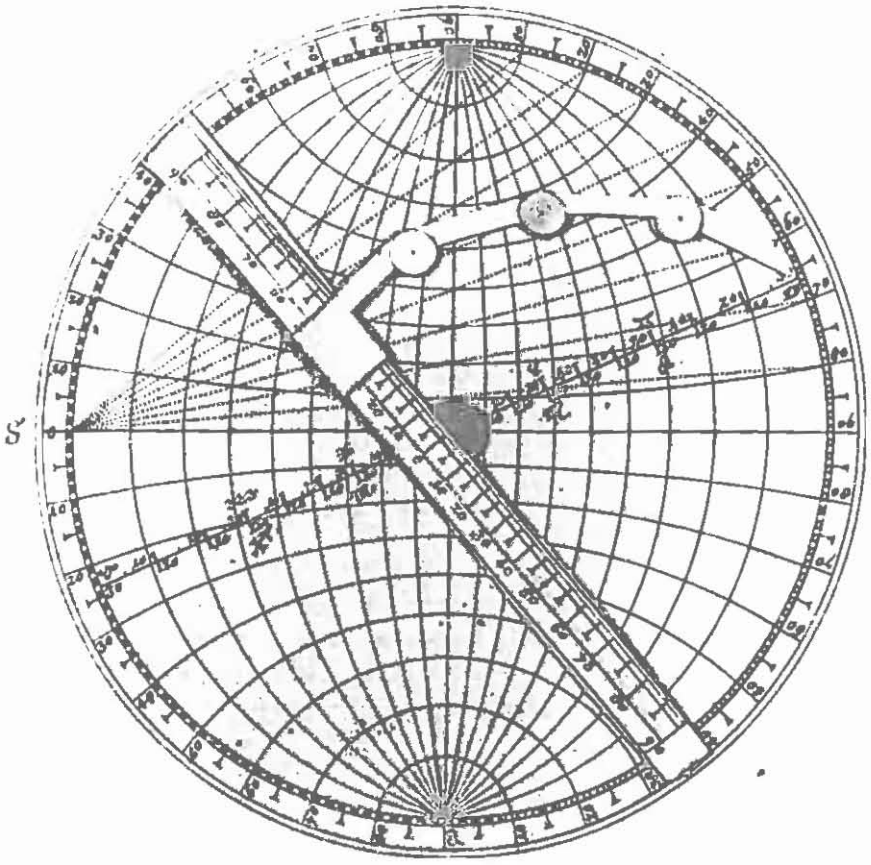


(80) *Brachiolus* of a Dutch mariner's universal or catholic astrolabe, in brass.



(81) Complete instrument shown in the detail of a portrait of *Directeur Generaal* Gerard Pietersz Hulft by Govert Flinck (1654) in Rijksmuseum, Amsterdam.

(82) The so-called *Armken van Barentsz*, a similar *bruchiolus* with its wooden cursor, one of the objects abandoned in the famous *Behouden Huis* in 1597 by Willem Barentsz' party. At the time of the discovery, no other fragment or complete instrument existed.



(83) A cardboard model of the instrument, showing the articulated small arm and the cursor, from a manuscript written in 1647 by Jan Nanninghsoon, a Dutch land surveyor. (Noord Holland Archiefsdienst).

And it is made clear in Jacobus van Neck's "*Tweede Schipvaart*" (1598-1600) that frequent use was made of the "*Astrolabum Catholicum*" in the course of the early Dutch navigations for the purpose of geographical and astronomical observations as well as for the very navigation itself, *Linschoten Vereeniging Publicaties* 50, V, 1, pp. 218-19, etc.

Study of the iconographic and printed documents has led the author to believe that there existed a cheap simplified variety of the catholic astrolabe - the Dutch mariner's catholic astrolabe made of hardwood or cardboard - to be used by unsophisticated pilots for transoceanic crossings, and that the *brachiolus* he recovered was part of one such instrument.

This instrument is thought to be the one very often shown in portraits of seamen, on the engraved titlepages of Dutch navigation treatises, atlases, pilot books, etc., on their many foreign translations, on maps, etc. (see Waghenaer (1586); Blaeu (1608); Hondius (1611); Colom (1633); De Graef (1658); Pietersz (1659); Colom (1669), etc.). Iconography thus first suggests that this instrument was used widely by Dutch pilots from the late 16th to the late 17th century (certainly 1586 to 1669).

Iconography further shows it was made of wood, for if many engraved documents, admittedly too sketchy, do not supply conclusive evidence, one painting at least does. The portrait of the first governor of the Dutch Indies, Gerard Pietersz Hulft, painted in 1654 by Govert Flinck, Rijksmuseum, Amsterdam, shows a Dutch mariner's catholic astrolabe which, except for the brass *brachiolus*, identical to the one here described, is made of painted, varnished hardwood or cardboard (fig. 81). The comparison with a solid brass mariner's astrolabe (Waters' type 14, similar to 15 found on wreck of BATAVIA 1629; see Halls (1964)), which partially hides it, makes the point quite clear.

The *Armken van Barentsz* which had a wooden cursor, presumably had a wooden rule and body, and the literature confirms the existence of wooden or cardboard astrolabes "Magellan's fleet was equipped in 1519 with ... one wooden astrolabe ... and 6 metal astrolabes with rulers ..." (not otherwise described), Waters (1966), 18. Finally, various types of cardboard astrolabes actually still exist: the John Pruyan's astrolabe of 1670, now in Oxford, is famous, and a private collector in Paris owns an 18th century cardboard astrolabe published by Guye and Michel (1970), fig. 220, with the caption: "some makers ... also produced astrolabes printed on paper and glued on cardboard". This last reference is of very particular interest because it raises still another question: the possible relationship between the Barentsz instrument and a set of blank maps being nets of parallels and meridians printed in equatorial stereographic projection, also found in the "*Behouden Huijs*" (note the one lying under the *armken* (fig. 82)).

The perishable nature of the material is consistent with the disappearance of the instruments in sea-water, and the cheapness of an instrument not worth keeping would explain its total absence in the world's collections and museums today.

Let us mention finally that a slightly different variety of the Dutch catholic navigation astrolabe is figured on a world map of 1611 by Jodocus Hondius (in *Theatrum Orbis Terrarum* by Mercator, Hondius and Janssonius, pl. XXII). In that instrument, the diametral equatorial revolving rule is replaced by a radial rule which is made to pivot around a central axis. The purpose of that difference in construction is unclear.

Pocket Sun Watches. Although not specifically navigational instruments, six portable sundials are here discussed with the rest of the instruments in the cargo.

A flat, cylindrical box of blackened ivory (now treated and the white colour restored) was found intact in square C-10. When the lid was unscrewed in the expedition's laboratory, the contents were seen to be: 1. a ring-shaped brass pocket sundial resting on the flat-upper edge of the box; 2. a thin, round piece of glass resting on an inner, narrower, circular ledge of the box which spontaneously broke into 2, 4, 8 and more parts in a matter of seconds and turned opaque in minutes; 3. a tiny, pyramidal, hollow object, in brass, with a circular groove; and 4. many flakes of what seemed to be remains of cardboard. A thin, sharp brass needle pointing upwards was set in the centre of the box.

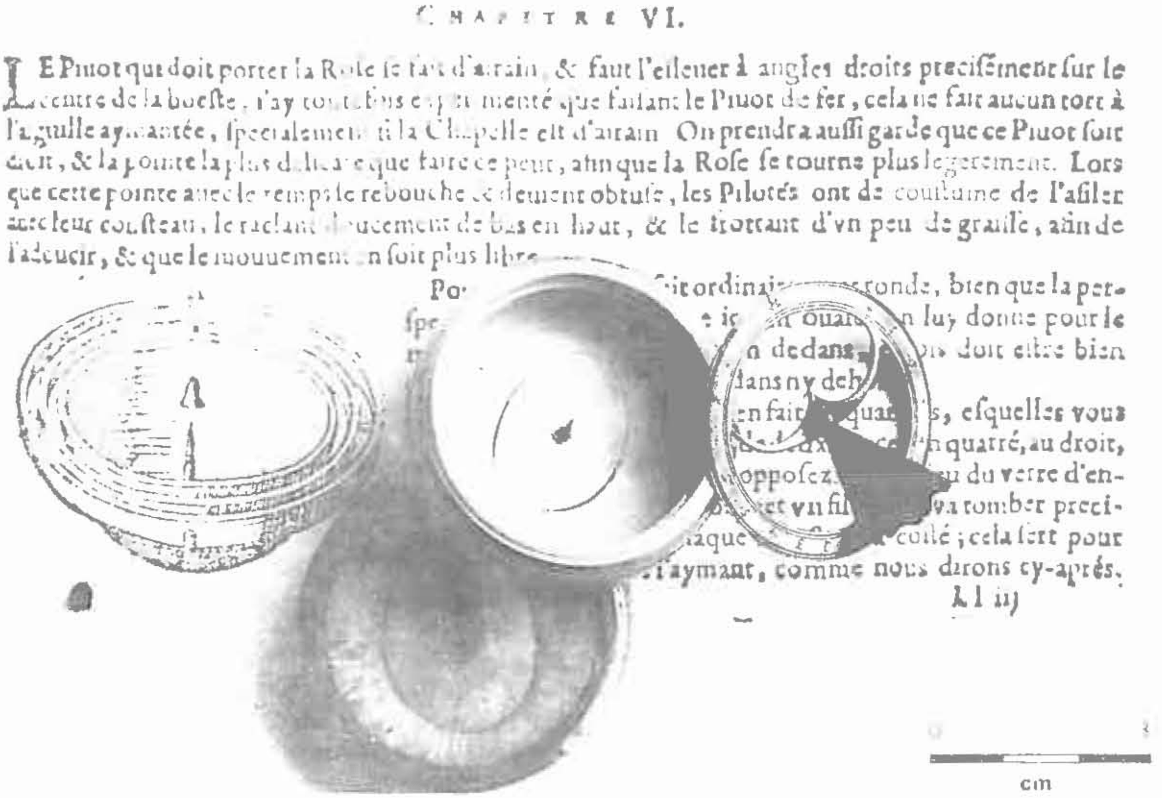
Aubin, *Dictionnaire de Marine*, (1702), 248, writes: "The mariner's compass is ... composed of a thin cardboard, cut in a circle, divided in 32 parts, representing the horizon with the 32 winds. In the centre is a concave bronze cone called *chapelle* with a lozenge-shaped needle of good iron or steel affixed under the cardboard and touched with a loadstone and the whole is called a rose. That rose is put on a pivot, then in a box closed with a glass ..."

Fournier, *Hydrographie* (1679), LIV-XI, 400-3, writes in the same terms, illustrating a pivot and a *chapelle* (fig. 80), and illustrates and describes in detail how the steel needle is to be made.

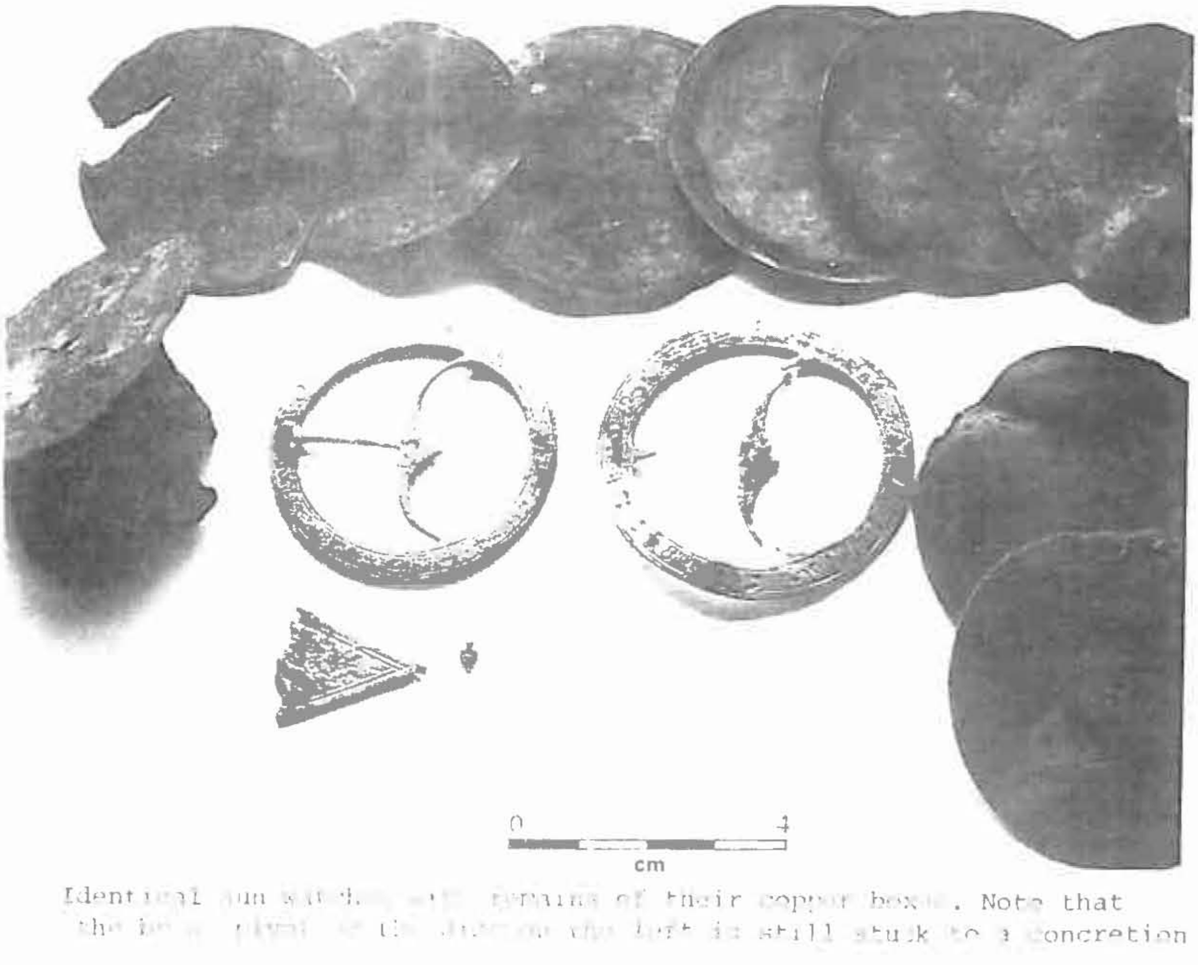
All the parts described above were found in the box except the needle (presumably rusted away). The sundial, also found, is a brass ring graduated in hours 0 to 8 and 4 to 12, 12 coinciding with zero and being the base of the hinged (foldable for transport) brass triangle whose long oblique side is the style.

Michel (1952), H-12, T58: 253-287, distinguishes between sundials: a. based on daily variations of the sun's height (originating in southern countries) and b. based on the variation of the sun's direction, which record the position of the shadow of the style. The instrument discussed is of the type b. i.e. a directional sundial, a type in which Michel further distinguishes between instruments which record the sun's azimuth, or like the one here discussed, the sun's horary angle. We are thus in the presence of a portable equatorial sundial or pocket sun watch.

For correct operation, the ring must be parallel to the equator, i.e. the style (the oblique side of the folding triangle) must be aimed at the celestial pole, i.e. north, so as to make an angle with the horizontal equal to the local latitude, and be in the plane of the local meridian. This requires the use of a compass, hence the combination of both instruments in one box. The shadow of the style then



(84) A German pocket sun watch and the ivory box it shared with its compass. Note the brass pivot and chapelle of missing rose of compass. Photographed against Father Fournier's description of a mariner's compass, showing similar compass pivot and *chapelle* in *Hydrographie*, 1643.



(85) Identical sun watches with remains of their copper boxes. Note that the brass pivot of the one on the left is still stuck to a concretion block.

touches the graduation corresponding to the hour of the day. In the instrument discussed, the rose of the compass could be read through the ring. The star engraved on the ring opposite the style was easily set on south and the reading immediately taken.

Two similar instruments (one wanting the style) were recovered in magma in A-8 and next to ten thin copper discs of slightly larger diameters (fig. 85). Dimensions are almost identical and as follows:

Instrument Description	Diam. of ring	Mark opposite style	Mark scratched on reverse of style
whole in ivory box	0.036m	a star	II
whole	0.035m	a star	VIII
style wanting	0.039m	a K	? (eroded)

Some of the copper discs bear a brass needle sticking out from, and set through the centre, or show a central hole; some are engraved (externally?) with thin, concentrical (decorative?) lines; most show circular traces of black glue (on the inside?). It is believed these ten discs were either glued, as a reinforcement, to the base and lid of cylindrical boxes made of perishable material (wood, leather or cardboard?) formerly containing compass and sundial; or actually were the base and top of lid of such boxes the sides of which have perished.

The ten discs recovered indicate there were at least five such boxes, or at least six sun watches on-board.

The type is not rare in museums and collections today. It is to be seen for instance in the superb Max Elskamp collection, in the Musee de la Vie Wallone in Liege, see Michel (1952); Michel calls these particular instruments: "cheap, of rather rustic construction" and states that they "entirely lack precision".

It seems surprising that instruments of this type should have been part of the LASTDRAGER cargo for they would have been useless in the East Indies (or at the Cape).

Obviously, as the style, once raised, is set in a single fixed position (not adjustable with a system of crutches and according to instruction tables), these instruments could only be used in one area, the latitude of which corresponds to the present angle of the style. These are thus not universal but particular sundials.

The style of the two instruments recovered intact rises from the plane of the graduated ring at an angle of 48°;48° is the latitude of Munich or Vienna (most pocket sundials were then made in southern Germany from where they originated around 1400). The sun watches could have been used neither in the Southern Hemisphere, for the hours are engraved for use in the Northern Hemisphere, nor, indeed, in any part of the Dutch trading area - the East Indies, China and Japan being roughly between the latitudes of 15°S to 30°N but only in Mongolia, certainly not an eager market!

A simple explanation pointed out by Michel (Pers. Comm.) is that in the mid-17th century, wealthy orientals, Chinamen in particular, had taken a fancy to western science and were acquiring or often imitating many types of astronomical and scientific instruments, often without understanding their use and purpose but mainly as western curiosities for the status attached to their possession. The Dutch would thus appear to have capitalized on early oriental snobbery.

A sounding lead (fig. 86), found B-13, weighing 6.550kg or 13 Amsterdam *ponden* is suitable for depths of 40 to 80 fathoms maximum, Aubin (1702), De Loture (1953).

Some 80 brass navigational dividers (fig. 87) are of four different types. For the sake of coherence, the 72 artefacts of types 8 to 11, although obviously part of the ship's cargo, are here discussed together with the other ship's instruments.

Pair No. 1 (B-11), brass, has bifid-ringed hinges on both legs, interlocking at top. Aubin (1702), 293, illustrated Type Nos. 1-2 with the caption: "chart compasses: pilots call chart compasses the ones which open by pressing on the head side. They used them for measurements on nautical charts."

The author has recovered similar pairs on the wreck of the GIRONA (Spanish Armada, 1588) and one identical pair on the CURAÇAO (Dutch, 1729). The advantage of the type is that it can be opened and closed with one hand.

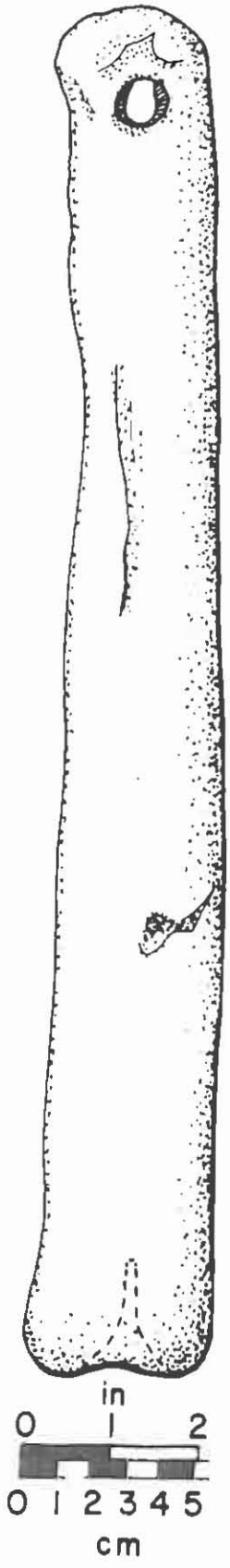
Pair No. 3 (A-10) is much corroded and is not unquestionably navigation dividers, and it apparently had wrought iron points, now missing. One leg is filed down to a single blade which is hinged between the two blades of the opposite bifid leg and seems to continue to form the top handling tip as far as can be judged from corrosion.

The much eroded fragment of Pair Nos. 4-6 scattered in western area of site were probably of Type Nos. 8-11, size 8.

Pair Nos. 8-11 are all of a general type illustrated in Aubin (1702), described as: "straight compasses ... used by shipwrights and pilots". Fig. 85 clearly shows the hinge system which demonstrated superb craftsmanship. The central blade of the three-bladed leg is set in, not cut from the same piece of metal. The fit is perfect. The lubricating tallow in the hinges is still intact.

Pair Nos. 8 (with perhaps fragments 4-6) and 9 are the only ones which have a round, not octagonal, upper section.

