

**HEALTH AND DISEASE ON THE DUTCH HIGH SEAS: AN ANALYSIS OF
MEDICAL SUPPLIES FROM *BATAVIA, VERGULDE DRAAK* AND *ZEEWIJK***

A Thesis

by

CORAL AM-ERIKA EGINTON

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Chair of Committee,	Luis Filipe Vieira de Castro
Committee Members,	Kevin J. Crisman
	April Hatfield
	Wendy Van Duivenvoorde
Head of Department,	Cynthia Werner

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ABSTRACT

During the 17th and 18th centuries the Dutch East India Company or *Vereenigde Oost-Indische Compagnie* (henceforth the VOC or the Company) maintained its presence as a power of trade in Asia by establishing footholds and even monopolizing spice markets through its active and successful network of maritime transportation. Unlike its predecessors in the Indies, the VOC was not interested in colonization so much as pure economic gain. It was understood from the inception of the Company in 1602 that making a profit was dependent upon the safe arrival and return of cargo laden ships, the chances of which could be greatly increased by the presence of ship surgeons who worked to keep the crew healthy enough to function. Thus it became Company policy to employ ship surgeons on every outbound and homeward vessel and by the end of its two hundred year presence in Asia close to ten thousand surgeons had served aboard ships heading to the Indies.

During the 1970s the Maritime Archaeology Department of the Western Australia Museum conducted full-scale excavations of three VOC ships off the coast of Western Australia. The artifact collections of *Batavia* (1629), *Vergulde Draak* (1656) and *Zeewijk* (1727) yielded archaeological evidence for the presence of surgeons practicing aboard these ships. Ship surgeons were a unique class of medical practitioner whose profession was significantly different at sea than it was on land. These men acted as barber, surgeon, and apothecary to crews commonly exceeding two hundred individuals. They faced diseases that had never before been encountered and commonly found themselves treating the casualties of maritime war in addition to treating the daily dietary imbalances and ailments of a standard early modern life.

This thesis will explore the education, career, and status of ship surgeons employed in the VOC and provide an in-depth analysis of the artifacts recovered from *Batavia*, *Vergulde Draak* and *Zeewijk* that are associated with the surgeon's daily practices. As the ships in question date to the rise

and height of Company power in Asia, they provide an excellent snapshot of the surgeon's profession at the busiest and most dangerous periods in VOC shipping.

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TABLE OF CONTENTS

	Page
ABSTRACT	ii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	vi
LIST OF FIGURES	viii
LIST OF TABLES	xii
CHAPTER I: METHODOLOGICAL INTRODUCTION	1
CHAPTER II: INTRODUCTION TO THE VOC AND THE SHIPS <i>BATAVIA</i> , <i>VERGULDE DRAAK</i> , AND <i>ZEEWIJK</i>	4
A Brief History of the Dutch East India Company	4
Outfitting and Trade Routes	7
The Story of <i>Batavia</i>	10
The Story of <i>Vergulde Draak</i>	12
The Story of <i>Zeewijk</i>	15
The Presence of Surgeons	19
CHAPTER III: THE EDUCATION, OCCUPATION, AND STATUS OF SHIP SURGEONS IN THE VOC.....	22
Surgeons First Arise	23
Education.....	25
Career Options on Land	27
Career Options at Sea.....	29
Employment in the VOC.....	30
Shipboard Life.....	35
Success?	37
CHAPTER IV: BARBERING DUTIES AND TOOLS.....	40
Barber's Bowls.....	44
Razors.....	51
Scissors.....	54
Combs.....	57
Discussion	60

	Page
CHAPTER V: SURGICAL DUTIES AND TOOLS	63
Required Instruments	64
Handles	72
Discussion	74
CHAPTER VI: APOTHECARY DUTIES AND TOOLS	79
Mortar and Pestle.....	81
Discussion	91
Apothecary Jars	101
Albarelli.....	103
Zalfpotten	116
Discussion	134
Apothecary Weights	138
Discussion	147
CHAPTER VII: CONCLUSION	150
REFERENCES	154

LIST OF FIGURES

FIGURE	Page
1 Map of Sailing Routes to the Indies	9
2 Maps of <i>Batavia</i> Wreck Site	13
3 Maps of <i>Vergulde Draak</i> Wreck Site	18
4 <i>Monkeys in the Surgeon Shop</i> by Pieter van der Borch (1545-1608).....	41
5 <i>The Village Barber</i> by Adriaen van Ostade (1637).....	45
6 <i>Dentist by Candlelight</i> by Gerrit Dou (1655).....	46
7 BAT516B (left) and BAT516A (right).....	47
8 BAT516A.....	49
9 BAT516B.....	50
10 ZW421.....	53
11 ZW109.....	53
12 ZW5354.....	54
13 ZW1013 (left) and ZW1021 (right).....	55
14 ZW203.....	56
15 Bone Comb from <i>Avondster</i>	59
16 GT1129.....	59
17 ZW426A, ZW426B and ZW2874	60
18 Examples of Surgical Tools for Making Incisions	67
19 Examples of Surgical Tools for Clamping and Prying.....	67
20 Examples of Surgical Tools for Probing	68
21 Amputation Tools.....	70
22 Examples of Trepanns.....	71

FIGURE	Page
23 BAT4426.....	73
24 BAT4028.....	74
25 Amputation Scene from <i>De Gangraena et Sphacelo</i>	75
26 Comparison of Handles.....	77
27 Cautery Irons	77
28 <i>Interior of a Pharmacy</i> by Unknown Artist	82
29 BAT457.....	83
30 BAT562.....	84
31 BAT562 Detail.....	85
32 BAT625.....	86
33 GT74.....	87
34 GT6.....	88
35 Florets from BAT457 (left) and GT6 (right).....	89
36 VOC Crest from GT74 (left) and GT6 (right).....	90
37 GT613.....	90
38 <i>The Apothecary</i> by Gabriel Metsu (1661).....	92
39 <i>The Alchemist</i> by Cornelis Bega (1663).....	93
40 Woodall's Diagram of a Surgeon's Chest.....	102
41 <i>Frontispiece of Physicias in an Apothecary's Shop</i> by Unknown Artist (1486).....	105
42 BAT2326.....	106
43 BAT2318.....	107
44 BAT2331.....	109
45 BAT2305.....	110
46 GT2006, T2023, and GT2088	111
47 BAT2370.....	112

FIGURE	Page
48 BAT2669, BAT2668, and BAT2670	114
49 BAT2337	115
50 BAT2831 (left) and BAT2101 (right)	116
51 <i>Surgeon Treating a Peasant's Foot</i> by David Teniers (1610-1690)	118
52 Comparison of Zalfpotten Glazes	119
53 Comparison of Zalfpotten Rims	120
54 Comparison of Zalfpotten Bases	120
55 BAT2300	121
56 BAT2298	122
57 BAT2299	123
58 BAT2330	124
59 BAT2297	124
60 BAT2658	125
61 BAT476	126
62 BAT2320	127
63 BAT2323	128
64 BAT2321	129
65 BAT2324	130
66 BAT2415	130
67 BAT2252	131
68 GT2007	132
69 GT2008	133
70 GT2009	133
71 BAT3295	142
72 BAT3295 Detail	142

FIGURE	Page
73 BAT3296.....	143
74 BAT3296 Detail	144
75 Comparison of Metal Tab Artifacts.....	146
76 BAT568.....	147

LIST OF TABLES

TABLE	Page
1 Inscriptions on Christie's Mortars.....	95
2 Pharmeceutical Measurements and Equivalents	140
3 Various Symbolic Representations of Drachms	148

CHAPTER I

METHODOLOGICAL INTRODUCTION

During the 1970s the Maritime Archaeology Department of the Western Australia Museum conducted full-scale excavations of three Dutch East India Company or *Vereenigde Oost-Indische Compagnie* (henceforth the VOC or the Company) shipwrecks off the coast of Western Australia. The information gained from the excavations of *Batavia* (1629), *Vergulde Draak* (1656) and *Zeewijk* (1727) greatly contributed to our understanding of Dutch ship construction, VOC shipping in the Indies, and the quality of life experienced on long distance voyages in the 17th and 18th centuries. Among the thousands of artifacts recovered from these ships were the remains of tools and containers that evidenced the presence of shipboard surgeons. Ship surgeons were a unique class of medical practitioner whose profession was significantly different at sea than it was on land. Though these medical artifacts were briefly addressed and often illustrated in the subsequent catalogs of finds from the above wrecks (Green 1977, 1989; Ingelman-Sundberg 1978), their historical importance warrants a more in-depth study.

In the fall of 2010 the author traveled to the Western Australia Museum's Shipwrecks Gallery in Fremantle in order to analyze the collections from *Batavia*, *Vergulde Draak* and *Zeewijk*. In addition to those artifacts touched upon in the earlier catalogs and attributed to the surgeon's equipment, additional finds were identified and will be addressed in this thesis. These artifacts and their uses will be set in historical context by comparison to parallel examples found in contemporary Dutch paintings and wood carvings. Illustrations of these instruments from medical treatises and descriptions of their uses or applications from journal accounts will further illuminate how they were utilized in the surgeon's daily practice.

This thesis aims to identify the equipment used by the surgeons aboard *Batavia*, *Vergulde Draak* and *Zeewijk* to fulfill their tri-part role as the ship's barber, surgeon, and apothecary. It will investigate which tools were supplied by the VOC and which instruments the surgeon was expected to provide. The question of whether or not certain surgeon-owned instruments can be identified by personal markings or inscriptions will be addressed. This work will also attempt to ascertain whether or not standardization existed in Company-issued materials and if a shift in quality or morphology can be perceived over the century that these three collections span.

The following introductory chapter will provide a brief historical background of the VOC and describe the trade routes that ships undertook to Asia. It will also place the ships *Batavia*, *Vergulde Draak* and *Zeewijk* in their historical context by describing the events that led to their demise and modern rediscovery. This will be followed by a chapter that will give necessary background information on the profession and lives of ship surgeons. Their education, shipboard duties, and social status will be discussed as well as what motivated them to seek employment as a sea surgeon and specifically with the VOC. The question of whether or not it is possible to judge if they were successful in their work will also be addressed.

The profession of the ship surgeon is essentially a tri-part role as he was the ship's barber, surgeon, and apothecary. The tools used to conduct the various aspects of his duties can also be divided by those roles which they helped him to fulfill. Chapter III will investigate the surgeon's role as the ship's barber and analyze the equipment generally associated with this task. The ownership and intended purpose of some of these tools, namely razors and combs, will come into question. Chapter IV will provide a scope of the surgical procedures commonly practiced and give descriptions of the instruments used in these operations. Since very little archaeological evidence of the tools employed in this aspect of the surgeon's job survived from the wrecks included in this study, this section relies heavily on the descriptions and illustrations of contemporary medical treatises of the 17th and 18th centuries.

On land, the surgeon performed minor operations and was even likely to perform barbering, but he was restricted from acting as an apothecary and preparing or administering internal medicines. Since this was the aspect of a ship surgeon's tri-part role that he had least experience with, it receives the most attention in this study. Chapter V explores the new responsibilities a surgeon had as acting apothecary and provides a detailed investigation of the equipment required for this role. Owing to the extensive collection of apothecary elements from *Batavia*, this section includes a comparative study of inscriptions found on mortars from the 15th to 18th centuries, an in-depth analysis of apothecary jars and their decorative motifs, and an investigation into apothecary weights and the deciphering of their stylized symbols. The final chapter will summarize the observations made in the preceding chapters and address the research aims laid out above.

CHAPTER II

INTRODUCTION TO THE VOC AND THE SHIPS *BATAVIA*, *VERGULDE*

DRAAK AND ZEEWIJK

A Brief History of the Dutch East India Company

In the 16th century it was common for a group of merchants to incorporate and pool their resources to launch a fleet of ships to engage in trade for a single voyage. Upon the fleet's return, the company would be dissolved and the profits would be split among the merchants as stipulated in their contract. The Dutch East India Company was officially established in 1602 after a particularly successful endeavor by a fleet of eight ships to the East Indies returned home boasting a profit of nearly 400%. The formation of the VOC, strongly encouraged by the Dutch government, was implemented to contend with the newly formed English East India Company which aimed to monopolize trade in the Indies. In order to successfully compete for trade routes and ports, the VOC was granted the ability to establish colonies, erect forts and install infrastructure, enact treaties with foreign powers and even wage war if necessary. The first permanent Dutch foothold in the Indies was established at Banten in 1603 and as trade proceeded another large center of operations was established at Jakarta in 1610 (Gaastra 2003:38).

The governing body of the VOC was headquartered in a large building called the *Oost-Indisch Huis* in Amsterdam. This cabinet of seventeen shareholders was called the *Heeren XVII* and collectively managed all aspects of Company affairs. The VOC was divided into six chambers (*kamer*) which were each expected to undertake certain tasks delegated to them by the *Heeren XVII* and contribute to Company needs by amassing raw materials, establishing warehouses and building ships (Parthesius 2010:34). These chambers were Amsterdam, Delft, Enkhuizen, Hoorn, Middelburg

and Rotterdam. The *Heeren XVII* wanted an official representative present in Asia to manage aspects trade and company concerns on the ground, and so the post of Governor-General was created in 1610 (Gaastra 2003:38).

From 1619 to 1623 Jan Pieterszoon Coen held the post of Governor-General during which time he greatly advanced Dutch footholds in the Indies. He retook the trading post in Jakarta after it fell into English hands, rebuilt the city, erected a new fort, and renamed it Batavia. He also established a monopoly over the trade of nutmeg and mace by leading an assault on the Banda islands and wrenching control away from the English. Coen also devised a system of intra-Asian trade that shipped goods in high demand between Asian centers. This made the most abundant resource of the VOC, ships and transportation, a valuable commodity. The speed and efficiency with which this system functioned made it a quite desirable alternative to land routes, and the profits were reinvested into the Company to advance its growth (Parthesius 2010:37-49).

The VOC continued to grow and flourish in the decades that followed the jumpstart Coen implemented. In 1640 the VOC obtained control of Galle Harbor in Ceylon (modern-day Sri Lanka) and ended the Portuguese monopoly over the cinnamon trade. From this point until 1659 the Company focused on expelling the Portuguese entirely from Sri Lanka. In 1652 a Dutch post was officially established at the Cape of Good Hope at the southernmost point of Africa. Though this had been a stopover during voyages for many decades, the official colonization of the area ushered in the building of warehouses for resupplying and repairing vessels at a halfway point in their journey. During the 1650s and 1660s trading posts were established in Taiwan, Bengal, Malacca, Siam, Sumatra and on the Malabar Coast of India (Parthesius 2010:37-49).

Around 1670 the success of the VOC stalled due to a decline in trade with Japan after the Dutch were expelled from Taiwan, and the start of the Third Anglo-Dutch War. During the ensuing skirmishes between the Dutch and the English forces in the Indies, other companies attempted to

infiltrate the spice market, particularly the trade in pepper. During this period the VOC began to diversify into the trade in tea, coffee, and textiles from Asia. Though these commodities required significantly more volume than did spices to produce the same profits, the Company took advantages of changing European tastes and low interest rates which made such an expansion look promising (de Vries and van der Woude 1997:443-447).

Though the VOC attempted to strengthen its trade monopolies through renewed treaties with native leaders during the early 1700s, French, Danish, and English influences continued to grow in the Indies. By 1720 the Company began to abandon its less profitable and more bothersome trading posts to the English in order to focus their dwindling resources on more favorable footholds.

Continuing resistance from native and European military forces coupled with growing trade alliances between Asian powers and other European traders contributed to the decline of the VOC after the middle 1700s. A divided focus on commodities in the 1680s led to a significant portion of Company resources being split between the spice trade and auxiliary trade endeavors in Asia. When foreign influences began to push the Dutch out of the spice trade, it became clear that the previous split had compromised the Company's ability to redirect the necessary funds to restore its previous state. A policy change in the 1730s saw less profits being reinvested into Company needs in favor of paying out a greater percentage as dividends (de Vries and van der Woude 1997:447-448).

In addition to the financial issues decided by officials in Amsterdam, problems in Company affairs in Asia also contributed to the decline of the VOC. Corruption among high-ranking Company employees in Asia led to the neglect of their duties. Many of these men engaged in illegal trade and even forged secret alliances with competing trade companies (Nierstrasz 2012:190-205). A high mortality rate among employees in Asia was also contributing factors to the loosening of Dutch footholds.

The beginning of the Fourth Anglo-Dutch war heralded the killing blow to the already faltering power of the VOC. British attacks on Dutch ships from 1780 to 1784 reduced the Company fleet by nearly half. If vessels were not captured or destroyed, they were boarded and their cargo was transferred to English ships. This devastated the VOC beyond repair. Though the Dutch states of Holland and Zeeland attempted to reorganize and revive the Company after the war, it was to no avail. On March 1, 1796 the *Vereenigde Oost-Indische Compagnie* was nationalized and its charter was allowed to expire three years later (Frederick and Worden 2011:29).

Outfitting and Trade Routes

The profitable return of the first VOC fleets to the Indies allowed the Company to instill and perpetuate a business model in which a large portion of the net profits was invested back into the running and improving of the Company. This allowed the VOC to construct and outfit its own vessels without relying on external funding or purchasing vessels from outside sources. Not every chamber was on the water, and thus not all participated in the actual construction of vessels, but all were required to contribute in different ways, some of which were not necessarily monetary. This was done via the provision of raw materials for ship construction, the supplying of textiles or other materials for trade in the Indies, the provisioning of food and drink for the duration of the journey, or the furnishing of shipboard necessities such as armament.

Until 1610 a fleet of four or more ships was commissioned and crewed for a round voyage, taking from two to three years (Parthesius 2010:31). This collection of vessels would stop over at the Cape of Good Hope and then at multiple points throughout Asia to gather the necessary cargo. Once Jakarta was established as a Dutch trading post, it served as a central point for the collection of Asian goods. After Coen established his intra-Asian trade network and set up storehouses at the newly named Batavia, this process of collecting cargo became much more efficient.

With the new model in place, ships often changed out crew members at Batavia while being laden with their return cargo of spices. Round-trip voyages were expected to take an average of nine months, and single vessels were launched and returned along a staggered timeline. The efficiency of this model resulted in a huge increase in the number of voyages undertaken between 1610 and 1630 which then transitioned into a steady growth until 1650 (Parthesius 2010:32).

A ship embarking for the Indies often awaited its crew and a favorable easterly wind at the standard departure point in Texel. Depending on the time of year and the weather, ships either navigated around Scotland through the North Sea or headed directly into the English Channel (Figure 1). The Bay of Biscay and Cape Finisterre were often stormy and could pose dangerous obstacles. Ships sometimes stopped at the Cape Verde Islands off the western coast of Africa to resupply with cattle, pigs, or chicken (Stichting Ons Erfdeel 2003:98). After this the long haul to the Cape of Good Hope began. After 1652 when the Cape acted as an official Dutch port, ships often paused here for up to a three weeks in order to reprovision and treat sick crew members at the hospital in Cape Town.

English vessels, and Portuguese before them, tended to take the route from the Cape of Good Hope by hugging the coast of Africa and heading to the Indian subcontinent. Ships of the VOC commonly chose the more direct route by catching the “Brave Westerlies” which had the potential to sweep them all the way to Australia (Stichting Ons Erfdeel 2003:99). At this point they followed the Sunda Straits where they would redirect course and head north to Batavia.

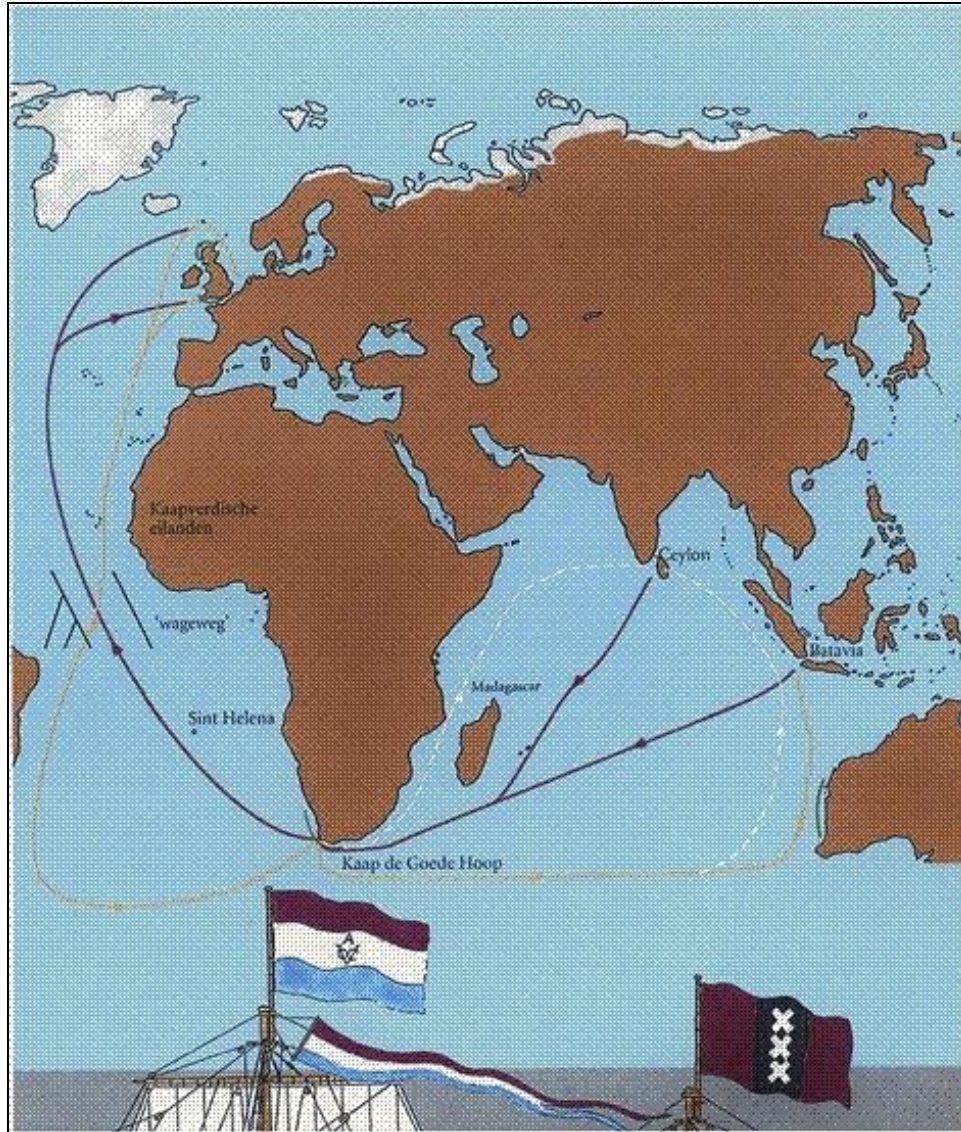


Figure 1: Map of Sailing Routes to the Indies.

Yellow = Route to Batavia. Red = Return Route to Holland. Dotted = Direct Route to Ceylon.

(Stichting Ons Erfdeel 2003:98)

The return route followed that of the initial voyage for the most part. The “Brave Westerlies” worked against a ship heading back towards the Cape, so whether setting off from Batavia or from Ceylon a more direct route was taken across the Indian Ocean back to the tip of Africa. Vessels could again stop over here before undertaking the long stretch up through the Atlantic. At this point the ship

sailed a bit closer to the western coast of Africa until it veered west to take advantage of the *wageweg*, a channel of converging winds in the Atlantic which helped to propel the ship towards its homeland. On the outgoing voyage, this same area was often referred to as “the doldrums” because working against the current could sometimes leave a ship becalmed for days or even weeks. Upon reaching northern Europe, the same option existed for navigating north around Scotland or going through the English Channel to make landfall back in Texel.

The Story of *Batavia*

The *retourschip Batavia* was built in Amsterdam in 1628 and set sail from Texel for the Indies on 27 October of that year. Sometimes referred to as a homeward-bounder, this largest [Rate 10] and most well known class of VOC ship was specifically built to bring substantial amounts of Asian products home to the Netherlands (Parthesius 2010:65-66). Unfortunately, it did not fulfill the duty boasted by its name and instead foundered on the Houtman Abrolhos reefs off the coast of Western Australia during its maiden voyage in 1629. The story of the events leading up to this disaster and the ensuing trials which the surviving crew underwent are renowned in VOC history.

Pilot Ariaen Jacobsz and merchant Jeronimus Cornelisz devised a plan to intentionally drive the ship off course and away from the rest of the fleet after stopping over at the Cape of Good Hope. They thought they would be able to cause a mutiny aboard and commandeer the vessel and its goods in order to set up a comfortable living for themselves outside of the Netherlands. After *Batavia* had been separated from the fleet, Jacobsz, Cornelisz and a group of mutineers molested a high ranking female passenger in an attempt to goad Captain Francisco Pelsaert into disciplining the crew, thus making him appear to be a cruel and unfair man to gain support. However, the woman identified her attackers and Pelsaert planned to arrest the men once reaching shore instead of taking any actions while on the ship.

In the midst of this dramatic tale, on the morning of 4 June 1629 the ship struck a shallow reef on the western side of Australia, near modern-day Beacon Island. No lives were lost in the wrecking itself, and crew members were able to flee to the waterless Beacon Island with some supplies in hand. As the ship was beginning to break up in the surf, with 70 individuals still on board, Pelsaert decided to leave the 198 survivors on Beacon Island and 48 officers and passengers in the intact long boat on a search for water. He did in fact look for water, but only as they traveled along the coast towards Batavia. It took them 33 days to reach the city and upon making landfall Pelsaert had his boatswain executed and Jacobsz arrested for their actions in the mutiny.