Type No. 11, in two sizes, accounts for 7/8 of the total number of dividers found. All of these were grouped in, or very near, square B-7. The objects were found by the writer in a mass of exceptionally hard magma formed in a narrow crevice and cemented by rust from the disintegrated points (fig. 88). Careful dissection with hammer and cold chisel revealed the paralleled positions of most dividers, indicating tight, careful packaging. The wrought iron points, when rusting away, had left *in situ* not a clean usable



(86) Sounding lead.

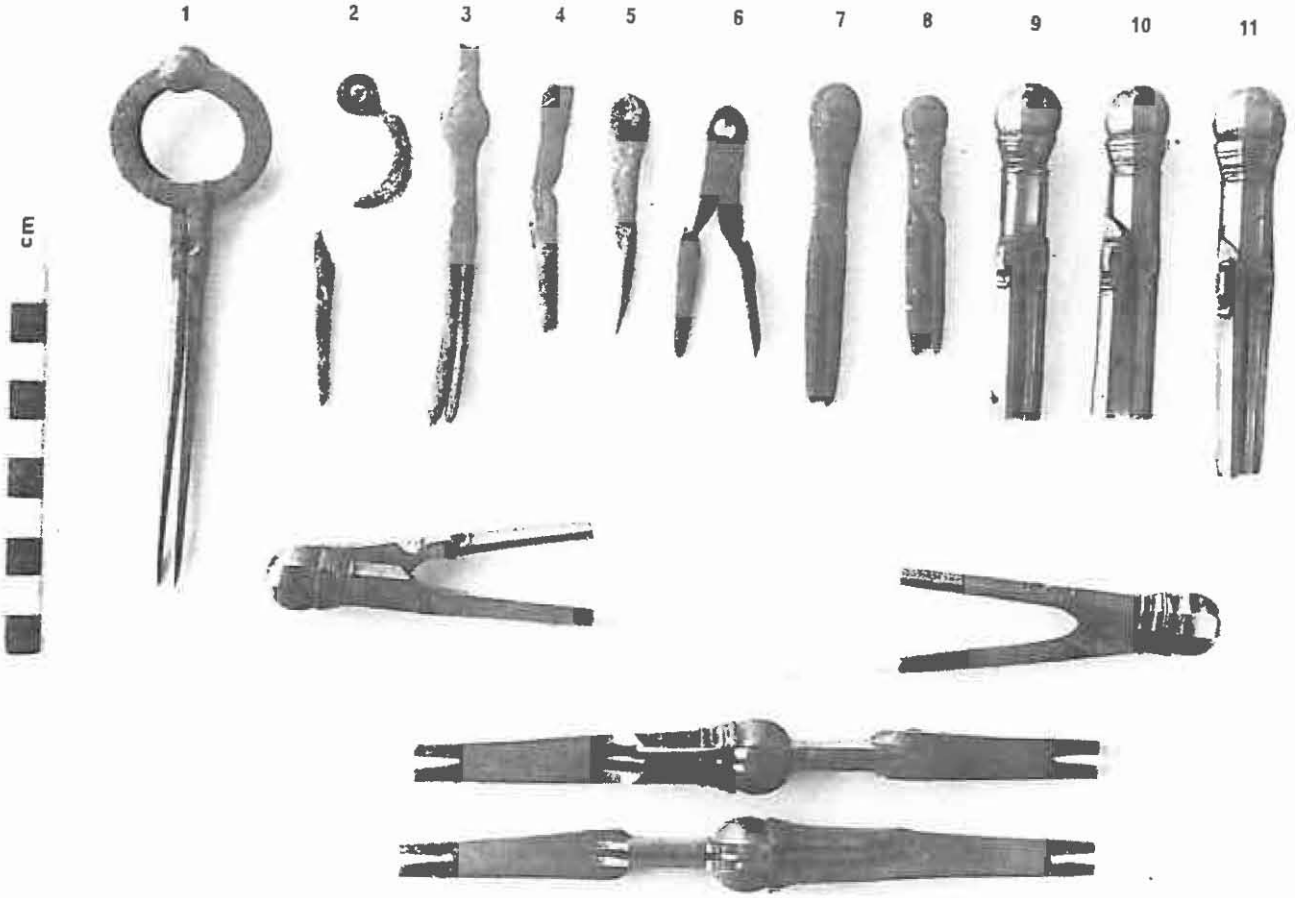
mould, but a perfect imprint, partly filled, however, with the decayed wrought iron strands and a greyish, iron paste. Precise measurements allowed diver Louis Gorsse to construct an accurate model from which plastic casts were then made (due to the fragility of plastic, the casts are regrettably slightly too short).

No trace of a container was observed

True measurements are:

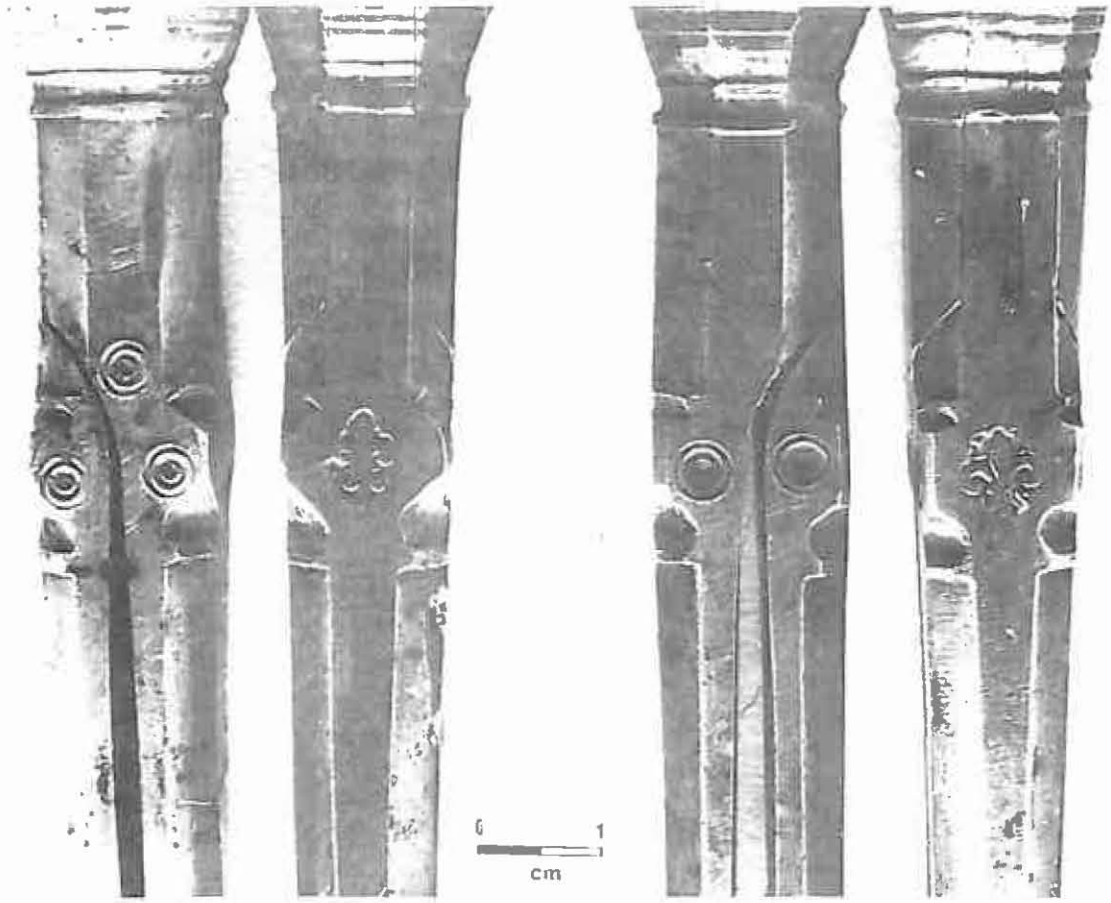
	Brass Legs	Iron Points	Total
Type II small	0.084-0.087m	0.057-0.059m	c. 0.143m
Type II large	0.099m	0.071m	0.170m

Pair Nos. 9 and 10 have a peculiar feature and are the only ones found to have brass pins, pegs, or stops that stick out about 0.002m to keep the legs from closing completely. The pegs are small, cylindrical brass rods set into holes specially drilled through one leg (obviously before surface finishing, which seems to indicate a preconceived purpose, not a later correction). The pin's function may, not impossibly, have been to hold in place some larger stops of various sizes, each of which would have kept a constant, known aperture corresponding to a fixed distance on the terrestrial globe or on a map.



(87) Brass navigational dividers. Nos. 1 to 8, the total found were probably in use on-board; Nos. 9 to 11, examples of 72 similar pairs found, were obviously cargo. The four pairs lying horizontally feature modern plastic casts of the missing wrought iron points.

(88) Divider, with imprint of part of its disintegrated point left in [illegible] concretion. Note other imprints, in same block, two above and three beneath, indicating tight packaging of instruments. Maker's mark not identified (see text for parallels).



(89) Ornament on dividers. The wide-open *Fleur-de-lis* flanked by a *C* on each side always corresponds with two sets of stamped concentric circles. The compact *Fleur-de-lis* without the two *C*s always corresponds with three sets, plus an indentation beneath the circles (see text).

Type Nos. 8-11 bear a maker's stamp which takes two forms (fig. 89):

a. a narrow compact *fleur-de-lis* always associated with three stamped sets of concentric circles on the side. A small hole underneath was apparently designed to introduce the point of a splicing tool between the legs, in order to pry them open if too stiff (also on Pair No. 1),

b. the most frequent form, a wider open, larger *fleur-de-lis*, flanked with the initials II (which at the period stood either for I or J); and which is always associated with two stamped sets of concentric circles. Such slight variations in the marks could well point to two closely related workshops (father and son or cousins?) having worked jointly on what was rather a massive order.

Although the makers are unidentified, it must be pointed out that a Jooris Janszoon, initials II, (died 1637, trade unknown), used a *fleur-de-lis* for his *huismerk* (see further for definition), as did a Theunis Janszoon who died in 1703. The *fleur-de-lis* were engraved to mark their tombstones in the cemetery of Amsterdam Oudkerk (Old Church) but without the II. See OK 75, OK 76, Gemeentelijke Archiefdienst, Amsterdam. If the instruments were made in Amsterdam, which is unproven, the faint possibility may perhaps exist that the makers were members of the Janszoon family.

Remember that Joannes Janssonius (1588-1644), the son of Arnhem printer and bookseller Jan Janszoon, the son-in-law of Jodocus Hondius and the associate of Jodocus's son, Henricus, was in 1653, an active map and atlas publisher with a shop *op 't Water* (on the Damrak) in Amsterdam at the sign *in de Pascaert* (in the navigational chart). He was Blaeu's main competitor. He may well have produced and sold navigational instruments.

Type Nos. 8-11 are parallelled by two pairs in the Maritime Museum, Greenwich, both featuring the *fleur-de-lis*, the stamped circles and the small brass pegs (recovered from the Thames Chamber's Wharf, Pool of London, in 1963). Two more are known to be in the possession of antique dealers in Brussels and Amsterdam. The wreck site of the BATAVIA (V.O.C. 1629) has produced one which Waters calls typically Dutch. The wrecks of the HOLLANDIA (V.O.C. 1743), PRINSES MARIA (V.O.C. 1686), and FRENCH PRIZE, an unidentified ship lost at Port Royal in 1692 (R. Marx) have all produced Type No. 11.

Types Nos. 1-2 and 9-11 are featured on countless Dutch maps, paintings and engravings of the period. Careful examination of some 30 such documents, some showing fancifully, others realistically, pilots at work or teaching their art, indicates that ir fact both types were used indiscriminately, for plotting or measuring, both on terrestrial globes and on charts.

Was this unusual consignment part of the allegedly smuggled goods of Captain Struijck? Was it part of the offical V.O.C. cargo, and then for sale to Asiatic seamen, or for sale as mere western curiosities? The question is not easy to answer.

CARGO

According to a 1637 V.O.C. *resolutie*, a ship 140 ft. (42.67m) long (one Amsterdam *voet* = 0.028m) was to carry besides the ship's victuals and armament, 200 *lasten* of cargo and, according to a later rule, 130 *lasten*. No bill of lading of the LASTDRAGER nor any details of the alleged smuggled goods exists. Consequently, except for three lines in Camphuijs' MS referring to iron work and quicksilver, and one line in Irvine's letter about lead ingots, all the existing information on the nature of the *fluit* cargo is provided by the underwater excavation.

Most remarkable is the large consignment of navigational dividers and the useless pocket sundials already discussed.

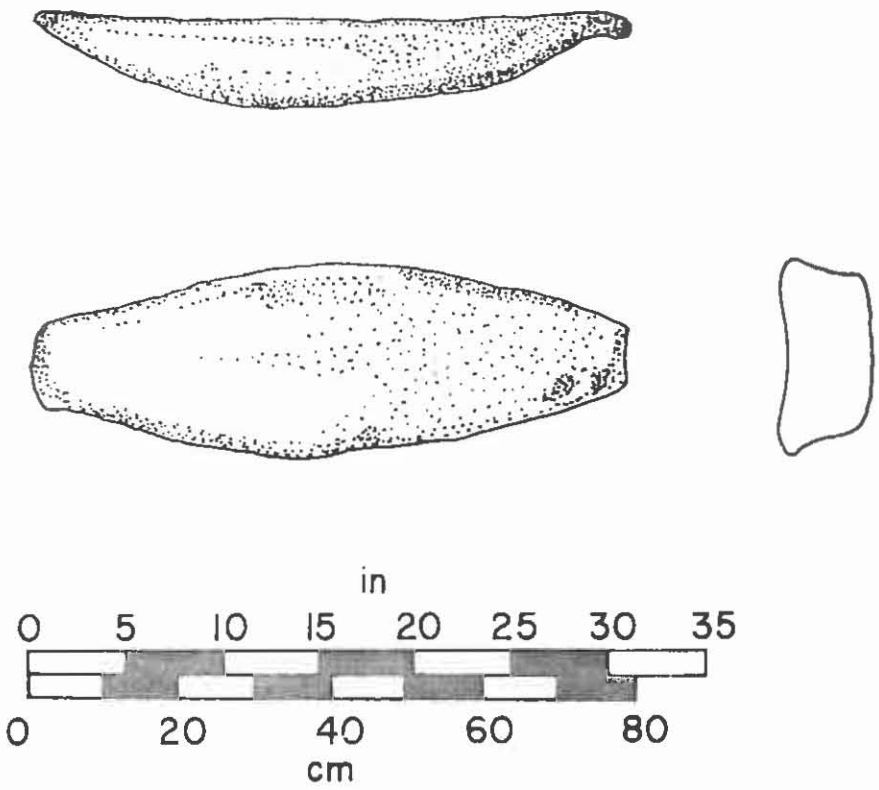
Cooking Vessels. Over 300 fragments of brass and 52 fragments of copper, found mainly in and around squares A-8 and A-9, indicate an important cargo of kettles, cauldrons and the like. Most fragments are of spherical bellies; some with the rim at an angle, angular handles, paw-shaped feet of three-legged cauldrons, which come in at least three sizes. This type of cauldron was common in the mid-17th century; in later times it was usually made in cast iron. Various other types of vessel were present.

Lead Ingot. One lead ingot (fig. 90) was found in B-9. Irvine's divers also had recovered: "Three slabs of lead weighing between 200 and 300 pounds each" (Irvine to Morton, March 30 1736).

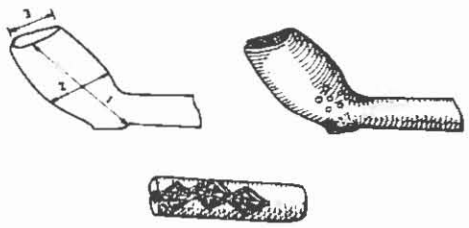
Bricks. Numerous bricks or fragments of bricks were found widely scattered on the site. No wear or blackening due to smoke or fire, as would be expected on bricks from the galley floor or oven, could be observed. The bricks are yellow and crudely baked, irregular in shape, not very straight or flat. Similar bricks have been found in quantities on other Dutch East-Indiamen of the same period: KENNEMERLAND, BATAVIA and VERGULDE DRAECK. It is believed the bricks were taken in lieu of ballast to complete the cargo. A fair part of colonial Batavia was actually built with such bricks. The irregularity of the bricks' dimensions is illustrated in note 1.

Clay Smoking Pipes. Fragments of 80 white clay smoking pipes were found; a. grouped in B-7, tightly packed and stored next to other fragile goods (fine drinking glasses) thus possibly part of the cargo (although no traces of a basket, cask, or other *ad hoc* container was observed) and b. scattered all over the site and possibly issued to the crew by the V.O.C. (the sailors were by conditions of service supplied with boots, shirts, hats or caps, pipes, tobacco and brandy by the V.O.C., Van Dam, I.). All are of the same type and quality.

The base of one "heel" (or "spur") only is marked, it bears: A DL obviously a maker's mark (not identified). The bore of the fragments of stems recovered, varies from 5/64 to 7/64 of an inch (sometimes almost 8/64); many holes are badly off-centred and/or more ellipsoidal than round. Several pipe bowls are marked in relief with five dots circling a sixth dot (fig. 91); this is believed by most experts to be a final stylisation of the Tudor



(90) Lead ingot. Unmarked.



Scale 1:2

1	38 5	34	34	35	37	37	33	34	37
2	20	18	18	18 5	18	17 5	18	19	19
3	12	11 5	10 5	12	12	12	12	12	11

(91) Nine tobacco pipes, dimensions in mm.

rose, itself a souvenir of the mark of the early English immigrant William Baernelts (or Willem Barentsz as the Dutch called him later) who founded the first manufacture of clay smoking pipes in Gouda, in 1615 or 1617 (?). Barentsz's mark was a "crowned" Tudor rose, however, and it was often copied, as such, by his early competitors, Oswald, no. 75 etc. ... Experts usually relate the mark of the six dots with a Gouda origin, but a pipe with this feature can be seen in the Museum De Moriaen, in Gouda, where it is labelled as typical of pipes made in Schoonhoven (a small town, south-east of Gouda). Dutch pipe bowls found in England, bearing the same mark, have been published by Atkinson (1972), nos. 13-19; by Oswald (1969), no. 76; and by others. They are dated 1623-1675, and Atkinson notes that: "the motif as a mark lasted about 100 years". He illustrates one, indeed, dating from 1730, (*ibid* no. 37); and an identical mark is shown on a pipe in an oil painting by Adriaen S. Coorte "Nature Morte de la Vanite" (1688). The mark exists on later pipes with six, nine or more dots, and finally does not pretend to represent a rose any more but becomes a bunch of grapes (it may well have been the origin of the so-called English "mulberry" type, see an example in Oswald, no. 49). The bowls which feature the six dots motif do not have a milled linear decoration (tiny parallel vertical lines) around their top whereas the otherwise unmarked bowls always do.

A variety of the six dots mark which is also well-known features the same motif but with the difference that five sepals are shown (as on the supposedly original Tudor rose) between the dot-shaped petals. This could be an intermediary state of the stylisation (although not in the chronological sense of the word). Examples have been published by Green (1973), 283, from the VERGULDE DRAECK, see above Chapt V.2.4; by Atkinson (1972) who calls it "one of the many varieties"; by Oswald (1969), no. 77, and others. All published examples cover roughly the same period (c̄ 1630-1680) with one late exception in the early 18th century, 1727, see Atkinson (1972), p. 178, no. 36. One such rose made of dots and sepals has petal-shaped dots and is, perhaps, the clearest proof of the rose-origin of the dots. It can be seen on a pipe published by Atkinson (1972), p. 176, no. 16, dated 1634.

The theory which sees the Tudor rose as the origin of the dots motif is given further strength by the fact that Dutch pewterers, who have traditionally used the Tudor rose, crowned, (originally a quality mark) and personalized with their initials, as a maker's touch have sometimes stylised the rose on their pewter works. This is done in exactly the same dots or dots and sepals fashion; see, for example, in Dubbe (1965), 73, fig. 62, the mark of tin-caster, G.J. van de Sighenhorst, who reduces the rose to seven heavy dots with intermediary small dots.

A few of the fragments of stems recovered are stamped with *fleur-de-lis* inscribed in a diamond and repeated three or four times on the top of the stem or round it. The motif (also a well-known motif) may be, according to Dunhill, 1924; 175: "... not the French emblem but a conventionalization of the tobacco plant". The "tobacco-plant-*fleur-de-lis*-in-a-diamond-mark" has been published by Green (1973), 283, and Chapt. V.2.4. above, pipe found on the VERGULDE DRAECK; and by Dunhill (as above, the pipes, intact,

now in the British Museum store rooms, came from the Bragge collection) etc. A pipe on exhibit in the De Moriaen Museum, in Gouda, features the same mark and is labelled 1630-1660. Comparable marks, with other motifs, but also grouped or isolated on the stem only, have been found on red clay pipes from Port Royal dated before 1692 (found by H. Pawson, see Peterson (1965), 188), and on other finds. Pawson believes that such marks are makers' marks which seems very doubtful: known makers' marks are almost always on the bowl or on the base of the spur (full names excepted and this very occasionally); there are, in fact, at least 20 very slightly different, and thus easily confused, varieties of the *fleur-de-lis*-tobacco-plant mark known, all on pipes of about the same period. This would have been imcompatible with the Guild's regulations, after 1660 in any case. Oswald (1969), nos. 73 and 80, has illustrated nine such varieties.

Scattered over the site were 86 strong copper nails, 0.025-0.05m long of square section, with round heads, tapering regularly head to tip, remarkably untouched by corrosion. None was pinned through any of the fragments of the lead strip of the hull sheeting, and most of them were much too thin to fit the holes. It is believed they were part of the cargo.

Fragments of copper sheet 0.003m thick, were found, one more than a yard square (F-13).

Glass fragments include: square-based bottles found in G-13, D-13, and onion type bottles (B-11); also fine drinking glasses of the Rhenish type (commonly seen in Dutch and German paintings of the period), clear or green, of thin glass, the foot decorated with green glass grapes, also one fragment with white and clear stripes. These objects, too fragile to have been used on-board, were presumably cargo. They were associated with glass beads, and with fragments of tobacco pipes in B-7.

COINS

Over 500 silver coins or fragments were found, but none of gold or copper.

A detailed numismatic publication is being prepared, a brief summary of which follows:

More than 100 coins or fragments are unrecognizable; 407 identified coins or fragments, many corroded and eroded, include:

58 Spanish coins found scattered, date indecipherable, include eight Spanish colonial pieces of eight *reales*, four of them minted in Mexico City, three pieces of four *reales*, three colonial, one metropolitan, bearing the name of Philip III then reigning; five pieces of two *reales*; also 42 colonial cob-type, similar pieces, too eroded for further identification, found grouped in B-12.

391 Dutch coins of great variety, including 37 large coins, found scattered of which:

Eight *Patagons* of Archdukes Albert & Isabelle, undated: three minted in Antwerp, other mint marks unreadable; one *Ducaton* of Philip III, dated 1639, minted in Antwerp; 19 *Patagons* of Philip III, variously dated 1623-1650, five minted in Doornik, four in Antwerp, three in Brussels, other mint marks indecipherable; nine unidentifiable; one double weight *Thaler*.

Small Change: 354 coins comprised *snaphaans*, *halfdaalders*, quarter *daalders* and mainly *arend schellingen* of a number of different dates (the earliest 1585) and mints. The majority of the coins were from the imperial cities of Campen (over 159), Zwolle (over 83), and the rest from most of the other cities and provincial mints in roughly even quantities: Holland, Zeeland, Friesland, West Friesland, Deventer, Utrecht, Nijmegen, Overyssel, etc.

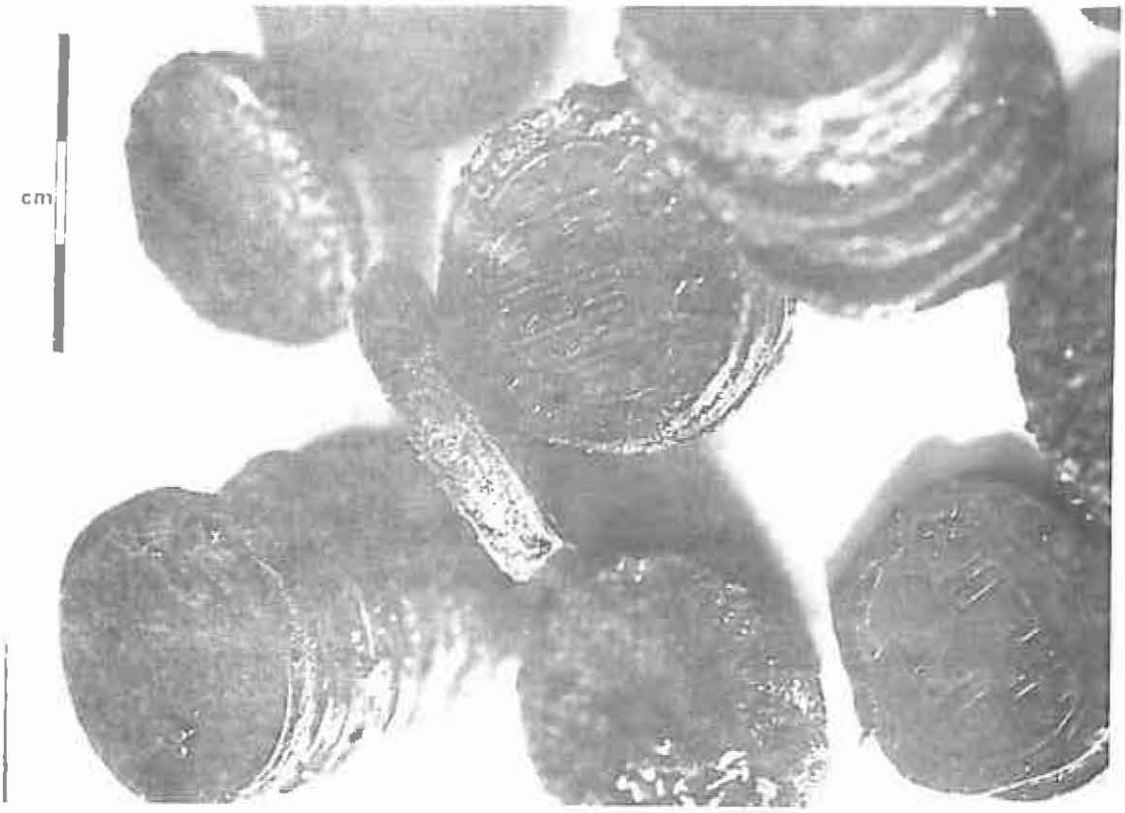
Nearly all the small coins were found in squares A-8 and A-9, and in the form of piles cemented together by exuded copper salts (obviously from the copper in the alloy). This suggests that the coins remained undisturbed in bags and chests for a period long enough to allow the chemical process involved to take place, and were only later scattered in already conglomerated piles, probably during some specially strong winter gale (fig. 92). It was necessary to dissolve the copper salts in a mild acid solution in order to separate each individual coin. The coins in the piles were of various years, types, origins, and degrees of wear, showing that they had been packed for shipment by the V.O.C. from existing currency and not in the mint.

It is of interest to check the number of coins recovered, their nature and distribution in categories, against the planned V.O.C. consignment of specie for the year; also, against the various recorded shipments in late 1652/early 1653; and the references to specie in Camphuijs' manuscript, in the Court records for Shetland and in Irvine's letters.

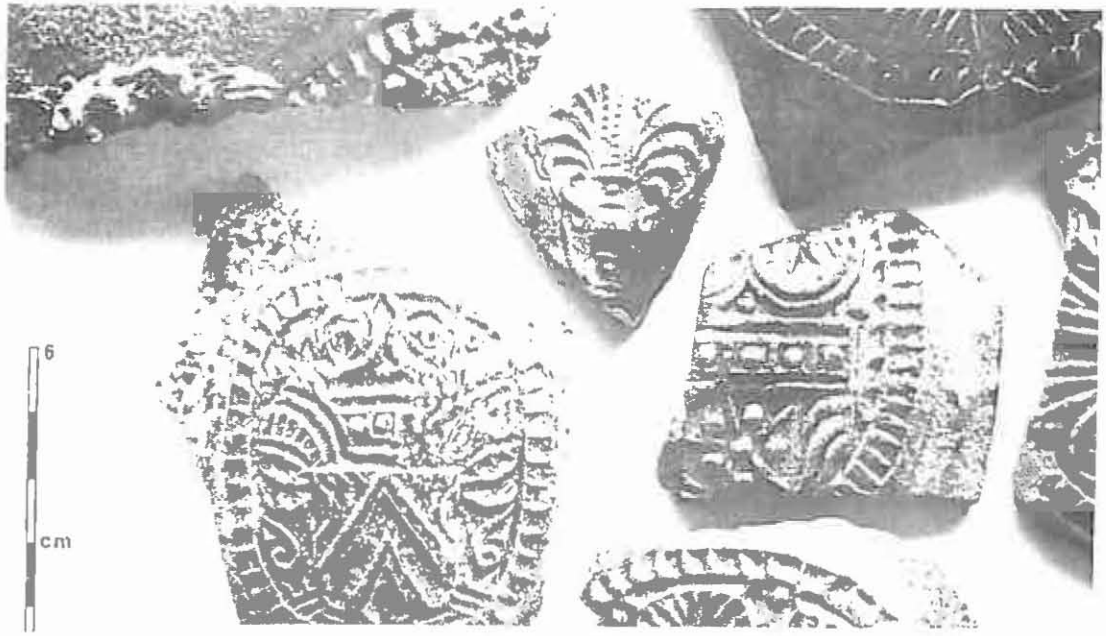
In September, 1652, it had been resolved by the *Heeren XVII* that 400,000 guilders in specie should be sent to the Indies: 300,000 were to be in *gross gelt* (heavy pieces) namely in provincial *daalders* and/or in pieces of eight; and 100,000 in provincial *schellingen*, in double *stuivers* and in *stuivers*. The small change was to be specially minted and, in case it should be insufficient, could be supplemented by heavy pieces.

Of this, the share of the Amsterdam Chamber was to be 100,000 guilders: 25,000 guilders were to be in heavy pieces or *grosse gelt*; and 75,000 in small change, or *payementen*, consisting of *escalins* or *schellingen* to the amount of 50,000 guilders, *dubbelstuivers* or *dobbelden* to the amount of 20,000 guilders and 5,000 guilders' worth of *stuivers*.

The DIAMANT and the WINTHONDT, according to their bills of lading, were carrying 25,125 guilders in specie - as a remittance of the Hoorn Chamber - which were recovered, one half on each after the ships were stranded. The letters and some cargo of the DIAMANT, perhaps including coins, were eventually loaded on the LASTDRAGER on top of her normal consignment, the amount of which is unrecorded;



(92) Piles of silver coins (Dutch small change) found cemented together by copper salts from metal in the alloy and other agents.



(93) Decorated fragments of Bellarmine flagons. The flower on the upper right fragment is similar to the ornament on the flagon found on the Isle of Vatlar (Fig. 95), possibly plundered in 1613 from the LASTDRAGER wreck-up.

the specie from the WINTHONDT presumably shipped on the AVENHORN (see official V.O.C. correspondence, December, 1652-April 1653).

The writer has been unable to find the details of each of the subsequent 1653 shipments of specie but it is reasonable to assume that on top of the 12,500 guilders from the DIAMANT (belonging to the Hoorn Chamber), the LASTDRAGER was carrying specie worth perhaps 25,000 guilders, i.e. a quarter of the Amsterdam 1653 remittance. The Amsterdam Chamber had resolved on October 17, 1652: "... to send of her own 25,000 guilders in specie on three ships leaving for the Indies before the winter". As successive delays and losses kept preventing this, the 25,000 guilders were presumably loaded on the next departing ship, the LASTDRAGER, and the latter's total consignment was thus probably about 37,500 guilders or, indeed, more if another slice of the 100,000 guilders was also loaded.

The fraction of this amount recovered by the expedition is insignificant. Camphuijs refers to the salvage of two chests, which he later heroically defended against some mutinous survivors, helped by Scottish adventurers. (The fascinating story of Camphuijs' fights and adventures in Shetland, are not the concern of the present account. They will be told later in a book (Sténuit (1977)). Camphuijs comments that they (the two chests) would have been worth 16,000 guilders. As an inexperienced junior accountant, however, he may well not have been in a position to estimate accurately the contents of two locked chests (V.O.C. rules required that: "... all keys to the treasure chests on-board outgoing ships will be placed

(94) Bottleneck reinforcements and matching pewter screw caps, from square-based green glass bottles. Contents unknown, but quicksilver a possibility.

in one chest and its number noted on the bill of lading, so as to avoid the trouble of breaking or prying open all the locks in Batavia to find the keys", *Heeren XVII* to Governor General in Batavia, November 15, 1714. From 1703, the chests were sewn in sailcloth as a further precaution, and one key was always kept in Amsterdam, the other in Batavia.

The Court records of Shetland refer only to "tew chists with silver", obviously a mere supposition based on the Dutchmen's comments.

When the same two chests were opened in Amsterdam, the *Heeren XVII* wrote to the Governor at the Fort of Good Hope, May 3, 1653: "26 people only have been saved as well as some money and a little gold". This is odd because gold is nowhere mentioned in the V.O.C. specie export plans for 1653; apparently, it was not shipped fraudulently since it is mentioned in official correspondence as a matter of course, and because one may assume from the words "a little gold" that there was more aboard which was not saved.

Irvine, in 1736, reported to having recovered a very few *ducatons*, half *ducatons* and six pennies.

The cargo of specie of the LASTDRAGER appears in conclusion to be still largely unsalvaged. It is believed that the bulk of it still lies in the stern of the ship.

If we turn from number to denominations, we see that the denominations of the coins as put down in the records were mainly indicative: *daalders* being actually any large, Dutch crown-size silver coin; *schellingen* and the like consisting, in fact of any small coins; and pieces of eight being any of eight, four and two *reales*, perhaps according to actual availability. The records indicate that the small change would be specially minted, but the bulk of the recovered small coins are from two imperial cities Campen and Zwolle, and bear the names of Emperor Rudolph II (1576-1612) and Mathias (1612-1619); no coin is dated 1652 and therefore no specially minted coins are in the recovered sample (which, however, only comes from one chest and is too small to have more than an indicative value).

QUICKSILVER

Shining puddles of quicksilver (mercury) were observed in many crevices, hollows and crannies in squares C-13 and D-13; other puddles were buried under a floating layer of coarse gravel, pebbles and an occasional lead musket-ball. A sample of the metal was recovered with the use of a large-size glass syringe (diameter 0.04m). The metal appeared to have suffered no visible effect from its three centuries in sea-water.

The V.O.C. quicksilver trade is scarcely documented. The only reference to quicksilver on the LASTDRAGER is in Camphuijs: "The inhabitants having learned that such a richly laden ship had been wrecked, came from all places pretexting to help us salvage the goods and so overloaded their boats with ironworks and mercury, that two of them sank to the bottom with nine men, thus chastized by their own cupidity."

The presence of quicksilver on the site raises various questions about which little is known: the origin of the metal, its use, packaging, and marketing in Asia.

Origin of the Quicksilver. It is the opinion of various experts that one could not relate the sample to a particular mine by analytical composition because quicksilver is obtained by distillation and trace impurities in the ores would not be apparent in the metal. Furthermore, no contemporary samples from identified mines are known to exist.

Some evidence, however, is to be found in literature. The main European sources of mercury in the mid-17th century were:

a. the mines of Almaden, Spain, operated since Roman times - a source to exclude at once, because the production was reserved, as a royal privilege, for the Spanish new world silver mines;

b. the relatively unimportant mines of Eisenerz in Styria (now in Bavaria);

c. the important mines of Idria in Illyria or Carniola (now in Yugoslavia), belonging to the House of Austria.

The *Encyclopedie* (1773) says of the Idria mines: "It is a Dutch company which gets the best part of that quicksilver. It takes 300 hundredweight of it a year". We may perhaps assume that the Dutch company either supplied the V.O.C., or was the V.O.C., and that the same applied for the 17th century.

The use for Quicksilver in Asia. In 17th century Europe, quicksilver was used mainly for refining purposes in mining, for gilding, for making mirrors and for medicinal purposes. A letter sent in 1662 by the Governor in Batavia to the *Heeren XVII*, gives clear proof that quicksilver was used in Asia also for treating silver ore; the letter refers to the discovery of "mountains of mineral in the Isles of Telauw" (the Tataud Island, 4°N and 126° 45"W), and says: "one was not sure if it was silver or tin, for the amount of material brought back from there had been very small and no quicksilver had been obtainable to find out", Coolhaas (1969), *Generale Missieven, Maetsuijcker*, etc., XXVII, December 26, 1662. The amalgamation and extraction of gold and silver from their ores, a method developed in Central Europe after 1555 and widely used in south and central America by the Spaniards (Marx), had replaced in the 17th century the ancient method of refining. (The latter was fit only for high grade ore and required enormous quantities of wood for successive boiling operations. The new mercury amalgamation process, on the contrary, was suitable for low grade ores, it required much less heat than the old method but more labour for the mixing).

Gilding was widely practised in Asia and it may reasonably be assumed that quicksilver was used for that purpose also.

The Market for Quicksilver in Asia. Early references to quicksilver being a trade commodity of the V.O.C. are to be found in other *Generale Missieven*, Coolhaas (1960), I, and Coolhaas (1969), II. They tell us, for instance, that the settlement in Masulipatnam constituted a profitable market for quicksilver (1625) and that the quantity that could be sold there yearly was ten to twelve *Bhaer*; that there was a demand for the metal in Suratte in 1632, in Macao in 1636, where the Portuguese had just brought in "a good quantity", and in Amadabath where the English had landed the enormous quantity of 1140 *man* in 1637. We further learn that: "13 *man* quicksilver were sent from Batavia to St. Jacob" (1640); that metal had been sent from the Netherlands the same year; and that more quicksilver was reported to be sent to Goa in 1641 together with other merchandise.

In 1660, the Dutch sent 2875lb. of quicksilver to Ougly (in Bengal), some to Coromandel, etc.

China did not import much quicksilver in the mid-17th century for it produced its own and even exported some to Japan, either directly or through the Portuguese, and later through the Dutch (Boxer, pers. comm.).

Scattered references in the V.O.C. records generally point to the main V.O.C. customer having been India, where the major consumer could have been the Moghul's mints at Surat and elsewhere (Boxer's guess, pers. comm.). Smaller quantities were sold in Persia and Indonesia. The market about 1653 seems to have been limited and easily glutted in ports where English, Portuguese or Danish Indiamen had called and sold their own metal before the Dutch. This is confirmed by the following indications, *Generale Missieven*, II and III. In 1650, three English ships brought to India a cargo containing 200 *man* quicksilver; in 1652, Dutch officials complained to Amsterdam that the profits on quicksilver and vermillion were very low because the English and the Portuguese had brought too much of both. In 1655, an English ship had brought quicksilver to Bellesor and there was "much quicksilver on five English ships arrived at Suhalys"; in 1658, the same situation occurred in Surat; in 1659, four English ships had brought quicksilver into the Moghul's country at Suhalys .... etc. Regrettably, Dutch records give no more precise indications as to quantities, customers, or use for the metal.

The Packaging of Quicksilver. The metal puddles observed were associated with some 30 fragments of glazed stoneware (i.e. about half the total recovered), some of them bearing the characteristic decoration of the so-called Bellarmine flagons (fig. 93) and with about 30 pewter screw-cap bottlenecks of various sizes (fig. 94). Many of the pewter bottlenecks and caps still had inside them the green glass end of the bottle which they obviously capped. Several, when examined, had minute droplets of quicksilver left in the sandy or calcareous encrustations that had accumulated inside. These pewter caps (the pewter appears to have a high content of lead) and the bottles to which they belonged are of a type found on various V.O.C. wrecks (DE LIEFDE, VERGULDE DRAECK, PRINSES MARIA) and other unpublished wrecks. Bottles seem in most cases to be large, square, green glass containers. Could these bottles have contained the quicksilver?

Existing evidence about the way quicksilver was packaged comes from: a. underwater excavations, b. land discoveries, c. literature and records.

a. Evidence from other underwater excavations. Two glazed Bellarmine flagons (height 11in. (0.28m) by 7in. width (0.18m), one filled with quicksilver, the other with traces inside) have been recovered from the wreck of the KENNEMERLAND, Forster (1973), 54, and Forster and Higgs (1973), 297-8.

Similar finds have since been reported by the Rex Cowan team from the wrecks of the HOLLANDIA (1743) and PRINSES MARIA (1686).

On a wreck found at Sharm-el-Sheikh, tentatively reported to be Levantine *c.* 1600, quicksilver has been found in bowls made of bronze with 20 per cent lead content, and in glazed pottery jars, Raban (1973), 182.

b. Evidence from land discoveries. Colin Martin has kindly pointed out to the writer that a Bellarmine flagon, now in the National Museum of Antiquities, Edinburgh, was "... found filled with quicksilver in the year 1881, having been exposed to view on the surface of a piece of mossy ground near the shore after a storm and much rain in the Isle of Fetlar .... The dimensions of the jug: 11in. high by 8½in. maximum diameter, capacity one gallon .... It was undated", so wrote John Reid (1884), who concluded his paper by saying: "why and how it should have been used is not easy to say".

Today, the author can suggest an explanation: The Isle of Fetlar is east of and very near Yell. The Fetlar flagon (fig. 95) bears a similar decoration to the one found on a fragment from the LASTDRAGER (fig. 93). It is similar also to a Bellarmine flagon now in the Guildhall Museum, London, said to date from 1650-1700. It is identical to a Bellarmine flagon deposited between 1653-1656 in the Bristol Saint-Nicholas Almshouse, Barton (1964), 8-203, fig. 67, no. 26. It is thus thought likely that the flagon was one of the containers taken from the fore half of the LASTDRAGER with which "inhabitants coming from all parts", to quote Camphuijs, "had in their cupidity overloaded their boats" (the possibility that the jug should have come from the wreck of the KENNEMERLAND is slight in the author's opinion).

c. Evidence from literature and records. That quicksilver was often carried in grey stoneware jugs in the international trade in Asian waters is shown by the V.O.C. records, *Generale Missieven*, I, II and III, and one sees no reason why a transfer of container would have been effected in Batavia before distribution of the imported metal.