Pelsaert attempted to return to the wreck site in a small *jacht* called *Sardam* but the journey back took another 63 days. Three months after Pelsaert left, he returned to Beacon Island to find a bloody mess. Cornelisz, not satisfied with the trouble he had caused on board before the foundering, had rallied a group of mutineers and massacred 125 men, women, and children of the remaining crew and passengers on the island. Pelsaert quickly overcame and arrested the mutineers. While local divers assisted in the recovery of cargo from *Batavia*, Pelsaert organized trials on Beacon Island and executed some of the mutineers. More of the guilty were executed after *Sardam* finally reached Batavia with the rescued crew and cargo.

In 1963 the wreck site was rediscovered and subsequent expeditions were undertaken with the official excavation commencing in 1972 under the Western Australia Museum. The site is located on Morning Reef in the Wallabi Group of Houtman Abrolhos. Some artifacts were scattered over the reef but the general body of the site is approximately 50 m long and 15 m wide (Figure 2). There were four seasons of excavation, entailing the recovery of finds from the intact stern portion of the ship. Being a relatively new field, nautical archaeology was still in its infancy while the investigations were carried out and many excavation and recording techniques were pioneered during these field seasons. Provenance of artifacts on the site was originally recorded in terms of proximity to numbered cannons

and concretions before a grid system was later implemented. The original method of recording provenance is used when discussing artifacts in this thesis.

The Story of *Vergulde Draak*¹

On 21 January 1653 the *Heeren XVII* met and decided to purchase a newly built *jacht* and outfit it in Amsterdam for use the following spring. The ship was purchased on 10 March of that year and named *Vergulden Draeck* (Green 1977:23). Listed as having a cargo capacity of 130 *lasten*, Parthesius (2010:73) would classify the vessel as a medium-sized yacht [Rate 5]. The initial voyage of this ship was affected by a series of delays due to the First Anglo-Dutch War. The *Heeren XVII* eventually had to go against the wishes of the military, who wanted to use the ship as an armed escort, and launch the *Draeck* in secrecy on 23 August 1653. After this rocky start, the vessel met with significant delays in “the doldrums” where twenty individuals died from an unknown shipboard disease and the rest of the crew was so sick that they were barely able to navigate to the Cape.

¹ The common convention for the spelling of this ship’s name has changed over time. The original VOC communications regarding the vessel use the classical Dutch *Vergulden Draeck* and sometimes abbreviate the name as *de Draeck*. Green modernized the first word of the original Dutch and called the vessel *Vergulde Draeck* in his publications. The modern Dutch spelling for the name “Gilt Dragon” or “Gilded Dragon” is *Vergulde Draak*. The historical convention will be applied where the referenced citations maintain it, but the author will use the modern spelling for research conducted throughout the course of this thesis.

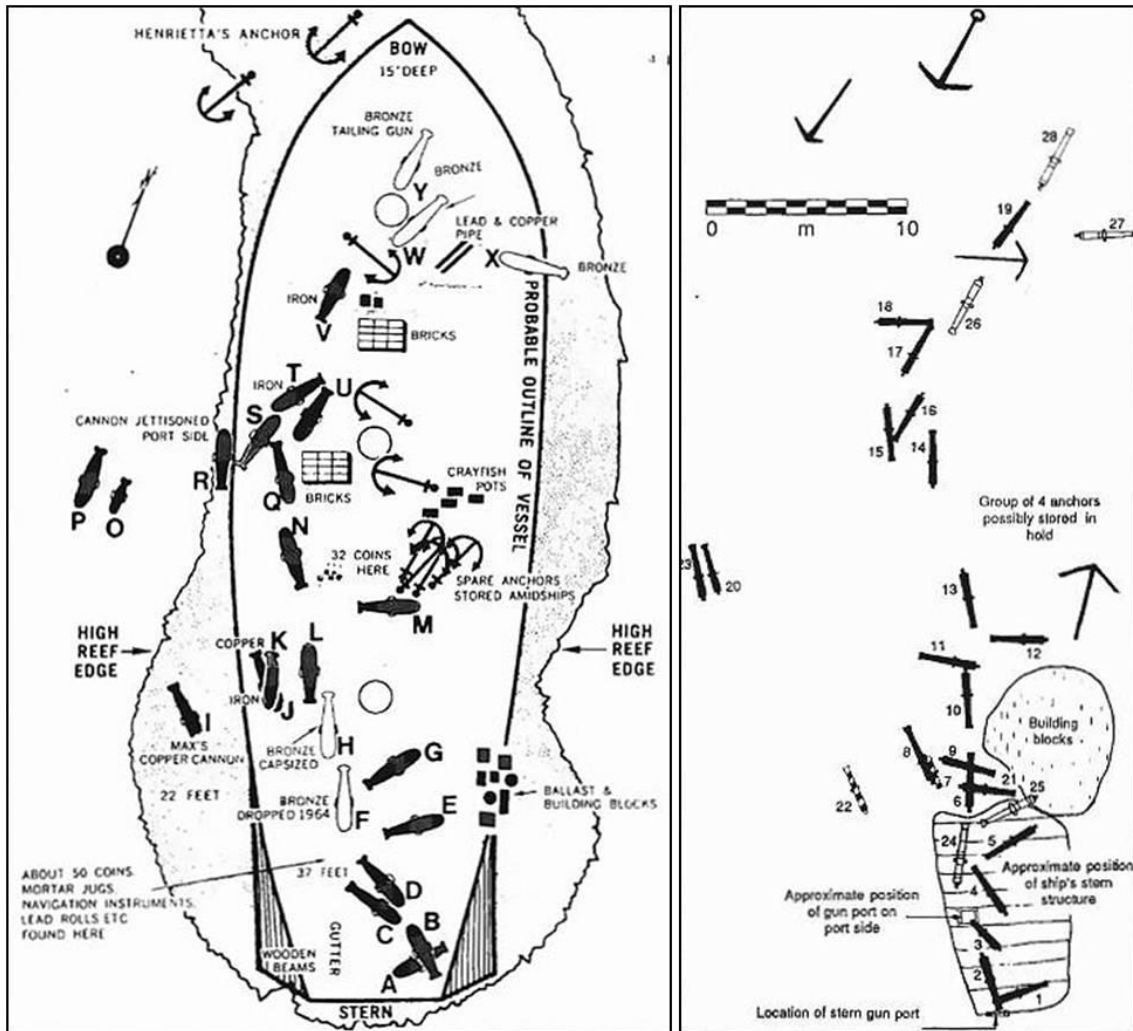


Figure 2: Maps of *Batavia* Wreck Site. Illustrated by Edwards in 1966 (left) and During the Initial Western Australia Museum Survey in 1971, with Cannons Removed in 1963 Added (right)

(Green 1989:26-27)

It took nearly seven months to reach this stopover, but after resupplying and resting at the Cape of Good Hope for an entire month, the *Draeck* departed for Batavia on 12 March 1654 and reached this destination on 24 May. After unloading its cargo the ship was selected to stay behind, because of its larger cargo capacity, as the rest of its accompanying fleet returned to Holland. It was not until 7 November that the *Draeck* set sail for home with a new fleet of four ships, filled with

pepper and sugar intended to return for the chamber of Enkhuizen (Green 1977:38). The ship arrived at the Cape of Good Hope on 27 January 1655 and then arrived back in the Netherlands on 11 June 1655.

A month later it was decided that *Vergulden Draeck* would make another journey to the Indies. The vessel was completely loaded and crewed in a relatively short turn around and left from Texel on 4 October 1655 (Green 1977:44). After an expeditious first leg, *Draeck* arrived at the Cape of Good Hope for the second time on 9 March 1656. It only took three days to unload the small amount of supplies intended for the Cape and the ship set sail for Batavia. The *Vergulden Draeck* was swept off course while caught in the “Brave Westerlies” and struck a reef off the western coast of Australia on 28 April 1656 (Green 1977:47).

The ship immediately began to break up in the waves and many lives were lost in the struggle to make it to shore. Of the 193 crew members, only 75 survived the wreck. Of these, 68 were left behind when the understeersman and six sailors left for Batavia in the ship’s small *schuyt* in order to find help. They did not arrive in Batavia until 7 June. A *fluit* was outfitted with a team of salvage divers to retrieve the lost cargo and, along with a small transport *jacht*, it set south from Batavia to search for the wreck and survivors. Rough weather challenged this rescue mission and a small boat with eleven men was lost during search efforts along the shore. Ships setting off from the Cape of Good Hope were even requested to keep an eye out for the *Draek* and its survivors, but to no avail. The ship and castaways were never found (Green 1977:48-50).

The events leading to the modern rediscovery of *Vergulde Draak* began as early as 1931 when a hoard of *ducatons* and Japanese coins began to erode from the mouth of the Moore River (Green 1977:63). In 1957 two divers claimed to have discovered cannons on the wreck site, but a closer investigation revealed these to be coral outcroppings and limestone features. In 1963 one of the men from the 1957 sighting returned to the area south of Lancelin Island where he thought he

originally saw the cannons. Along with friends and a team of spear-fishermen he was able to relocate the site. A few dives were conducted which identified cannons, anchors, coins and ceramics indicative of VOC shipwrecks (Green 1977:64-65). As the find gained publicity, the safety and integrity of the site became an issue. In 1966 the first official survey was conducted by the Western Australia Museum but continued disputes over shipwreck protection legislation caused delays and it was not until 1972 that excavation began on the site (Green 1977:66).

The *Draak* site was located off 12 km southwest of Ledge Point. The scattered remains spread out in a fan 50 m long and 40 m wide and indicate the ship was pushed into the reef along the western side of the site (Green 1977:71). Cannons come to rest atop the reef, within its caves, and on the sea floor proper illustrating that the deposition of finds has been greatly complicated by the intricate reef structure. In addition to this, drastic swell and surge on the site made artifact recovery and site recording particularly difficult. As was the case with the excavation of *Batavia*, the provenance of finds was originally recorded in relation to large landmarks on the site. Due to the nature of the environment, there is little to no noticeable wreck distribution pattern which makes artifact provenance almost irrelevant (Figure 3).

The Story of *Zeewijk*

In 1725 the *Heeren XVII* commissioned the building of five ships for travel to the Indies. One of these was *Zeewijk*, which was constructed and outfitted by the Zeeland chamber. Based on its tonnage of 140 *lasten*, this ship would likely have been classified as a medium-sized yacht [Rate 5] according to Parthesius' classifications (2010:76). The ship sailed from Vlissingen on 13 November but had a troubled start in the English Channel and did not officially leave for Batavia until 23 November. *Zeewijk* made good time to the Cape of Good Hope, arriving on 26 March 1727. The ship

was unloaded and provisioned during the next few weeks and set forth to Batavia on 21 April (Ingelman-Sundberg 1978:7).

Despite the known dangers of the shallow reef along the coast of Western Australia, the skipper Jan Steyns went against the sailing directions of the Company and intentionally steered the ship towards the coastline. For an unknown reason, he wanted to make landfall and seriously misjudged the perils of the reefs (Ingelman-Sundberg 1978:7-8). *Zeewijk* ran aground on the northern edge of Half Moon Reef in the Houtman Abrolhos on 9 June 1727. The impact was quite devastating, ripping the rudder from the stern and breaking the main mast in half. Though the ship took on water, the crew was able to remain on board for a week while they waited for conditions calm enough to launch the ship's boat and row for a string of islands 4 km in the distance.

Of the original 208 crew members 96 made it to the nearby Gun Island which, although it was a treeless limestone outcrop, had a source of fresh water. After setting up a camp on the island, 11 sailors and First Officer Peter Langeweg took the longboat and headed to Batavia in search of assistance on 10 July. While waiting for the boat's return, the remaining inhabitants of the camp salvaged supplies from *Zeewijk* and foraged for food on the island. As months passed it became clear that the longboat and its crew were not returning. By the end of October the community on Gun Island had collected enough timbers, rigging elements, and tools to construct a second vessel from the remains of *Zeewijk*. On 7 November 1727 construction began on this new boat and by 26 March 1728 *Sloepie* set sail with the salvaged chests of VOC silver from the original cargo aboard. The journey to Batavia took another month in which six men perished but on 30 April the remaining 82 crew members arrived triumphant in port (Ingelman-Sundberg 1978:10-11).

The island on which the survivors had made camp was named during the 1840s when surveyors from H.M.S. *Beagle* found a brass swivel gun with the VOC crest on shore and consequently named it Gun Island. The islands in this area of the Abrolhos were mined for their

guano deposits throughout the 19th century and many artifacts of the *Zeewijk* were recovered as a result. These included cannon balls, fish hooks, lead weights, cooking utensils, wine bottles, various coins, clay pipes and tobacco. In 1952 six cannons were discovered on the Half Moon Reef, three of which were raised and later contributed to the Western Australia Museum. In 1963 journalist Hugh Edwards organized an expedition to the island in search of *Zeewijk* and rediscovered the wreck site and the island camp. His investigations continued until 1968 (Ingelman-Sundberg 1978:11-13).

In 1972 the Underwater Explorers Club conducted surveys of the marine and terrestrial sites under the supervision of the Western Australia Museum. Subsequent discoveries of cannon and anchors underwater as well as graves and ceramic finds on land warranted a more sustained investigation. In 1976 the Maritime Archaeology Department of the Western Australia Museum commenced the “*Zeewijk* Project”. Under the direction of Catherine Ingelman-Sundberg the remains of the wreck were recorded and artifacts were recovered from both the underwater and island sites. The material from *Zeewijk* was scattered over the neighboring reef up to a distance of 1 km away from the point of impact. No ship structure remained by the time of rediscovery and there was no noticeable wreck pattern. Little or no provenance information was recorded for recovered artifacts due to these factors.

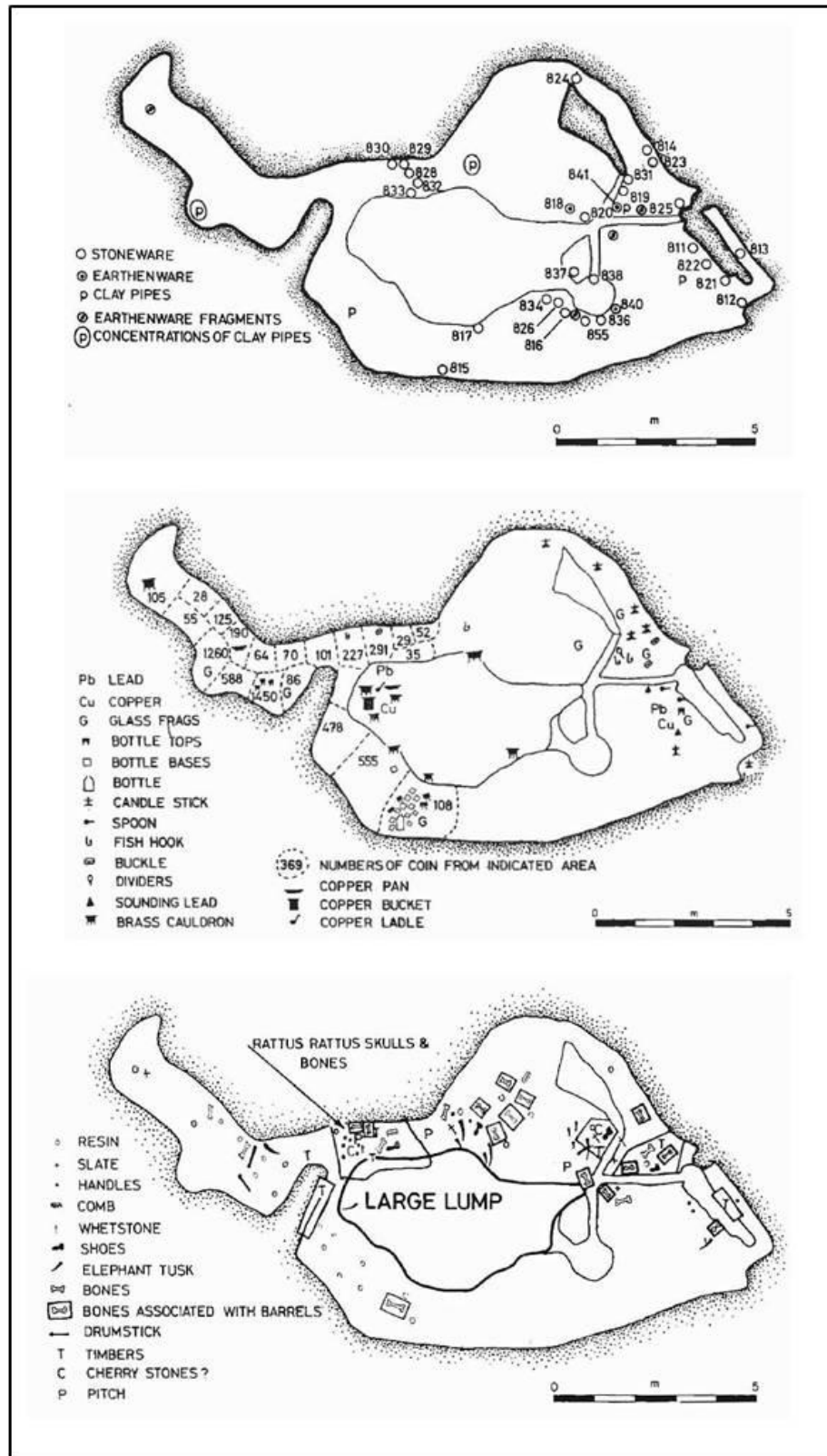


Figure 3: Maps of *Vergulde Draak* Wreck Site

(Green 1977:86-89)

The Presence of Surgeons

The staffing policies of the Company made it clear that surgeons were seen as a necessity; not an accessory. The VOC was created for the sole purpose of establishing and protecting trade footholds in the Indies. To ensure success in this matter, the *Hereen XVII* understood that the merchandise must be kept flowing. The crews that sailed these cargo-laden merchant vessels were literally the engine that moved the goods. Therefore, it was only logical that the health of the crew was a high priority to the Company. Surgeons, being the only class of healers who typically went to sea, were thus the answer to the healthcare needs of the VOC.

Each of the three ships discussed above carried ship surgeons on board. The number of surgeons employed on a ship of the VOC had depended upon its size. As a *retourschip* [Rate 10], *Batavia* was the largest of these vessels and had three surgeons appointed including a first surgeon (*oppermeester*) and two assistants, who could be a combination of second surgeon (*ondermeester*) and third surgeon (*derdemeester*) (Bruijn 2009:62). Though *Vergulde Draak* is considered a medium-sized yacht [Rate 5] its capacity of 130 *lasten* dictated that only two surgeons were required, one of whom still needed to be a first surgeon. *Zeewijk* is also designated as medium-sized yacht [Rate 5], but at 140 *lasten* it is just on the border of requiring three shipboard surgeons and its medical staff would likely have been organized much like that of *Batavia*.

Not much is known about the individual surgeons aboard *Vergulde Draak* or *Zeewijk*, but the personal journal of Captain Francisco Pelsaert, which chronicles the questioning he conducted on the mutineers while awaiting the salvaging of *Batavia*, mentions the ship's surgeon a number of times. Since this journal compiles the personal accounts of many people involved with the massacre on the island, there is quite a lot of variation in the names used to identify certain individuals. The titles of

chief barber, upper barber, barber and barber's assistant are all used to describe a single man². This man's name is told to be Aris Cornelisz, Aris Jansz, Frans Jansz, Meester Frans Jansz, and Meester Frans depending on who is recounting the tale. When the barber was questioned he refers to himself as Aris. These titles all refer to a single individual as the multiple retellings in which they appear all correlate and recount the events of a single evening where in which the barber was the central figure.

As the story goes, once the survivors were settled on the island Jeronimus Cornelisz started gathering followers into a mutinous group that stole from and killed other inhabitants. It was decided that Aris was a threat to their rebellious regime because he "would not dance to their pipes" (Van Huystee 1994:29). A plan was concocted to lure him out of his tent on the pretence of needing to search for seals and birds to feed the camp. While out foraging for food in a group of many survivors, the mutineers killed a number of undesirables and attempted to kill Aris. Fortunately, the blade that struck him was rather blunt and he was able to escape into the dark water and hide from his attackers. He was later found by another group of survivors and lived to tell his tale to Pelsaert when the rescue ships arrived.

The archaeological finds from Beacon Island corroborate the presence of the ship's surgeon. Fragments of *albarelli* and *zalfpotten* apothecary jars were recovered from among the remains of the large camp. This suggests that the surgeon intentionally gathered some important medicines from the sinking ship and carried them with him to the island. Numerous other medical artifacts were recovered from the submerged wreck site of *Batavia*. Though there are no journals describing the activities of the surgeons aboard *Vergulde Draak* and *Zeewijk*, medical finds recovered from the wreck sites confirm the presence of ship surgeons aboard these vessels.

² The use of the title "barber" here is uncommon. Contemporary treatises written by those in the medical field refer to 17th century surgeons as *chirurgyns* or one of their shipboard ranks (*oppermeester*, *ondermeester*, or *derdemester*). The author sought out the original Dutch manuscript to confirm that this anomaly was not an effect of the modern translation. Though *meester* is used to address this individual, it is generally coupled with the term *barbier* (Pelsaert 1648). Perhaps this is simply a reflection of the general ignorance of the crew. It is possible that the general populous interchanged the terms barber and surgeon. In the early 17th century the two professions were working to differentiate themselves from one another.

The presence of surgeons aboard ships of the VOC is beyond doubt, but the reasons they sought employment in this field deserves more explanation. The following chapter will introduce the profession of a ship's surgeon and illustrate the reasons why this career path was appealing to many individuals. The success with which they carried out their duties will also be addressed. This additional background information will provide the necessary knowledge to approach the analysis of artifacts used in the ship surgeon's trade.

CHAPTER III

THE EDUCATION, OCCUPATION, AND STATUS OF SHIP SURGEONS IN THE VOC

There are a great many unfavorable assessments of ship surgeons who practiced on vessels of the VOC during the 17th and 18th centuries. Captains and travelers complained about the incompetence, limited intelligence, youth and hasty promotions of ship surgeons. Even physicians, fellow practitioners in the medical field, represent ship surgeons as an uneducated and unqualified class of healer (Bruijn 2009:15-16). These men were called bunglers, executioners, and callow, but is there any real merit to such descriptions?

There are some snippets of truth in the above examples, namely the youth of many surgeons upon their initial employment with the Company and the rate at which they could ascend medical ranks once contracted. However, such accounts are often biased by personal experiences and commonly misrepresent the entire profession of ship surgeons based on an unfortunate encounter with a single individual. A captain who writes of encountering one poorly trained surgeon throughout the entirety of his voyages, paints the picture that all surgeons were equally unqualified. Where opinions are rendered by contemporary physicians, it is likely that long-established rivalries within the medical field prompted them to slander the name of surgeon in an attempt to perpetuate the existing hierarchy.

Despite such reviews, the VOC never doubted that surgeons were absolutely necessary. Since its inception in 1602, the Company required surgeons on every vessel setting out for the Indies. This practice did not change even in its dwindling years when economic factors forced the VOC to restructure certain aspects of its operations. During the two centuries that the VOC maintained its presence as a power in Asian trade, some ten thousand surgeons were employed to care for nearly one

million sailors and soldiers who ventured to the Indies in the service of the Company (Bruijn 2009:17).

This unique class of healers was not only required to treat the basic injuries sustained in every day seafaring life, but also the fevers and tropical diseases that so often ravaged Company crews. On land, surgeons were forbidden from infringing upon the field of the apothecary or the physician, who prepared medicines and treated diseases. The single exception to these strict borders of practice was when the surgeon was at sea, where physicians would not stoop to venture and apothecaries were not qualified to serve. The lives of the sailors he treated greatly depended on the surgeon's ability to quickly adapt to his new responsibilities.

Surgeons First Arise

The distinction of a surgeon as a specialized healer, so far as it existed in the 17th and 18th centuries, traces its roots back to the medieval period. The prevalent belief during this time was based in the ancient teachings of Galen. It was generally accepted that the human body was controlled by seven natural principles which included elements, temperaments, humors, parts or members, faculties, actions, and spirits. Health was maintained by properly balancing those liquid humors of blood, phlegm, choler and melancholy which are found in every natural living thing. These forces were most easily manipulated by bloodletting, cupping, purging, sweating and diet.

Monks and bishops were forbidden from visiting the sick in order to maintain their cleanliness and properly bestow blessings upon the necessary symbols but lowlier members of the clergy commonly acted as the healers for their communities. As the stewards of these humors, these men treated patients as their imbalances required. In the Fourth Lateran Council of 1215 Pope Inocent III forbade priests, deacons and subdeacons from performing any surgical procedures as well (Herbermann 1910:18). Without the clergy available to balance the humors through bloodletting, a

new class of healer was needed. Barbers were chosen to fill this niche since they were already known to have skill with a blade. With their new healing responsibilities, they became known as barber-surgeons.

Though initially linked together, by the 14th century the classes of barber and surgeon began to divide into separate practices. Count Jan of Bloys, the Lord of Gouda (1308 – 1356) had on staff both a barber to bleed him and a surgeon to attend his hunting accidents during which the barber would then act as assistant (Bik 1955:9). In the 15th and 16th centuries these two professions began forming independent guilds throughout Europe. The surgeon's guild of Middelburg was founded in 1500, a similar guild arose in Amsterdam in 1552, and Gouda boasted a surgeon's guild by 1660 (Bruijn 2009:37).

The purpose of incorporating into a guild was to provide mutual aid and protection for members, and to promote common professional interests. However, with the emergence of guilds came defined boundaries between the many medical fields and the imposition of certain restrictions and regulations to maintain those boundaries. In most major cities, membership in a guild was unavoidable and practicing one's trade without a license from the local guild was punishable by law. Among the regulations imposed by surgical guilds was the restriction upon surgeons to practice only in the field of external medicine (*heelkunde*).

The force behind these stipulations was the university-educated physicians whose higher levels of education and long-established profession granted them the highest regard in the medical community. Though the physician of early modern times was generally thought of as "an insufferable prig and pedant" (Bruijn 2009:24) by the common people, his position at the apex of medical education was incontrovertible. The *Collegium Medicum* (physician's guild) of Amsterdam required the attendance of the surgeon's guild members to their anatomical lessons and inspected the shops and practices of apothecaries (Cook 1994:81). The *Pharmacopeia Amstelredamensis*, laid down by the

physicians guild as early as 1636, contained lists of the herbs and other materials that needed in every apothecary shop (Mooij 1999:37).

Though the physician of the 17th and 18th centuries was a highly educated man, his knowledge consisted of classical medicine and philosophy. He was severely lacking in empirical experience. He studied the theories of Galen and Hippocrates and applied the philosophical reasoning of Aristotle in the prognosis and treatment of his patients. His goal was to correct maladies through diet and propose theories to rebalance the humors. His treatment generally included the prescription of some internal medicine (*physick*), bed rest, and sweating or bleeding. Such lofty advice and slow-paced treatments might have seemed rather unimpressive to those patients suffering from intense pain or chronic conditions.

Surgeons addressed the immediate needs of their patients. Though they did not prescribe internal medicine, they had the empirical skill to mend broken bones, treat infected wounds with topical applications, balance the humors, and perform minor surgeries based on their specific specialty. They were often the favored option for the common people because their fees were significantly lower than those of a physician. Surgeons were also more abundant and more easily accessible as many of them owned and operated shops within the city. It was surgeons, not physicians, who treated the working class of Europe in the early modern period.

Education

The guilds of the larger cities often had impressive libraries containing both classical and modern medical treatises, many of which were translated into Dutch. This is understandable since the Republic was the center of printing and publishing in Europe. These libraries were free to be used by any guild member who actively paid their dues. Classical works by Hippocrates (c. 460 BC – c. 370 BC) and Galen (AD 129 – c. AD 216) could always be found but specialized surgical texts such as

Avicenna's (c. 980 – 1037) *Fleubotomia*, Guy de Chauliac's (c. 1300 – 1368) *Chirurgia*, and selections from Ambroise Paré (1510 – 1590) were among the favorites. These and other works were incorporated into a set curriculum for any aspiring surgeon.

A man wishing to follow this path of education would enter the guild as an apprentice (*leerknecht*) and study under a master surgeon with whom he lodged. He would assist in shaving clients, cleaning the instruments and the shop upkeep, as well as minor operations and the treatments of wounds. The curriculum set down in Amsterdam also required the apprentice to attend anatomical lessons at the *Gasthuis* (the major hospital in Amsterdam) and the occasional dissection of cadavers at the *Teatrum Anatomicum*. He could also attend lessons on the creation of ointments and topical medicines at the *Hortus Medicus* botanical gardens (Bruijn 2009:37). Most lectures were headed by instructors of the surgical guild, but physicians lead the more complex medical and anatomical teachings.

After the apprentice had completed this basic learning stage lasting seven years, his master would provide a letter of satisfaction (*leerbrieff*) that would allow him to rise to the class of journeyman (*knecht*) (Bruijn 2009:174). At this stage he was in control of his own education and advancement. He could choose to continue his instruction under the same master surgeon or seek out a new teacher, perhaps a specialist in an area he wished to pursue. He could attend higher-education courses at various city lecture halls, or he could travel in search of different education. As a journeyman he was also able to take a guild administered sea examination (*zeeproef*) which enabled him to seek employment in the Admiralty or merchant fleets.

If a surgeon wished to attain the rank of master surgeon, he would continue his studies as a journeyman for three to five years and then apply to take the master's examination (*huisproef*). Time spent as a journeyman under a master on land or employed at sea both counted toward this requirement. A master's examination of the 17th or 18th centuries included: 1) the shaping of iron

into a lancet and executing the incision of a vein, or phlebotomy, 2) general knowledge of anatomy, arteries and veins, 3) the treatment of complicated wounds, fractures and dislocations, 4) practical bandaging and dressing of wounds, 5) trepanation of the skull (elevating a skull depression, drilling into the skull, and relieving pressure through the draining of blood away from the brain tissues), 6) amputation, 7) and theoretical knowledge (Bruijn 2009:39).

A complete education from the rank of apprentice through master surgeon took an average of 11 to 12 years. Apprentices began training at 14 years of age and if they stayed on track throughout their studies, they would be about 21 years old as a journeyman. Upon reaching the rank of master, a surgeon could therefore be as young as 24 but was more likely to be closer to 28 years old (Bruijn 2009:179). Once he had achieved this station, he was free to set up his own shop or seek to make a living in any number of surgical avenues.

Career Options on Land

A surgeon had few career options on land before he was awarded the title of master. As a journeyman he received pay for his services but still required supervision. This period of extended education did not have to take place at a master's shop. The general hospitals and specialized institutions such as the leper's hospital (*leproserie*) and the plague house (*pesthuis*) employed surgeons of all ranks. Here, an apprentice or journeyman could be placed under the direction of a master surgeon while making a small profit of his own.

Upon receiving the title and obtaining a license to practice, the master surgeon could open his own shop in the city and begin training apprentices or journeymen as assistants. These private practices were required to adhere to surgeon's guild standards and undergo inspection by *Collegium Medicum* representatives. A city physician (*medicus civilis*) and a city surgeon (*chirurgicus civilis*)

were also employed by the larger municipalities to inspect and regulate the healthcare needs of public institutions (Lindemann 2001:167-168). These positions might include administering care to prisoners, inspecting hospitals and evaluating their practices, and assisting in the inspection of independently owned shops.

If a master surgeon was particularly gifted, he might be able to gain a position as an instructor of surgical courses at his guild or become a lecturer of anatomy at one of the city amphitheatres. However, this career path required a level of education higher than the guild structure offered. Surgery was essentially behind the times as a university accredited field, but its recognition in the 17th century was rapidly growing. The works of earlier scholars like Ambroise Paré and Andreas Vesalius (1514 – 1564) had sparked an interest in surgery and anatomy that permeated the upper echelons of university academics. This, in combination with the revolutionary anti-Galenic teachings of Paracelsus (1493 – 1541) and the emphasis placed on empirical knowledge by René Descartes (1578 – 1657), had led universities of the 17th century to offer courses in surgery. Master surgeons were allowed to attend these courses (for a fee) to further their education and by the late 18th century, many universities offered a separate doctorate in surgery as well.

The path that led to a higher education was very expensive and time consuming. Most master surgeons could not afford to spend the time and money required to attain a doctorate degree. These men had to content themselves with operating a shop in town, but even this career choice had its hurdles. In accordance with the boundaries of their field, as laid down by the original guild charters, surgeons were not allowed to infringe upon the practices of other medical professions. This was often a difficult task considering the number of specialists and various wandering empiricists who were looking to make a living in larger cities such as Amsterdam and Rotterdam. These various competitors included cataract masters (*staarstekers*), tooth masters (*tandmeesters*), cancer masters (*kankermeesters*), tumor masters (*fijtmeesters*) and head masters (*hoofdmeesters*) to name a few

(Bruijn 2009:36). The activities of these specialists were generally overseen by a member of the surgeon's guild since each procedure fell under the greater scope of surgery.

Career Options at Sea

Careers at sea offered certain benefits and freedoms that surgeons could not find in the options offered on land. This path was often more expedient. While surgical guilds required an individual to have obtained the rank of master before he was granted a license to practice on his own, the sea examination (*zeeproef*) could be taken at journeyman level. The years spent gaining empirical experience at sea counted towards a surgeon's continued education and he could choose to return home after his service having made some money and be closer to his master's requirements. Due to the high mortality rate of men at sea, entry level surgeons moved quickly up the ranks when their superiors prematurely perished. However, any promotions that were made ad hoc during a voyage would still have to be certified once reaching land either in the Netherlands or at Batavia (Bruijn 2009:64).

Corresponding with its shorter preparation time, the sea examination was a comparatively easier trial of knowledge and could be taken after only one year of apprenticeship (De Moulin 1988:42). The candidate was questioned about common shipboard accidents such as fractures, dislocations, gunshot wounds, contusions, burns and how to treat them. There was also a lancet preparation and phlebotomy practical that illustrated how important balancing the humors was even at sea (De Moulin 1988:61). There was no theoretical section, no questions regarding abnormal growths or ulcers, and no required knowledge of fevers or diseases even though the sea surgeon would surely face the latter. For employment in the VOC, each chamber of the Republic required its own variation of an additional examination. This was presided over by the chamber's physician and surgeon, as well

as various members of the personnel committee. This additional chamber-based surgeon's examination was a requirement stipulated as early as 1610 (Schoute 1929:17).

The path of the sea surgeon was also less costly as fees to take the sea exam were significantly lower than those required for the master's examination. Additionally, once he was shipped out, the surgeon no longer needed to pay his dues to the local surgeon's guild. Though the sea surgeon generally received a lower rate of pay than his terrestrial counterpart, he was often privy to compensatory perquisites that had the potential to significantly offset this difference. In the merchant fleets, specifically the VOC, first surgeons (the highest rank of surgeon who was considered an officer) on outgoing vessels were allotted space for trade cargo which could be sold for a profit upon reaching the Indies. In addition to this, the company provided him with three months of advance pay to purchase any required tools he did not own and provided the necessary apothecary ingredients for his shipboard duties. On land surgeons often had to take out loans to amass the necessary tools and ingredient to start their own businesses.

Employment in the VOC

The VOC provided the most open positions for surgeons wishing to practice at sea, but they were by no means the only employer of sea surgeons. Among the well documented names of men who passed their sea examinations, there are many who do not appear in the meticulously kept records of the VOC (Bruijn 2009:177). Thus, there were some individuals who intentionally became sea surgeons in other maritime powers. These alternatives included becoming a naval surgeon or joining a competing merchant fleet such as the WIC (*West Indische Compagnie*) or the MCC (*Middelburgsche Commercie Compagnie*).

The Dutch employed "soul sellers" (*volkshouders*) to coerce sailors and soldiers into the merchant and naval fleets. However, surgeons were not forced into service but rather applied for

positions of their free will. Some surgical applicants even traveled long distances from home to market themselves to chambers where there was less competition and they were more likely to be hired (Keevil 1957:12-151). Many German surgeons applied for positions in the VOC and they composed roughly 20% of the ship surgeon population during the 17th and 18th centuries (Bruijn 2009:135-141). Whereas Dutch surgeons often requested to fill particular positions on specific ships, German applicants were more than happy to take any job available and for an even lower rate of pay (Bruijn 2009:175).

Though a life at sea came with serious risks, the Company never suffered from a lack of willing employees because the potential benefits far outweighed the drawbacks. The first of these attracting factors was that signing a contract with the VOC offered job stability. Any sailor, soldier or surgeon who committed themselves to the service of the Company did so for a minimum of five years (Bruijn 2009:191). For some individuals who found it difficult to maintain a job at home, this stability was appreciated. Others may have considered the five year commitment too onerous. As the Company could assign its employees however it saw fit, some men ended up in unwanted posts. On the whole surgeons may have been more enthusiastic about this duration of service, especially if the competition and costs of practicing on land had forced them to search for a more stable source of income.

Once a surgeon made it to the Indies on the Company dollar, there were a great many more job opportunities both within and without VOC employ. Among the more abundant positions were those available at Company-run hospitals throughout Asia. Obviously, ship surgeons alone, operating in the small and dimly lit cabins of a vessel, could not be the sole health care providers for a maritime empire as large as that of the Dutch in the east. General hospitals at the Cape of Good Hope and Batavia were erected in the early 17th century and many more specialized hospitals existed as well. These provided care to the transient sailor populations and to permanent Company employees residing in the Indies. However, VOC intentions in establishing such institutions were not of a

completely benevolent nature. Control of the hospitals gave the Company control over their employees as well. Medical supervisors could ensure that there were no malingerers among their patients and quickly turn recovered men back over to their posts. By 1642, employees in Asia were required to attend only Company hospitals for their healthcare needs (Bruijn 2009:100).

These hospitals were run much like the general *gasthuizen* back in the Republic. They were intended as professional institutions founded to heal the sick and not simply charitable houses. Patients paid for their own admission. Each hospital was managed by a trustee who focused on the bookkeeping and a warden who lived and worked on site seeing to the daily needs of the establishment. Neither of these positions required much medical knowledge, though it did help. The medical personnel for the Batavia hospital eventually included a physician, two master surgeons, four surgeon's mates, a pharmacist, a dresser and a specialized university educated surgeon who conducted the more complicated surgeries (Bruijn 2009:100). This was in addition to various management and clerical personnel. Whether at the Cape or Batavia, newly arriving surgeons were often called in to assist at the local hospital. If they had proven themselves and wished to remain stationary for a period of time, they could apply for a permanent position.

Since there was no guild control or regulation in Asia, it was also much easier and much cheaper for a surgeon to open a shop. If he was still in the service of the Company, he could only practice privately on a small scale and only so long as it did not interfere with his Company obligations. While Christopher Fryke was in the service of the VOC towards the end of the 17th century, he operated as ship surgeon on 15 different vessels, held prominent positions at three different hospitals, and also dabbled in private practice (Fryke 1929). During his time in the Indies he served in almost every post appropriate to a surgeon including a stint as an army surgeon and even a short time as acting ship captain. At one point, after realizing that he had very little money to his name, Fryke started to treat the local Javians on the side while he was still acting as a lead surgeon at the Batavia hospital (Fryke 1929:70). A few years later he began a small practice among the burghers

(ex-employees or colonists) of Batavia and since there was no regulation on fees, he made quite a profit off of his fellow Dutchmen (Fryke 1929:111-112). Apparently, it was very easy for a VOC surgeon to stretch the boundaries of his employment if he did not draw too much attention to his work.

The threat of poor quality surgeons running amuck in the Dutch colonies was identified as a potential problem early on. In 1627 the physician Jacob de Bondt (1592-1631), also known as Bontius, was appointed by the *Hereen XVII* to oversee the activities of all Company medical personnel in the Indies. Thus, Bontius became the first Head of Surgery in Asia (Cook 2007:175-177). It was he who structured the hospital staff, established centers of surgical learning in Batavia and the Cape, and established a pharmacy and medical dispensary at Batavia castle. After his death the post of Head of Surgery or Surgeon General passed to various other qualified medical personnel. Through his re-structuring of the medical staff in the Indies, Bontius created many new positions ready to be filled by eager surgeons.

Many scientists were inspired by physicians like Bontius who traveled to the Indies for scientific research and there are a few examples of surgeons who did the same. In the 1660s, surgeon Wouter Schouten traveled to the Indies to gain experience with tropical diseases and a collection of his observations was published after his return (Schouten 1676). In his work he criticizes the native people's lack of natural sciences but is impressed with their use of herbs. He notes that herbs and flowers used for paints and pigments were also turned into quite effective medicines (Cook 2007:306). These kinds of observations by surgeons sparked the interests of the *Hereen XVII*. They had been attempting to find local sources of medicines to lower operating costs and replace stores that had been depleted, or damaged in transit. Physician Robert Padtbrugge was hired by the VOC as a "merchant" whose only task was to seek out the herbs described by surgeons and physicians and verify their efficacy (Cook 2007:305-307).

One factor that did not attract surgeons to the VOC was the amount of pay they received. Surgeons in the other merchant fleets and even those working for the Dutch Admiralty received higher wages (Cook 2007:178). During the 17th and 18th centuries the average monthly wage of a first surgeon was 36 Dutch guilders (Bruijn 2009:65). The highest that the monthly salary ever reached was 50 Dutch guilders in 1760, but this was only given as an incentive if he had completed four or more successful voyages (Bruijn 2009:183). On average, the annual salary of a ship surgeon was 540 Dutch guilders while a surgeon working on land in Amsterdam could make over a thousand (Bruijn 2009:185). In the late 18th century the Company did initiate a premium program that awarded surgeons a bonus for each healthy man they returned to port, but this proved to be too costly and was soon abandoned (Bruijn 2009:183).

In the minds of many surgeons the potential to make a significant profit from personal trade endeavors far outweighed the lower rates of pay. Contrary to popular misconceptions, all Company personnel were allowed to engage in small scale merchant ventures of their own. According to his rank, employees were allotted space on outgoing ships to store the goods they planned on trading in the East. The chests in which these goods were transported were standardized and sold by the Company. For example, in 1745 a senior surgeon was allowed to bring two very large chests ($2.5 \times 2 \times 2$ m), two *kelders* specifically made to transport a dozen bottles each, two small linen chests ($1 \times 0.5 \times 0.5$ m) and two large liquid jars (Bruijn 2009:120). The large chests could be filled with all sorts of trade items or bric-a-brac including clay pipes, ribbons, knives, mirrors, clothes, thimbles, buttons, tobacco and snuff boxes, razors, watches, compasses, combs and the like.

Only those items that did not infringe upon the commerce of the Company could be traded by its employees. Private trade in spices or textiles, on which the VOC held a monopoly, was strictly forbidden. If a person wished to make additional profit off the *morscahandel* or spillage trade, he would be operating outside of the Company allowances and could be severely punished. Christopher Fryke once attempted to engage in the smuggling of clove oil from Amboina to Batavia to sell to the

English and Chinese (Fryke 1929:70-71). He and his consorts tied a line to their bottles of oil and let them hang off the back of the ship from a rope. Fryke was particularly nervous about this, having once seen a friend hanged for a similar offense. When he saw the Fiscal (the shipboard disciplinarian) coming to check that all was well, he cut the line and let the bottles be lost forever.

Any employee could also be very successful in turning a profit from the difference in exchange rates between Batavia and the Republic. For example, in the Republic a pound of tobacco that cost 8 *stuivers* would sell for 65 *stuivers* in the Indies. It was for this same reason that employees stuffed their allotted space with all sorts of otherwise pointless items. Such commodities could be cheaply purchased at home, survived travel well, and due to their useful nature (though sometimes just because they were “shiny”) could be readily sold off to the natives of the Indies at a much higher rate. The Company even turned a blind eye to the manipulation of bills of exchange and allowed them to be cashed at home for higher rates than they were purchased in Asia (Bruijn 2009:186).

Through such methods it was relatively easy for a surgeon’s position in the VOC to become quite profitable, even more so than that of his counterparts on land. Tales of physicians and surgeons amassing unbelievable (and often exaggerated) profits reached the homeland and motivated even more eager individuals to apply for service. It was said that Jacobus van der Steege (1746 – 1812), who introduced a smallpox treatment to Batavia, earned a fortune of five million Dutch guilders during his 16 years in the Indies (De Haan 1984:154-155). Perhaps this is why so many surgeons were willing to enter the company at a lower rank and rate of pay than they were qualified for and risk their lives to reach Batavia.

Shipboard Life

The duties of Company employees were not officially dictated until the first General Instruction (*Artikelbrief*) of 1634 but this contained no mention of ship surgeons. Most likely,

surgeons functioned just as they would have on land by keeping the ship and their workspace as sanitary as possible and addressing the needs of their mariner patients. The *Ordre en Instructie voor de Chirurgyens* of 1695 defined the tasks of the surgeon as: 1) preparing bandages, splints and compresses, 2) to allow one hour each morning and evening for sailors and soldiers to receive consultation (most likely shaving or humor balancing), 3) to visit ill and wounded men two or three times daily, 4) to regularly clean and wash bed-ridden patients, 5) to record all cases and treatments in a log book, and 6) to sanitize the ship by boiling vinegar and venting tobacco smoke between the decks (Bruijn 2009:65).

The first surgeon was considered an officer and messed at the captain's table, but the surgeon's mate and the third surgeon were petty officers among the ranks of the steward, cooper, and quartermaster (Bruijn 2009:172). Multiple firsthand accounts agree that all three surgeons slept in the gun room until 1739 when the first surgeon was finally awarded a cabin (Leuftink 1991:39). The allotment of cabin space would have made it much more convenient to treat patients, and in many ways it must have been greatly appreciated by the healthy crew members as well. Since two of the most common ailments on ships were dysentery and constipation, and as the treatment for both included an enema or laxatives, a more private cabin in which to receive these would have saved both the patient and the other crewmembers from embarrassment. Unfortunately, since the surgeon stored his tools in his cabin and also slept there, there was little that could be done regarding the problem of where to place long term patients. Often times, they were left under the supervision of the lower ranking surgeons in the gun room, or in times of naval engagement, they were moved to the hold (Bruijn 2009:69). Essentially, patients were placed wherever they would be comfortable and out of the way.

Surgeons were sometimes required to participate in shipboard activities that were less medically oriented. Christopher Fryke recounts that during a horrible 10-day storm that hit while he was aboard *Europa*, even he was required to tend the pump for an entire four hour watch (Fryke

1929:23). He was also called to act as a soldier and field surgeon during the Bantam War (Fryke 1929:44-51). Aside from unusual instances of chance employment outside of his profession, the surgeon might be required to assist in shipboard discipline. Fryke notes that a common punishment for striking another man was for the assailant to be fixed to the main mast with a knife, which the surgeon drove through the hand in a particular position according to the offense (Fryke 1929:8). However, it is unclear whether or not Fryke actually performed this disciplinary duty himself, or if he had just heard of its use from another employee.

Occupying both roles of "care giver" and "disciplinarian" must have been a strange juxtaposition for the surgeon, especially considering his age. If he followed a normal apprenticeship and worked for two years as a journeyman before taking his sea examination, a ship surgeon could be as young as 20 years old. This was in fact the average age of third surgeons in the Company, whereas surgeon's mates averaged 23 years of age and first surgeons were closer to 30 years old (Bruijn 2009:179). The youth of a surgeon obviously did not hinder his status on the ship since his position as a petty or full officer implied that he had power over and commanded respect from the general crew. Even on land, surgeons were considered part of the petty bourgeoisie (*smalle burgerij*) along with schoolmasters, smiths and carpenters (Bruijn 2009:171). It appears that on a ship they occupied a similar niche where they were neither the lowest nor the highest ranking class of individuals.

Success?

There is little hard evidence that can be used to determine if ship surgeons were successful in their treatment of patients. Mortality rates do little to illuminate this subject but they are one of the few data sets that are applicable to the question at hand. Unfortunately, these rates fluctuate only slightly over time and the causes of such changes are not easily identified.

The average mortality rate on outward bound voyages of the 17th century was 6.7% but rose to 7.3% in the 18th century. There were a few periods in both centuries when mortality rates reached exceptional highs. For example, from 1690 to 1695 and from 1770 to 1775 nearly 20% of the individuals on VOC ships died on their way to the Indies (Bruijn 2009:129). Scholars attribute spikes in these numbers to outbreaks of typhus running rampant on land and boarding the ship with the crew. If that was the case, then ship surgeons can be held no more accountable for the ensuing deaths than physicians on land who were unable to isolate the disease in the first place.

Though the homeward bound ships boasted much lower mortality rates of up to only 4%, this leg of the voyage was still considered much more perilous. Christopher Fryke was one of many Dutchmen who would rather have remained in Batavia, with all its heat and sickness, than risk the perils of returning home (Fryke 1929:111). It is also important to note that these vessels were often completely full of merchandise and sailed home with the minimum number of crew in order to maximize cargo space. Since there were fewer men on board sanitation would have been easier to maintain, and communicable diseases easier to contain.

It is difficult to determine whether or not the employment of a surgeon really did anything to lower mortality rates on ships of the Dutch East India Company. From the very beginning surgeons were required aboard every ship, so there is no period in the two centuries of the Company's existence when they were not present. Therefore, there is no control against which to test their efficacy. What is clear is that the *Hereen XVII* believed surgeons were effective, otherwise they would not have spent the money to employ them.

It is important to remember that, although these shipboard surgeons were initially employed to care for crewmates on voyages to and from the Indies, many of them found jobs on land once they had reached Asia. Even though they were hired as ship surgeons, the Company was essentially stocking up on medical professionals and shipping them to the Indies as a sort of commodity

themselves. Once they reached the Cape of Good Hope or Batavia, Company officials there could pull them away from their ships to serve at the local hospital. Many of these men spent very little of their time in Company employ actually working on a vessel.

Therefore, in order to determine whether or not ship surgeons were effective and properly trained in their field, the scope of analysis must be widened to include all those surgeons working in the Dutch colonies and factories of the Indies. This, unfortunately, is a much larger subject than this thesis can address. What should be noted however, is that since the great majority of men providing healthcare in the Dutch Indies were ship surgeons, and since the VOC operated quite successfully there for nearly 200 years, they must have been doing something right. If the Company had not provided quality care to its employees in Asia, its foothold in the east might have faltered much earlier than it did. When the VOC finally did dissolve, it was due to economic decline in the Republic and not to massive health issues.

These individuals helped to shape the Dutch maritime empire in the east. Without surgeons to treat wounds and illness on outbound ships, cargo and crew might not have made it to Batavia. Without proper medical care throughout the Dutch colonies of Asia, it would have been difficult, if not impossible, to keep the engines of commerce running. The VOC would not have been nearly as successful if surgeons were missing from among its personnel. The *Hereen XVII* understood this from the beginning even if the complaining captains and passengers did not.

CHAPTER IV

BARBERING DUTIES AND TOOLS

The relationship between barbering and surgery had its roots in medieval times, but by the 16th century they had divided into separate guilds. Though the *Collegium Medicum* called for a separation of duties between these two professions (Koning 1961:10), there was often competition for business and some infringement by both parties into the rightful practices of the other. While surgeons generally thought of themselves as more skilled and specialized than the village barber, they often resorted to shaving local clients to supplement their surgical income and keep their shops afloat. Inversely, barbers were often sought out as commonly as surgeons were to balance the humors of their clients primarily through bleeding.