Quicksilver was sometimes contained in Bellarmine flagons. Bellarmine flagons were not always satisfactory. In 1636, the following complaint was sent by Governor Van Diemen *et al.*: "about the stoneware jugs and the bottles (?) one should always take care to check that they are devoid of leaks or cracks before the quicksilver is poured inside. Out of the eight that came with the HAERDERWIJCK, one was almost empty when disembarked; glass bottles in crates would serve the purpose still better". Other containers were used and were found

(95) The Fetlar Bell Armin[illegible] Flagon (National Museum of Antiquities, Edinburgh).

even less adequate as proved by a request made in a letter of Governor General Maetsuyker in 1668, *Generale Missieven*, for the "quicksilver to be sent out not in breakable pots but in *baertcannen* ("pots with a beard" or Bellarmine flagons again). However, other completely different containers were also used in the V.O.C. trade, namely leather bottles in small wooden kegs.

Governor Van Diemen reported in 1636 that: "The quicksilver that arrived on the WESEL, NASSOUW and HOLLANDIA, has arrived properly packaged for it was sent by your excellencies in the good season and it has arrived here rapidly in such manner that the leather bottles were still free of damage by putrefaction. On the contrary, the metal brought here by the AMSTERDAM, 'S GRAVENHA(GE) and AMBOINO has suffered extreme leakage because, due to the great humidity of the ship's holds and the long time they remained in them, the said leather bottles had begun to rot, and because the kegs were not tight and leakproof. Indeed, they were made with thin, rotted wood, of poor quality and no thicker than the little finger and they were so poorly assembled that one arrived empty, others half empty and others still partially empty. The said quicksilver had penetrated so deeply in the rotted wood of some of the kegs that, when empty, they were found to be as heavy still as the others which contained the full leather bottles."

Still a fourth type of container appears to have been tried and discarded by the V.O.C.: "the copper cauldrons in which the quicksilver flows from its mineral are fine and adequate to hold and preserve it in European countries where they are not exposed to extreme changes of climate and where they are not penetrated so powerfully by the grinding and corrosive hot equinoctial air. People say also that quicksilver has a very peculiar antipathy for copper and consumes it."

It is clear that shipping such a heavy and irretrievably spillable fluid must have presented difficulties. The *Generale Missieven* shows that the packaging of quicksilver was unsatisfactory at the time as losses due to breakage and leakage were consistently heavy. Examples of complaints from Batavia are numerous -

> 1632: "the extreme leakage of the quicksilver sent to Suratte is utterly unacceptable, even considering that much of what was sent there was part of what was salvaged from the sunken BATAVIA, your Excellencies are asked to kindly give their best attention to future shipments ..."
>
> 1636: "our complaints about the way the quicksilver is packaged have now lasted for four successive years. ... If your Excellencies cannot bring a better remedy (to the situation) in the future, it would be better to wait and not ship any more of it, sending in the meantime its value in specie, because we must avoid the unacceptable losses which are too heavy for our profit margin in the Indies ..."
>
> 1649: "Quicksilver brings 36 *stuivers* per lb. against 22½ *in patria* (i.e. the Netherlands) but breakage is too serious" (to make the trade profitable) - (comment about the general commercial policy for all the Indies.)

The Company was always looking for better solutions and it is relevant, in the present discussion, to examine the solutions adopted at the time by other nations (and often recommended to the *Heeren XVII* by the Batavia Company top servants) as well as the modern method.

We learn from the *Generale Missieven* that: "the quicksilver sent to the Indies from Portugal is in double leather bottles which are tightened with a knot and then put in small double watertight vats, the two of which, the inside one and the outer one are reinforced with iron hoops ..." (1632).

The same year we hear that: "it is reported from Suratte that the English receive their quicksilver much better packaged in various sorts of smaller kegs, these are easier to handle and also much stronger and heavier than the ones we make but also we believe that what helps most is that it is brought to the place it is to be sold without transhipment". In 1636: "The English bring it in thick glass bottles and also in big, thick, heavy jugs ..." The same year, Governor General Brouwer had sent some empty English quicksilver kegs to Holland to serve as models.

How the Spaniards managed in their trade with the West Indies is not too clear. Olive oil jugs were sometimes used and the production of the Almaden mines was traditionally counted in so many "bottles", *Grande Encyclopédie* (1885); the Chinese quicksilver produced in Tchang Tchou in the 19th century was poured into bamboo stumps, still retaining their two nodal partitions. The upper partition which served the purpose of a lid, was pierced with small holes, later plugged by resin-sealed wooden pegs. But the Chinese were at the same time importing 200 tons of the metal a year from Peru and Spain in "spheroidal sandstone jugs snuggly inserted in small wooden buckets, 28cm high and 27cm diameter at the lid, each containing 60 catties" (one cattie = $1\frac{1}{3}$ lb average), *Dictionnaire Universel du Commerce et de la Navigation*, (1859), Paris.

We further learn from the French Archives de la Marine, Serie B, *Amiraute de Cornouailles, Quimper* - B 4375, that when the Dutch merchant vessel ZEVELIT from Amsterdam (correct spelling is probably ZEEVLIET - not a V.O.C. ship) was lost at Audierne on the coast of Brittany in 1765, the salvage fee of the salvors for the barrels of quicksilver salvaged from the wreck was fixed at 6 sols per lb. Were the barrels just barrels? Or were they an outer protection for fragile quicksilver-filled containers. The matter is further complicated by two references in the *Grande Encyclopédie* (1778): 1. "The mercury which is brought by the Dutch company (already referred to above) in the Ystria mines, first flows from the iron kettles into well-sealed earthenware containers"; and 2. "The mercury which has been obtained by distillation is put in heavy bags each containing 150 lb. and when the time to transport them arrives, two of these bags are put in a barrel, which is then sealed with wheat flour bran".

Today, quicksilver is hauled and shipped in metal flasks of the standard weight of 76 lbs.

Summing up the V.O.C. problems. Professor Boxer writes (pers. comm.): "All kinds of methods were employed (to prevent loss by leakage) even coconuts."

One may well ask, therefore, whether the quicksilver on-board the LASTDRAGER was not being carried, as an experiment the English way i.e. in glass bottles, as suggested in 1636 by Governor Van Diemen; the fragments of glass bottles were so closely associated with the metal puddles on the sea-bed (not forgetting that an equal number of fragments of Bellarmine flagons were also closely associated with the puddles).

The few fragments of bottles recovered do not enable us to reconstitute the sizes of any of the square, green glass bottles, but the various sizes of the caps suggest many different sizes of bottles. The glass bottles would obviously have been strongly protected either with straw, like old oil jars or modern bottles of chianti or, more probably, enclosed in a wooden or metal crate, again, as suggested by Van Diemen, like modern, large acid bottles. Corrosion of the pewter caps by the mercury could possibly have been prevented by an insulating plug of some neutral material, like tallow (no trace, however, of any such plug or of padding protective material has been observed). Such experimental containers, in any case, although not necessarily worse than coconuts, certainly would have been good reason for Governor Maetsuyker to ask for a less breakable alternative.

It is now up to further underwater excavations to settle the matter of packaging quicksilver in the V.O.C. trade.

PERSONAL BELONGINGS

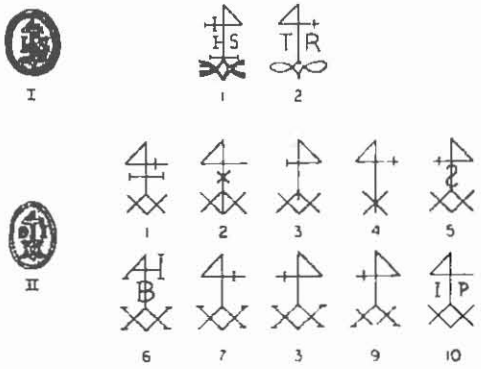
The following finds were presumably the personal property of the passengers and their families, or of the officers and crew, or of the soldiers:

Two large, brass finger rings (Nos. I and II) each bearing a different *huismerk* or merchant's mark (fig. 96).

Ring No. I (B-7) was preserved in magma. The engraved signet had left in the concretion the perfect positive imprint of a *huismerk* which the writer has been unable to identify with certainty. One must remember that in northern and central Europe *huismerken* had long been a mark of property and identification in houses (as on anchoring irons in the walls, or engraved in the lintel or on beams), on tools, on objects, on cattle, etc. They also became family symbols strictly inherited and duly recognized by law as an official signature, much like the arms of the noblemen which, in fact, they sometimes actually became. Merchants had also used the same family signs, incorporating their initials or sometimes their full names in monogram form, or a talking symbol, to mark their products or containers, thereby guaranteeing the quality of their production. The marks had to be simple so that they could be cut with a knife into the wood or crate or barrel, or painted with a few strokes on a bale. Craftsmen similarly identified the production of their workshops and the same signs were legally binding on them in commercial or customs documents, see Gruel (1926), Homeyer (1870), Ruppel (1939), Reydon (1940), Vlaanderen (1946), Nieuwenkamp (1955), etc. Merchants' marks should not be confused with hallmarks, custom seals or other official stamps.

(96)

A. The signet ring (no. I) has left a perfect positive imprint in the protective concretion in which it was embedded.



B. Similar merchants' marks, in use at the same period belonged to:

I) 1: Hans van Hanswijck, 1639 (O.K. 75 fo. 2 118 & O.K. 76 fo. 84).

2: Unidentified (Homeyer, 124, pl. V).

II) 1: Unidentified (Wedding register of Ooortmarsum (Staatsarchief, Zwolle).

2: Unidentified (On a grave in Steenwijck, Groote Kerk).

3: Unidentified (On a grave in Rotterdam's Groote Kerk).

4: Unidentified (On a grave in Oude Kerk cemetery, Amsterdam).

5: Thomas Janszoon, 1640. (On a tombstone in de Oude Kerk cemetery of Amsterdam (Grafboek O.K. 75)).

6: Anthony Verbruggen (as above, note that monogram is almost complete).

7: Jacob Willemsen, Blauwen Holm (Nieuwe Kerk cemetery Amsterdam, Grafboek N.K. 48).

8: Pieter Ruijs zijn kinderen, c. 1700 (as above).

9: Roolof de Vrij, 1666, (as above).

10: Unidentified, in use in Norwich (England) (Homeyer, 132, pl. V).

Mark No. I combines the figure "4" with the capital letters "I" and "S" and a double, symmetrically opposed, flattened alpha. The figure 4, with its horizontal bar extending on both sides of the vertical stroke, is extremely common on merchant marks, and not only on Dutch ones. The origin of the 4 has been alternatively ascribed to runic characters or to a simplified combination of the holy triangle or signifying the schematic representation of the movements to form the Catholic sign of the cross, de Marneffe (1939), Gruel (1926). Considering, however, a. the fact that the 4 is often shown sideways like a variation of a mere cross, and b. the universally human search for economy of effort, the author suggests a simpler origin i.e. that the figure 4, whether standing or leaning, was found by practice to be the simplest form to draw, after the stroke and the V, without lifting the hand. It is also featured on the marks of the English and Swedish East-India Companies. The little vertical stroke crossing the right side arm of the 4 indicates an elder son using the family mark; younger sons would have used two or three or more of such strokes, to identify them at a glance. The letters I and S are obviously the initials of the bearer, or of an ancestor. The opposed alphas are uncommon on merchants' marks; their meaning, if any, is not understood by the author. In the absence of any other clue, the fact that the I (which could be I or J in the period spelling) and S are the initials both of Jacob Struijck, the captain of the LASTDRAGER, and of Jan Sandeman, a midshipman from Lübeck, who survived the wreck (Camphuijs (1653) annexed list) indicates no more than possibilities of identification.

Ring No. II (A-8) also bears a figure "4", the vertical stroke stems from two opposed V's, superimposed upon one another, one of them upside-down, or possibly from two simple crosses. Two capitals, an "I" and a "C" (which looks, as usual in the period, like an inverted G), are on each side of the 4. This offers various possible combinations of the initials I,C,V,W and possibly A, or the initials I and C only, if we simply consider crosses (the letter X does not exist in Dutch). The mark is also unidentified and, again, no hasty conclusion should be drawn from the similarity to the initials of Johannes Camphuijs. Furthermore, as possession of a signet suggests some association with paperwork, literacy or finance, Jan Carzouw, a soldier from Berg op Zoom and a survivor, appears to be the least likely candidate of all the people whose names are known.

A detailed knowledge of all the merchant marks that were used throughout Europe from the Middle Ages onwards, would be of obvious and enormous importance to all historians studying the economic history of the period. To appreciate, however, the difficulties involved in identifying merchant marks, it must be realised that several tens of thousand different or slightly different *huismerken* were in use in the Netherlands alone, in the mid-17th century. Furthermore, merchants often used different marks to trade in different markets (one for Cadiz, another for the Baltic, for instance). To the author's knowledge, no attempt has been made to compile a complete systematic inventory or study of Dutch *huismerken*, and he, himself, has only been able to check less than 5,000 marks in contemporary records and documents, or in extremely incomplete modern compilations (Churchyard registers, marriage registers; also Voet (1912); Homeyer (1870), Reydon (1940), Reiner (1945)). Fig. 96B shows a few examples of marks similar to Nos. I and II. There is no suggestion of any direct connection between their bearers and the bearer of Nos. I and II.

It is not known if the legal bearers of the merchant marks actually sailed on the LASTDRAGER, or only their factors to whom lawful possession of the merchant mark gave power to complete business transactions on behalf of their employers. It is surmised that mere brass rings would not have been worn for purely decorative purposes.

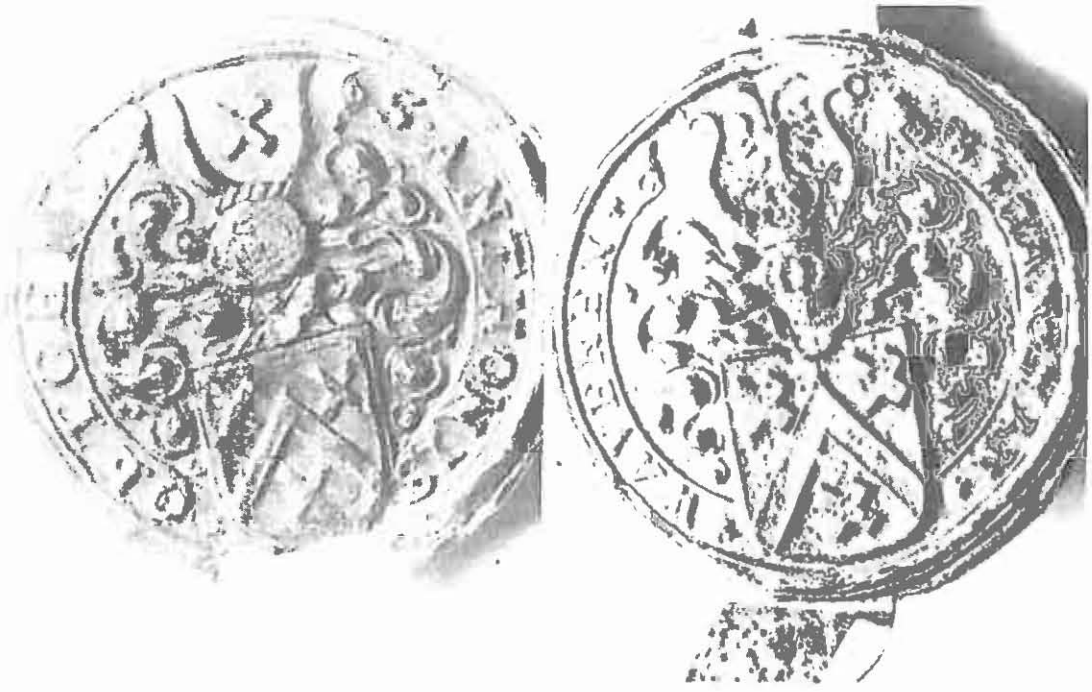
A man's decorated gold finger ring (A-8) bears a melanite signet engraved with a coat of arms of a chevron and three saltires, placed 2 and 1, inscribed in a blason under a double winged helmet. This is crested by a fourth saltire and frame in a mantle (fig. 97).

In the mid-17th century, two prominent and related families of Amsterdam, the Oetgens van Waveren and the Bors van Waveren, bore the following arms: "Or, a chevron gules between three saltires of the second with crest and mantle", Rietstap (1883), De Renesse (1892), 306. They were wealthy families of merchants, administrators, soldiers, lawyers, sailors, diplomats, etc. The records of the Gemeentelijke Archiefsdienst, Amsterdam, various monographs, (Bloys van Treslong Prins (1908), 1-7 and 10-15; Elias (1905), 107, 184, 211, etc.) and the help of the Dutch Centraal Bureau voor Genealogie, have enabled the writer to retrace part of the family tree (see note 2). In the 16th century, the arms rightly belonged to an Antoni van Houff, who had given his daughter in marriage to Frans Hendrickzoon Oetgens (1558-1625), an extremely wealthy merchant of Amsterdam, and *Bewindhebber* or director of the V.O.C. from 1614 on. One might well wonder if Antoni van Houff had not designed his coat of arms himself by drawing a shield around his old plebeian family *huismerk* or merchant's mark, for a chevron is nothing else but an inverted V and a saltire is a cross, the most common sign in merchants' and other marks. (An example is the mark on the tombstone of a Claas Gerbrandtszoon in the Oudekerk Cemetery in Amsterdam (OK-75). Furthermore, a mark used after 1614 (OK-75) to identify the tombstone of die Kinderen van Jakob Verhouff (a connection with the van Houffs seems probable) shows the same chevron and the three saltires, combined again in similar fashion and inscribed in a shield).

In any case, it is known that Frans Hendrickzoon Oetgens usurped the shield of his father-in-law, changing the tinctures and giving it additional panache later with helmet, crest and mantle. Self-made noblemen were in no way unusual in the Netherlands, as there was no national sovereign to confer genuine titles, nor legal rules to control imposters; at the same time, a deep aspiration to the status of nobility resided in the rich burghers, merchants and administrators. A true practical need existed for such status for those who, like the Oetgens, were being sent on diplomatic missions to foreign courts where all the other envoys they met were titled. Possible owners of the ring may thus be: 1. the son of Frans, Anthoni Oetgens van Waveren (1585-1658), who first called himself van Waveren after having purchased from the Saint Mary Chapter in Utrecht, in 1624, the lands of the *Heeren* van Waveren, Botshol and Ruige Wilnis, or 2. the grandson, Joan van Waveren (1613-1670). Both successfully occupied most of the highest posts in the civil, naval and military administration of the city and country. Anthoni, for instance, was Alderman, and Joan, Mayor of Amsterdam. Their seals and counter seals respectively, as alderman and mayor, are still extant on official documents of the period. The seals are shown (fig. 98) for comparison with the signet ring. As neither of these

(97)

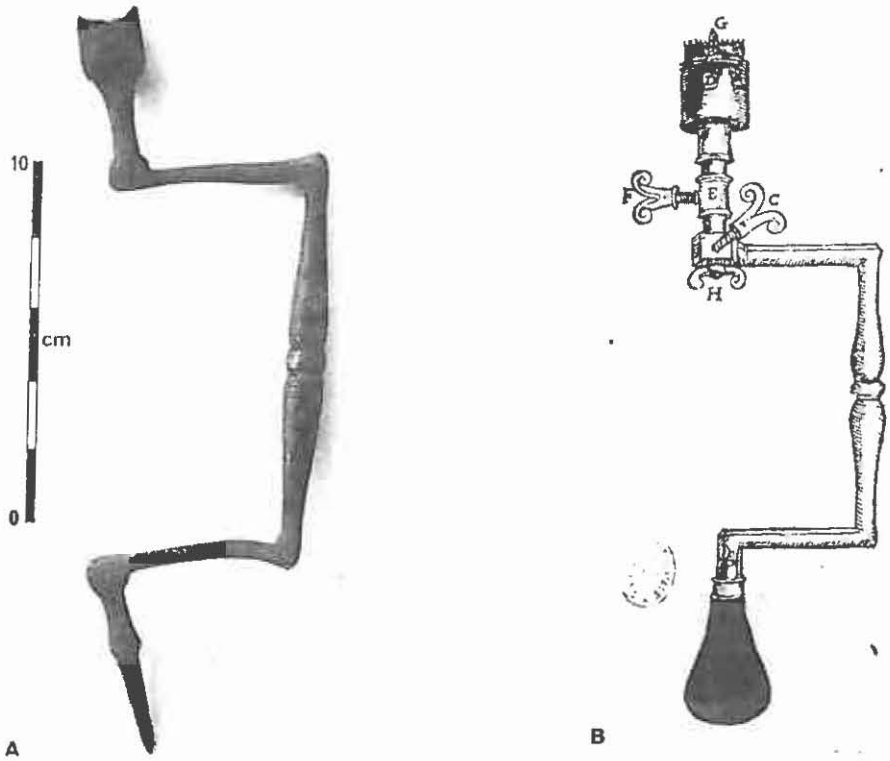
The van Waveren signet ring.