A series of 17th century Dutch paintings and woodcuts by various artists, Abraham Teniers chief among them, revolves around portraying monkeys in the place of humans in various everyday situations. Scenes include monkeys getting belligerently drunk and making fools of themselves at a tavern or representing wealthy lords and ladies gathered at an outdoor fair enjoying exotic meats and fruits presented by servants. The social commentary behind these scenes was intended to illustrate the non-rational beliefs and behaviors of humans. These included the love of alcohol and the foolishness it engendered, and ridiculous pomp and wastefulness of the wealthy class are being mocked.

Monkeys acting as barbers in a bustling shop is another commonly depicted scene (Figure 4). In these works the monkey barbers shave and groom their clients, who are sometimes cats, as well as perform small surgical procedures and dentistry. In the majority of these scenes at least one patient is undergoing bloodletting somewhere in the forefront of the shop. This act is always extremely exaggerated with jets of blood arcing from the patient's arm into a bowl some distance away. It is

often believed that these works were meant to parody and condemn the weakness of human nature, especially belief in the value of healers who focused on balancing the humors.



Figure 4: *Monkeys in the Surgeon Shop* by Pieter van der Borch (1545-1608)

(Boerhaave Museum 1993:17)

Though surgeons also balanced the humors they were not as openly ridiculed by the artistic community as barbers. Barbers received the criticism and scrutiny of the public because they were often perceived as a merchant class pretending to be more highly educated than they were. Their

system of education was left mostly to apprenticeships and their guild did not require them to further their professional knowledge as the surgeons guild did. They were trained to maintain the hygiene of their clients and were only approached for more in-depth procedures in rural settings, where they were the only option, or if a patient was particularly low on money.

Disrespect towards barbers was obvious within the surgical community as well. Though both professions sometimes shared the tasks of the other, surgeons often viewed barbers as mere tradesmen with little education. In advising ship surgeons to sharpen their lancets and razors as often as needed, John Woodall (Woodall 1617:xii-xiii) admits he is aware that most surgeons believe the task is “a base office belonging to mere barbers and grinders.”

At sea, any umbrage that surgeons felt towards the profession of barbers needed to be quelled as the surgeons themselves were required to take up the responsibilities of a barber. There is some debate as to how common it was for a surgeon of the VOC to act as the shipboard barber since nothing official is dictated in the *Order en Instructie voor de Chirurgyens*. Ship surgeons of the EIC were required to act as barbers to the crew and even John Woodall himself shaved high ranking employees of the company when in his office on land (Keevil 1957:203). Bruijn (2009:66) suggests the reason no VOC documents directly address the role of the shipboard surgeon as a barber may be due to the fact that it was such a commonly accepted task that no further discussion of the subject was necessary.

According to Woodall (Woodall 1617:xxi-xxii) the surgeon's mate was delegated the role of shipboard barber since it was still considered among the most menial tasks. Regularly shaving a crew of 200 sailors would have been particularly time consuming and it is likely that the men were encouraged to get shaves in port if it could be managed. Keeping the crew members shaved and groomed was not simply a novelty. On long voyages into hot and humid climates, shaving provided relief from sweltering shipboard conditions. It also provided a certain amount defense against body

lice, which commonly infested crews and were simply considered a nuisance but later confirmed to spread diseases such as typhus. In addition to this, if the crew was kept shaved and hygienic it was easier for surgeons to observe their health and identify if they were suffering from skin ailments or rashes that otherwise went unnoticed and were signs of greater infection.

The tools required to complete the task of barbering were provided by the surgeon, not the Company. Newly hired surgeons were given three months worth of pay in advance to buy whatever surgical or barbering equipment they did not already own that was included in the *Order en Instructie voor de Chirurgyens* list (Bruijn 2009:71). The only instruments noted in the *Order en Instructie voor de Chirurgyens* that specifically relate to barbering are “1 scheer bekken” and “scheermessen” or one barber’s basin and razors (Gawronski 1992:232-242). Woodall’s list (Woodall 1617) is a bit more extensive and includes other barbering tools such as scissors, combs, an ear picker, looking glasses, aprons, whet stones, and even sweet water to act as an aftershave of sorts.

If they were still unable to provide each item, certain tools could be rented from the Company stores. Shaving basins, sometimes called bleeding bowls since they were used interchangeably for both purposes, were among the most commonly rented instruments associated with the barbering tasks. In her study of Company rentals, Bruijn notes that while many shaving basins were borrowed, no razors were ever logged in these transactions (Bruijn 2009:70). Bruijn also conducted a study of surgeon’s belongings at the time of their deaths and only seven of the 90 individuals investigated were in possession of shaving razors (Bruijn 2009:66).

A lack of required barbering tools mentioned in the *Order en Instructie voor de Chirurgyens*, and a corresponding lack of evidence from surgeons possessions, may indicate that the VOC placed much less emphasis on shaving its crew than the EIC did. However, barbering bowls as well as combs, razors and scissors were recovered from *Batavia*, *Vergulde Draak* and *Zeewijk*. Aside from the barbering bowls, which served a variety of purposes, the other artifacts may represent personal

possessions or even company trade items. These artifacts, as well as their potential ownership and shipboard purposes will be discussed below.

Barber's Bowls

These bowls were generally made of copper or brass, but ceramic versions were less expensive and therefore not uncommon. They often have a semi-circular cut-out on their pronounced flat rims, but varieties do exist with solid rims. An example of a barber's bowl with a cut-out rim can be seen hanging on the left wall in the 1637 painting by Adriaen van Ostade entitled *The Village Barber* (Figure 5), and two more bowls with solid rims can be seen on the left counter and in the background of the same scene. These bowls generally have small rings attached to one side of their rim for the purpose of hanging them from a hook on a wall, as seen in Figures 4 and 5. This hanging of such bowls on the walls of a practicing surgeon's or barber's shop was a way of signifying that the practitioner within was skilled at bleeding and open for business. Sometimes the bowls would be set in shop windows, full of blood, as a way of advertizing the services provided within (Boerhaave Museum 1993:16). Many Dutch genre paintings make use of this symbolism as well (Figure 6).³

While employed as a barber's bowl the basin was placed beneath the chin of the client and pressed up against the neck. It was held there by the client so that the barber could exercise the use of both hands. The bowl was filled with warm water that the barber could use to rinse off his razor as he worked. It also served to catch the drippings of soap and hair that fell from the clients face so that it did not land on his clothes. When used as a bleeding bowl the recess in the rim was placed flush against the patient's arm just at the crook of the elbow to catch the blood released during the process.

³ Dutch genre paintings of medical subjects from the 17th and 18th centuries utilize many subtle symbols that will be seen throughout the figures provided in this thesis. In addition to "the hanging of the bowls" is the representation of a stuffed alligator or crocodile hanging from the ceiling of practitioner's shop. This is a reference to the Egyptian god Sobek who possessed the power to undo evil and conjure cures. Such items hung in the shop as a symbolic defense against disease. Sometimes a stuffed fish or a black orb takes the place of the alligator but the function is the same.

These bowls were most likely employed in a number of general purposes as well, including mixing and heating ingredients and as basic wash basins.



Figure 5: *The Village Barber* by Adriaen van Ostade (1637)

(WikiPaintings 2014)



Figure 6: *Dentist by Candlelight* by Gerrit Dou (1655)

(WikiPaintings 2014)

Two brass barber's bowls were recovered from the wreck of *Batavia* (Figure 7). They each exhibit a cut-out on their wide, flat rims and are equipped with a ring by which they could be hung in a shop. Green (1989:96) suggests that since these bowls can be nestled inside one another, they may have been part of a set. They were found closely associated and had formed into a concretion with various artifacts due to the corrosion processes at work in the underwater environment. Among the contents of this concretion were apothecary jars, wooden handles, and textile fragments. The author was unable to gain access to either bowl as they are currently separated housed at the Geraldton Museum in Western Australia and at the Nederlands Scheepvaartmuseum in Amsterdam respectively.



Figure 7: BAT516B (left) and BAT516A (right)

(Courtesy of Maritime Archaeology Department, Western Australia Museum)

BAT516A

This barber's bowl has a maximum diameter of 328 mm and a basin depth of 102 mm (Figure 8). The cut-out on its lip is situated directly opposite from its attached hanging ring. The rim of the bowl is created by the folding or rolling over of the brass. The brass of the rim is flattened and slightly upturned along the cut-out, creating a relatively smooth surface that would have fit snugly against the skin and assisted in catching any run off, whether from shaving or bleeding. Its basin has an almost square profile with fairly straight side walls. If these bowls were crafted to nest together, this larger one would have been on the outside.

BAT516B

This barber's bowl has a maximum diameter of 334 mm and a basin depth of 101 mm (Figure 9). The cut-out on its lip is situated along its side. The rim of the bowl is created by the folding or rolling over of the brass. The brass of the rim more acutely upturned along the cut-out when compared to BAT516A. It would have still fit snugly against the skin but may not have been as comfortable for the patient. Its basin has a smooth rounded profile with sloping sides. If these bowls were crafted to nest together, this one would have been on the inside.

The variations in the placement of the ring and the differing morphologies of the rims may suggest that these bowls were not created as a set. They are not uniform in their craftsmanship, though they would have nested together well to conserve space during storage.

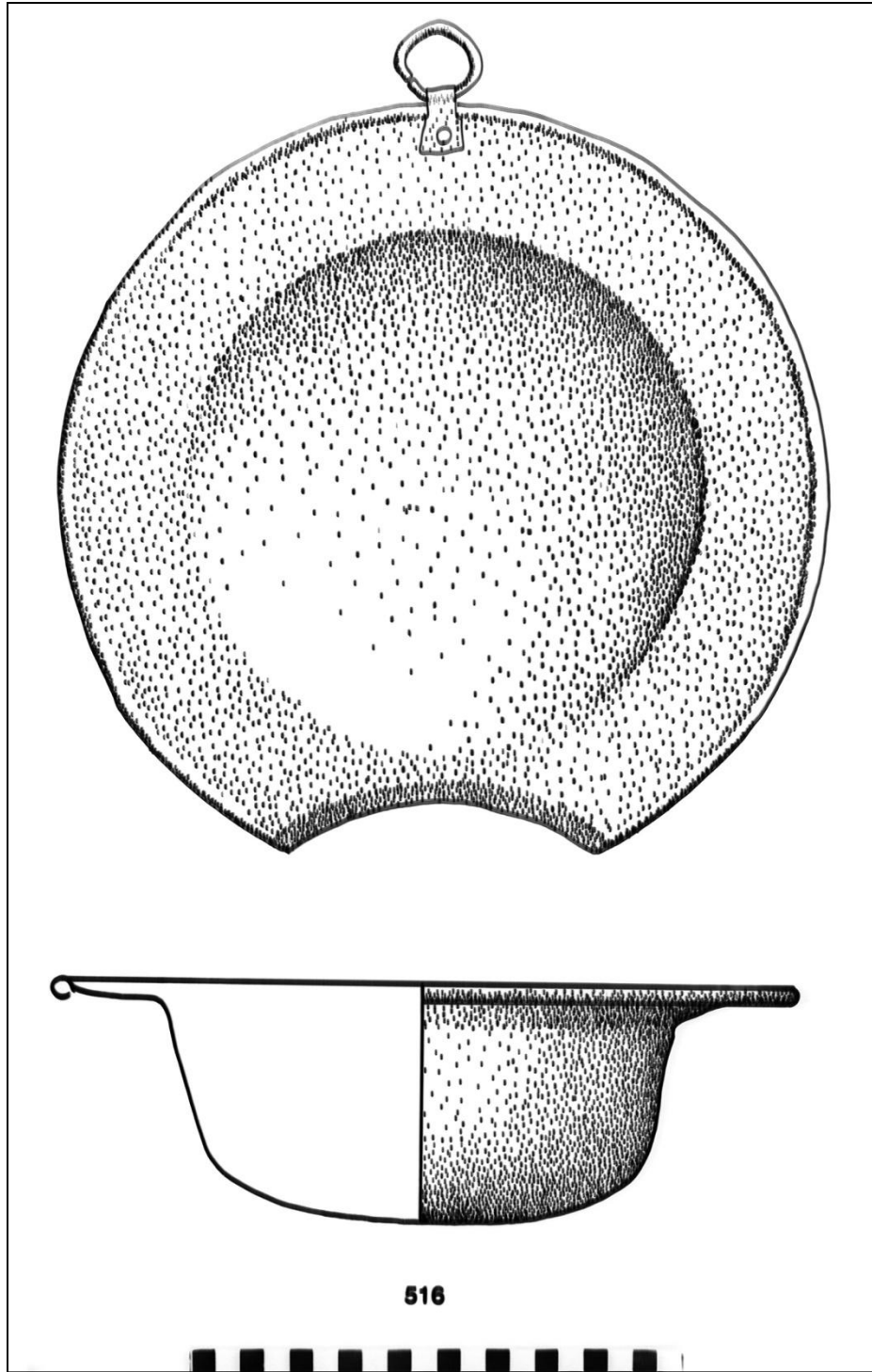


Figure 8: BAT516A

(Illustration by Myra Stanbury from Green 1989:96)

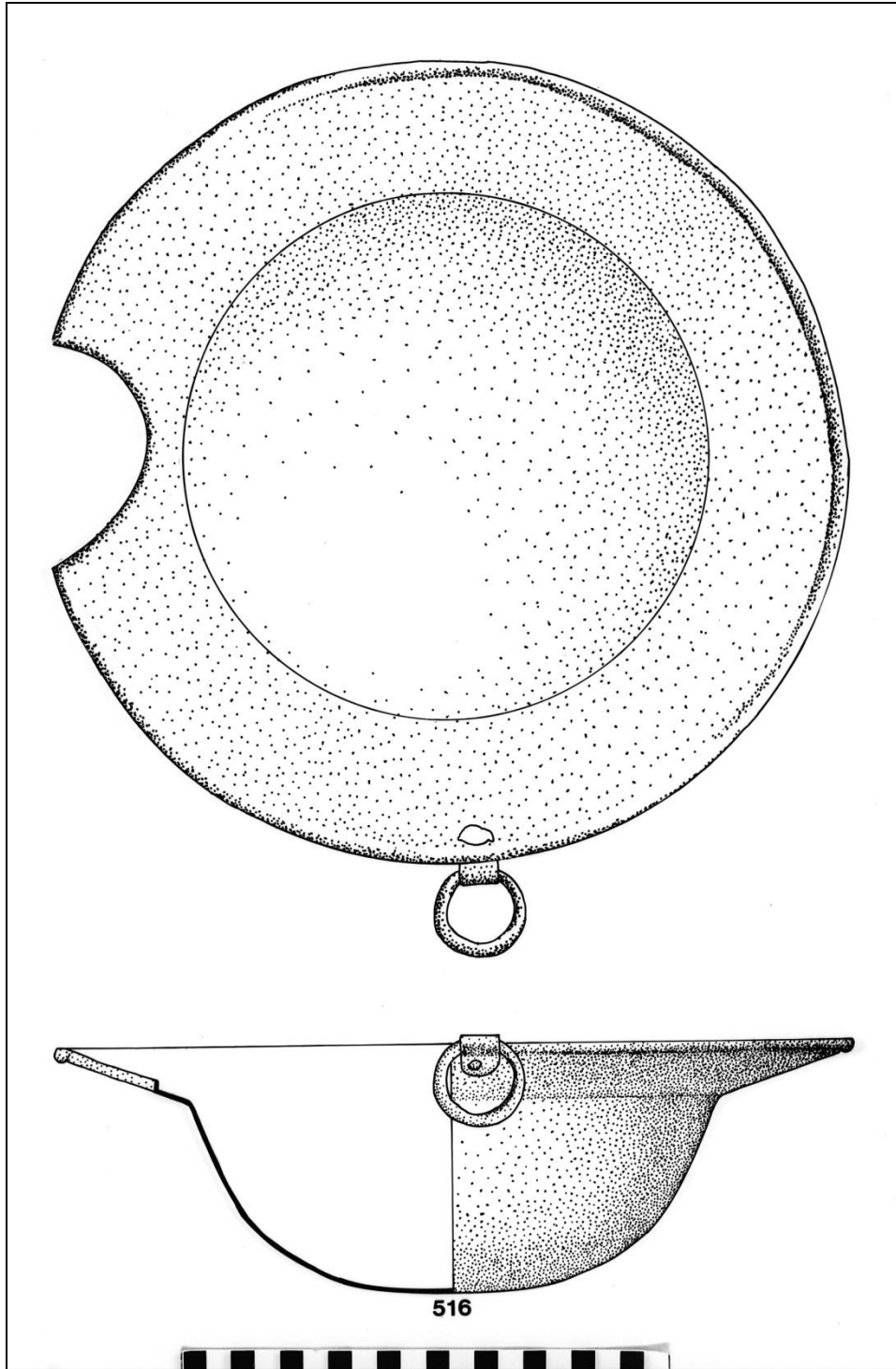


Figure 9: BAT516B

(Illustration by Myra Stanbury from Green 1989:97)

Razors

The toolkit of a 17th century surgeon included a number of instruments with flip blades that rotated out from between a casing made of either a single carved piece or two joined pieces of ivory or bone. In addition to shaving razors, incision bistouries with different shapes of blades and bleeding lancets shared this form. The significant difference of shaving razors was that they had a single, straight, sharpened edge and the other side was blunted with a small ridge that prevented it from slipping completely into the sheath. Such straight edge razors are still used in modernity and are still reputed to provide the closest shave possible.

Shaving razors were by no means solely used by surgeons and barbers. They were commonly owned by members of the general public for personal grooming purposes. Many men shaved themselves and may only have visited a barber for special occasions or if they had expendable income (Bruijn 2009:68). The challenge of maintaining one's own razor was in keeping the blade sharp enough to do any good. Most houses had a whetstone or two in order to sharpen a variety of general household blades such as kitchen knives or scissors. Blades that needed to be particularly sharp, such as razors, or those that were overly large like axes, could be taken to a grinders shop in town to be sharpened.

Since razors were common personal possessions sold by a number of shops, there was a significant amount of variation in their sizes, styles, and materials. It may have been normal for an individual to buy more than one razor at a time so that a spare would be on hand when one became dull or was broken, but they would not have been purchased in bulk by just anyone. When multiple uniform razors are discovered together in the archaeological record, it is unlikely that they were personal possessions.

Three identical bone handles were recovered from the wreck of *Zeewijk* which almost definitely belonged to straight edge razors. There were no definitive remnants of razors from among

the finds of *Batavia*, which was the only wreck to produce proper shaving bowls. The uniformity of these razors indicates that they were not personal possessions belonging to crew members. They may have been part of the barbering supplies brought onboard by the ship surgeon. It is also possible that these razors are examples of bric-a-brac intended to be traded for profit with natives upon reaching the Indies.

ZW421, ZW1099, and ZW5354

None of these razors are complete but their original features can be estimated from what remains (Figures 10, 11, and 12). The best-preserved example (ZW421) is still connected at its end. From this and the interior surfaces of the other examples it is clear that these handles were carved from a single piece of bone. No blades were recovered that would have belonged to such razors, but from the corrosion stains that remain on these artifacts it appears that the blades were made of a ferrous metal. During the 17th and 18th centuries razors such as these were likely made of an iron laminate known as shear steel since they were relatively thin and supported by a handle or backing (Kirkup 2005:112).

The dimensions of a complete razor can be estimated from the various elements still intact on these examples. The handle may have been as long as 10 cm with the flip blade protruding another 8 cm when it was opened. The blade was likely no thicker than 5 mm at its midpoint and thinner at its top and where it was attached to the handle. A ferrous pin was inserted through the bone and blade at the handles open end and then hammered over to create a swinging hinge. The whole instrument would have been no thicker than 1 cm at its midpoint.

The uniformity of these razors is most striking in the design that is applied to each side of their handle. Small incised circles with pinpoint centers are arranged into repeating diamond shapes from the base of the handle to the hinge. The pattern consists of alternating large diamonds,

composed of nine circles, and small diamonds, composed of four circles. The design is terminated by a single circle placed at the end of the line, before the hinge. The patterns of ZW421 and ZW1099 are identical but ZW5354 has an additional small diamond before the terminating point.



Figure 10: ZW421



Figure 11: ZW1099



Figure 12: ZW5354

Scissors

Various types of scissors were employed for surgical purposes, but basic straight scissors, also called tailor's scissors, were generally only ever used for cutting bandages or hair. The *Order en Instructie voor de Chirurghyns* calls only for “een regte en een kromme schaar” or one pair of straight and curved scissors. The trimming of hair did not require particularly specialized tools and it was apparently up to the surgeon to choose whatever pair of scissors would do the job.

Since straight scissors were common household items, there was a lot of variation in their sizes, design details, and even the materials of their blades and handles. As with razors, it would be curious if more than a few pairs of scissors from the same provenance to be matching unless they were all part of a single collection. However, as with the razors, multiple pairs of identical scissors were recovered from *Zeewijk*. This is even more curious considering that the surgeon was only required to have two such instruments in the entirety of his kit, but more than nine matching pairs were discovered.

In this instance it is highly unlikely that these scissors belonged to the barbering or surgical supplies. They are most definitely examples of the bric-a-brac that was brought on board to trade in

the Indies, whether as part of official Company trade or by officers in the crew. They are being discussed briefly to eliminate any doubt of their purpose and to provide potential interpretations for the uniformity of the razors that were previously examined.



Figure 13: ZW1013 (left) and ZW1021 (right)

ZW1013 and ZW1021

These two pairs of scissors were the only ones recovered with their blades still somewhat intact (Figure 13). As with the razor blades, the scissor blades were made of a ferrous metal, likely shear steel as well. The handles are made of brass and therefore survived the underwater environment with more resilience. It is difficult to see in these images but the handles were cast with a decorative pattern which is consistently found on each pair. Since ZW1021 is less corroded it is easier to differentiate the size and boundary of the brass handles before they are joined to the blades. The handles of each pair of scissors are the same size and it is likely that the blades of each pair are also proportional. The dimensions of ZW1021 at 111 mm long with a blade width of 13 mm and a width at the handle of 41 mm likely applied, with some small variation, to each of the examples discussed.



Figure 14: ZW203

ZW203

This registration number contains 13 separate halves of brass scissor handles identical to those found on ZW1013 and ZW1021 (Figure 14). Since these examples are better preserved than those discussed above, the cast design along the handles can be seen in more detail. The pattern is composed of repeating diamonds marked with cross hatches and exhibiting curved flares at their top and bottom points. Though some handles are more worn than others, this same pattern is present on each one. Some examples are broken at the attachment side for the blades, where the brass become particularly thin and its strength is compromised by three holes. Pins were passed through the two top holes to attach a single ferrous blade to each handle. The pin in the bottom and third hole penetrated both handles and both blades to create the pivot point for the instrument.

Combs

From antiquity onward men and women kept combs close at hand not only to keep their hair in order but also to free themselves of bothersome lice or nits. At sea, where people could not easily distance themselves from shipboard pests, combs were a particularly common personal possession. In the 17th century these could be made of wood, bone, ivory or even tortoise shell. While the *Order en Instructie voor de Chirurgyens* does not specifically direct the surgeon to bring any combs aboard, Woodall's list calls for many combs to be on hand and even recommends a comb brush with which to clean them.

Indicative of how commonly combs were recovered from the remains of shipwrecks, examples exist among the finds from *Batavia*, *Vergulde Draak* and *Zeewijk*. The three bone combs from *Vergulde Draak* and the two bone combs from *Zeewijk* were probably personal possessions of crew members. There is nothing in their provenance to suggest that they may have been associated

with the surgeon's barbering equipment. However, one of the two tortoise shell combs recovered from Batavia was removed from the barber's bowl concretion and the other was found in close proximity to a collection of apothecary jars near Cannon 2. It is likely that these two examples represent combs that were used by the surgeon for grooming the crew.

BAT4490 and BAT4400

Unfortunately these tortoise shell combs were inaccessible while the author was conducting research at Western Australia Museum Shipwreck Galleries, nor were photographs or drawings made of these combs after their initial conservation treatment. They are both similar in appearance and size to a nearly complete tortoise shell comb that was recovered from the VOC ship *Avondster*, which sunk in Galle Harbor off the coast of Sri Lanka in 1659 (Parthesius 2003:3-4) (Figure 15). The information obtained for these items was derived from field notes and their original registration. BAT4490 was removed from the barber's bowl concretion which included not only the shaving basins but also complete and fragmented apothecary jars and some wooden handles. BAT4400 was located very near to this concretion, underneath Cannon 2 in the area where a concentration of apothecary jars was also recovered.

GT1129

This bone comb fragment was assembled from two broken pieces (Figure 16). Two gauges of teeth are present with thicker more widely set teeth on one side and thinner more narrowly set teeth on the other side. Two additional bone combs very similar to this (GT986 and GT1131) were also recovered from *Vergulde Draak*. They were discovered separate places on the wreck site and were not obviously associated with any medical artifacts.



Figure 15: Bone Comb from *Avondster*

(Partheisus 2003:44)



Figure 16: GT1129

ZW426 and ZW2874

ZW426 is composed of two fragments from separate bone combs and ZW2874 is a fragment of another double-sided bone comb (Figure 17). ZW426B is unique compared to the other examples discussed in this section because it appears to be a single sided comb with a thick spine and one set of teeth. Neither of the double-sided examples from Zeewijk show different gauges of teeth. ZW426 was found on Gun Island and ZW2874 was recovered from among the general debris of the wreckage.



Figure 17: ZW426A, ZW426B and ZW2874

Discussion

There is no doubt that barber's bowls, like those recovered from *Batavia*, were intended to be used for shaving and bleeding. Bruijn's studies on the discrepancies between the presence of basins and razors have shown that such bowls often served other shipboard purposes. Since no razors were recovered from the wreck of *Batavia*, the function of these particular shaving basins could be called

into question. However, a tortoise shell comb was removed from inside the barber's bowl concretion which also contained fragments of broken apothecary jars. An additional tortoise shell comb was found in close proximity among additional apothecary jars, presumably in the surgeon's working space. At the very least these combs were in or very near the barber's bowls when the ship sank. It is likely then that the combs and the bowls were used in conjunction and stored together among the surgeon's supplies.

Perhaps the lack of razors recovered from *Batavia* is due to the fact that they were simply not preserved. As previously discussed, 17th century razors were made of ferrous materials that corrode and disintegrate particularly quickly in an aqueous environment. Not all razors of this period had handles made of wood or animal products. There are numerous surviving examples of contemporary straight razors made entirely of metal which would not have survived or may have been regarded as unidentifiable concretions. The same can be postulated to explain the lack of scissors from *Batavia* as well.

The razors from the collection of *Zeewijk* were all recovered from Gun Island. After the ship wrecked, the survivors traveled between the island and the ship multiple times to gather supplies. In the case of *Batavia*, which suffered a similar fate, the remains of apothecary jars were found on Beacon Island indicating that the surgeon prioritized the transportation of medicine to the survivor's camp. If the razors from *Zeewijk* were indeed part of the surgeon's equipment, it is curious that no other medical finds were recovered from Gun Island.

The uniformity of these razors is uncommon when they are investigated on their own, but when the presence of many identical pairs of scissors from the same shipwreck is taken into account new interpretations of their relationship arise. There is no reason that the surgeon, or anyone else on board, would need more than a few pairs of scissors to perform their duties. The scissors from

Zeewijk were created in mass, probably by the same manufacturer, and intended for a purpose other than shipboard use.

It is possible that the razors and scissors from *Zeewijk* represent Company or officer-owned cargo. Outgoing vessels were often laden with supplies for the Company establishments and employees in the Indies. *Zeewijk* had already offloaded a portion of its cargo at the Cape of Good Hope but it was by no means empty when it wrecked. If not intended for Company use, these artifacts may be examples of the bric-a-brac that officers often reportedly stowed in their allotted personal cargo space.

The investigation of the barbering equipment aboard these three vessels has shown that the differentiation of personal and professional remains in the archaeological record is sometimes difficult to establish. Even when function and role of certain artifacts is definite, their employment in shipboard uses may not always be clear.

CHAPTER V

SURGICAL DUTIES AND TOOLS

On land surgeons were seen by the public as the pragmatic healer for all of their basic injuries and ailments. Most common people did not have the money to visit a university educated physician when they could simply visit a local surgeon and receive quick treatment. Physicians were sought out when a patient was grievously ill, but surgeons built their entire trade on addressing every manner of minor cut, burn, or break and often practiced dentistry as well.

Intricate and complicated internal surgeries were conducted in a hospital by a physician or by a master at the surgeon's guild hall in one of its teaching amphitheatres. Practicing master surgeons who operated their own shop and village surgeons who were the only healer in rural communities performed many other minor operations. Some surgeons considered themselves specialists, particularly skilled in certain procedures such as tonsil removal or bladder stone removal. These individuals often advertised themselves as such in leaflets or in the pages of surgical publications in order to bring in more business.

Contemporary, widely published surgeons whose works were considered cannon in the field, such as Ambroise Paré, Paul Barbette and John Woodall, divide the concerns of the surgeon into a number of separate categories. These include the removal of foreign objects from wounds and their suturing, the treatment of contusions and ulcers, the removal of tumors and fistulae, the setting of dislocations, fractures and breaks, and the occasional amputation and cauterization. Some treatises included sections on more complicated operations as well. Barbette (Barbette 1687) includes detailed instructions regarding the removal of cataracts and bladder stones as well as a rather gruesome section on how to extract a still birth from a woman's womb.

When it came to the understanding of disease and internal medicine, the surgical community of the 17th and 18th centuries still held fast to ancient Galenic beliefs. In his famous 1691 surgical treatise, Ambroise Paré dedicates the first third of his manuscript to the description of every intricate detail of the humors. He focuses on discussing the seven natural principles believed to govern the functions of the body and further divides each of these into smaller components which are interrelated and need to be balanced in particular ways (Paré 1691:2-25).

However, surgeons were only allowed to balance these principles by physical treatments as they were restricted from prescribing any internal medicines. Pare summarizes the profession of surgery by stating:

“Chirurgery is an Art, which teacheth the way by reason, how by the operation of the hand we may cure, prevent and mitigate Diseases, which accidentally happen to us. Others have thought good to describe it otherwise, as, That it is that part of Physic which undertaketh the cure of Diseases by the sole industry of the Hand: as by cutting, burning, sawing off, uniting fractures, restoring dislocations, and performing other works, of which we shall hereafter treat (Paré 1691: 1)”

When surgeons did write about cures for various fevers, fluxes, and diseases they focused mostly on cupping or bleeding in conjunction with dietary restrictions. When purging was prescribed the surgeon gave his patient medicine by mouth to cause vomiting or violent bowel movements in order to flush out unwanted or excess humors. This was not considered *physick* and was a common remedy for many ailments.

Required Instruments

Since surgeons worked in the realm of physical remedies, their toolkit consisted mostly of metal instruments for the piercing, prodding and paring of the human body. Many published surgeons illustrated these tools in their written works so that their new or inexperienced fellows could see

exactly what instruments were needed for each procedure. Those tools that were heavier or required a very firm grip to operate such as saws, small and large cauterizing irons, hooks and scoops, are generally represented as having wooden or bone handles with metal working surfaces. More delicate instruments or those with pivoting parts such as bistouries, scalpels, pliers, bills, spreaders, guides and probes either had slight wood or bone handles but were often completely metallic. In the 17th and 18th centuries the metal used in the production of surgical tools was likely shear steel, which was essentially a laminate of wrought iron (Kirkup 2005:112).

As was the case with barbering equipment, sea surgeons entering into the service of the VOC were required to supply their own set of surgical instruments. Any practicing surgeon was likely already in possession of many required tools, but younger surgeons or those who worked in a shop where instruments were shared between multiple practitioners may have lacked some items they needed. On land city surgical guilds often kept an instrument cupboard that housed less utilized and expensive items for rare or unusual procedures from which members could rent items (Boerhaave Museum 1993:22). The pay advance offered to newly appointed Company surgeons was intended to purchase any instruments the individual did not personally own, whether because they had relied on renting them or had not often needed them previously. However, as with the barbering equipment, surgeons could rent certain tools from the Company stores that they were still unable to obtain personally.

The *Ordre en Instructie voor de Chirurgyens* is primarily focused on listing the surgical instruments that each surgeon “must buy and keep in repair at their own cost” (Gawronski 1992:236). This included a basic selection of tools that a surgeon needed to address any number of shipboard injuries. In their written works, Paré and Woodall recommend that surgeons have a number of additional instruments on hand in order to be truly prepared for every task, but the VOC deemed that only the following instruments were absolutely necessary. Though the number of instruments required for the work of a sea surgeon was limited when compared to those suggested for practice on

land, surgeon Samuel Haetlib still complains that sea surgeons pack enough bothersome and useless instruments “as would lade an ass” (Haetlib 1655:162).

The majority of tools described in the *Ordre en Instructie voor de Chirurgyens* were used to make incisions into skin and into internal organs if necessary (Figure 18). Two scalpels or incision knives were required for this purpose and an additional pair of curved scissors was used for various other surgical purposes. Four sheathed swing blade bistouries of different blade shapes, similar to the form of razors, were used for cutting internal organs. A specialized bistoury caché had a protected blade which was pushed forward by a spring mechanism once it was in place. This was used for the opening of internal organs in confined body cavities. An indeterminate number of lancets used for bloodletting and an apostumation lancet for opening abscesses were also required in the surgeon’s chest. Two hollow or grooved directors could be used in conjunction with any of these tools to guide and steady them during an operation (Gawronski 1992:236-242).

Pivoting instruments were often employed to hold wounds or incisions open and to hold onto foreign objects or even internal organs (Figure 19). The *Ordre en Instructie voor de Chirurgyens* only required a pair of artery forceps to lift or clamp down onto bleeding arteries and a raven’s bill to solidly latch onto teeth or foreign objects in wounds (Gawronski 1992:236-242). Paré recommends a number of similar clamps with different shapes and gauges of bills for the removal of shot and bone (Paré 1617). Among these are the duck’s bill, crane’s bill, parrot’s bill and swan’s bill. Any of these would serve the purpose of removing foreign objects and were likely all acceptable replacements for a raven’s bill. Such a tool could be used to hold open a wound or incision, but a dilator or pair of screw set forceps would allow the surgeon to have both hands free to work and may have been a common addition to his chest.

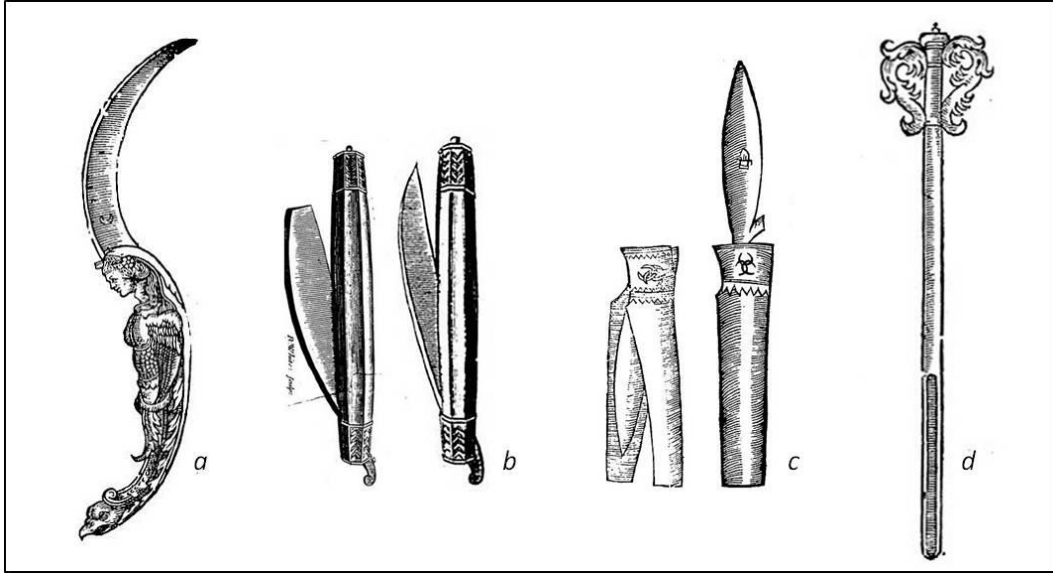


Figure 18: Examples of Surgical Tools for Making Incisions. a) Curved Swing-Blade Incision Knife, b) Two Different Bistouries, c) Lancet Shown Closed and Open, d) Director

(Paré 1691:101,108,412; Barbette 1687:11)

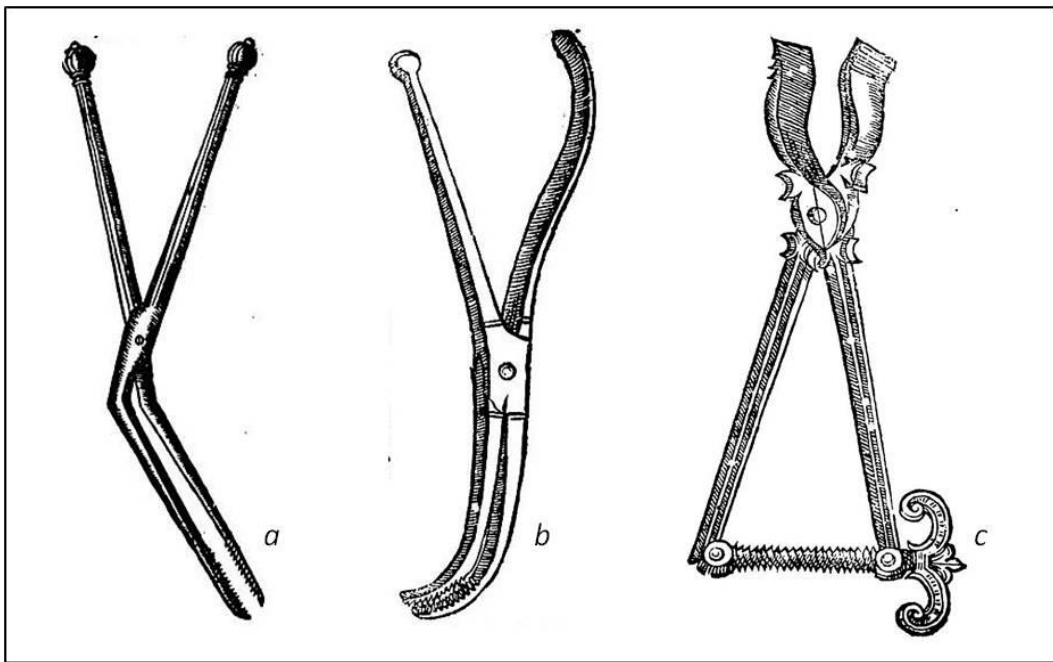


Figure 19: Examples of Surgical Tools for Clamping and Prying. a) Crane's Bill, b) Raven's Bill, c) Dilator

(Paré 1617:45; 1691:304,307)

Other required tools were inserted into the body to investigate wounds or to release pressure caused by gasses or liquids (Figure 20). Probes, which were smooth solid metal cylinders often with bulbs on their ends, allowed the surgeon to check the depth of a wound or search for fragments of shot and bone. Two of these in different thicknesses and a winged probe that prevented penetration after a certain depth were among the necessary items (Gawronski 1992:236-242). One large and one small trocar allowed the surgeon to punch a hole into the body cavity and withdraw the perforating device leaving behind a hollow tube in its place. Through this tube gasses or liquids could be released from a desired location. In the same manner, three male catheters of different sizes and a single female catheter could be inserted into the bladder in order to drain urine.

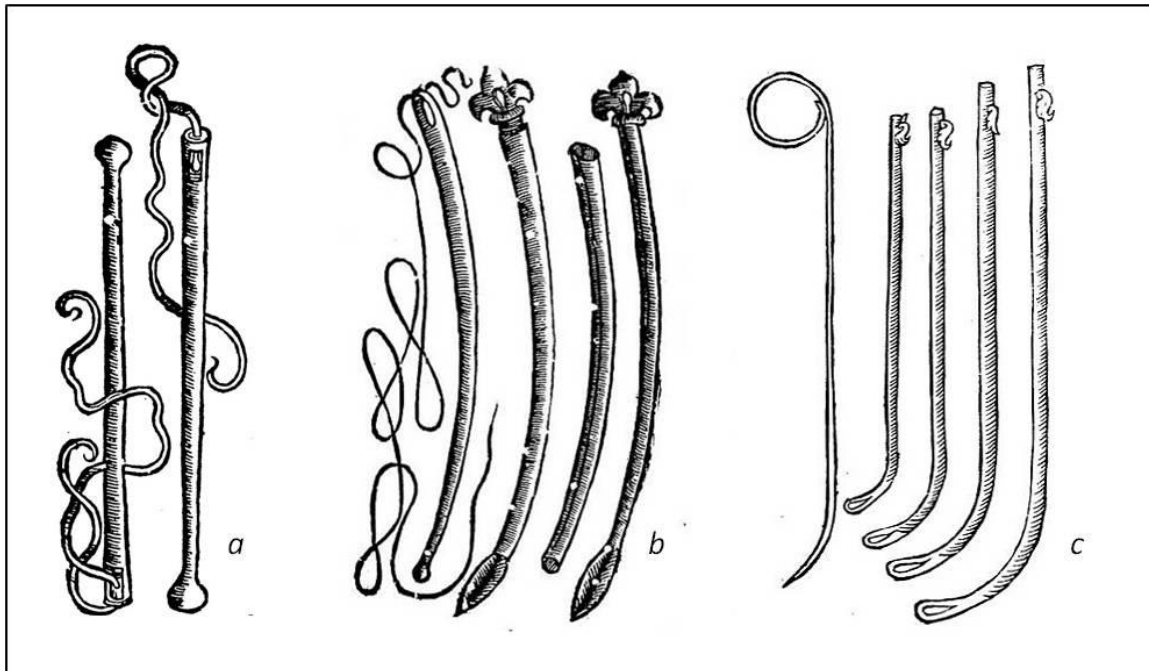


Figure 20: Examples of Surgical Tools for Probing. a) Basic Probes, b) Trocar Elements, c) Catheters

(Paré 1691:281,321,393)

A number of small instruments were used to close wounds after an operation was complete. Among these are six curved needles with eyes, six straight needles with eyes, and a needle holder to guide the surgeon during an operation. A single skein of silk supplied the material for stitching. A spatula is mentioned for applying salves to healing wounds and though the exact requirements of materials needed for creating bandages are not specified, they would have included boards for splints and old linen. A pewter syringe, specifically for flushing out healing wounds and applying treatments to them was also required (Gawronski 1992:236-242).

If a wound had become infected or gangrenous and threatened the life of a patient, appendages were sometimes amputated and the resulting stump was cauterized (Figure 21). For this the *Ordre en Instructie voor de Chirurgyns* called for an amputation saw with two blades, a straight and a curved amputation knife, a pair of amputation pincers and a hammer and chisel (Gawronski 1992:236-242). The saw and amputation knives were used on larger appendages while the pincers and chisel were used to remove fingers and toes. Paré illustrates many different forms of amputation pincers, some no different from carpentry tools. Three tourniquets were kept on hand for the preparation of a limb prior to amputation, in order to limit blood loss. Post amputation, a cauterizing iron would be heated in a coal-filled brazier and pressed against the wound to close bleeding arteries and veins by burning them shut. Though a plethora of different cauterizing irons were used on land, only three were required in the surgeon's chest.

A trepan and all of its fittings would have been placed in a small box of its own (Figure 22). This rather complex tool is a drill used to raise depressions of the skull or remove fractured pieces of bone from the surrounding cranium if they are unsalvageable and represent a threat to the brain. They are generally composed of a tri-part handle whose center piece was rotated in order to turn the drill bit below (Gawronski 1992:240). Simpler trepans exist with a solid handle that was manually turned but it is not specified which version should be included. Either form of this tool would have had interchangeable bits that fit into the handle mechanism. With these fittings holes could be drilled into

the skull to release pressure, or fragments of cranium could be raised directly upwards without damaging the brain.

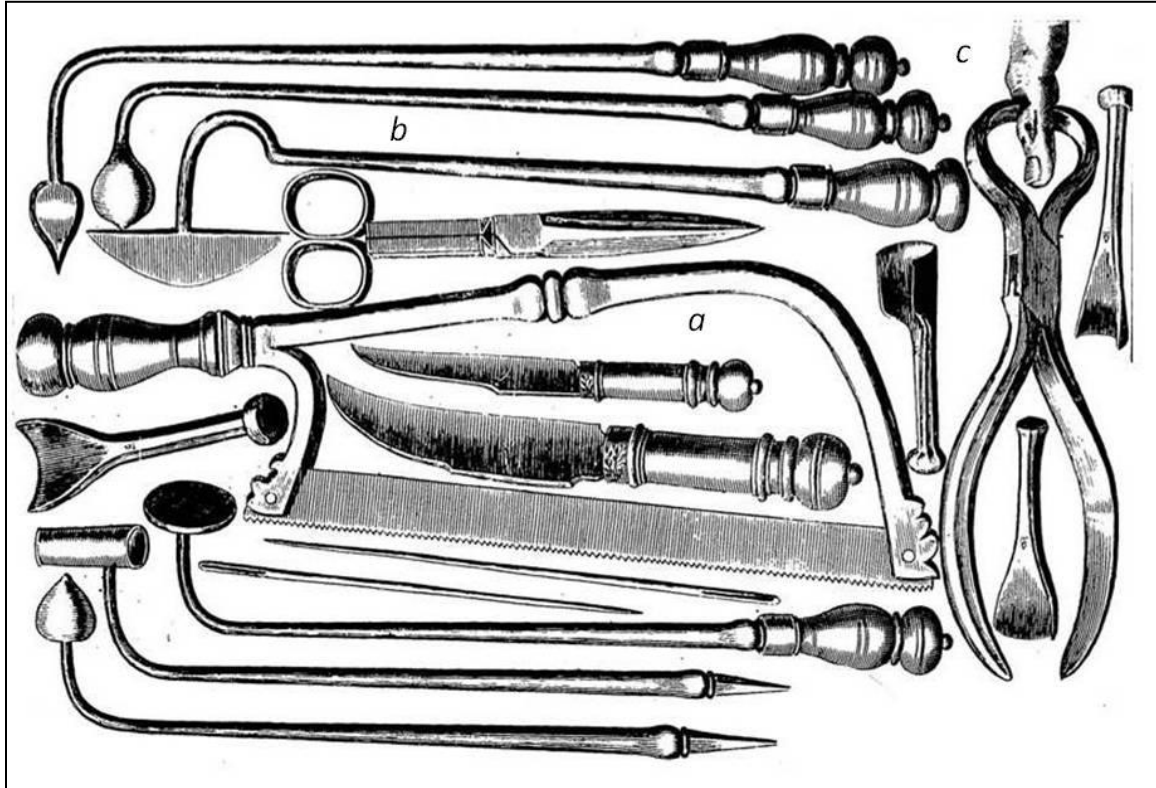


Figure 21: Amputation Tools. a) Amputation Saw and Knives, b) Cauterizing Irons, c) Pincers

(Woodall 1655:412)

Enemas were one of the most commonly prescribed treatments for both blocked and overly active bowels. For this reason, two syringes, generally made of pewter, and four interchangeable nozzles were required in the surgeon's chest (Gawronski 1992:232). These would be filled with various liquids and injected into the rectum to correct the issue at hand. If the patient required a

smoke enema, the surgeon would utilize one of the two clyster pipes in his kit. These were bound to bladder bags made from pig organs which were filled with tobacco smoke. Pressure would be applied to the bladder so that the smoke filled the rectum and loosened the stools.

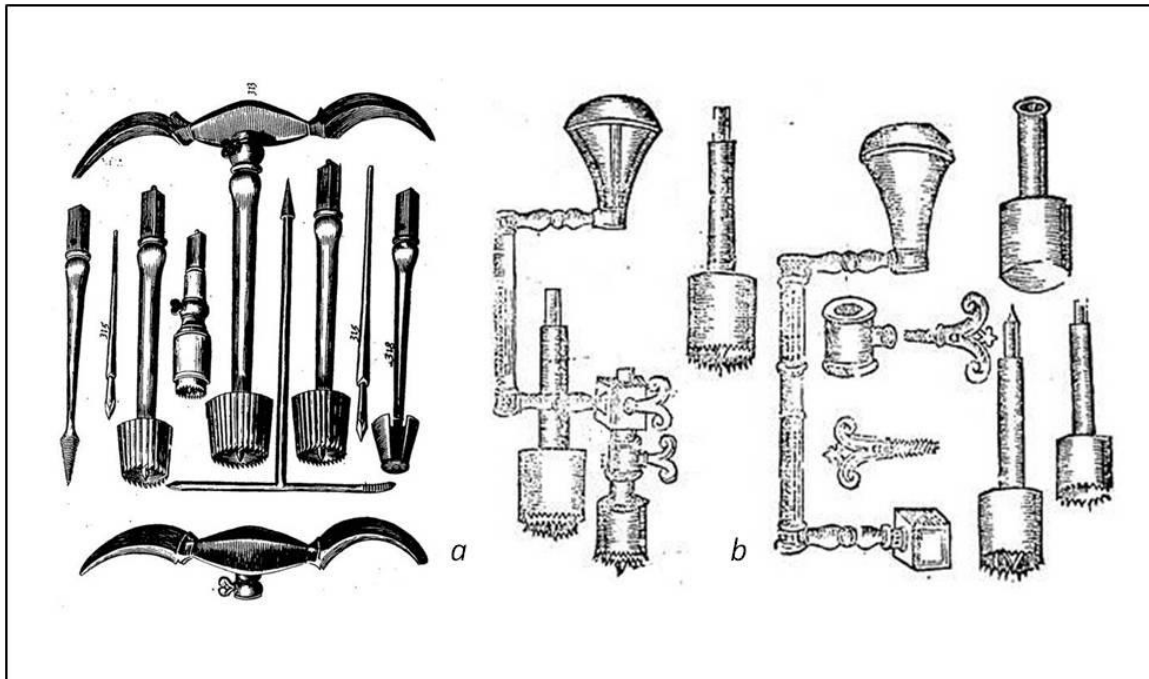


Figure 22: Examples of Trepan. a) Simple “German” Trepan with Bits, b) Tri-Part Trepan with Bits

(Woodall 1655:30; Paré 1691:245)

Six pewter cups are listed in the *Ordre en Instructie voor de Chirurgyens* (Gawronski 1992:234). These were likely used for the purpose of cupping a patient to remove excess blood or phlegm from the body and balance the humors. Glass cups were also commonly used for this purpose. The cups would be heated at their bulbous base and their narrow mouths would be placed against the

back, chest or other region of a patient's body. The skin inside the mouth of the cup would begin to pucker and bodily fluids would be drawn forth.

A number of additional containers and objects of general use are listed in the *Ordre en Instructie voor de Chirurgyens*, but as they are not directly related to surgical duties, they will not be described in detail. These include pewter drinking mugs, copper cooking utensils, some earthenware basins and parchment. Though these all have their place in the profession of a surgeon, similar items were widely used throughout the ship and artifacts matching these descriptions could be attributed to galley wares as easily as surgeon's equipment.