(98)

A. Seal of Alderman Anthony Oetgens van Waveren, on an official document dated November 26, 1614.

B. Mayoral seal of his son, Joan Oetgens van Waveren, on a document of the Municipality of Amsterdam, dated April 23, 1643 (*Historisch-topographische Atlas*, Gemeentelijke Archiedienst, Amsterdam, nos.1102 and 1219).



(99) A. Part of a brass wimble for skull-bone surgery.
B. A French 16th century complete instrument, similar but with a more elaborate system of trepan fixation (see text), from Paré, A., 1561, *La Methode curative des Playes et Fractures de la teste humaine*, pl. CLXXXVI, Paris.

very important persons sailed on the LASTDRAGER, one may suppose that the ring had either been entrusted to a factor or agent on whom the authority of the signet was thereby conferred, or stolen.

A brass wimble, in three assembled parts (A-10) of delicate construction, is believed to be a surgical instrument for human skull trepanation. It is paralleled in Pare (1561), pl. CLXXXVI, and other treatises (fig. 99). It lacks the wooden ball once fastened to a point and the crown-shaped trepan. Two opposite brass pins sticking out of the bottom of the hollow, olive-shaped ferrule, and close to the sides, were probably part of a simple locking device for the trepan. The instrument was used to detach bone discs from the skull in order to reach the organs, Dulieu (1967); re: Pare, instrument pl. V. This was not an operation lightly undertaken: "The Company surgeons may never ... perform a serious operation like an extirpation, trepanation or any other operation of similar gravity ... or assist in the performance of any ... without having previously advised the competent authorities or the Officers of Justice and obtained approval", Van Dam (1701), 168-171.

On a 400-500 ton Dutch ship of the period, the surgeon according to Fournier (1679), IV:111, 141, was paid: "50 pounds a month including his chest" which suggests that the instruments of the surgeons were their own property. Aubin (1702), 201, writes: "the rank of the surgeon comes after the bookkeeper ... his chest is kept in the ship's stablier and quieter place ... when there is a doctor aboard he must follow his advice ..."

There are two possible owners of the instruments - the ships' surgeon or a passenger surgeon.

1. V.O.C. regulations of 1685, indeed, rules that a 140 ft. *Retourschip* should have one head surgeon, *opper chirurgijn*, and two other surgeons. Rules for 1653 are not known to the author but one surgeon at least was aboard.

2. The Amsterdam Chamber had resolved on October 9, 1652, to grant a passage on the WINDHONDT to Willem Granaert and his wife. Granaert was going to the Indies to serve the V.O.C. there as the head surgeon. It seems probable that after the *jacht* was stranded and abandoned without casualties, Granaert, his wife and his instrument chest took passage on the LASTDRAGER.

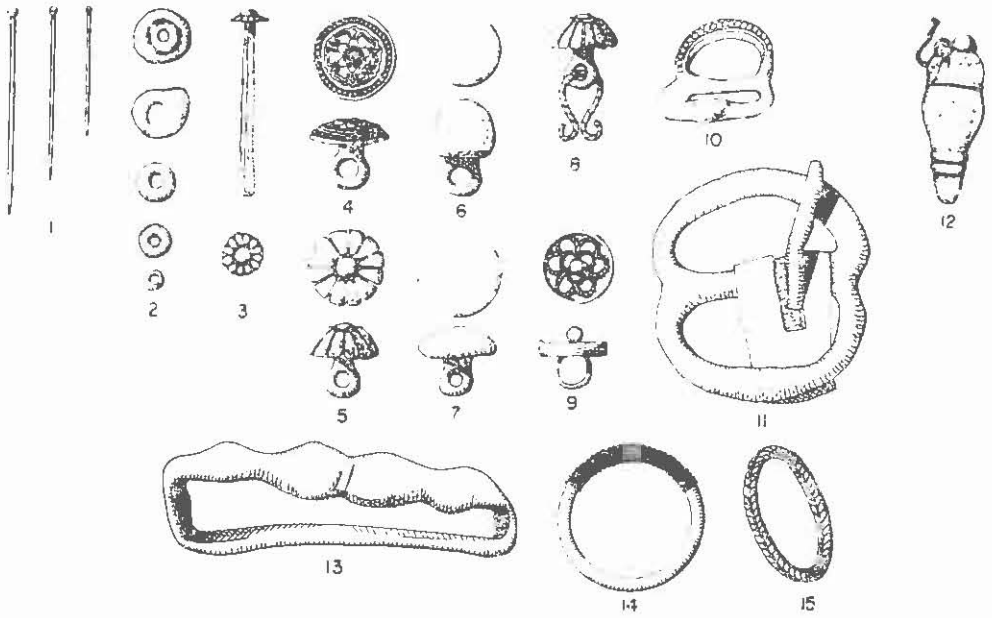
Seven brass pegs or rivets (fig. 100-3) are of a common type used mainly to attach the two wooden, or horn halves to the haft of the blade of a pocket knife - paralleled on the GIRONA (1588) - or to hinge the blade of a surgeon's lancet or bistouri, Pare (1561); Planche CLXXVII (1928), d'Allemagne, and Songy (1732).

There is a realistically reproduced silver lady's nipple (not illustrated) and column, arms, dolphin, etc., besides other unidentified fragments.

A delightful lady's gold wedding ring in the shape of plaited hair (fig. 100-15) (A-8) and a possible gold earring (fig. 100-12) (A-8) could have adorned the wife either of the head surgeon, Willem Granaert, or of Commander Vodencamp who was to serve the company overseas, and to whom the directors of the Chamber of Amsterdam had granted a passage with his wife, *Resolutie*, K.A. October 14, 1652.

A bone dice (0.01 x 0.01 x 0.01m) (B-10) with hollowed black dots, disposed as in modern dice (not cogged) presumably belonged to a sailor, as well as scattered fishing leads (fig. 101-1) which were found in a stratigraphical context which warrants their age.

Nine cast silver figurines or fragments (fig. 102) (all from B-10) include a man running or possibly shooting with what looks like a soccer ball, possibly one of a set of *poppenzilver*, the tiny silver toys which were as popular at the time with children of the Netherlands as were the dolls' houses in which they would have been lodged. The Historisch Museum of Rotterdam has a fine collection of *poppenzilver* and dolls' houses; regrettably, the collection is neither published nor researched. A palfrey rearing on its hind legs, fully harnessed and saddled, is hollow and only one half shell remains. It is similar to *poppenzilver* figurines now in Rotterdam, but it also resembles the decorative handles of some *pijpstoppers* or *pijpwroeters* (pipefillers and pipecleaners) now in the Pijpen en Aardenwerk Museum de Moriaan in Gouda. Further-



(100)

1. Brass pins of spiral wound-head type, 3 sizes (45 recovered).
2. Glass beads, top to bottom: blue-black, yellow, blue, blue, green.
3. Brass pegs.
4-7. Brass buttons (19 recovered).
8. Fixing arrangement of buttons, allowing use with thick cloth.
9. Gold button, bottom of cup is enamelled in white. Typically Dutch, often seen in pictures, worn as an ornament (12 recovered).
10. Gold buckle, use unknown.
11. Brass buckle.
12. Possibly a gold earing.
13. Brass webbing or belt holder.
14. Plain silver ring decorated with black thread.
15. Exquisite lady's gold wedding ring in the shape of plaited hair.

more, such silver figurines were also common on corkscrews, of which the Historisch Museum, Rotterdam, has a few later examples.

A heavy silver pommel of a sword or rapier, weight 213g. (fig. 103) (B-11), has the form of a pomegranate. It is very closely paralleled by several rapiers and daggers in the collection of S.A.I. le Prince Napoleon, now in the Musee d'Armes in Liege, and loosely paralleled by others in the Musee Curtius in Liege. Two of them are identified as weapons made in Amsterdam in the 17th century by the stamps on their blades, Gaier-Lhoest (1963), 88, 89.

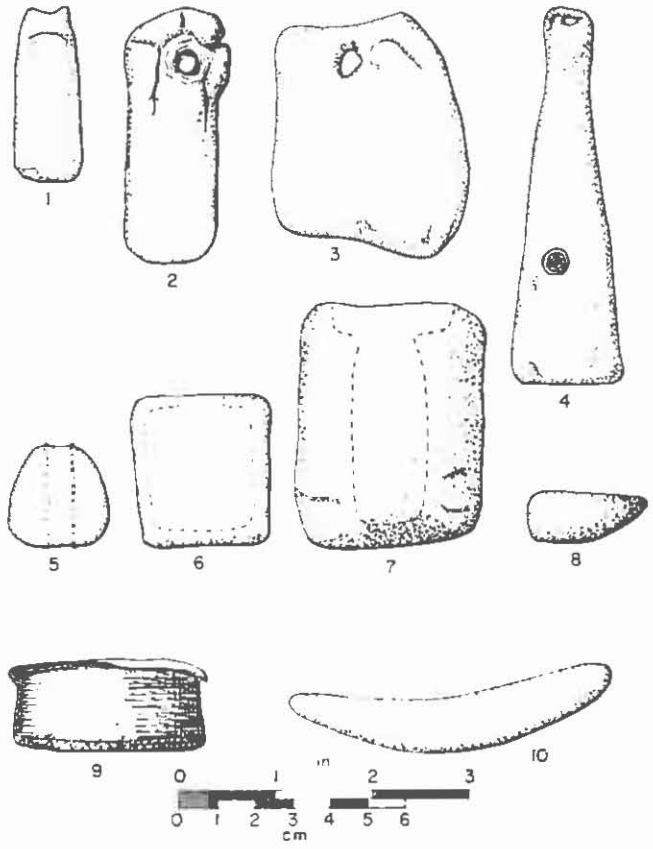
Three scattered knife handles (of ivory, horn and copper respectively) were remarkably well-preserved in concreted magma masses (fig. 104). The copper handle is exactly paralleled in d'Allemagne (1928), III; pl. 362, 12, who states correctly that it is a common 17th century Rhine Valley type, but erroneously calls it a "*reitre tenant un fusil*" whereas it is obviously meant to depict a hunter (shooting hat and suit, birds hanging from the belt, greyhound leaning against boots behind man).

Finally, the discovery of a piece of obviously personal property, now lost, was reported by Irvine to Morton on March 30, 1736: "I have recovered ... a piece of money, somewhat broader than a *ducadon*. My servant takes it to be a medal. It is dated September 27, 1622, on the one side and hath a Dutch inscription on the other ..." The author believes that the piece was indeed a medal and bore a view of the city of Hasselt with the words "*Anno 1622-Den 27 September - God will ons brengen eewig verblijden*" ("May God bring us eternal joy") and on the other side a view of Haarlem with the words *Haerlemen. Tot bergens ons set die van Haerlem gingen Hasselt te bewaren voor's vijants be springen 1623. Capitein waren Olican and van der Camer in die tiden*, meaning "To raise the siege of Berg op Zoom those of Haerlem came out of their city to defend Hasselt from enemy assaults." 1623 is the year in which the medal was struck.

The medal commemorates an episode of the wars in Flanders when two companies of Haarlem burghers, under Captains Olican and van der Camer, sailed to join volunteer forces who occupied and held Haarlem, after the garrison had left to reinforce Count Mansfield and succour Berg op Zoom, that was then besieged by Marquis Spinola's army, Van Loon (1732), II, 145-7. The burgher who received this medal, as did all the participants, apparently had sailed on the LASTDRAGER. He is not identified.

UNRELATED ARTEFACTS

Apart from obvious modern pollution, two anachronistic finds are: one eroded, silver Spanish colonial piece of eight (date and name of king erased) but fully round, struck with a screw press and of the bust type, and therefore minted after 1772; and many fragments of what seem to have been one or several fairly large earthenware vessel or vessels. The material is coarse, brownish and imperfectly fired. Some fragments show dark patches on their concave side, which could indicate an inner waterproofing coating, curvature is irregular, bottom flat, shape roughly spherical, diameter probably *c.* 2 or 3 ft. (0.6-0.9m). Fragments are still unidentified but appear to be considerably older than the wreck.



(101) 1-3. Probably sailor's fishing leads.

4. Carefully cast lead weight, perforated through a centre with the remains of a wooden rod (or pipe?) inside, use unknown.

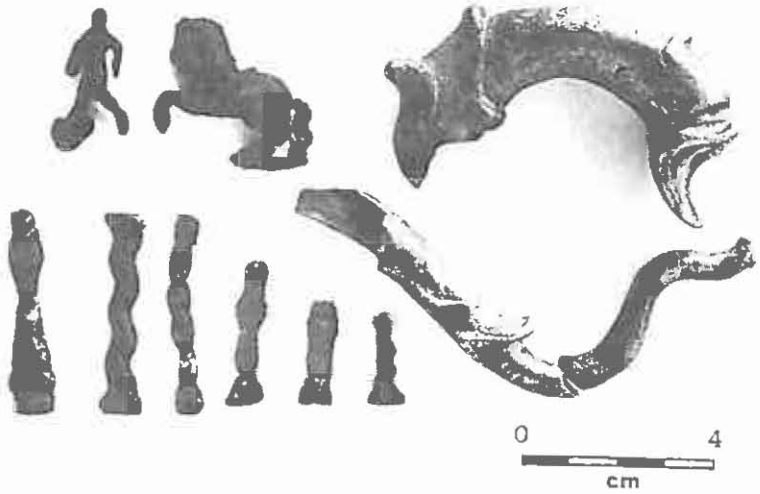
5. Section showing the hole, lined with a thin rolled copper sheet, and remains of unidentified fibrous matter inside.

6-7. Cubical and cylindrical lead boxes, use unknown.

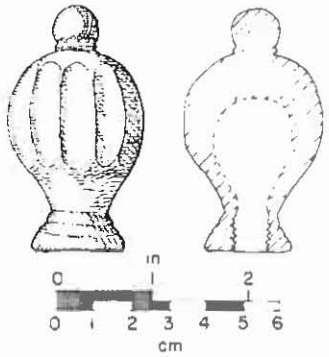
8. Flat cylindrical weight.

9. Lead filled thin cast copper cup, possibly a weight for some object on gimbals.

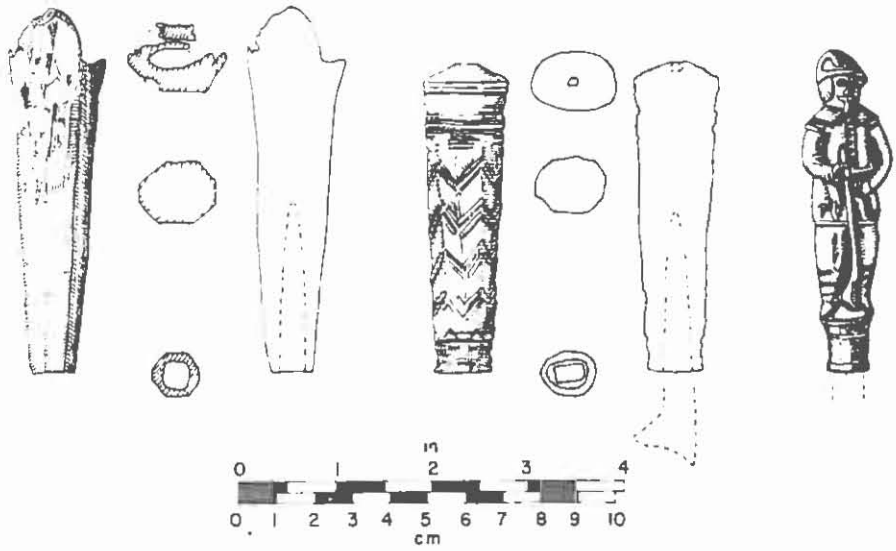
10. Possibly a fish-shaped trolling-lead.



(102) Unidentified silver objects. Man and horse are possibly *poppenzilver*.



(103) Silver sword or rapier pommel.



(104) Knife handles of horn, ivory and copper.

The coin was found among the other coins in E-13. The pottery was outside the debris area, in G-14 and H-15.

Such discoveries should remind all underwater excavators to use caution when basing deductions on isolated objects and always to consider the possibility of artefact contamination. Similar examples are: a Queen Victoria penny recovered by the author among 16th century coins on the wreck site of the GIRONA, and a late 19th century anchor found (probably snagged) in a 17th century wreck in Florida, a very common type of wreck site pollution.

CONSERVATION OF FINDS

Mr. T. Henderson, Curator of the Zetland County Museum, has cleaned and treated expertly the artefacts made of iron and of organic matter in the Museum conservation laboratory.

DISPOSAL OF FINDS

The recovered artefacts, which were part of the ship and cargo, lawfully belonged to the Government of the Netherlands as successor to the bankrupt V.O.C.; those which were the private property of crew members and passengers now without heirs have been claimed by the Crown. As no museum has showed a desire to purchase the collection as a whole, the artefacts have been disposed-of by auction according to English and Dutch law.

CONCLUSION

The excavation was carried out in adverse circumstances due mainly to the location of the wreck site which is exposed to the violent northerly winter gales and their powerful surge. The seabed offers evidence of being frequently remodelled. Very few objects were found intact except in concretion. Most fragments showed a pattern of destruction by erosion and corrosion repeated by frequent successive breakages, probably associated with successive displacements during winter gales.

In spite of this, the excavation has thrown new light on the trade of the V.O.C. at the period, and on its armaments, thereby fulfilling its original purpose. The world's "exceedingly small collection" of navigational instruments of the period, Waters (1968), has been enriched.

The excavation has also helped to underline some of the present shortcomings in the exploitation of potentially meaningful material, due to a lack of systematic reference works or catalogues in the field of merchants' marks, makers' marks and housemarks; also in the field of unspectacular, unartistic small objects of brass and copper of everyday use, until now neglected by researchers, collectors and antiquaries. Finally, new questions of some importance have been raised, if not answered.

ACKNOWLEDGEMENTS

The financial and logistical support of Mr. Henri Delauze, President Directeur General of COMEX (Marseilles), made the expedition possible, and the remarkable work of divers, Louis Gorsse, Maurice Vidal, Andre Fassotte, Jacques Ferlay, Alain Fink and Jean Claude Joffre made it a success.

The writer is sincerely grateful for the support of the National Geographic Society of Washington, D.C., and, in particular, for the active help of Assistant Senior Editor, Kenneth McLeish, and photographer, Bates Littlehales, for the support of the Archaeology and History Unit of the BBC, and the untiring assistance of Senior Producer, Paul Johnstone, and of Ray Sutcliffe, for the excellent collaboration of underwater photographer and cameraman, Marc Jasinski, for the help and advice of Mr. T. Henderson, Curator of Zetland County Museum, for the trusting support of the Zetland County Council, for the continuous assistance of Davy and Mary Johnston of Yell and, indeed, of all the people of the island, for the fine logistical support of COMEX Diving UK (Aberdeen), and for the expert collaboration of magnetometer specialist, Anthony Lonsdale.

Sincere thanks are due also to the officials of the Directie der Domeinen of the Dutch Finance Ministry, as well as of the Department of Trade and Industry, and to the Receiver of Wrecks in Lerwick for their active assistance.

Finally, during the preliminary research and in the study of the artefacts, the writer was efficiently and kindly advised and guided by the keepers and staff of the Algemene Rijks Archief in The Hague, Nederlandsch Historisch Scheepvaart Museum, Amsterdam, Germeentelijk Archiefdienst Amsterdam, Rijks Archief in Noord Holland, Haarlem, Rijksmuseum Amsterdam, Prins Hendrick Maritiem Museum Rotterdam, Pijpen and Aarderwerk Museum De Moriaan in Gouda, and Centraal Bureau voor Genealogie, The Hague.

The writer is grateful also for the valuable information contributed in personal correspondence and conversations by Mr. J. Banning, the expert on Dutch tobacco pipes, by Lieut. Jan Verkuijl of the Historical Section of the Dutch Defence Ministry (Navy), by Prof. C.R. Boxer, Mr. R. Cowan, Mr. J. Green, Mr. C. Martin, and by various members of the AUSACE and Ferdinand Research Group. Diver Alain Fink also deserves grateful thanks for the many hours spent at his drawing board.