Handles

With only slight variations over time, the instruments described above represent a complete collection of tools that would have been found inside the surgeon's chest aboard a ship of the VOC traveling to the Indies in the 17th or 18th century. Unfortunately, the archaeological record does not always cooperate in providing well preserved assemblages that can be easily compared to such extensive textual evidence. Due to the nature of their ferrous material, surgical instruments rarely survive the underwater environment. From the wrecks of *Batavia*, *Vergulde Draak* and *Zeewijk*, no intact surgical instruments were recovered. The archaeological evidence for these tools exists solely in the presence of wooden or bone handles whose morphology and provenance allow us to speculate about their original shipboard purposes.

BAT4426

This wooden, lathe-shaped handle was removed from a concretion beneath Cannon 2, between ship frames A7 and A8. A number of other wooden handles of indeterminate purpose were

recovered from the same general location, but most were poorly preserved. The composition of the concretion and the remains of the metal embedded in the wooden fragments suggest that these handles belonged to ferrous tools. A collection of apothecary jars and one of the bronze mortars from *Batavia* were also found near Cannon 2.

The handle's length is preserved to 78.2 mm, it has an ovoid midsection with a maximum diameter of 32.1 mm and its round tool hole has a diameter of 4.0 mm (Figure 23). The tool that was once inserted into this handle was made of a ferrous material and it appears that a collar or ferrule may have covered the point where they joined. The handle displays eight incised bands which encircle its diameter and are spaced along its length. Similar handles exhibit remnants of metal thread in these bands, but this particular handle either did not have this detail or the metal has completely disintegrated and left no traces.



Figure 23: BAT4426

(Illustration by Myra Stanbury from Green 1989:167)

BAT4028

This wooden handle was removed from Concretion 1 which was located in the uppermost layer of remains at the stern of the ship, just above where the apothecary jars and other contents of the surgeon's chest were situated. The concretion included other wooden fragments and a pair of rounded brass tongs. This nearly complete handle is 96.4 mm long, it has a round midsection with a maximum diameter of 22.9 mm and its round tool hole has a diameter of 4.9 mm (Figure 24). The remnant of metal in the tool shaft is ferrous and there is a pronounced impression around the tip extending 17 mm down the wood neck where a collar or ferrule was once fitted. Encircling the narrow point of the handle, just before the flared butt, is a thin band of disintegrated brass wire inset in the wood.



Figure 24: BAT4028

(Illustration by Myra Stanbury from Green 1989:167)

Discussion

Countless wooden handles were recovered from *Batavia*, but many of them are associated with concretions whose contents or location within the wreckage assign them to shipboard purposes other than surgical tasks. The finds from *Vergulde Draak* also contain many examples of wooden

handles, but the great majority of these were removed from concretions inside an intact tool box whose contents suggest that it was stocked with the possessions of the gunner or the corporal on board (Green 1977:256-268). The above examples from *Batavia* are included in this section because they were each found in the vicinity of the wreck where the barber's bowls and apothecary jars were located. The scattered nature of the *Vergulde Draak* and *Zeewijk* sites, and the lack of provenance information for many artifacts found therein, makes speculating as to the nature of wooden handles from these ships too unreliable.



Figure 25: Amputation Scene from *De Gangraena et Sphacelo*
(Wilhelm Fabricus Hildanus, 1671:80)

As evidenced by contemporary illustrations of surgical tools from the 17th and 18th centuries, many instruments were entirely made of metal. Those tools which are represented as having wooden handles include the larger amputation knives, saws, cauterizing irons and some components of the trepan (Figure 21 and Figure 22). If BAT4426 and BAT4028 are in fact the handles of disintegrated surgical instruments, they may have originally belonged to one of the above tools.

BAT4426 and BAT4028 are similar in size and shape and may have been the wooden handles of cautery irons from the surgeon's equipment. Such irons were not as large as one may think as they were not solely used for the cauterizing of limbs after amputation. They existed in a wide variety of shapes and sizes. Cauterization was employed in the closing of gunshot wounds, it was commonly used in tongue surgery. Extremely delicate irons also served to seal bleeding arteries and veins during an operation. The metal ends of these irons would be placed directly into a brazier of burning coals in order to reach extreme temperatures (Figure 25). Irons in use are sometimes depicted as entirely sleek, but more often they are shown to have handles. If these tools were metal throughout, the heat from the fire would radiate through the metal handle and a heavy glove would be needed to pick up the instrument. A wooden handle would have allowed the surgeon to contact the iron directly at its end without burning his hand or needing a glove.

The wooden handles portrayed in Woodall's illustration are more complex than other contemporary examples (Figure 21). His handles appear to be delicately turned with a narrow waist, a bulbous midsection and a small knob on their butts. Other contemporary authors illustrate cautery irons with simpler handles of turned wood that gradually widen towards their rounded butts (Lowe 1634:92; Scultetus 1674:80). The handles from *Batavia* are similar to Woodall's depiction but fall in between these two categories; they have a bulbous body and a narrow waist, but they have flat flared ends without any decorative knobs (Figure 26). Pare's depiction of thirty-five different cautery irons illustrates just how varied their handles often were (Figure 27).

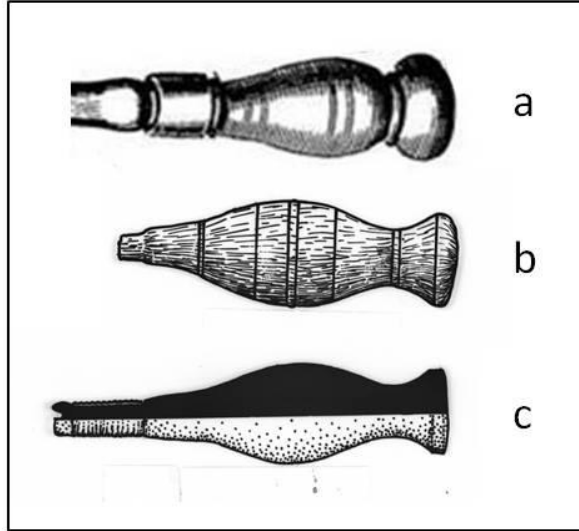


Figure 26: Comparison of Handles. a) Handle of a Cautery Iron from Woodall, b) BAT4426, c) BAT4028
(Woodall 1655:412; Green 1989:167)

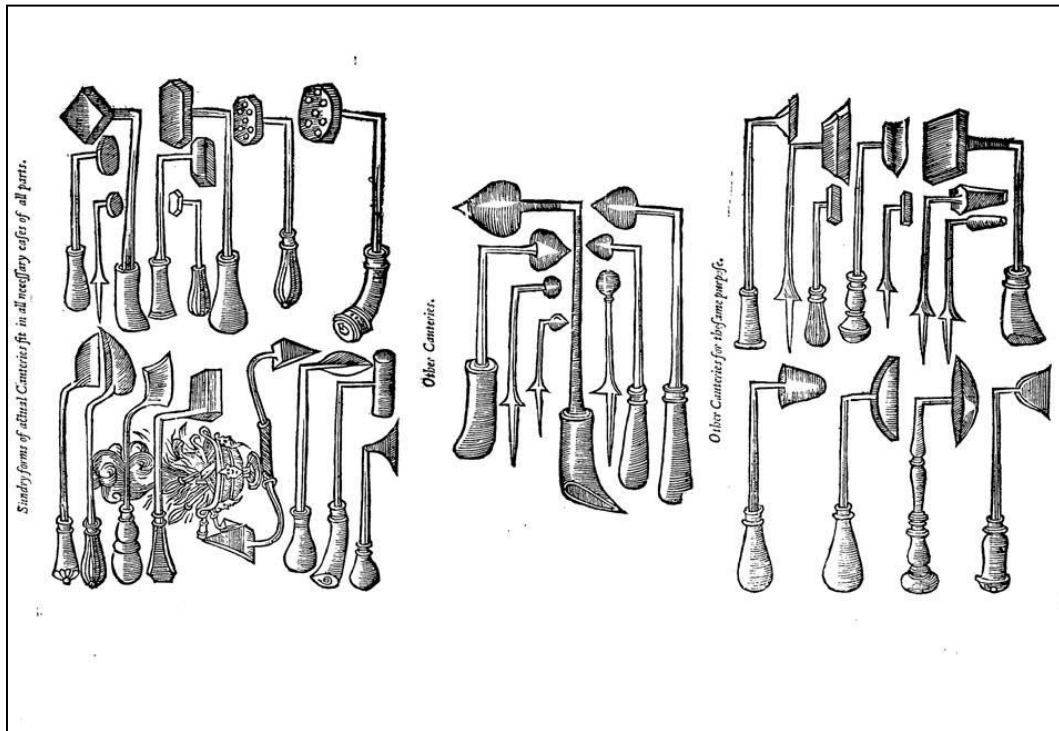


Figure 27: Cautery Irons
(Paré 1691:448)

The identification of these handles as possibly belonging to cautery irons is purely speculative. Without an indication of the form of their metal elements, their original use can never be known for certain. They have been included in this section due to their provenance and association with other medical artifacts collected at the stern around Cannon 2.

CHAPTER VI

APOTHECARY DUTIES AND TOOLS

Apothecary shops of 17th century Europe housed hundreds of varieties of herbs and other ingredients used in the production of both topical and internal medicines. In the larger cities, the *apothekers* themselves were members of the grocer's guild, but the quality control governing medicines prepared in the shop was regulated by the local *Collegium Medicum* (Boerhaave Museum 1993:8). In order to maintain standardization of the quality and quantity of herbs found in any given apothecary shop, and to set forth guidelines regarding the dosage and preparation of medicines, the governing bodies published a pharmacopeia. The *Collegium Medicum* of Amsterdam was particularly concerned with the regulation of drugs in the city and published the *Pharmacopeia Amstelredamensis* in 1636 not only to establish operations of apothecary shops, but also to officially prohibit surgeons and non-guilded druggists from preparing any of the prescriptions contained within (Bruijn 2009:36).

⁴ This did not mean that surgeons were uneducated in how to craft or prescribe medications, but that they were required to observe the separation of professions and refrain from infringing upon the business of the apothecary.

The apothecaries were also restricted in their trade as the *Collegium Medicum* forbade them from dispensing any drugs that had not been expressly prescribed for a patient by a physician (Koning 1961:10). An individual would have to consult a medical doctor and receive written directions for the creation of an accepted treatment, which he would then take to an apothecary to have crafted, much like modern pharmacists fill prescriptions today. This level of regulation applied to surgeons and

⁴ Attempts to establish a widely accepted pharmacopeia had been made in the Netherlands as early as 1300, and even met with some success in the later 16th century. However, it was not until a severe outbreak of plague in 1635 prompted the *Collegium Medicum* to take actions in finalizing the compilation of the 1636 *Pharmacopeia Amstelredamensis* and enforcing its adoption throughout the greater part of Holland (Koning 1961:7-16).

apothecaries not only maintained their division of practice, but also ensured their subordinate roles to physicians and the *Collegium Medicum*. Surgeons were not allowed to prescribe internal medicines, but they could purchase ingredients from apothecaries to compose topical treatments. Apothecaries could sell simple ingredients to surgeons, but could only vend completed drugs to individuals with prescriptions. Thus the physician oversaw the works of both professions, essentially making himself indispensable.

However, since physicians and apothecaries were either not willing or not qualified to serve at sea, the tasks of these two roles fell to the ship's surgeon. College educated physicians believed it below their station to act as a healthcare provider on long-term voyages. Though a few documented cases of physicians setting out to sea exist, these generally involve a unique set of circumstances or the physician is to receive a high post at an established hospital in one of the Dutch colonies such as Bantam or Batavia.⁵ Apothecaries were simply not qualified to serve in this post as they lacked the empirical knowledge and practical experience necessary to address the treatment of wounds and common shipboard illnesses.

To act as the ship's physician and apothecary, surgeons had to become skilled with certain equipment and materials they had occasion to use on land but may not have been intimately familiar with. Chief among these are the mortar and pestle, ceramic apothecary jars and their contents, and pharmaceutical weights. An in-depth analysis of these three artifact categories follows.

⁵ Jacobus Bontius was a university-educated physician from an extensive family of respected doctors, lecturers and medical professionals. He chose to pursue a career with the VOC because he had a passion for botany and wanted to discover the herbs of the Indies and what medicinal properties they might hold. Though he made many voyages of research and discovery throughout the East Indies, he never served as a ship's surgeon. He was appointed Attorney-General of the VOC in 1630 and held many prestigious medical posts throughout his career (Cook 2007:191-225).

Mortar and Pestle

The mortar and pestle were commonly utilized tools in the surgeon's profession for pulverizing the ingredients of poultices and unguents, but only in his position at sea would he have used them to prepare internal medicines. Mortars, the bowls that held ingredients, were made of metal, stone, ceramic or even wood to fit a variety of needs and economic situations. The material of the pestle, the club used for crushing and grinding, generally matched that of its vessel. This collective apparatus ranged in size from those that were so large and heavy they must remain stationary, to small portable versions. In a wood carving of a 17th century apothecary shop (Figure 28) an apprentice can be seen mixing ingredients in a stationary metallic mortar in the foreground while a smaller, potentially ceramic example is in use on the counter and two additional metallic mortars sit in storage on a back shelf.

Metallic mortars, particularly those of brass or bronze, tend to survive the trials of time better than those of other materials and numerous archaeological examples can be found from the 17th and 18th centuries. The fashioning of these instruments was initially done by bell-founders, as bells and mortars share similar shapes and are composed of the same materials. In Holland, special craftsmen called *geelgieters* used mirroring interior and exterior molds into which the molten metal would be poured in order to create a seamless mortar made out of a single piece of metal (Boerhaave Museum 1993:31). Many mortars of this period exhibited inscriptions or were stamped with a maker's mark, making them relatively easy to date.

Three mortars were recovered from *Batavia* (BAT457, BAT562 and BAT625) and another two mortars (GT6 and GT74) and a pestle (GT613) were recovered from *Vergulde Draak*. All four mortars and the pestle were composed of bronze.



Figure 28: *Interior of a Pharmacy* by Unknown Artist (1677)

(Anonymous 1667:xii)

BAT457

This complete mortar, made of bronze, is housed in the Western Australia Museum of Geraldton and personal access to the artifact was not gained (Figure 29). The mouth diameter is 175 mm with a total height of 142 mm. The bottom of the mortar is recessed so that the true base has a diameter of 115 mm and the overhang above it measures 127 mm in diameter. This is the largest and most well preserved of all five mortars discussed in this section.

There are three registers of decoration including two foliate bands around the neck, the lowest with a centered false gadroon motif, and an inscription below the rim of the vessel. This Latin inscription reads: AMOR VINCIT OMNIA ANNO 1625. This translates to “love conquers all [things]” and provides a date. The meaning of this inscription and the accompanying date will be discussed below.



Figure 29: BAT457

(Illustration by Myra Stanbury from Green 1989:95)

BAT562

This example of a bronze mortar is composed of 5 fragments, two of which have been refitted and consolidated (Figure 30). The curvature of the rim was used to estimate a mouth diameter of 124 mm and the vessel's reconstructed height is 116 mm. The bottom of this mortar is recessed in the same fashion as BAT457 with a true base diameter of 75 mm and an overhang diameter of 87 mm (Figure 31). There are no apparent maker's marks, though the state of preservation on the bottom surface of the mortar makes this difficult to conclusively determine.



Figure 30: BAT562

This mortar also exhibits two registers of encircling floral decoration and an inscription below the rim. Due to the incomplete state of the mortar, the full inscription does not survive but the following can be deciphered: OMNIA...Z. As a stand-alone symbol the “Z” on this mortar may appear to be an alphabetical value, but comparison to the date from the inscription of BAT457 reveals

that it is most likely a numerical “2” and therefore likely the last numerical value of the date associated with the mortar. It can be concluded that had BAT562 been complete, it would have exhibited an inscription identical to BAT457 with a unique date proceeding.



Figure 31: BAT562 Detail

BAT625

A single, very poorly preserved fragment of a bronze mortar with faint traces of an inscription was assigned the artifact number BAT625 by the Western Australia Museum in 1971 (Figure 32). It measures 72 mm tall by 102 mm across and exhibits signs of severe erosion and pitting throughout. The curvature of the rim was used to estimate a mouth diameter of approximately 120 mm. Careful inspection of the weathered surface revealed a barely legible inscription in the upper register reading: AMOR VIN.... Considering that the mouth diameter of BAT625 and BAT562 are so

similar, and that the inscription on this fragment supplies the words missing from BAT562, it is likely that they are both part of the same mortar.



Figure 32: BAT625

GT74

This complete bronze mortar has a mouth diameter of 175 mm and a height of 145 mm (Figure 33). Its base, like the examples above, appears to be recessed but it is deteriorated and only the overhang could be accurately measured at 130 mm in diameter. The decorative friezes in the bottom and middle registers of the vessel are more elaborate and detailed than those seen in the mortars from *Batavia*. Motifs here include larger floral and foliate designs with the addition of long-legged birds (possibly storks or herons) and small owls perched atop vines. In the second register the VOC crest can be seen with a smaller “A” set above it indicating a connection to the Amsterdam

chamber of the Company. This mortar also bears an inscription encircling its top register reading:
AMOR VINCIT OMNIA 1654.



Figure 33: GT74



Figure 34: GT6

GT6

This bronze mortar is fairly well preserved though the deterioration of its rim and base make obtaining accurate measurements difficult (Figure 34). Rim diameter was estimated at 145 mm with a height of 118 mm and the overhang of the base, which was again recessed, had a diameter of 112 mm. The decorative elements of this mortar are very similar to those found in BAT457 with simplistic floral designs. In fact, both mortars have an identical floret in their middle registers which serves as a focal centerpiece for the foliate design of the frieze (Figure 35). This mortar also has the

VOC crest present in its lowest register but unlike GT74, there is no distinguishable chamber indication (Figure 36). The same inscription exists below the rim, but in this particular case the date is obscured and cannot be deciphered leaving only: AMOR VINCIT OMNIA.

GT613

Only one pestle was recovered from the remains of all three shipwrecks. It is a bronze pulverizing club, finely made, measuring 186 mm in length with a head diameter of 30 mm (Figure 37). Though there is pitting throughout the instrument, both ends exhibit remnants of smooth surfaces achieved through repetitive use in the grinding of ingredients.

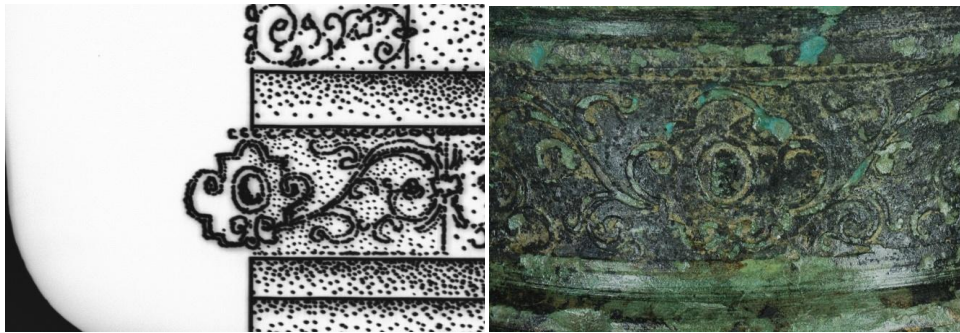


Figure 35: Florets from BAT457 (left) and GT6 (right)

(Illustration by Myra Stanbury from Green 1989:95)



Figure 36: VOC Crest from GT74 (left) and GT6 (right)



Figure 37: GT613

Discussion

All four mortars presented in the previous pages share a very similar morphology. They have relatively straight body walls with a flared base and an acutely flared collar. This is the standard morphology for metallic mortars of the 16th through 19th centuries. The recessed base exhibited in each of the above examples would have allowed the user to place the mortar into a depression on a working surface to prevent it from slipping out of place while pressure was applied during the grinding process. Iconographic representations of mortars from the 17th century illustrate that they often had handles (Boerhaave Museum 1993:31) or small protrusions (Figures 38 and 39) on either side. Never are mortars portrayed with both a recessed base and handles, likely because both features serve the same purpose and would have been redundant.

Mortars with recessed bases appear to be the most common form recovered from VOC shipwrecks. In addition to the two examples from *Batavia* and the two from *Vergulde Draak*, excavations of *Hollandia* (1743) (Gawronski 1996:216; Cowan et al. 1975:290) produced two additional mortars of this morphology. Perhaps this form of mortar was preferred by ship surgeons because, lacking handles, it occupied less space in an already crowded toolkit. Without protrusions on either side, a smaller mortar of this type could also be nestled inside another of larger dimensions. In the three cases above, each pair of mortars contains a smaller vessel whose dimensions would allow for it to be stacked inside of its larger counterpart.

Maker's marks on mortars were often symbols or crests impressed into the underside of the vessel or shields of the maker's insignia incorporated into the designs of the foliate bands. More blatantly, mortars were sometimes stamped with their maker's name boldly encompassing the inscription register below the lip of the vessel. In the case of the mortars recovered from *Batavia* and *Vergulde Draak*, the bottom surfaces are too poorly preserved to distinguish markings of any kind.

However, the erosion patterns on the base of BAT562 (Figure 31) may indicate that the integrity of the bronze in this area was compromised by stamping or incising of some kind.



Figure 38: *The Apothecary* by Gabriel Metsu (1661)

(WikiPaintings 2014)



Figure 39: *The Alchemist* by Cornelis Bega (1663)

(Courtesy of The J. Paul Getty Museum, Los Angeles)

A comparative study was conducted of the inscriptions on thirty bronze mortars which appeared in auctions hosted by Christie's over the past three years (Table 1)(Christie's 2013a – 2013ee). These artifacts date from the 15th through 18th centuries and have Dutch, German, or

Flemish origins. Mortar styles include those with recessed bases, handles, or knob-like protrusions, but never more than one of these features is present. In all cases, the inscriptions encircle the topmost register of the mortar, just below the rim, sometimes with an additional entry around the foot. The dates provided are taken directly from the inscriptions and the attributed makers are determined either by names provided in the inscription, a maker's seal in the bottom register, or by the provenance and craftsmanship only if there is conclusive evidence.

All translations of the following inscriptions are provided by the author. Of the sample investigated, only two mortars are inscribed with nothing more than a date (Table 1: #2 and #3). There are four mortars which are inscribed with a single individual's name who does not appear to be the maker (Table 1: #1, #14, #19, and #23). Maker's names appear in inscriptions of seven mortars, sometimes accompanied by the name of the craftsman who repaired the artifact at one point in time (Table 1: #4, #22, #24, #26, #27, #28, and #30). Eight additional inscriptions have religious connotations and offer praise, honor, or glory to God (Table 1: #5, #6, #9, #10, #11, #12, #13, and #29). The remaining mortars, nearly a third of the sample size, contain inscriptions either providing the name of a man and a woman together, they give reference to a housewife, or they tout the familiar: AMOR VINCIT OMNIA (Table 1: #7, #8, #15, #16, #17, #18, #20, #21, and #25).

Table 1: Inscriptions on Mortars

#	Origin	Form	Inscription	Translation	Date	Attributed	Type
1	Dutch	handles	IOHAN VLEDINCK HOER IC TOE M CCCC LXIX		1469	Steven Butendic, Utrecht	owner
2	Dutch	handles	I.A.B. ANNO SALVITIS NOSTRE 1541	I.A.B. IN THE YEAR OF OUR SAVIOR 1541	1541	Engel Tolhuys, Nijmegen	date
3	Dutch	handles	ANNO SALVITIS NOSTRE A 1545	IN THE YEAR OF OUR SAVIOR 1545	1545	Tolhuys, Nijmegen	date
4	Flemish	recessed	IAN VAN DEN GHEIN HEFT MI GHEGOTEN INT IAER MCCCCCLIII	JAN VAN DEN GHEIN HAS CAST ME IN THE YEAR 1553	1553	Jan Van Den Ghein II, Malines	maker
5	German	handles	INT IAER ONS HEREN M VC LXIX (rim) MYN HAVE STEIT ALLEIN IN GODT (foot)	IN THE YEAR OF OUR LORDS 1569 HAVE MY STRENGTH ALL IN GOD	1569	Wilhelm Hachman, Cleve	religious
6	Dutch	handles	SOLI DEO GLORIA 1576	GLORY TO GOD ALONE 1576	1576	Unknown	religious
7	German	handles	GERICHT VAN DEEL LUYTGEN SYN HUYSFROW (rim) INT IAER ONS HEREN MVCLXXVII (foot)	GERICHT VAN LUYTGEN IN PART TO HIS HOUSEWIFE (rim) IN THE YEAR OF OUR LORDS 1577 (foot)	1577	Wilhelm Hachman, Cleve	marriage
8	Dutch	handles	GISBERT ARENDES UNDE IDE SIN HVS FROV 1592	GISBERT ARENDES IN THE IDEA OF HIS HOUSEWIFE 1592	1592	Henrick Wegewaert, Deventer	marriage
9	Dutch	handle	LOF GODT VAN AL AO 1602	PRAISE THE GOD OF ALL 1602	1602	Henrick Wegewaert de Jonge, Enkhuizen	religious
10	Dutch	handles	ANNO 1623 LOF GODT VAN AL	PRAISE THE GOD OF ALL	1623	Unknown	religious
11	Dutch	handles	ERT GODT BOVEN AL AO 1624	HONOR GOD ABOVE ALL 1624	1624	Henrick Wegewaert de Jonge, Enkhuizen	religious
12	Dutch	recessed	SOLI DEO GLORIA 1634	GLORY TO GOD ALONE 1634	1634	Unknown	religious
13	Dutch	handles	LOF GODT VAN AL AO 1645	PRAISE THE GOD OF ALL 1645	1645	Unknown	religious

Table 1: Continued

#	Origin	Form	Inscription	Translation	Date	Attributed	Type
14	Dutch	handles	HENDRICK VAN KIRCKHOF 1649		1649	Johan Van Trier, Huissen	
15	Dutch	handles	IOHAN GEORGH REIGER HELENA HACDORN AO 1654		1654	Johan Van Trier, Huissen	marriage
16	Dutch	recessed	AMOR VINCIT OMNIA 1670	LOVE CONQUERS ALL 1670	1670	Unknown, Deventer	marriage
17	Flemish	recessed	AMOR VINCIT OMNIA 1670	LOVE CONQUERS ALL 1670	1670	Unknown	marriage
18	German	knobs	IOANNES DAM CATHARINA WESSELING 1676		1676	Unknown, Wesseling	marriage
19	Dutch	recessed	LAUS DE GILLES WIBRANS 1677	PRAISE OF GILLES WIBRANS 1677	1677	Gerrit Schimmel, Deventer	owner
20	Dutch	recessed	AMOR VINCIT OMNIA 1687	LOVE CONQUERS ALL 1687	1687	Gerritt Schimmel, Deventer	marriage
21	Dutch	recessed	AMOR VINCIT OMBIA 1688	LOVE CONQUERS ALL 1688	1688	Gerritt Schimmel, Deventer	marriage
22	Flemish	recessed set in pedestal	JOHANNES VAN HALLE HEEFT MIJ GEGOTEN ANNO 1688 (rim) BY MANCKEMENT VAN'T GELDT HEEFT PAUWELS NEERINCX MY HERSTELDT (foot)	JOHANNES VAN HALLE HAS CAST ME IN 1688 (rim) BY MISTAKE OF IT HAS PAUWELS NERINCX RESTORED ME (foot)	1688	Johannes Van Halle (original) & Pauwels Neerincx (repair)	maker
23	Dutch	recessed	+GERTRVY.HARTCAMPS A 1688		1688	Unknown	owner
24	Dutch	recessed	QUIRYN.DE.VISSER.1699		1699	Quirin De Visser, Rotterdam	maker
25	Dutch	recessed	AMOR VINCIT OMNIA 1701	LOVE CONQUERS ALL 1701	1701	Gerritt Schimmel, Deventer	marriage
26	Dutch	recessed	QUIRIN DE VISSER ME FECIT 1704	QUIRIN DE VISSER MADE ME 1704	1704	Quirin De Visser, Rotterdam	maker
27	Dutch	recessed	ME FECIT IAN ALBERT DE GRAVE AMSTELODAMI ANNO 1729	IAN ALBERT DE GRAVE MADE ME IN AMSTERDAM IN 1729	1729	Jan Albert de Grave, Amsterdam	maker

Table 1: Continued

#	Origin	Form	Inscription	Translation	Date	Attributed	Type
28	Dutch	recessed	CORNELIS HOOFT AGITANDO REMEDIA REDONUTER APTICORA 1735	CORNELIS HOOFT TROUBLED HIMSELF TO GIVE REMEDY TO THAT WHICH FIT BEFORE 1735	1735	Alewijn Crombosch, Amsterdam (original) & Cornelis Hooft (repair)	maker
29	Dutch	recessed	SOLI DEO GLORIA AO 1749	GLORY TO GOD ALONE 1749	1749	Unknown	religious
30	German	recessed	JOHAN SWYS MONASTERY AO 1773		1773	Johan Swys, Wesel	maker

Gawronski (1996:216) suggests that mortars were often given as wedding presents by the father of the bride to the young couple. This belief is well supported by the inscriptions found on entries #7 and #8 which state that these mortars were given as gifts in consideration of or possibly by a “housewife”. Though “love conquers all” is more of a generic romantic slogan and does not make specific reference to marriage, Gawronski believes mortars with this inscription were produced in bulk and could be easily personalized with the simple addition of a marriage date. This would have been a more economic option than paying to have the entire upper register augmented with the names of the couple.

However, mortars of this quality and craftsmanship would still be quite a costly gift to present to just any newlywed couple. The only individuals who would truly benefit from and appreciate a sturdy bronze mortar would be those practicing in the medical fields, namely physicians, surgeons, or apothecaries. For general household and cooking purposes, mortars of wood or stone would suffice. Perhaps such a gift was only given by the father of the bride if his daughter was marrying a man belonging to one the above trades.

It is interesting to find AMOR VINCIT OMNIA inscribed on a mortar that also bears the VOC crest as seen in both GT74 and GT6. If Green’s (1977:173) postulation is correct, and the presence of this seal indicates that the mortar was specifically made for the Company, then why do these examples also exhibit a personalized inscription generally attributed to matrimony? For these two details to exist together on a single mortar, one of the following circumstances must also be true.

If the intended husband was already an established surgeon in the employ of the VOC before he entered into marriage, then the father of the bride might have been able to purchase a Company branded mortar and have it inscribed to give as a wedding gift. It may also possible that mortars with this inscription were presented as a gift from a surgeon’s wife to her husband and dated to commemorate his first voyage with the VOC. However, the fault with both of these theories lies in

the fact that it is highly unlikely that a member of the general public would ever have access to materials stamped with the VOC crest. There is no evidence for mortars, or any other objects, bearing the Company seal, being sold or even utilized outside of official VOC business.

A mortar and pestle were among the chief items laid down in the *Order en Instructie voor de Chirurgyens* that a surgeon was required to provide for his station, prior to setting sail. However, if he was incapable of supplying certain instruments, he was given the option to rent them from the Company stores. Most often, rented items included those tools used in the production and dispensing of medicines since surgeons were not accustomed to need such items on land. Numerous entries made by Company storekeepers (*pakhuismeesters*) chronicle the renting and returning of mortars and pestles (Bruijn 2009:70). Although it was common for surgeons to own personalized mortars, as evidenced above, they could also take advantage of this Company rental system.

Perhaps the answer to this question can be found through investigating how the VOC supplied its rental stores. Being the large and powerful company that it was the VOC required a massive amount of polished and raw materials to keep its endeavors running. Production centers flourished around the more active chambers, notably in Amsterdam, Hoorn, and Enkhuizen. Bronze foundries were commissioned to cast canons and even ship's bells which were often emblazoned with the VOC crest. However, since surgeons were required to supply their own mortars, and equipment rentals were conducted as more of a courtesy to them than an obligation on the Company's side, it is unlikely that the VOC commissioned the specific casting of mortars alongside cannons or bells.

In order to stock its collection of rental supplies, it is possible that the Company storekeepers purchased pre-inscribed mortars from foundries or apothecaries for a discounted price. If Gawronski's theory is correct and mortars with the AMOR VINCIT OMNIA inscription were produced in bulk, they would have been easy to come by. Mortars purchased in this fashion and intended to be rented out would then have been stamped with the VOC crest to mark them as a Company-owned

instrument. This would prevent any confusion regarding the ownership of the loaned mortar and make it easy for the Company to keep track its possessions.

The death of surgeons in the employ of the Company may also account for how such inscribed mortars came to exhibit the VOC crest. If the surgeon did not have a will or deed drawn up and he was without children or parents, his possessions would pass directly into the ownership of the Company if a colleague was not quick enough to pick through them first (Bruijn 2009:214-216). Upon a ship's return to the Netherlands, such possessions were likely sorted through and medical instruments in good condition would have been committed to the Company rental stores.

Precedent exists for cases in which the VOC stamped its crest into bronze works that were not initially cast with the intention of being Company property. Cannon 12 from *Vergulde Draak* (GT1454) was initially property of the *Geoctroeerde West-Indische Compagnie* (the Dutch West India Company, henceforth GWIC). This is evidenced in the AGWIC mark at its base indicating that it belonged to the Amsterdam chamber of the West India Company. It was likely purchased by the VOC sometime after 1647 when the GWIC was heading towards bankruptcy. It was then emblazoned with the AVOC symbol to mark its passage into new ownership.

If adding the Company crest to a cannon was a common practice, it could easily have been done to mortars already bearing inscriptions in order to mark them as VOC possessions. This would account for why instruments appearing at first to be personal possessions, may have indeed been rented items from the Company stores. The exact history of these mortars cannot be known, but this section has illustrated that although inscriptions generally indicate ownership, there are situations in which they may be misleading. The VOC seal was only ever applied to Company-owned and regulated materials, and unless evidence can be provided that illustrates individuals purchasing VOC-branded items, it can be concluded that GT74 and GT6 were company issued mortars.

Apothecary Jars

Ship surgeons saw a number of injuries and diseases from cuts and scrapes to exotic tropical fevers. Different types of burns, rashes, and other flesh wounds were all treated through the application of the correct emplaister, ointment or unguent. Fevers and deficiencies were generally prescribed a curative mixture of wasters, spirits, and syrups. The medicine of 17th century Europe placed a great deal of emphasis on the balancing of the humors for the remedying of simple cases of fatigue, constipation and sleeplessness. All of these treatments included herbal or medicinal curatives that were freshly prepared by the surgeon using only the ingredients included in the stores of the surgeon's chest, which was supplied by the VOC.

Woodall (1617) sets forth a list of over 250 ingredients he believed useful for the sea surgeon. In his collective 1655 edition of this work, he provides a diagram of a select 160 ingredients and states that while more would certainly be useful, these are the most important to provide in the amount of space allowed (Figure 40). Woodall's position as the Surgeon-General of the EIC deemed his work very authoritative and the guidance provided in his publications no doubt influenced the way medicinal ingredients were provisioned by the VOC.

Initially, the Heeren XVII debated which ingredients should be included in their shipboard apothecary chests and decisions regarding how to stock them were made on a fleet-by-fleet basis (Gawronski 1992:214). Earlier versions of the *Order en Instructie voor de Chirurgyens* did not include any specific ingredient lists for this reason. It was not until the latter half of the 17th century that Company decided on a select 130 ingredients from Woodall's list to be required aboard their own outgoing vessels. The use of any of these precious and expensive ingredients required documentation that was later reviewed by company officials. Two hundred years of voyages to and from the Indies affected little change on the contents of these chests.

Since the Amsterdam chamber of the VOC outfitted significantly more ships than the others, the task of stocking these ingredients was assigned to an official chamber pharmacist while the smaller chambers simply placed orders to local apothecaries. Each of the 130 ingredients required to be included within the chest needed to be stored in some sort of container. For dry ingredients that were rarely used and therefore supplied in small portions, parchment envelopes were a common method of storage. Caustic salts and corrosive oils were kept in tightly corked glass vials in order to maintain the integrity of the container and the stability of the contents. However the majority of ingredients, both dry and wet, were stored in ceramic apothecary jars.

Electuariū Diatris piperis.	Pulvis re- string. mi- nus.	Mag. con- tra ignem.	Unguen- tum Mar- tium.	Vng. Dia- pompha- ligos.	Elect. Diascar- dium.	Mel Depara- tum.	<p>The lowest part of the Chest.</p> <p>The present appearance of the Chest with the order of every Medicinē as they are placed, is here demon- strated.</p>																											
Theriaca Diatiss.	Vnguentum Dialthea.	Axungia Cervi.	Vnguentum Egyptia- cum.	Vng. An- reum.	Confer- Rosarum.	Rhubarb. elect.															Lixivi- um capi- sale.	Syrupus Rosarum.	Balsa- mum ar- tific.	Oxymel.	Acetum Rosarum.	Agua Ab- sinthii.	Agua Ro- sarum rab.	Oleum Lilio- rum.	Oleum Limonii.	Mel Rosarum.	Oleum cha- movilli.	Oleum Rosarum.	Agua Angelica.	Agua Plantagina
Theriaca Lond.	Vnguentum Album.	Axungia Porcina.	Vnguentum Potabile.	Linum. Arcei.	Confer- Barbar.	Confer- Prunel- lorum.	Acetum Rosarum.	Oleum Terebin- thorum.	Ol. Lum- bricorum.	Oleum ambuci.	Oleum Anethi.	Agua Ly- maniorum.	Agua Cer- tui bened.	Oleum Lauri.	Confer- Cidonia- dorum.	Palpa Tamaris- dorum.	Acetum Rosarum.	Oleum Syrupus Scorpio.	Ol. Lun- bricorum.	Oleum Syrupus Abinthii.	Oleum ambuci.	Oleum Anethi.	Agua Ly- maniorum.	Agua Cer- tui bened.										
Terebinth. Venetia.	Vnguentum Populea.	Vnguentum Arragon.	Vnguentum Pectorale.	Mel Sa- Confect. ponis.	Hamech.	Acatia.	Oleum Petre- oli.	Oleum Vitrioli.	Oleum Succini.	Oleum Abinthii.	Agua Ci- namomi.	Succu Ly- maniorum.	Agua Mentha.	Oleum Lauri.	Confer- Cidonia- dorum.	Palpa Tamaris- dorum.	Acetum Rosarum.	Oleum Syrupus Scorpio.	Ol. Lun- bricorum.	Oleum Syrupus Abinthii.	Oleum ambuci.	Oleum Anethi.	Agua Ly- maniorum.	Agua Cer- tui bened.										
Vnguentum Basilican.	Vnguentum Apopolarū.	Vnguentum Aurcum.	Vnguentum Al. Campb.	Vnguentum nutritum.	Vnguentum Dialthea.	Vnguentum Populeon.	Vnguentum cont. ignem.	Vnguentum Pectorale.	Vnguentum Potabile.	Vnguentum Arragon.	Vnguentum Martiatum.	Linamen- tum Arcei.	Mel Sapo- nis.	Vnguentum Aegyptiaci.	Syr. Rosa- rum.	Syr. Viola- rum.	Mel Rosa- rum.	Mi- thridi- ata.	Dia- cordi- am.	Conf. Hia- mech.	Crocus Mart.	Pilule Cochia- gia.	<p>Note that the particulars mentioned on each side this place, are usually to be found in the upper part of the Chest.</p> <p>The middle part, which can- not be here expressed, I leave to the Surgeon's experi- ence and use.</p>											
Axungia Porci.	Syr. Papa- veris.	Syr. Liqui- ritia.	Mel Rosa- rum.	Theri- aca Ven.	Theri- aca Lond.	Dia- pheni- con.	Conf. Alker- mes.	Pilule Agrog.	Pilule Raff.	Cano- bogia.	Scamo- nium.	Sper- ma Casti.	Terra Sigilla- ta.	Merc. Subli- mat.	Praci- pit.	Eu- phorbi- um.	Pul. Bene- dictus.	Argen- tum.	Vnguentum Diapom- pholigos.															
Axungia cervi.	Syr. Limo- num.	Syr. Prunel- lorum.	Syr. Dian- thi.	Elect. de ovo.	Laud. epiat Prac.	Dia- holi- con.	Elect. Pipe.	Pilule Eupho.	Pilule Aurca.	Sibi- um.	Opium	Crocus.	Bolus Tereb.	Cina- baris.	Hiera- picra.	Sal Ni- tri.	Sal Abfin- thii.	Tusla.	Vng. cont scarbum.															
Species Dia- trion Pipe- rian.	Species Di- atrisseron.	Terebinth. Clara.	Confer- Rosarum.	Confer- Amboi.	Confer- Barberorum.	Confer- Prunclerum.	Confer- domorum.	Pul. Reftrin- gens major.	Pulvis ar- thriticus.	Palpa Tamarind.	Succu Liquiritia.	Mithridat.																						

Loving Reader, this explanation is more for putting the Artift in memory of what may be, then of what must be in his Chest; for although there may seem many particulars, yet there wanteth at the least forty more, that may not in true method be omitted in a due proportion; as namely, all the instruments for manual uses and operations, all the most useful of which are expressed in an Index following the Preface in the beginning of the Book.

Figure 40: Woodall's Diagram of a Surgeon's Chest

(Woodall 1655:16)

Large versions of such jars were commonly used in apothecary shops throughout Europe. These earthenware vessels were coated inside and outside with tin or lead based glaze to make them suitable containers for liquids and moist pastes as well as dry stores. They were sometimes decorated with geometric designs, and those used for permanent storage of specific ingredients often had the symbol or the name of their contents applied to the outside. In a frontispiece from a German apothecary shop of the late 15th century such jars can be seen, decorated with the characters symbolizing their contents, lined up on the back shelves (Figure 41).

Three basic forms of apothecary jars were recovered from *Batavia* and *Vergulde Draak*. The largest of these is called an *albarello* and is commonly depicted in 17th century paintings as a vessel for long-term storage at apothecary shops. Smaller versions of apothecary jars are generally placed together in a category referred to as *zalfpotten*, which simply translates to cream jars (Green 1989:99; Schaefer 1998:142; Baart et al. 1977:276). Within this family however, are two distinct morphologies which should be treated as separate entities. The first is a small, rounded earthenware pot which is only glazed inside and sometimes referred to by the English as a gallipot. The second is a miniature version of the *albarello*, glazed inside and out but never decorated and only ever left with a plain white surface, for which it will be referred to as a white pot. These three forms of apothecary jars will be discussed in depth below.

Albarelli

In the early 16th century Italian potters under the influence of Persian craftsmen began to create ceramic jars for the specific purpose of storing apothecary ingredients. The Persians called such vessels “el barani” or powder kegs (Boerhaave Museum 1993:29). In a merging of languages and styles, the Italian versions became known as *albarelli* and were decorated in the Majolica tradition of a white tin glaze background with an array of metallic oxides lending brilliant colors in

geometric designs. When Italian potters settled in Antwerp later in the 16th century, they brought this style of apothecary jar with them, where it came to be considered part of the Delftware tradition. The Spanish occupation of Antwerp in 1585 forced many inhabitants to flee north, and the form of the *albarello* went with them. Thus, by the end of the 16th century this particular style of apothecary jar had become common throughout the whole of the Netherlands.

The *albarelli* recovered from *Batavia* and *Vergulde Draak* exhibit simple decorative motifs of zigzagging leaves and geometric designs, which are taken from the earlier Faenza tradition of Italy, later adopted in Antwerp (Drey 1978:114-116). Determining a center of production for such wares is often difficult as motifs were commonly imitated far from their attributed geographical origins. Since the chamber pharmacist of Amsterdam was in charge of obtaining these containers, it is not impossible that a supply contract may have been enacted in a production center outside of the city. However, it is much more likely that the following examples of Antwerp style, Faenza inspired *albarelli* are local imitations.

The author has observed three forms of *albarelli* which can be easily distinguished from one another. These are the large jars, the small versions with identical morphology, and a small “egg cup” form of which few examples survive from these collections. Variations in wall thickness and concavity of the base are common and will be discussed, but not necessarily used as a means of determining independent manufacturing styles. Only select examples of the entire collection from *Batavia* will be discussed below.



Figure 41: *Frontispiece of Physicians in an Apothecary's Shop* by Unknown Artist (1486)

(Anderson 1983:135)



Figure 42: BAT2326

(Illustration by Myra Stanbury from Green 1989:100)

BAT2326

This large *albarello* exhibits a perfect example of the zigzag leaf pattern that is often attributed to Dutch imitations of the Faenza style (Figure 42). Examples of actual Faenza productions from the 15th and 16th centuries are nearly identical (Drey 1978:115). The neck and the foot of the vessel are encircled by a succession of blue dots or dashes between a pair of triple-stacked blue bands. This motif is seen on every example of painted *albarello* in some variation or another. A yellow and orange band cap either end of the middle register which contains yellow and green leaves outlined in blue. A frond motif, painted in blue, fills the space between the alternating leaves. The use

of green here is somewhat unique in that it was not found on any of the other *albarello* recovered from *Batavia* or *Vergulde Draak*.

Though reconstructed from 21 fragments, this is one of the best-preserved examples of an *albarello* from *Batavia*. Its interior and exterior surfaces were still fully coated with the original tin glaze before it was consolidated during conservation. The vessel is 181 mm tall with a base diameter of 110 mm, a body diameter of 103 mm and a mouth diameter of 107 mm. The walls have an average thickness of 6.5 mm, but the interior surface at the foot was formed to create a straight angle with the convex base instead of following the exterior curvature as the other examples do.



Figure 43: BAT2318

(Illustration by Myra Stanbury from Green 1989:101)

BAT2318

Another example of a large *albarello*, BAT2318 is decorated with simple geometric designs (Figure 43). The foot and neck of the vessel exhibit the standard bands and dots motif. The center register contains blue arches with yellow diamonds in between, and the classic Faenza style frond inside each arch. The tin glaze is well preserved on the exterior of the vessel, but the interior maintains it only in patchy remnants due to weathering effects.

Slightly smaller than BAT2326, but still well within the range of the large *albarelli*, this vessel measures 174 mm high with a base diameter of 93 mm, a body diameter of 94 mm, and a mouth diameter of 96 mm making the jar appear slightly top-heavy. The walls are thinner than BAT2326 at 5.5 mm thick, but unlike the above example, this *albarello* is not thinned out at the base of its interior walls. The curvature of the inside matches that of the outside, and the base is nearly flat.

BAT2331

Though the glaze on this vessel was poorly preserved, the bands and dots around the foot and neck can still be deciphered (Figure 44). In her illustrations from 1988, Stanbury (Green 1989:100) was able to decipher painted designs on the exterior surface of the vessel that have all but disappeared in the twenty-five years since. Though not much remains of the decorative elements, this artifact is a great example of the standard morphology of the large *albarelli*. It measures 190 mm tall with a base and mouth diameter of 105 mm and a body diameter of 106 mm. Its body walls are 5.5 mm thick on average and it does not have a hollowed interior like BAT2326. It has a thicker and more convex base than BAT2318, but the overall body morphology is very similar between the two.



Figure 44: BAT2331

(Illustration by Myra Stanbury from Green 1989:100)

BAT2305

Even though BAT2305 is broken and only the bottom half of the vessel is intact, it is still a good example of the morphology and design of large *albarelli* (Figure 45). The exterior tin glaze is badly weathered, but traces of the design can be seen throughout. A portion of the jar is stained by what appears to have been an iron compound. This stain has acted to preserve a section of the motif well so that even the colors can be seen. From what remains it is clear that the bands and dots around the foot, and presumably around the neck, are also present on this example. Little of the center register remains, but the blue Faenza style frond motif can be clearly deduced, connected by thin blue arches, running the diameter of the jar.

The base of the jar has a diameter of 106 mm and the diameter of the body just at the break like is 107 mm. This is one of the most robust examples of *albarello* with a wall thickness of 7.5 mm. Its base is only slightly convex, but again, its walls are not thinned out and the interior and exterior curvatures match.



Figure 45: BAT2305

(Illustration by Myra Stanbury from Green 1989:101)

GT2006, GT2023 and GT2088

Only five fragments of *albarelli* were recovered from *Vergulde Draak* (Figure 46). Though they were given three independent artifact numbers, they may have come from the same vessel. All of the recovered sherds come from either the base or the rim of a large *albarello* and do not exhibit any unique colors or designs that can set them apart as separate vessels. The fragments are identified as belonging to *albarelli* based on their shape and the fact that each one shows a portion of the indicative bands and dots motif. GT2023 provides the largest glimpse of the middle register and shows that only blue pigment was used in the geometric design atop the white tin glaze. The alternating frond design can also be seen on this fragment. Well preserved white tin glaze can be seen on the interior surfaces of the larger fragments from GT2023 and GT2006. Though not much can be deciphered from these small sherds, their recovery indicated that large *albarelli* were in use on *Vergulde Draak*.



Figure 46: GT2006, GT2023, and GT2088

BAT2370

Only the bottom half of this *albarello* survives and it is completely devoid of glaze and design (Figure 47). It is being included among the detailed examples of finds because it is representative of a medium size category which contains only one other example (BAT2668 below). Though the vessel is incomplete, the base diameter of 67 mm and body diameter of 65 mm indicate that this jar was smaller than the large *albarelli* (with diameters closer to 100 mm) yet still larger than the examples of small *albarelli* below (with diameters closer to 40 mm). The morphology of this jar is identical to the large *albarelli*, with an indented foot whose interior curvature mirrors that of its exterior. The inside of the vessel is not scraped thin nor is the structure of its base altered to accommodate its smaller size, as will be seen below.



Figure 47: BAT2370

(Illustration by Myra Stanbury)

BAT2668, BAT2669, BAT2670

Three well-preserved examples of one medium and two small *albarelli* are housed at the Geraldton Museum and the author was unable to gain access to them. Luckily, Stanbury's (Green 1989:101) illustrations of the jars provide excellent detail of the morphology and design of the vessels (Figure 48). All three jars were recovered from a concretion around one of the surgeon's barbering bowls. They are all very well preserved with white tin glaze intact on their exterior and interior surfaces.

BAT2668 is one of two medium-sized *albarelli* (along with BAT2370 above) recovered from *Batavia*. It is decorated with simple blue bands and the blue Faenza frond motif in its middle register. It is 96 mm tall with a base diameter of 75 mm, a body diameter of 72 mm, and a mouth diameter of 74 mm. It is squatter than the other small *albarelli* with slight indentations around the foot and neck. Its internal curvature does mirror its exterior, but because of its squatness, the internal ridge created by the flared foot is less pronounced. It has a slightly convex base.

BAT2669 is decorated with alternating blue and yellow bands. It is 71 mm tall with a base diameter of 47 mm, a body diameter of 49 mm around the shoulder, and mouth diameter of 45 mm. It has a unique morphology with a very flared foot almost creating a pedestal of the base. This design, though still being considered one of the small *albarelli*, is almost like the "egg cup" variety that will be discussed later, in which the foot of the vessel is solid ceramic leaving less useable volume inside.