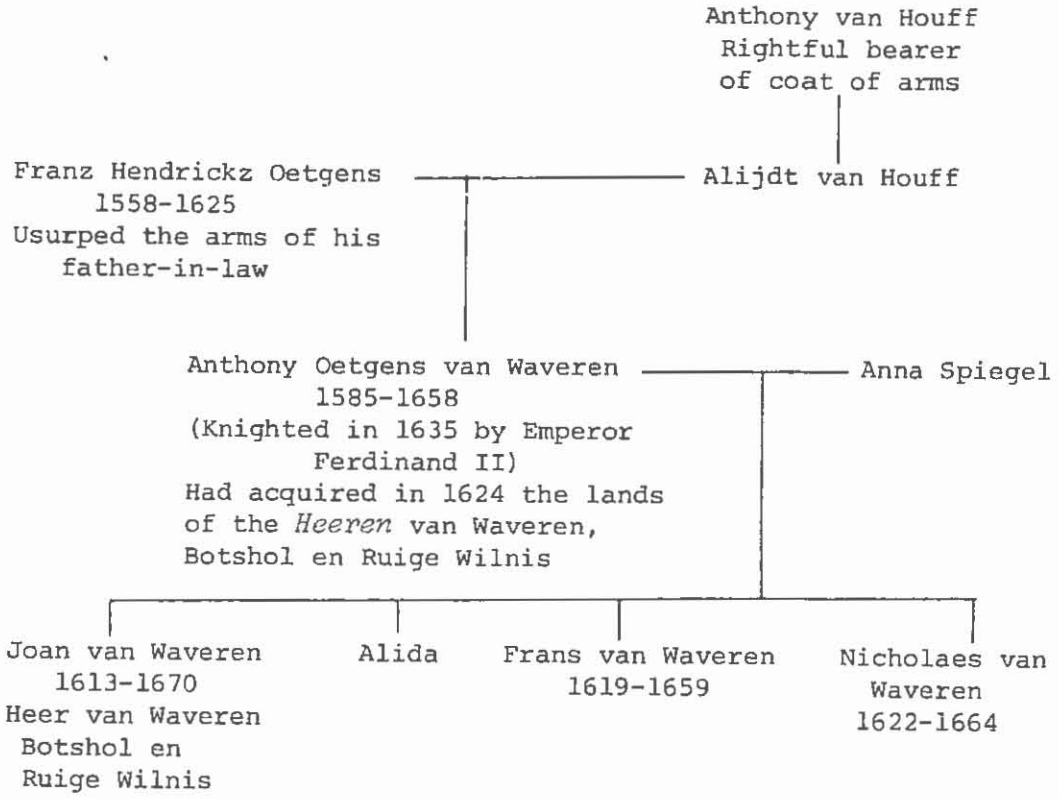
(105) Decorated glass bottle (about 20cm), believed to be German or Dutch 17th century work, said by tradition to have been recovered from the LASTDRAGER wreckage shortly after the shipwreck. (Lerwick Museum).

NOTES

1. Dimensions of yellow bricks recovered (12 measurable):

Length (m)	Width (m)	Height (m)
0.169	0.072	0.033
0.175	0.085	0.036
0.175	0.075	0.034
0.176	0.078	0.038
0.173	0.070	0.034
?	0.065	0.030
?	0.085	0.036
?	0.070	0.030
?	0.074	0.035
?	0.070	0.030
?	?	0.031
?	?	0.033

2.



ANNEX 1

The following document has been copied from family papers (and annotated) by the late Robert Stuart Bruce of Symbister (Whalsay). It has not previously been published. I am grateful to Mr. T. Henderson, Curator of the Zetland County Museum for bringing it to my attention.

A DEED ONCE IN THE SYMBISTER PAPERS, ABOUT THE PLUNDERING OF NINIAN NEVEN'S HOUSE (S. THOMAS LESLIE, 13 MARS 1655)

At Scallowaybankis the 13th day of March 1655 yeiris. The quhilk (which) day by vertew of ane order directit to us under scryved by Major Henrie Pennall and Patrick Blair of Lilleblair Sherffis principall of Orkney and Zetland for taking tryell as to the mater of fact comittit be James Keith of Benholme and his associats upon the persone and goods of Ninian Neven of Windhous Gilbert Neven his sone and Bessie Neven his dochter and to that effect haveing issued furth fides (?) against both parties and witnesses to produce as we requyrit the names of those insistit against by the said Ninian and his sone followis: Viz: the said James Keith of Benholm Ro^{t}- Douglas Christopher Mowat Jo^{n}- and Jaspeir Edmonstounes Jo^{n}- Sinclair son to Mitchell Sinclair of Aith James Sinclair of Scalloway and Arthur Sinclair his sone George Isouster Jo^{n}- Mitchell of Jo^{n}- Moubray Nicols Gariock George McErie Patrick Kintore Marie Sinclair Laurens Haweik Arthore Bartelsone Hew W^{m}- and Bartlemo Sinclairis in Lerwick.

The said James Sinclair of Scalloway being present for himself and the rest of the forenamed persones market present did produce and give in ansyrs to the said persewaris lybell ane paper q^{r}- by they deny any losse or prejudice done by them to the said persewaris their persones or goods which being referred to the deponents (?) series (?) of witnesses to pronounce as to the mater of fact. They deponed as followis.

Viz: Johne Pennen of the age of 40 yeiris of theirby depones James Keith of Benholme wes in Scallowayis hous and stayed their befoir he went north with his company and that a day or twa befoir he took jorney he still /stole/ the armis q^{r}- with Benholmes company was armed to the quantitie of sex muskets and some pykis. Depones forther one went to the Nes for Soundrugh /Sunburgh/ his great boit which came to Laxforth and transported Benholme and his company north and came to Cullovo in Zell and efter landing depones that the comandure of the hollander wrack a ship callit Lastindrager came to Benholme and desired he wold send to Ninian Nevens hous and dtake out the chists of silver of the hollanders Ninian had in custodie.

Chrystie Isbuster being callit as a partie declaired he wes at the persewaris hous of Sandwick and that his mater Airthor Sinclair sent him with the rest of Sandwick upon the caire of Benholmes requeirs and saw tew chists with silver takin out and carries away by Benholmes partie ... W^{m}- Tyrie being commander and that he saw gunns presented to /i.e. at/ Ninian Neven and that by Benholmes order W^{m}- Tyrie wes capitane over the Zetland men who were with Benholme ... Johne Nisbit of the age of three scoir yeiris or

theirby depones that at the same tyme Johne Moubray and Laurence Stewart with severall others came to him and causid him with his neighbors Hendrie and Olla Androsones carie them by force in about to Sandwick and be ye way heard them say among themselves they had comission from Benholme to burne Ninian Nevens hous of Sandwick if he wold not render it up and that Laurence Stewart said if they wold goe on that accompt he sould leave them.

Henrie and Olla Androsones deponed confirmis Johne Mitchell confest he was in the boit the same tyme ... Robert Peitarsone of the age of fourtie yeiris married deponed that when a partie of armed men came to Ninian Nevens hous he was there and did see Ninian send messengeris to thame and /i.e. as/ they approcht the hous desyring to know their intent and the messengeris wer hollanders and a Scotisman desireing to send men of yair number to speak with Ninian and show them what they intendit in coming thither uthierwise he would defend himselff by killing some of them if he could for he expectit na les fra thame and that Windhous shot first and theirefter the partie dischargis their armis and came upon the hous and then he saw Ninian bledding as he came away.

Andro Edmonston of the age of fourtie yeiris or theirby maried deponed that he hard James Durie Scotsman eftir his comeing to the partie shew them Ninian Nevens desired twa of them wold cum and speak with him and shew their intent and that Golbert Mowat wes /not/ willing to goe but the partie thrust him in a furie over the dyke towards the hous and the deponent James Durie told Ninian /that he/ was affrayed that he saw Ninian woundit and that his dochter wes also woundit.

Johne Sinclair of the age of fourtie yeiris confirmis ... Johne Thomsone (?) of the age of fourty four yeiris deponit that efter Ninian and his dochter wes woundit he being sent for to cure them at first the partie wold not suffer him to cum neir them but efterwaras got libertie to cum where he found Jo^{n} Umphray who had applyed some thingis to their wounds to stop the blood or then they had bled to death and att his entrie in the hous did see the partie bring ane halff barrell wine sett out of the sellar and put it on the tabill out of which they drank a cup full and as he thinis sent it to Benholme and a cage (keg) of Brandewine ... The names of the partie being Crystopher Monat Jo^{n} Rowsay George McErie James Linklett Jo^{n} Mitchell Lawrence Stewart Patrick Kintore George Mackie with several others wheis names he does not remember and they took (?) several things out of the hous and see (i.e. saw) tham teck victualls at their pleasure and he saw sevin scoir and threttin elnes of canves taking away which he see Jo^{n} Umphray measured. Robert Douglas present confest he took away out of Windhous hous thrie foulling peices and twa swords and that twa guns wes taking away the nyght befoir.

Johne Honstane depones ther was tallow and geis iron butter and oyll takin out of Ninians booth and sent to Cullevo and that they browght twa brewingis of aill in the hous and sent malt to Cullevo and that Ninian was keipit prisoner in his hous fra the tyme of petitioner first comeing to his carieing to Scalloway which was about a month with centries over him ... The parties names that keept him was Jo^{n} Mitchell Alex^{r} in Douarie James

Linklett Patrick Kintore Bernard Bernardsone and utheris and that he was logit in close prisone and that he /Honstone/ was rypit narrowlie each tyme he came to apply salves to Ninian and his dochter. Johne in Murfield deponed he was at the carieing of malt out of Sandwich to Cullevoe being comandit yeir to be Benholmes partie and delivered it to the souldiers.

James Denoldsone officer deponed that Harie Sinclair caused him chairse men to goe to Sandwick and that the said Harie took out of Sandwick ane coffer bandit with iron wherein wes certaine wreats and 'that' he saw twentie aispunds of bear takin out of Windhous and that Harie Sinclair ressaved a barrell of beiff and another (?) of meall and that the cariers of it told him it came fra Windhous and that it was caried to Cullevo ... Nicholl Gilbertsone deponed tha same and that he was upon another boit wheren was a lockit chist and a barrell meale covered with a bed coverlet ... David Thomassone depones he was at the bankis of Windhous with a boit accompanied with Andro Jacobsone and Peitar Scot and Ninian Marsone and brcwght with them a barrell fish oyle a barrell meall and barrell beiff twa cheiss twa sheip twa geis... Depones he receaved these goods fra Benholmes partie but knew not their names and that he delyrit (delivered) it to Harie Sinclair at Cullevo.... David Bartelsone of the age of twentyfour yeiris depondes he was at the carieing of goods fra Sandwick to Cullevo with a great boit wherein was iron copper and ropes and that Bernard the lairds domestick delyvred it and took it out of the booth of Sandwick and that Harie Sinclair receayed it at Cullevo and that these was of boitmen with Ossa Jo-sone Andrew Crawfoird Thomas Ollasone and Jo- Nisbit. Extradit furth of the sheriff court buikis of Zetland be me Thomas Leslie, notar publick clerk therin to witnessing heirto my sign and subscription.

(sgd) Tho: Leslie

Note that Benholme was near Montrose, that Thomas Leslie of Ustaness was Steward-depute, Patrick Blair of Littleblair was sheriff of Orkney and Zetland and that Major Harry Pennel was the Cromwellian Governor of Kirkwall Castle. (Note by Stuart Bruce, ed.)

ANNEX 2

A LIST OF THE ARTEFACTS RECOVERED FROM THE SUNKEN REMAINS OF THE V.O.C. *FLUITSCHIP* LASTDRAGER

BRASS:

Rivets or pegs (the head decorated), from pocket knives -	7.
Unidentified objects or fragments -	7.
Fragments of rods -	6.
Fragments of kettles, cooking vessels, cauldrons, etc. -	236.
Fragments of handles of same -	17.
Fragments of supports of same (in the form of a paw) -	47.
Nails -	86.
Head of same -	1.
Small buttons -	19.
Pins -	45.
Tips of lids -	10.
Pocket sundials (one in its horn box) -	3.
Small, circular, flat discs being top and bottom parts of sundial boxes -	7.
Navigation dividers (the iron parts wanting) -	80.
Fragments of same -	8.
Finger rings -	2.
Brass wimble, for skull bone surgery -	1.
Revolving keg tap, with stamped mark -	1.

COPPER:

Cast figurine, of a hunter, the handle of a knife -	1.
Buttons -	2.
Fragment of rod -	1.
Fragments of handles and/or lids of cooking vessels -	18.
Ditto, in wire -	1.
Unidentified fragments, many of sheet -	63.
Discs -	4.
Buckles -	8.
Key hole frame -	1.
Belt holders -	2.
Spoon, with hallmark -	1.

GOLD:

Small shirt buttons (with filigranee decoration) -	11.
Small buckle -	1.
Small fragment of jewel (filigree decoration), possibly and earring -	1.
Finger signet ring (with engraved black stone) -	1.
Lady's wedding ring -	1.

IRON:

Cannonballs -	8.
Nails -	5.

LEAD:

Unidentified objects -	7.
Fragments of hull sheeting -	213.
Other fragments -	36.
Musket-balls or grape shot -	961.
Ditto, linked by copper wire (pairs) -	40.
Small shot (for hunting?) -	36.
Seals (damaged, unreadable) -	7.
Buckle -	1.
Plug -	1.
Fishing leads -	7.
Sounding leads -	1.
Pig (approximately 300 pounds) -	1.

PEWTER:

Bottle necks with cap (from quicksilver flagons?) -	80.
Unidentified fragments -	16.
Fragments of spoons -	5.
Handle of small pot -	1.

SILVER:

Decorated fragments of unidentified objects (in the form of dragons, pillars, nipple, arm, horse, a group, a toy soldier, etc.) -	9.
Sword pommel in the form of a pomegranate -	1.
Fragments (some of cutlery?) -	24.
Fragment of lid -	1.
Finger ring -	1.

COINS:

Spanish (pieces of eight, of four, of two) -	16.
Dutch: large (*Ducats, Pistagons*, etc.) -	37.
small (*arindschellingen*, etc.) -	354.
Fragments of coins (unrecognizable)	

Note: Most coins badly corroded and damaged by sea action.

QUICKSILVER:

About 3cc.

POTTERY:

Fragments, unimportant, small (various colours, thicknesses and materials) -	66.

GLASS:

Fragments of flasks, drinking cups (decorated), etc. -	50.
Coloured beads -	8.

WOOD:

Plug -	1.
Peg -	1.
Fragments (unimportant) -	6.

IVORY:

Knife, handle -	1.

BONE:

Knife, handle -	1.

MISCELLANEOUS:

Bricks or fragments -	11.
Fragments of pipes -	80.
Chalk sticks, sanguine (red) -	2.
Ivory, round, flat (screw-in cover) box, contained a sundial -	1.

APPENDIX TWO

METALLURGICAL REPORT ON A SECTION FROM A CORRODED BRASS CANDLESTICK FROM THE VERGULDE DRAECK (GT 795)

Mike Owens Conservation Laboratory, W.A. Museum.

(106) Corroded Candlestick GT 795.

SUMMARY

A corroded brass wax-tray, part of a candlestick, GT 796, was sectioned for chemical and metallographic analysis, and examination of the corrosion behaviour due to immersion in the sea.

The tray was found to be leaded brass, with a low amount of tin and iron, having an equivalent structure and properties of brass containing 75% copper, 22% zinc and 3% lead.

Metallographic examination revealed it to be an as-cast single phase alloy of large grain size; not a cold-worked section as it would have been if modern techniques had been used. It was probably cast in a loam or clay mould.

Corrosion has proceeded by a directional attack on the high zinc-low copper areas of the large cored grains, probably because these are anodic to the surrounding higher copper areas. As these areas were destroyed, corrosion was transferred to progressively higher copper zones, under the same type of electrochemical reaction. Some areas have been completely corroded by this process.

Finally, recommendations for treatment of objects such as this have been put forward.

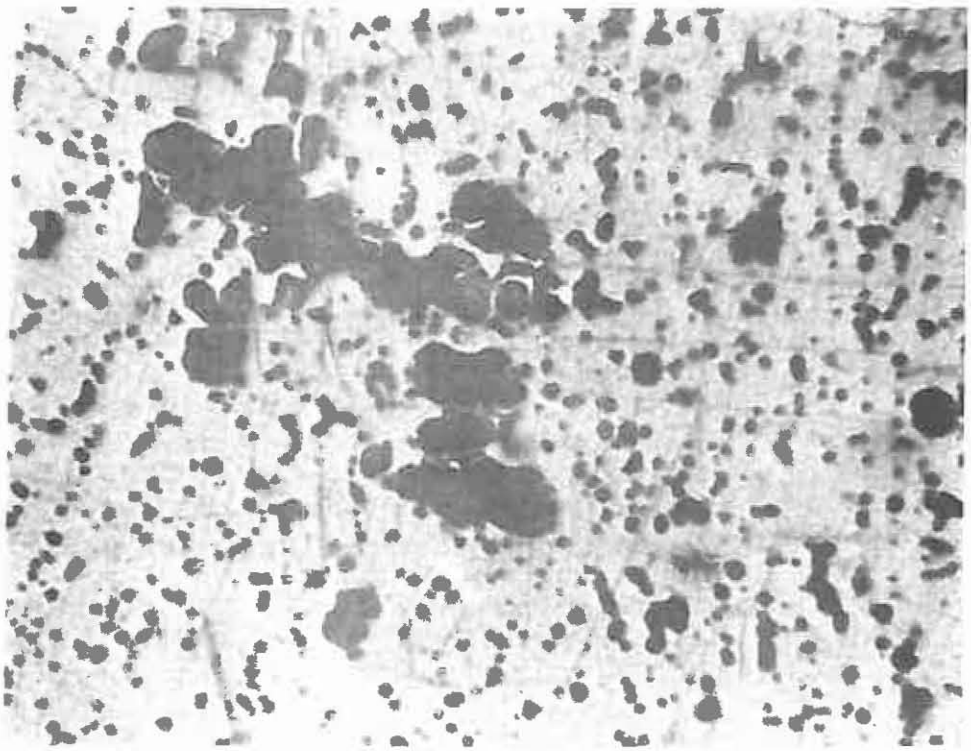
1. Sectioning and Preparation

The section examined was the dish-shaped tray of a candlestick similar to that shown in figs. 106 and 107. The tray, which was not attached to a candlestick, had corroded completely at the rim, but was fully consolidated at the centre, with intermediate levels of corrosion between these two extremes. In view of its dilapidated condition, it was made available for destructive tests. These were carried out to determine the chemical composition, metallographic structure and type and extent of corrosion. The tray was sectioned from the edge to the centre in a narrow strip. This was, in turn, cut into small pieces suitable for mounting in epoxy resin for examination under the microscope. The pieces were mounted on edge, using Ciba Geigy Araldite D, in plastic moulds, with the standard hardener ratio of 6:1. These mounted specimens were then ground and polished to a 0-1 micron diamond lap. In addition some small chips of good metal were sent to the Western Australian Institute of Technology's consultants' organization, WAIT-Aid Ltd., for chemical analysis.

2. Chemical Analysis

The chips analysed by WAIT-Aid contained the proportions of elements as shown in Table One. The analyses were performed by the methods shown.

(107) Detail of wax tray showing corrosion.



(108) Unetched uncorroded polished metal surface showing porosity and lead globules (magnification x 100).

TABLE ONE

ANALYSIS OF BRASS CHIPS FROM A VERGULDE DRAECK CANDLESTICK

ELEMENT	% W/W	METHOD
Copper	74.2 ± 0.2	Gravimetric - CuSCN
Zinc	19.3 ± 0.1	" - $ZnNH_4PO_4$
Lead	3.15 ± 0.05	" - $PlSO_4$
Tin	0.76 ± 0.01	" - SnO_2
Iron	1.70 ± 0.03	" - Fe_2O_3
Nickel	0.15 ± 0.01	Atomic Absorption Spectrometer

Sodium thiosulphate titrations performed at the Western Australian Museum's Conservation Laboratory showed an average copper content of 75.1% copper, a higher value than the WAIT-Aid analysis. The error here was caused by the high iron content (1.7%), no reagents being added to complex this before titration.

The two important elements above are copper and zinc, the remaining elements having little or no effect on the structure and properties of the alloy. Zinc has been added to copper from early times to improve the mechanical properties (especially hardness and ductility) and to lower the cost in terms of pure copper, Tylecote (1962), 57-9, and Avner (1964), 347-53. The zinc present as 19.3% would yield a single-phase yellow brass, not very different from standard compositions used today.

Of the other elements present, lead has the most significance. It has been added to brasses and bronzes for centuries in order to lower the cost of the alloy, and to improve casting properties and machinability, Tylecote (1962), 57-9 and Avener (1964), 347-53. There is no reason to doubt that it was added deliberately here. Leaded brass is still made today when machining operations are required.

The iron content (1.70%) is rather high for brass. In modern times, iron is only added in that amount in conjunction with aluminium to impart high tensile properties. However, it appears to be an unintentional addition in this case and probably resulted as "pick-up" from an iron ladle or as an impurity from the ore used to smelt the metal.

The tin content (0.76%) is higher than a normal brass and was probably picked up as an impurity from the ore, as was the nickel (0.15%). As mentioned previously, the elements other than copper and zinc have no significant effect on the microstructure, although they do affect the limits and composition of the phase or phases in brass, and can be regarded as playing the part of an equivalent quantity of zinc. A list of zinc equivalents is given in Table Two.

TABLE TWO

ZINC EQUIVALENTS

ELEMENT	ZINC EQUIVALENT
Silicon	10 x
Aluminium	6 x
Tin	2 x
Iron	0.9 x
Manganese	0.5 x
Nickel	-1.0 x

Thus the effect of the iron (1.7% Fe $\equiv$ 1.5% Zn) and tin (0.76% Sn $\equiv$ 1.5% Zn) is to raise the effect of the zinc (analysed as 19%) and to give a zinc equivalent of 22.0%. This alloy would have the equivalent structure and properties to an alloy containing 75% copper, 22% zinc and 3% lead. Such an alloy would be a single-phase yellow brass with good machining and casting properties contributed by the lead addition. If properly worked and annealed, it would have a tensile strength of about 45,000 psi and a ductility of 65% elongation in 5cm. with a Brinell hardness of 55HB 10/500. These properties, however, would not apply to the as-cast alloy, since casting leads to segregation, porosity and planes of weakness.

3. Metallographic Examination

The specimens which were mounted in araldite moulds were polished to a 0-1 micron diamond lap and were then examined and photographed at varying magnifications using an Olympus M.G.K. microscope. Examination was performed before and after etching, and the etching reagents used were alcoholic ferric chloride and aqueous ferric chloride (see Annex 1). The latter is capable of producing better contrast between the grains and was the etchant most often used. Several polishing scratches were visible after etching, however, these are due to the difficulty in polishing a soft single-phase alloy, Samuels (1967), 160. They can be eliminated by chemical polishing methods, however, these sometimes have deleterious effects when lead is present. It was decided to use the standard polishing technique with diamond paste as the scratches can be tolerated in small numbers.

The unetched microstructure of the uncorroded metal area, close to the centre of the tray, is shown in fig. 108. The numerous dark areas consist of lead globules, as well as shrinkage porosity and gas porosity which occur during casting. Some of the dark areas may also be due to the ingress of corrosion, but this would only be in the initial stages, if present at all. Fig. 109 shows the structure, again unetched, of an area further out towards the rim where corrosion is almost complete. The light areas are uncorroded metal which is about to be attacked. These two micrographs serve to show the different between the sound metal almost in its original condition and the fully corroded metal adjacent to it. In order to study the microstructure, it was necessary to examine the uncorroded specimen. Only 20% of the tray was uncorroded and suitable for this purpose, the remaining 80% being too severely attacked.

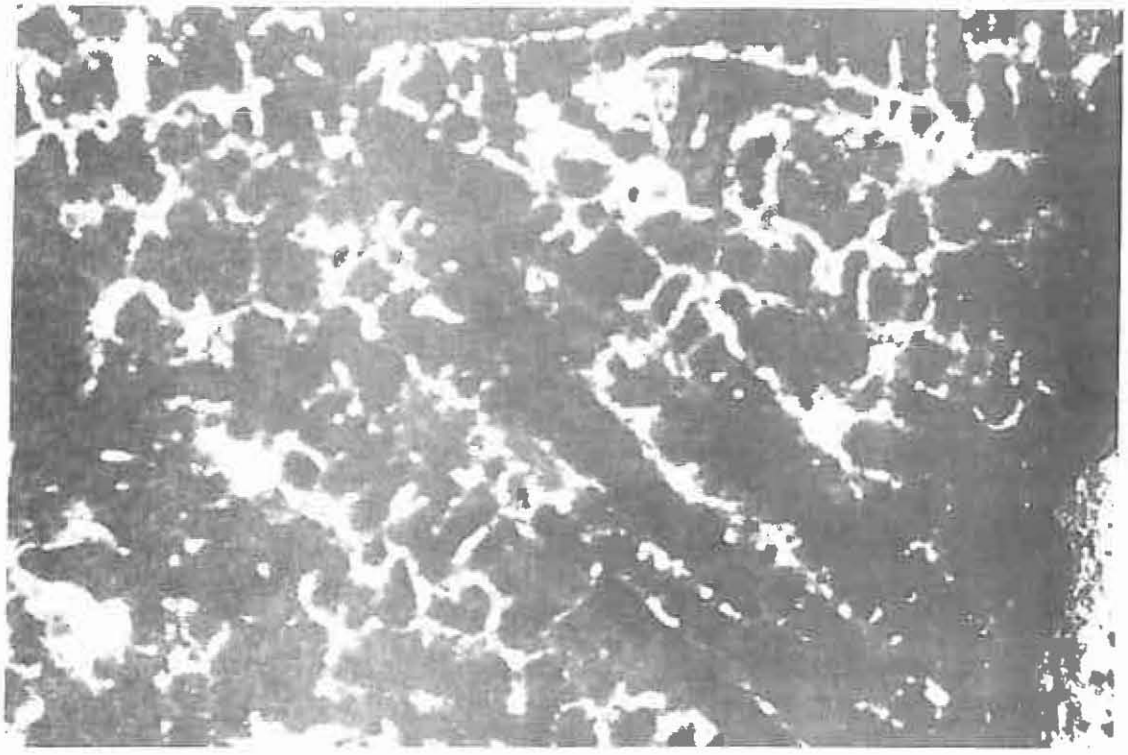
The structure, after etching in aqueous ferric chloride, is revealed in fig. 110, and shows the typical cored appearance of an as-cast, single-phase, copper/zinc alloy. It also shows the extremely large grain size of the metal which has been brought about by slow cooling, possibly using a loam or clay mould, since sand-cast structures are often finer-grained.

It is surprising to see a section such as this cast, since the tray was detachable from the candlestick, and was thus amenable to stamping or beating formation procedures, which would yield a worked structure. The use of casting, in making this thin section, shows the relative importance of casting when it was manufactured. Today such a section would be made by hot or cold working, which gives improved properties compared to the as-cast alloy, as well as a superior surface finish. However, since there is no stress placed on the tray section, casting was an acceptable process. The pattern on the surface of the tray was probably produced by an impression from the mould.

Reference has been made to the cored grains evident in fig. 110. Each grain consists of numerous tree-like growths or dendrites which are the centres for solidification. The coring, also known as dendritic segregation, is a phenomenon brought about by the fact that the first liquid to solidify (the nuclei) is richer in copper than the surrounding liquid, Copper Development Association (1965). The minute nuclei increase in size by throwing out branches in certain directions bearing relation to the symmetry of the crystal. In this way, the dendritic shape of each grain develops. As solidification proceeds, metal progressively poorer in copper is deposited. In consquence, the zinc content of the residual liquid increases above that of the original melt.

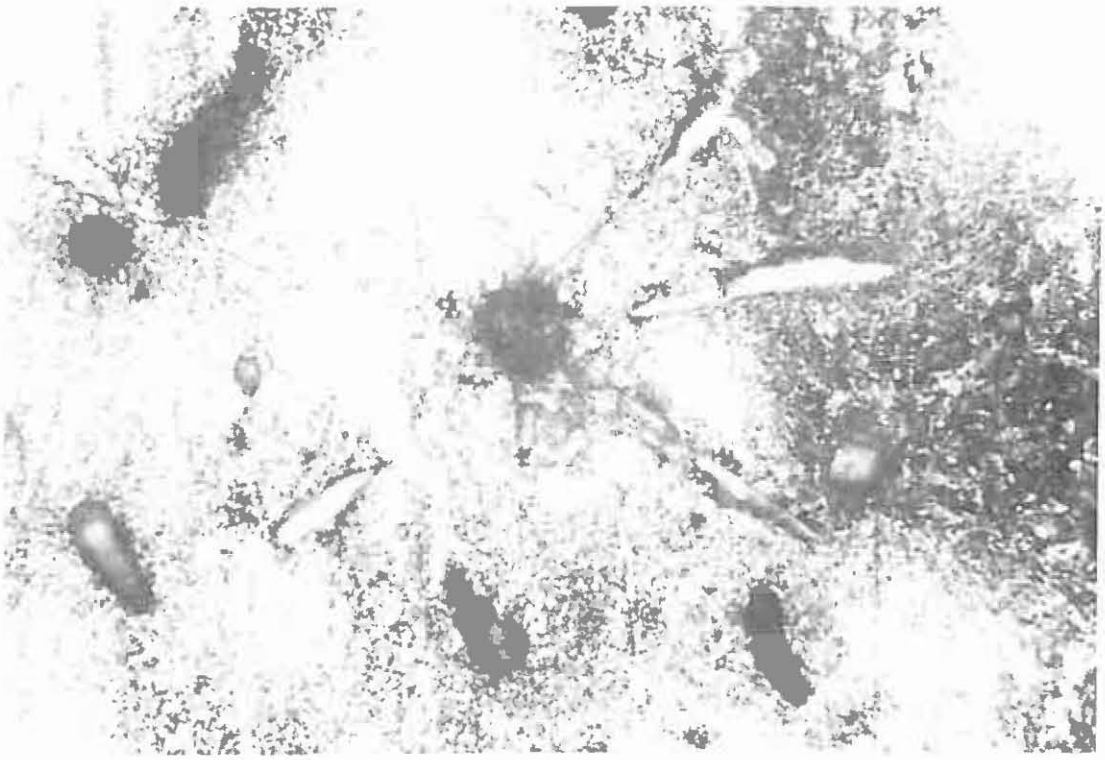
Dendritic growth continues until it is obstructed by neighbouring grains and the final stages of solidification take place between the dendrite arms. The last liquid to solidify is richest in zinc and is seen as the most darkly-etched part of each dendrite. Variations in composition across the dendrites are reflected in etching characteristics and show as corresponding differences in microscopic appearance.

The dendritic form of growth results from the inherent directional nature of the crystal and occurs in most pure metals as well as alloys, although in pure metals the dendritic shape is not apparent because of the uniform composition. The degree of dendritic segregation in an alloy, (often called coring), is controlled mainly by the width of the freezing range from initial to final solidification, segregation being more pronounced with rapid cooling. However, this alloy was cooled slowly and has a relatively narrow freezing range from initial to final solidification. It is also influenced by the rate of solidification, However, this alloy was cooled slowly and has a relatively narrow freezing range of about 20^{o}C, so the heavy coring must be explained by the relative sizes of the atoms of copper and zinc. The atomic radius of zinc is greater than that of copper, leading to slow interstitial diffusion through the face-centred-cubic crystal structure formed by the copper atoms. Thus, there is not sufficient time, even during slow cooling, for

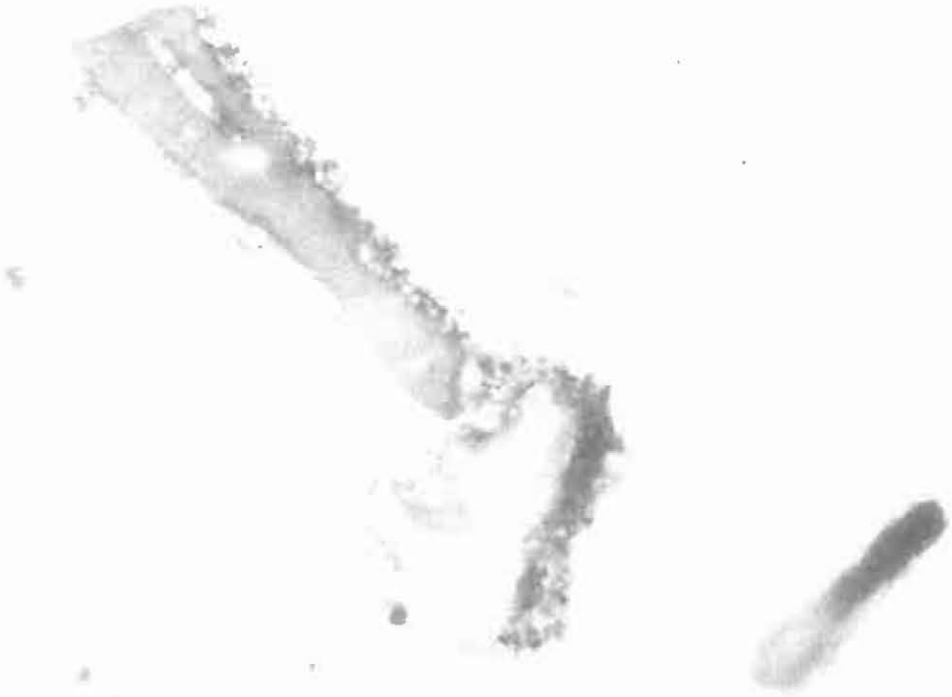


(109) Fully corroded [illegible]. Only skeleton of [illegible] remains (magnification x 50).

(110) Etched in aqueous ferric chloride. The light area is a single [illegible] grain (magnification x 50).



(111) Etched. The light grey inclusions are probably zinc sulphide, lead globules are also present (magnification x 400).



(112) Etched. Enlarged view of inclusion (magnification x 1,000).

the concentration differences to be eliminated as they would be if cooled under equilibrium conditions. Cored microstructures are typical of as-cast single-phase brasses.

Other factors contributing to the microstructure are shrinkage porosity, gas porosity, lead globules and iron-rich areas. Shrinkage porosity is caused by the contraction of the metal during solidification, leading to voids with a jagged edge. Gas porosity results from the melting stage when gases, usually hydrogen and oxygen, are dissolved in the high temperature metal. Their solubility is lowered during cooling in the mould and gas bubbles are entrapped if unable to escape through vents in the mould wall. This causes a rounded type of porosity. Both shrinkage and gas voids are shown in fig. 108, but are hard to distinguish from the lead globules, also dark, which are present. Lead is the last to solidify and does so in the inter-dendritic spaces.

The iron present enters into solid solution in the copper up to a value of 0.2%. Above this it appears in the microstructure as dark-etching iron-rich areas. In a slowly cooled alloy, these are finely dispersed, and this is what has happened here, as can be seen from fig. 110. Iron particles, if massive due to fast cooling, cause difficulties because they act as centres for corrosion. Tin and nickel, in the small quantities present, enter into solid solution and are not visible in the microstructure.

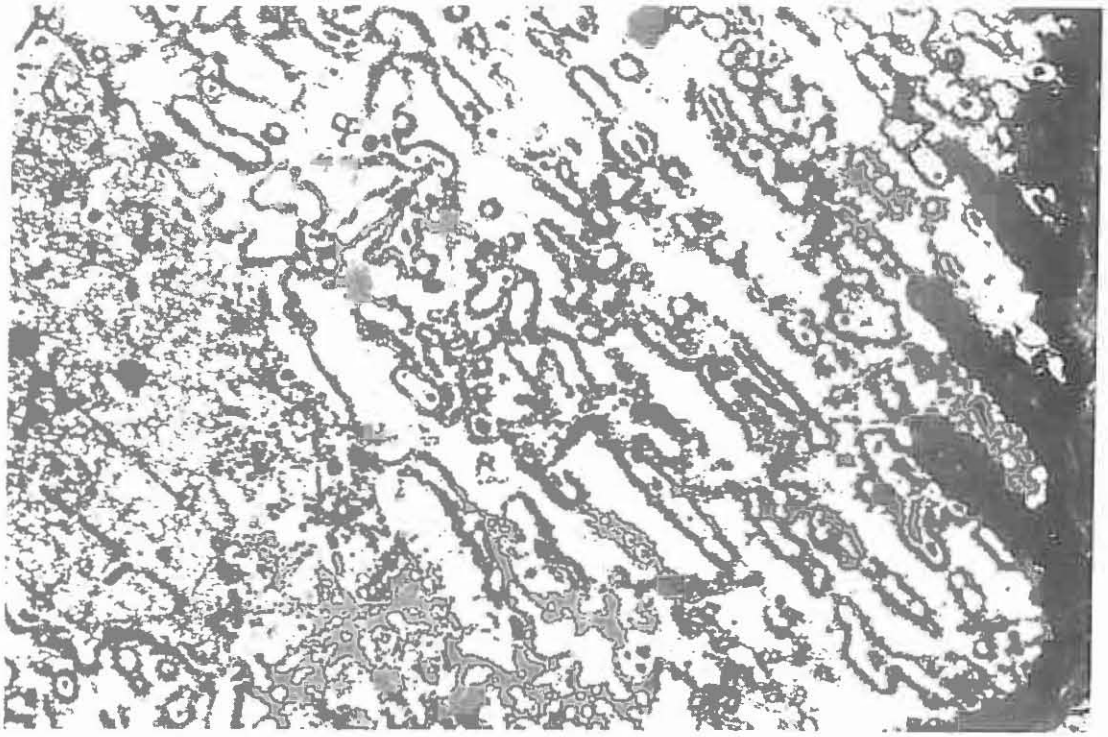
Small inclusions, grey in colour, are present, as shown in fig. 111. These are probably zinc sulphide (ZnS) inclusions and appear both individually and associated with lead globules. This is revealed at a higher magnification in fig. 112. These are sometimes difficult to distinguish from lead, but due to the polishing technique used, there is a good contrast here.

4. Corrosion of the Alloy

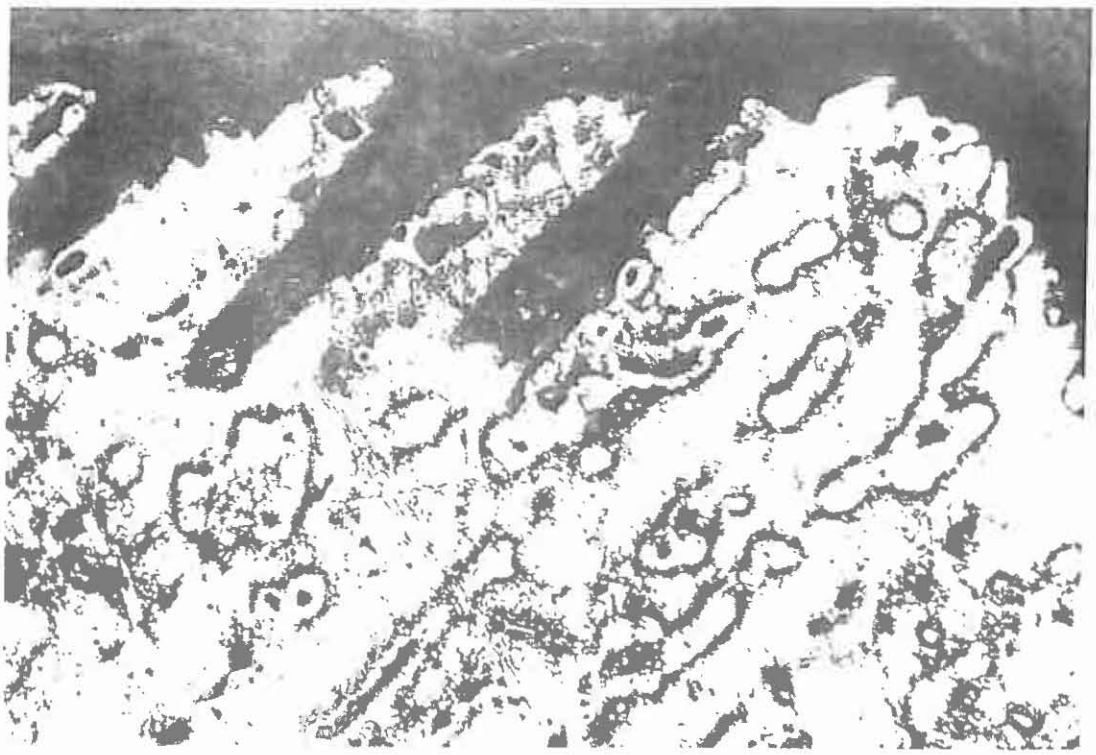
Brasses are prone to several types of corrosion, the most common being stress-corrosion cracking (season cracking) and dezincification. Stress-corrosion cracking occurs most commonly after cold working and is not in evidence here. Dezincification is the dissolving of the alloy by an aggressive environment and the subsequent deposition of porous nonadeherent copper. This occurs in seawater, and also fresh water with a high oxygen or carbon dioxide content. The seawater in which the VERGULDE DRAECK wreck lay contained a typical chlorinity of 19.2 ppt, Uhlig (1966), 1111, which is aggressive towards copper alloys in several ways.

Another type of attack is electrochemical, usually brought about by the presence of a more noble metal nearby in an aggressive medium. Impingement corrosion and erosion by sand are also possible causes of deterioration of brass objects under the sea.

However, to get a true picture of the process involved, it is necessary to examine the sound metal specimen under the microscope, where corrosion has just commenced. In fig. 113, at the edge of the specimen, are three black areas which show the ingress of corrosion. Fig. 114, reveals them at higher magnification. It is obvious that the attack is of a highly directional nature, commencing from the surface of the object and proceeding along the high zinc (darker etching) zones of the cored grains.



(113) Etched. The beginning of corrosion along the high-zinc areas of the grain (magnification x 50).



(114) Etched. Enlarged view of corrosion path (magnification x 50).

Fig. 115 shows how this type of attack proceeds, in very long, narrow rods across each of the very large grains, following the direction of the zinc-rich zones. This specimen was taken from a more corroded area further out from the centre of the tray. As mentioned previously, the only sound metal was located at the centre of the tray and it became progressively more corroded towards the rim, where pieces had actually fallen away. In fig. 115, branches of sideways attack are occurring in addition to the long rays of initial direction attack. The sideways attack penetrates through higher copper (lighter coloured) zones (since the zones most rich in zinc have already been corroded). This secondary attack occurs also in preferred zones, the most copper-rich areas remaining uncorroded. Eventually, even these areas are penetrated, however, and corrosion reaches the stage revealed in fig. 109 where only a skeleton of metal remains.

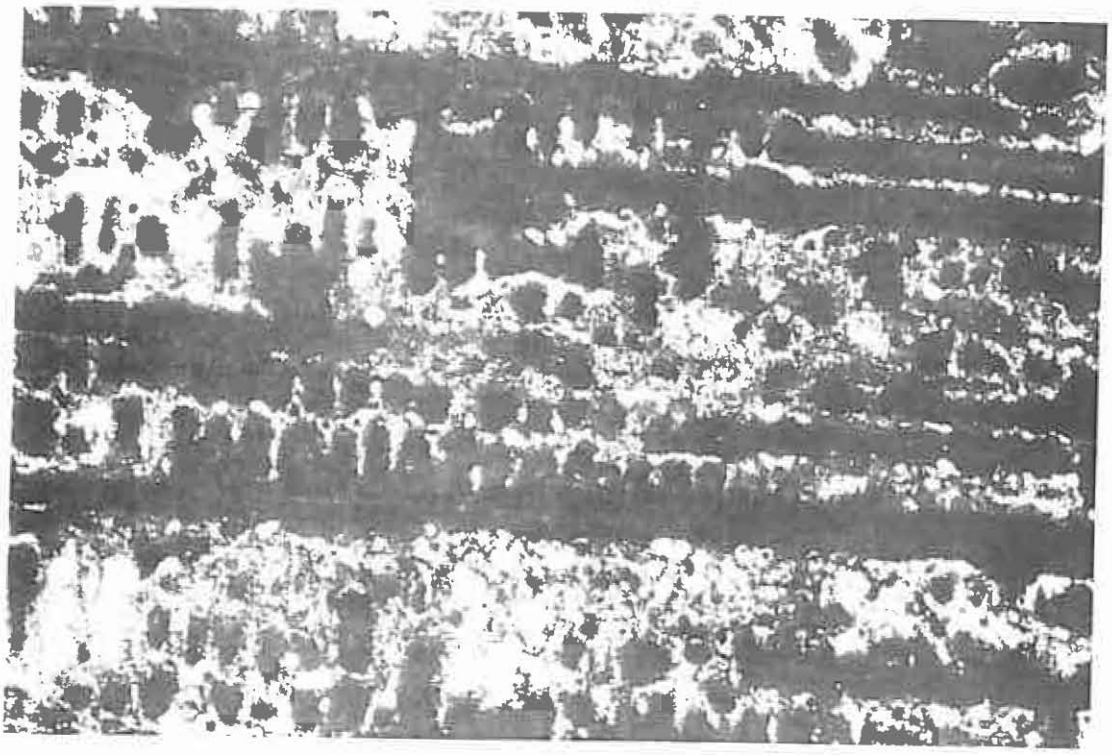
The fact that the metal is attacked in this way, along areas of gradually decreasing zinc content, suggests that it is a purely electrochemical reaction. It is also reasonable to assume that the whole tray has been subject to only this type of corrosion, since the extent of the attack becomes gradually worse from the centre to the rim where the initial entry once took place. This type of intense pitting corrosion has completely undermined the strength of the material and was worsened because of the extremely large grain size. If the grain size were smaller, the more numerous grain boundaries would probably have retarded the onset of the long filaments visible in this alloy. It is difficult to explain why the rim of the tray corroded before the centre. It could possibly be due to uneven concretion formation under the sea, the rim being the last to receive this protective layer.

The sound metal area shown in figs. 113 and 114 was examined on the electron microprobe at the Commonwealth Scientific and Industrial Research Organization's Division of Mineral Chemistry. The aim of this was to verify by scanning for zinc that the areas under attack contained a higher zinc content than their surrounds. However, the instrument was insensitive to minor fluctuations in concentration and gave inconclusive results. The proposal put forward on the mechanics of corrosion was thus based on optical microscopy alone.

The iron-rich phase may have added to the extent of the attack by acting as anode in an electrochemical cell. However, it was very finely distributed because of the slow cooling rate and its dissolution would lead to only minor pitting. The lead present would not have had any significant effect on the deterioration of the alloy.

6. Recommendations for Treatment

Since the brass was very porous, and had been penetrated severely by filaments of corrosion, it was advisable to soak it in 10% citric acid with 2% thiourea added as an inhibitor. This would serve to eliminate the copper chloride salts which could cause the whitish-green eruptions on the surface known as 'bronze disease'. Several changes of this solution were necessary to complete the washing process.



(115) Etched. Here the corrosion has penetrated deeply; and a secondary (bridging) attack is occurring (magnification x 50).

This treatment was best followed by de-watering and soaking in 3% benzotriazole in alcohol. This is a recognised reagent for the stabilisation and preservation of corroded copper alloys.

The final surface treatment was best conducted by coating with Incralac (a solution of benzotriacole in lacquer) or by immersion in a dilute (2%) solution of P.V.A. in acetone, followed by immersion in a more concentrated (10%) solution. Both of these coating processes are reversible, i.e. they can be removed using the necessary solvents if better treatments should become available.

ANNEX ONE

COMPOSITION OF ETCHANTS

Ferric chloride, alchoholic

Ferric chloride	5g
Hydrocholoric acid, conc.	2ml
Ethyl alcohol, abs.	95ml

Ferric chloride, acqueous

Ferric chloride	5g
Hydrochloric acid, conc.	10ml
Water	100ml

APPENDIX THREE

FURTHER NOTES ON THE MERCURY TRADE

JEREMY GREEN

Sténuit has pointed out above in Appendix One that the V.O.C. mercury trade is scarcely documented. This section is intended to supplement his extensive description of this trade.

1. The Containers

Sténuit has already indicated the literary evidence for the four basic types of mercury containers: stoneware jugs (*baertcannen*); glass bottles; leather flasks in barrels; and copper cauldrons. On 4 January 1636, the Council of the V.O.C. in the Indies recommended the system used by the English for carrying mercury; namely a *dickeglaese flessen* (thick glass bottles) and *grove dicke swaere kannen* (coarse thick heavy jugs), in preference to the leather flask system, Coolhaas (1960), 510. On 28 December 1636, the Council complained of leaks in the *steene crycken ende flessen* (stone jugs and bottles) and suggested *glaese flessen in kelders* (glass bottles in cellars), Coolhaas (1960), 559. This leakage problem is reflected in the two stoneware jugs from the VERGULDE DRAECK GT 84 and 87 (section 2.1 Chapter V), which have small leaks in their body, large enough for water to drain out of the jug in less than a minute. This indicates that these jugs either did not contain fluids or they had these flaws repaired and subsequently the repair has disappeared during the long immersion in seawater. One flask, GT 816, had its wooden bung intact, but neither this, nor any other jugs, were found with traces of their original contents. In 1642, 20,000 lbs. of quicksilver was requisitioned for the Indies, KA 1006l, and in different handwriting alongside these requisitions it is noted: *in steene kannen 120lb.* Thus the mercury in that year was sent in stoneware jugs, 120lbs. of mercury represents a 4.37 litre container. This volume is slightly larger than the VERGULDE DRAECK stoneware containers.

Thus it seems that there can be little doubt that the *baertcannen* were the most usual mercury container after about the 1630s. The suggested use of square green glass bottles for mercury containers has been suggested by Sténuit in Appendix One. His suggestion is based on the 1636 recommendation for the use of glass bottles in *kelders* (cellars) as mercury containers, and the association of mercury with the pewter screw caps and fragments of glass bottles on the LASTDRAGER wreck site. If these bottles are in fact similar in size to the complete example from the VERGULDE DRAECK, GT 1399 (Section 4.1.2. in Chapter V), then their volume is about 3.5 litres, which when filled with mercury, would weigh about 47kg. In view of the thin glass, the fragile nature and unsuitable parallel sided shape for carrying mercury, it seems unlikely that they are the bottles referred to by the Council in 1636. Furthermore, as a cellar contained 15 bottles, this would have given it a total weight of 705kg, and required to have been specially strengthened to hold such an enormous weight.

It seems certain that the large green case bottles were part of the *fleskelder* personal wine supply allowed by the Company, (see Chapter VI-5), and that smaller strong glass bottles would have been used for mercury. The VERGULDE DRAECK beardman jugs appear to have been empty, possibly as supplies for the Indies, for the transhipment of mercury.
The use of beardman jugs for carrying mercury may be further associated with the discovery, approximately half a century ago, of several hundred "little beardman" which were dug up near Painan, south of Pedang on the west coast of Sumatra. It was here that the V.O.C. worked the Salida gold mine in the third quarter of the 17th century, (Dinas Museum). Although the guidebook suggests these jugs would have been filled with beer and other beverages when imported, it is possible that they were originally mercury containers, and the mercury was used in the extraction of the gold.

The tall stoneware jars from the Sarawak Museum have been classified as Phase I and II brittle ware by Moore (1970) illustrated in Plate 1c, and it has been suggested by Treloar (1972) that they were used as mercury containers. This suggestion is based on the account of the discovery of some forty or fifty broken earthenware pots in 1864 in the wall of a cellar in Malacca. It was estimated at the time that these pots would have "contained considerably more than a ton in weight" of mercury. The author (Treloar) bases the suggestion that the tall jars were mercury containers on the following: "...we estimate the 'considerably more than a ton in weight' as 2,500 lb. and the number of pots as 50 (rather than 40) then each of these earthenware pots on this basis must have originally contained about 50 lbs. of mercury and so could have been pots of identically the same type (as the Sarawak vessels)." This assumption is based on an estimate of the volume (from the dimensions) of the Sarawak vessels of 1.5 litres which gives 21 kilogrammes of mercury which is then said to be about 50 lbs., whereas the true value is 45 lbs. Even if it could be shown that the pots had the same volume, and that the description of the "earthenware pots, many of which were crumbled to pieces", actually meant stoneware, the connection of the two in size alone seems tenuous.

2. The Use of Mercury

The most widely known use of mercury in the period we are dealing with, was in the amalgamation process for the extraction of gold and silver. Captain Betagh gave the following description in the 1720s of the use of mercury in the extraction of silver from the South American mines:

"It is a common thing for the People here, as well as elsewhere, to complain of the present Times, and commend the past, as if heretofore there were infinitely greater Quantities of Silver dug out of the Mines than at present: It is generally believed and there seems to be some Reason for it, that Experience has taught the Creolians here a perfect Acquaintance with Minerals, and the Art of treating them, so as to obtain the largest Profit. But, however, when one considers their Ignorance in other Arts, their going on constantly in the same beaten Track in this, together with their *vast Waste* of Quicksilver, one is almost tempted to believe, that our *European* Miners might manage their Works to still greater

Advantages. This seems the more probable, when one reflects, that this Knowledge of theirs is not all founded upon Principles, but is, properly speaking, an Art built upon accidental Discoveries, in which there is little of Accuracy, and abundance of Uncertainty; which will be more evident to the Reader, when he has perused and considered the following Account of the Manner, in which the Silver is extracted from the Ore at the Mines.

"The most perfect Silver that comes from thence, is in that Form which the *Spaniards* call *Pinnas*, which is a Lump of Silver extremely porous, because it is the Remainder of a Paste, made of Silver-dust and Mercury; and the latter being exhaled, leaves this Remainder of the Mass spongy, full of Holes, and light. In regard to the Art of Refining, therefore, I am to shew the Progress of the Ore from the Mine to this kind of Mass or Cake: After having broken the Stone taken out of the Vein of Ore, they grind it in their Mills with Grind-stones, or in the *Ingenios Raales*, or Royal Engines, which consist of Hammers or Pounders, like the French Plaster-mills. They have generally a Wheel of about twenty-five or thirty Feet Diameter, whose long Axle-tree is set with smooth Triangles, which, as they turn, hook or lay hold of the Iron Hammers, lift them up to a certain Height, from whence they drop at once at every Turn; they generally weigh about 200 Weight, and fall so violently, that they crush and reduce the hardest Stones to Powder by their Weight alone. They afterwards sift that Powder through Iron or Copper Sieves, to take away the finest, and return the rest to the Mill. When the Ore happens to be mixed with some Metals, which obstruct its falling to Powder, as Copper, then they calcine that in an Oven, and pound it over again.

"In the little Mines, where they use none but Mills with Grind-stones, they, for the most part, grind the Ore with water, which makes a liquid Mud, that runs into a Receiver; whereas, when it is ground dry, it must be afterwards steeped, and well moulded together with the Feet for a long time. To this Purpose they make a Court or Floor, where they dispose that Mud in square Parcels about a Foot thick, each of them containing half a *Caxon* or Chest, that is, twenty five Quintals, or 100 Weight of Ore; and these they call *Cuerpos*, that is Bodies. On each of them they throw about 200 Weight of Sea or common Salt, more or less, according to the Nature of the Ore, which they mould, and incorporate with the Earth for two or three Days. Then they add to it a certain Quantity of Quicksilver, squeezing a Purse made of a Skin, into which they put it, to make it fall in Drops, with which they sprinkle the Body or Mass equally, according to the Nature and Quality of the Ore. They allow to each Mass ten, fifteen, or twenty Pounds; for, the richer it is, the more Mercury it requires to draw to it the Silver it contains: So that they know not the Quantity, but by long Experience. An *Indian* is employed to mould one of these square Parcels eight times a Day, to the end that the Mercury may incorporate with the Silver. To that Effect they often mix Lime with it, when the Ore happens to be greasy, where Caution is to be used; for they say, it sometimes grows so hot, that they neither find Mercury nor Silver in it; which seems incredible. Sometimes they also strew among it some Lead or Tin-ore, to facilitate the Operation of the Mercury, which is slower in very cold Weather, than when it is temperature; for which Reason, at *Potosi* and *Lipes*, they are often obliged to mould the Ore during a whole Month, or a Month and an half: But, in more temperature Climates, the Amalgama is made in eight or ten Days.

"To facilitate the Operation of the Mercury, they in some Places, as at *Puno* and elsewhere, make their *Buiterons* or Floors on Arches, under which they keep Fires, to heat the Powder of the Ore, for twenty-four Hours, on a Pavement of Bricks. When it is thought, that the Mercury has attracted all the Silver, the Essayer takes a little Ore from each Parcel apart, which he washes in a little earthern Plate, or wooden Bowl, and, by the Colour of the Mercury found at the Bottom of the Bowl, knows whether it has had its Effect: For, when it is blackish, the Ore is too much heated; and then they add more Salt, or some other Drug. They say, that then the Mercury *dispara*, that is, shoots or flies away. If the mercury is white, they put a Drop under the Thumb, and, pressing it hastily, the Silver there is amongst it remains sticking to the Thumb; and the Mercury slips away in little Drops. In Conclusion, when they perceive, that all the Silver is gathered, they carry the Ore to a Bason, into which a little Stream of Water runs, to wash it, much in the same Nature as I shall shew they wash the Gold, excepting that this being only a Mud without Stones, instead of an Hook to stir it, an *Indian* stirs it with his Feet, to dissolve it. From the first Bason it falls into a second, where another *Indian* is, who stirs it again, to dissolve it throughly, and loosen the Silver. From the second it passes into a third, where the same is repeated, to the end that what has not sunk to the Bottom of the first and second, may not escape the third.

"When all has been washed, and the Water runs clear, they find at the Bottom of the Basons, which are lined with Leather, the Mercury incorporated with the Silver; which they call *Lapella*. It is put into woollen Bag, hanging up, for some of the Quicksilver to drain through. They bind, beat and press it as much as they can, laying a Weight upon it with flat Pieces of Wood; and, when they have got out as much as they can, they put the Paste into a Mould of wooden Planks, which, being bound together, generally form the Figure of an octagon Pyramid, cut short, the Bottom whereof is a Copper-plate, full of little Holes. There they stir, in order to fasten it; and, when they design to make many *Pinnas*, as they call them, that is, Lumps of various Weights, they divide them with little Beds or Layers of Earth, which hinder their coming together. To that End the *Pella* or Mass must be weighed, deducting two-thirds for the Mercury that is in it; and they know, within a small Matter, what net Silver there is. They then take off the Mould, and place the *Pinna* or Mass, with its Copper Base, on a Trivet, or such-like Instrument, standing over a great earthen Vessel full of Water, and cover it with an earthen Cap or Covering, which they again cover with lighted Coals; which fire they feed for some Hours, that the Mass may grow violent hot, and the Mercury that is in it evaporate in Smoke; but that Smoke having no Passage out, it circulates in the Hollow that is between the Mass and Cap, or Covering, till, coming down to the Water that is underneath, it condenses, and sinks to the Bottom again, converted into Quicksilver. Thus, little of it is lost; and the same serves several times; But the Quantity must be increased, because it grows weak. However, they formerly consumed at *Potosi* 6 or 7000 Quintals or hundred Weight of Quicksilver every Year, as *Acosta* writes: by which a Judgement may be made of the Silver they got.

"When the mercury is evaporated, there remains nothing, but a spongy Lump of contiguous Grains of Silver, very light, and almost mouldering, which the *Spaniards* call *la Pinna*; and is, as I observed, a contraband Commodity from the Mines, because, by the Laws of the Kingdom, they are obliged to carry it to the King's Receipt, or to the Mint, to pay the fifth to his Majesty there. Those Masses are cast into Ingots, on which the Arms of the Crown are stamped, as also that of the Place where they were cast, their Weight and Quality, with the Fineness of the Silver ....", Harris (1744), 246.

In the post mediaeval period, Mercury was one of the foremost reagents on the alchemist's shelves and was widely used in China and the Orient. As early as 659AD lead and mercury was used to make silver metal powder for painting; as early as the Thang period (618-906AD), mercury in amalgamation with tin and silver was used for filling dental cavities, and which was only introduced to Europe in the 19th century; mercury-tin alloys were used for silvering mirrors. Mercury and mercury compounds were widely used for elixirs by Taoist adepts and believers, usually leading to metallic poisoning, and was used specifically for abortions, curing male exhaustion, and impotence. Mercury sulphide was found in the burial of a Lady of Tai (died *circ.* 186BC), in a large tomb excavated near Ma-want Tui, (Needham and Gwei-Djeu, 1974), and is thought to have been used for and was the cause of her remarkable preservation.

Moreland (1923) assumes that the mercury arriving in India was chiefly converted into vermillion. Annual offtake of the Gujarat market was about 15,000 to 20,000 lbs. annually. Supplies came from China as well as Europe in the latter case via Red Sea as well as the Cape, and it is interesting to note here the discovery of the mercury carrier from the Red Sea, Raban (1972-5) dated from about 1600. Moreland suggests that the mercury trade in India was highly speculative, and that in 1630 its price in London was raised owing to the quantity bought for private trade. However the figure of 300 cwt. given by Sténuit in Appendix One for the total annual weight of mercury bought by the Netherlands from the Idria mines in the 18th century, indicates that either the demand had dropped off by the 18th century or another source of supply existed.

CONCLUSIONS

The size and complexity of this work prohibits the drawing of over-long conclusions, particularly because of space limitations. Also, in a sense, this is an interim report, since the wreck site is not yet completely excavated, and some research is still in progress. The study is the result of six years' work, and has led to some unexpected and unusual fields of research. Before the full implications of this work are clear, it will have to be related to and compared with the research now being carried out on the BATAVIA.

We have seen some of the difficulties and shortcomings of the excavation work carried out on the VERGULDE DRAECK site. Particularly, the recording aspects were unsatisfactory, and these were not properly developed until work started on the BATAVIA. The VERGULDE DRAECK site still holds much potential for excavation, and it is anticipated that work will re-commence on this site in the near future. Amongst other things, it is hoped to raise all the cannon and study these in detail.

The study of the artefacts has not been consistently thorough; particularly, more work is needed on the biological material: seeds, bones, etc. The animal remains present a unique example of pre-breeding revolution domestic cow and pig. Analysis of coal, pitch and resin would be of interest, together with identification of the sources of these materials.

It is hoped that this present study will serve as a useful reference work for readers interested in the VERGULDE DRAECK, and that post-medieval archaeologists and maritime archaeologists will find it helpful, too.

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KA 187 *idem* *Oktober 1654 - Augustus 1660*

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KA 364 *idem* *1653-1658*

KA 455 *Copieboek van brieven, instructies en andere papieren van de Heren XVII en de Kamer Amsterdam aan de Regeringen van Indie en de Kaap - September 1644 - Oktober 1657.*

KA 456 *idem* *April 1658 - Juni 1666*

KA 577 *Copieresoluties van Gouverneur Generaal en Raden* - Jan. 1654 - Dec. 1657

KA 578 *idem* *1658-1663*

KA 1093 *Overgekomen brieven en papieren uit Indie gericht aan Heren XVII en Kamer Amsterdam 1655*

KA 1104 *idem* *1657*
KA 1107 *idem* *1657*
KA 1115 *idem* *1659*

KA 3966 *Overgekomen brieven en papieren gericht aan de Kamer Amsterdam, van de Kaap de Goede Hoop, Mauritius en Suratte in Nederland aangekomen 1653*

KA 3967 *idem* *1654*
KA 3968 *idem* *1656*
KA 3969 *idem* *1657*
KA 3970 *idem* *1658*

KA 4389 *Uitloopboekje van schepen van 1603 tot en met 1701*

KA 4390* (Alphabetical list of ships of the VOC)

KA 10061 *Verdeeling vanden Eysch voor India tegens den jaren 1634-1664. Generalen Eysch voor India; soo van coopmanschappen, contanten provisien, scheepsgereetschappen, Ammonitie van oorlogh als andersints Ingestelt by den Gouverneur Generaal ende Raden van India.*

KA 10072 *Bevindinge op den eijsch generaal. van hier uit t'patria voor den jaare 1654 gedaen. Alphabet van d'naer volgende provisien gereetschappen ende nootwendicheden voor India. Generalen Eijsch van India uijt patria gedaen voor den jare A 1653 Bestaende inde volgende provisien, gereetschappen, Ammonitie van oorloge en soo volght.*

KA 10074 *Idem* for 1656.

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