Of these three examples, BAT2670 is most like a miniature version of the large *albarelli* that have been previously discussed. It is decorated with a simple blue bands and zigzags motif. It is 64 mm tall with a base diameter of 42 mm, a body diameter of 41 mm, and a mouth diameter of 42 mm. Its interior walls mirror its exterior curvature and it has a completely flat base.

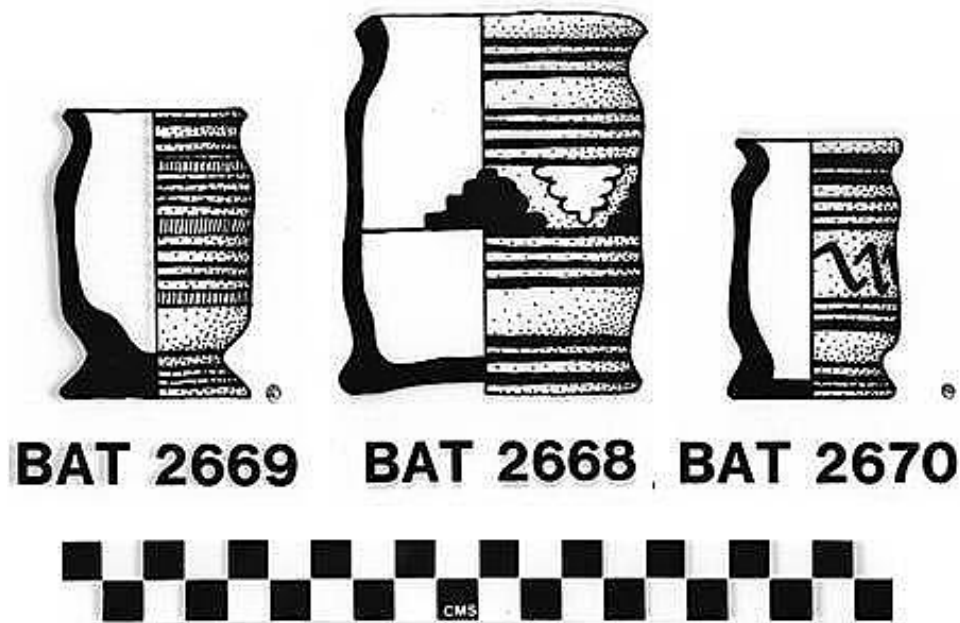


Figure 48: BAT2669, BAT2668, and BAT2670

(Illustration by Myra Stanbury from Green 1989:101)

BAT2337

This example of a small *albarello* has been reconstructed from 22 fragments (Figure 49). The tin glaze on the exterior is very weathered but faint impressions of the original design remain. The jar was decorated with blue bands encircling the neck and foot, and a yellow motif of zigzags and dots in the middle register. This restored vessel is slightly lopsided, being bowed near the shoulder and having an unlevel rim. The highest slope of the rim is 72 mm from the base, while the lowest point is 69 mm from the base. The base and body have a diameter of 43 mm and the mouth diameter is slightly wider at 45 mm. The vessel has a flat base and the interior is not hollowed out.



Figure 49: BAT2337

(Illustration by Myra Stanbury from Green 1989:101)

BAT2831 and BAT2101

When discussing the morphology of BAT2669 above it was mentioned that this jar, with its nearly solid pedestal base, was similar in form to those *albarelli* being called here an “egg cup”. Truer examples of this form are found in BAT2831 and BAT2101 (Figure 50). In both of these vessels, the foot is completely solid so that the exterior curvature of the jar is misleading to the interior volume, which is much smaller. The interior walls of the vessel are rounded at the bottom making the jar look like an egg cup intended to cradle a soft boiled egg.

Unfortunately no glaze remains on either of these examples so it is not possible to see if they were decorated with any different motifs. BAT2831 has a very small pedestal base with a diameter of only 42 mm and what could be measured of the body diameter yielded a value of 51 mm. This is a very extreme ratio of base to body diameter. BAT2101 has a more subtle base ratio with a base

diameter of 53 mm and a body diameter of 57 mm. Though an illustration of BAT2101 was never made, its interior structure resembles that of BAT2831 minus the small bump at the very bottom.



Figure 50: BAT2831 (left) and BAT2101 (right)

(Illustration by Myra Stanbury)

Zalfpotten

Smaller earthenware apothecary jars of various forms are often collectively referred to as *zalfpotten*. These include crude earthenware jars with no glaze, small earthenware pots with lead glaze inside, and even small tin glazed jars. During the 1970s excavations of domestic structures and refuse deposits conducted throughout the suburbs of Amsterdam yielded several examples of each form of these jars, all dating to the 17th and 18th centuries (Baart et al. 1977:276-283). Many were complete and recovered from trash dumps or household debris indicating that they were commonly used for an array of general purposes and disposed of once their usefulness had expired. These pots were economically and expediently crafted to serve various utilitarian purposes and were inexpensive enough to be discarded when their current contents were depleted.

Though these jars were commonly used in other occupations, they served their purpose in the medical world as well. When patients filled a physician's prescription for a salve or ointment at an apothecary shop, they would be given their medicine to take home in one of these disposable earthenware pots (Boerhaave Museum 1993:29). Since these were intended to be used only for a short time, effort and supplies were not wasted on making them durable or impervious. These earthenware pots were only ever glazed inside indicating that long term preservation of the contents was not a primary concern.

The more finely crafted variety of *zalfpotten* is sometimes referred to as a white pot. These resemble miniature versions of *albarelli* with the same morphology and white tin glaze coating their interior and exterior surfaces. Archaeological and iconographic evidence of white pots indicate that they are never decorated, hence the common nomenclature. These jars, being more expensive to craft, were not given to patients as take-home containers like the earthenware pots described above. Instead, they were used by surgeons to store smaller amounts of ingredients commonly employed in their trade. Figure 51 illustrates a surgeon treating a patient's foot wound with a large *albarello* and a small white pot easily accessible.

For the storage of small amounts of ingredients, the surgeon's chest aboard *Batavia* utilized the crude earthenware pots, but higher quality white pots were recovered. Though few ceramic finds from *Vergulde Draak* survived, the *zalfpotten* that were recovered consist only of the white pot variety, and no crude earthenware jars were discovered. The possible reasons for this will be investigated later. For now, a select representation of *zalfpotten*, both earthenware pots and white pots, will be discussed in detail below.



Figure 51: *Surgeon Treating a Peasant's Foot* by David Teniers (1610-1690)

(The Anatheum 2014)

From *Batavia*, thirty complete or nearly complete small earthenware pots were recovered from the barber's bowl concretion or in very near proximity to the *albarelli* discussed above. These are coated with lead-glaze on their interior, but never intentionally glazed on the outside. Though the color of the glaze can appear different due to the effects of the underwater environment or the clay of the vessel itself, three distinct variations of light, medium, and dark brown can be clearly distinguished (Figure 52). These pots are all very similar in their shape, each having a bulbous bottom and recurved bodies ending in narrowed mouths.

Most of the vessels have very little narrowing at their shoulder causing them to terminate in a simple smoothed rim, while a few examples have a more pronounced lip. Those pots without a lip often have one to three scores circumventing their diameter just below the rim (Figure 53). Finger impressions created during the potting process can be seen on almost every example, and the majority of vessels have a swirl pattern on their interior base further illustrating the lack of concern for perfecting these utilitarian jars (Figure 54). In total, only three preserved bases exhibit intentionally smoothed interior surfaces.



Figure 52: Comparisons of Zalfpotten Glazes. Light Brown Glaze (left), Medium Brown Glaze (middle), and Dark Brown Glaze (right)



Figure 53: Comparison of Zalfpotten Rims. A Pronounced Lip (left) and Two Encircling Scores (right)



Figure 54: Comparison of Zalfpotten Bases. A Smoothed Base (left) and a Swirled Base (right)

BAT2300

This is the largest example of a coarse earthenware *zalfpotten* recovered from *Batavia*. It measures 60 mm tall with a base diameter of 42 mm, a maximum body diameter of 64 mm, and an estimated mouth diameter of 48 mm (Figure 55). It is coated with a dark brown lead glaze inside, which was spilled or slopped over the rim to coat a portion of the outside surface as well. This was

likely unintentional as the glaze inconsistently covers only patches of the exterior. This vessel has the most exterior glaze of any *zalfpotten* from *Batavia*. There is a single score encircling the vessel just below the moderately outturned lip. The base of this pot is incomplete and it is impossible to determine if it was smoothed out or left swirled.

BAT2298

This pot is incomplete but a small portion of rim is still intact and the vessel was estimated to be 56 mm tall (Figure 56). It has a base diameter of 47 mm and a maximum body diameter of 59 mm, but its mouth diameter cannot be determined. It is coated with medium brown glaze inside, with no traces of glaze outside. Since the rim did not survive, it cannot be determined if there were any scores beneath it encircling the jar. This is one of the few examples of a pot that has a smooth interior and base.



Figure 55: BAT2300

(Illustration by Myra Stanbury from Green 1989:99)

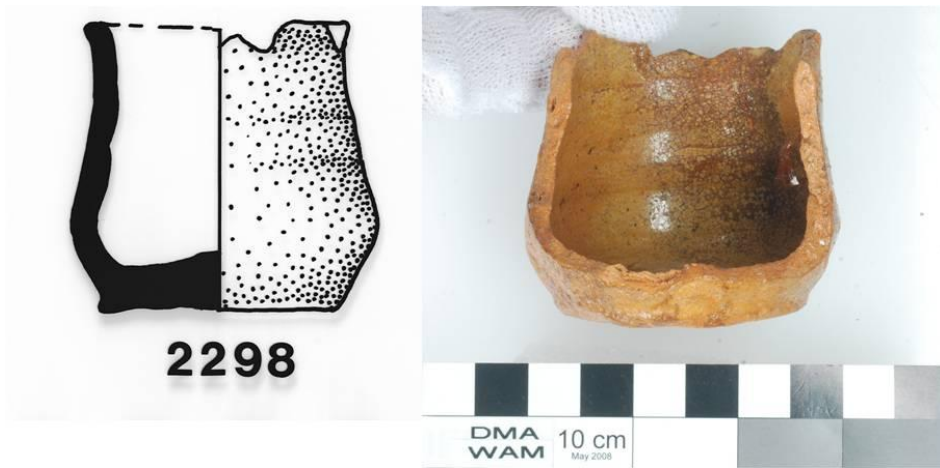


Figure 56: BAT2298

(Illustration by Myra Stanbury from Green 1989:99)

BAT2299

This pot is 55 mm tall with a base diameter of 44 mm, a maximum body diameter of 55 mm and a mouth diameter of 54 mm (Figure 57). It is coated inside with a light brown glaze which carries over the rim to its exterior creating one small splotch. Though it is very weathered, the faint trace of a single score beneath the rim can be seen. The inside surface of this jar is swirled.

BAT2330

This pot is 52 mm tall with a base diameter of 41 mm, a maximum body diameter of 50 mm and a mouth diameter of 50 mm (Figure 58). It is relatively straight walled when compared to the other examples, but its widest point is still at its belly just above the foot. It is coated with dark brown lead glaze inside, with no traces of external glaze though it has been consolidated and appears to have a luster in its photograph. The rim of the pot has been badly damaged, but where it is preserved there

is no proper lip. Due to weathering effects, two light scores can barely be distinguished below the rim the vessel. It is not smoothed inside and has a swirled base.

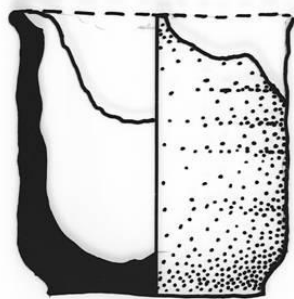
BAT2297

This pot is 50 mm tall with a base diameter of 38 mm, a maximum body diameter of 51 mm and a mouth diameter of 49 mm (Figure 59). It has a light brown glaze inside and remnants of small splotches of glaze on its exterior, just below the rim. The vessel is fairly weathered and there are no remains of circumventing scores below the mouth. This pot has a well formed, pronounced lip and its interior base exhibits a deep swirl pattern.



Figure 57: BAT2299

(Illustration by Myra Stanbury from Green 1989:99)



2330



Figure 58: BAT2330

(Illustration by Myra Stanbury from Green 1989:99)



BAT2297



Figure 59: BAT2297

(Illustration by Myra Stanbury from Green 1989:99)

BAT2658

This pot is 50 mm tall with a base diameter of 42 mm, a maximum body diameter of 52 mm, and a mouth diameter of 53 mm (Figure 60). Its interior glaze is dark brown, but the clay of the pot itself is darker and this may affect the appearance of the glaze. Roughly a third of the pot's exterior is coated with glaze that spilled over during the coating process. Again, this does not appear intentional since the glaze is only present in sporadic patches and does not reach to the bottom of the vessel in any areas. This jar has straight sides and barely any flare at the rim. There is one very pronounced score below the rim and traces of another faint one below that. The interior of the base has been smoothed out and no swirl pattern remains.



Figure 60: BAT2658

(Illustration by Myra Stanbury from Green 1989:99)

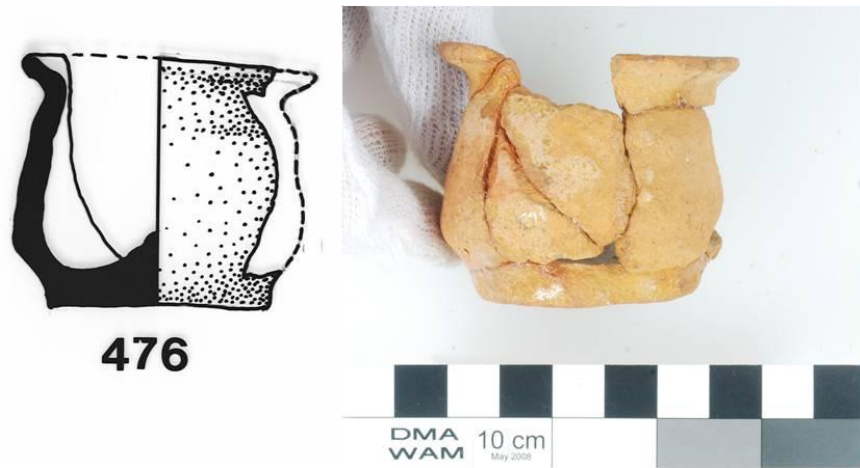


Figure 61: BAT476

(Illustration by Myra Stanbury from Green 1989:99)

BAT476

Reconstructed from seven fragments, the estimated measurements of this pot place it at 49 mm tall, with a base diameter 43 mm, a maximum body diameter of 58 mm and a mouth diameter of 58 mm (Figure 61). Its interior glaze is a light brown and weathered patches of glaze can be seen dappled on the outside surface. From the portions of the rim that remains, it appears to have had a fairly pronounced lip but due to weathering and reconstruction, no encircling scores can be seen. The inside base exhibits a swirl pattern.

BAT2320

This pot measures 47 mm tall, with a base diameter of 35 mm, a maximum body diameter of 74 mm and a mouth diameter of 45 mm (Figure 62). It has a medium brown glaze coating its interior which spills over onto a portion of the rim and forms into a single drip down the exterior. There is a

score just below the flare creating the developed lip, and an additional, less pronounced score beneath that. The interior is not smoothed and the base exhibits a deep swirl.

BAT2323

This pot is 45 mm tall, with a base diameter of 36 mm, a maximum body diameter of 46 mm and a mouth diameter of 48 mm (Figure 63). A light brown lead glaze coats the interior of the vessel, and though it appears to have sheen in its photograph, this is caused by a consolidant that was used during artifact conservation. The pot has a pronounced lip with a groove beneath its rim that accentuates the angle of the lip. There is no score present in addition to these features. The interior base has been left with its swirl pattern.



Figure 62: BAT2320

(Illustration by Myra Stanbury from Green 1989:99)



Figure 63: BAT2323

(Illustration by Myra Stanbury from Green 1989:99)

BAT2321

This pot is 45 mm tall, with a base diameter of 36 mm, a maximum body diameter of 51 mm and a mouth diameter of 45 mm (Figure 64). A medium brown lead glaze coats the inside of the vessel and most of the exterior rim, dipping down to cover part of the body as well. The relatively straight body terminates in a simple rim and there is no lip on this vessel. A single pronounced score can be seen below the rim with a few faint impressions of scores beneath that. The interior base retains its swirl pattern.

BAT2324

This pot is 41 mm tall, with a base diameter of 37 mm, a maximum body diameter of 48 mm and a mouth diameter of 44 mm (Figure 65). It has a light brown glaze inside which spilled over the rim in one location forming a single splotch on the exterior surface of the vessel. Though the pot is slightly lopsided, a defined lip can be perceived from most profile angles. In addition to this feature,

there is a faint score cut into the neck of the pot just below the lip and another more defined score encircling the jar below this. The inside base of the pot retains its swirl pattern.

BAT2415

With proportions and a shape very similar to BAT2321, this pot is 41 mm tall, with a base diameter of 35 mm, a maximum body diameter of 47 mm and a mouth diameter of 41 mm (Figure 66). Its interior lead glaze is light brown, a single spot of which can be seen on its exterior surface. It has a simple rim with no proper lip and encircling scores cannot be seen either due to the weathered state of the pot or because they are not present.



Figure 64: BAT2321

(Illustration by Myra Stanbury from Green 1989:99)



Figure 65: BAT2324

(Illustration by Myra Stanbury from Green 1989:99)

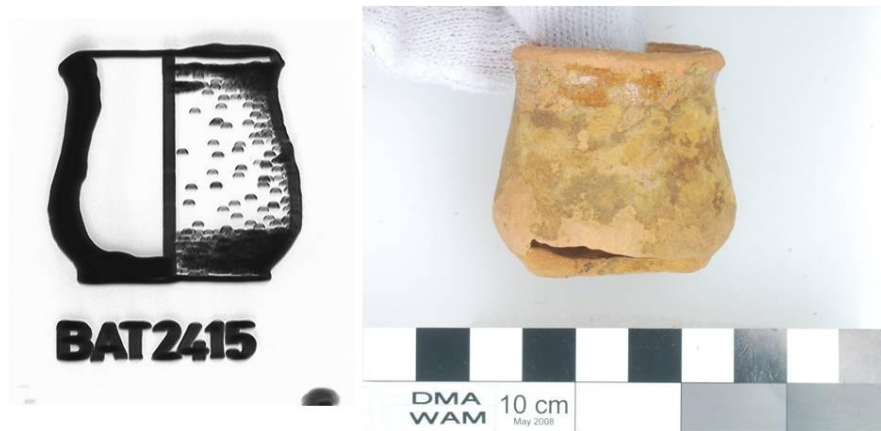


Figure 66: BAT2415

(Illustration by Myra Stanbury from Green 1989:99)



Figure 67: BAT2252

(Illustration by Myra Stanbury from Green 1989:99)

BAT2252

As the smallest *zalfpotten* discussed in this section BAT2252 stands at 35 mm tall, with a base diameter of 33 mm, a maximum body diameter of 39 mm and a mouth diameter of 31 mm (Figure 67). The glaze coating its interior surface is medium brown and a single spot of this is still present near the rim on the weathered exterior surface. This pot has a simple rim without a proper lip and no encircling scores can be seen. The inside base retains a pronounced swirl pattern.

GT2007, GT2008 and GT2009

These three white pots from *Vergulde Draak* represent the only examples of such jars recovered from the three shipwrecks addressed in this thesis. They were all found in close association with one another, in the same area of the wreck site. Essentially, white pots are miniature *albarelli* with the same general form and white tin glaze over their entirety, but they lack decoration of any kind. Sometimes considered part of the *ablarello* family because of these features, they are here being

included in the *zalfpotten* section due to their size and function, and because of the precedence for such categorization (Schaefer 1998:142; Baart et al. 1977:276).

These jars are nearly identical with dimensions varying only 1 mm in any given area. GT2007 is 58 mm tall with a base diameter of 47 mm, a waist diameter of 51 mm and a mouth diameter of 49 mm (Figure 68). GT2008 is 57 mm tall with a base diameter of 48 mm, a waist diameter of 51 mm and a mouth diameter of 49 mm (Figure 69). GT2009 is 57 mm tall with a base diameter of 48 mm, a waist diameter of 51 mm and a mouth diameter of 50 mm (Figure 70). The interior surface of each white pot is smooth with a completely flat base and the curvature mirrors that of its exterior. Such uniformity must be intentional and was not even exhibited in the large *albarelli* from *Batavia*.



Figure 68: GT2007

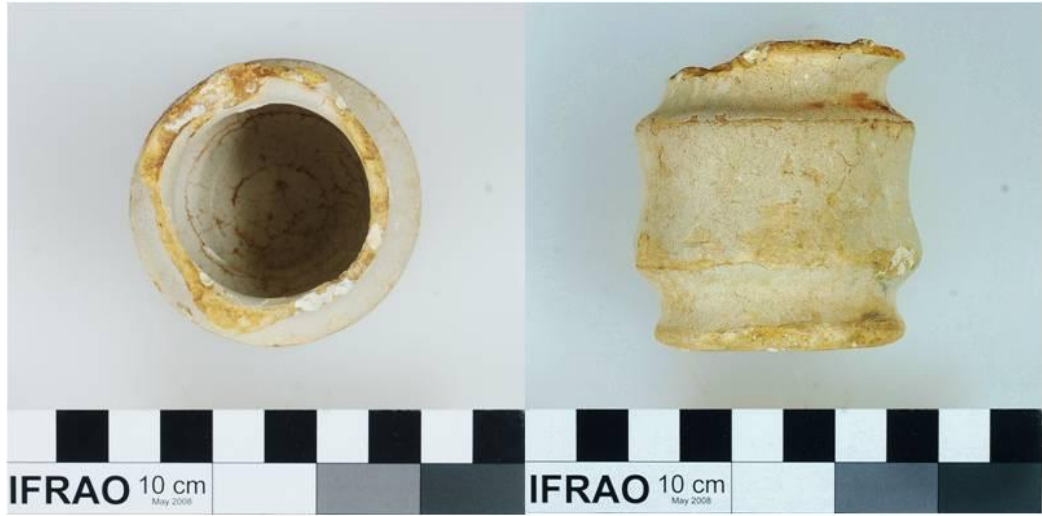


Figure 69: GT2008



Figure 70: GT2009

Discussion

The excavations of *Batava* and *Vergulde Draak* yielded no evidence for how any of the apothecary jars were sealed or labeled. Iconographic representations of *albarelli* and white pots from the 17th century show the mouths of such jars being covered with parchment or a form of leather which was folded over the rim and fastened with twine or string. Figures 10, 11, and 23 show examples of *albarelli* and white pots being sealed in this way. The *Ordre en Instructie voor de Chirurgyens* calls for a quire of grey paper and four skins of leather (Gawronski 1992:232) which may have been included for this very purpose. Though the author was unable to find representations of crude earthenware pots covered in the same manner, it is probable that they were as well. Such a method of sealing would account for the grooves or scores seen beneath the rim of many pots from *Batavia*. These likely served to lend grip for the twine and provide additional security sealing those jars without a pronounced lip.

Finely made apothecary jars displayed on shelves in a shop or those generally intended for long term use were often painted with a label worked into their decorations that contained the name of their contents. Sometimes these labels provided only the symbol or apothecary's cypher for the ingredient (Figure 41). This trend emerged as early as the 13th century and appears in many popular motifs all the way into the 20th century. Faenza designs, like those painted on the *albarelli* from *Batavia*, are rarely seen in accompaniment with a label of any kind. However, jars boasting designs of false gadroons, *a foglie*, satyrs, and cherubs often revolve around a central label.

Faenza *albarelli* were unlikely to be painted with a label because it was incongruent with their designs and *zalfpotten* were almost always left plain because of their size. The archaeological evidence from *Batavia* and *Vergulde Draak* confirms this. Still, there must have been some method for differentiating the contents of these vessels. In some instances, jars that were not permanently labeled were affixed with small ceramic tiles painted with the name or symbol for their contents

(Drey 1978:137). These were likely tied to the twine which served to secure the parchment or leather acting as a lid. This would allow a jar to be more versatile since it was not dedicated to holding only a certain ingredient. The contents could be easily changed or transferred to a different container and so long as the labeled tile followed, there would be no confusion. However, no such tiles were recovered from either wreck. Perhaps they existed, but were easily washed away or overlooked as indistinguishable ceramic fragments.

In this instance it is just as likely that the jars were labeled by marking their parchment lids. Such a solution would have provided the versatility of an interchangeable label without having to keep track of small tiles. If a jar lost its lid and label, a new one could easily be made from the materials at hand. The position of such a label would have been convenient for the ship surgeon, who could lift the lid of his chest and see the contents of each jar boldly marked upon their tops. He would not have needed to remove the jar and rotate it to read its contents or fumble with a small tag in the dark and swaying confines of his working space.

The *albarelli* recovered from *Batavia* and *Vergulde Draak* are quite crude when compared to contemporary European finds (Drey 1978). Many other Dutch examples from this era are more finely made and much more elaborately decorated. Genre paintings of alchemists, apothecaries and surgeons working in the Netherlands during the 17th and 18th centuries portray various styles of *albarelli* associated with the activities of these professions. Figure 38 displays a finely made blue and white Delftware style *albarello* in the foreground next to a mortar and pestle. In Figure 39 another blue and white Delftware *albarello* sits on the window sill and above the subject's head a second *albarello* in the replica Faenza style (similar to those from *Batavia* exhibiting a yellow and blue zigzag motif) rests broken and discarded atop some old linen. A third example of a blue and white Delftware *albarello* sits on a counter in the center of Figure 51.

Proper Faenza productions date to the 15th and 16th centuries and though replicas incorporating their motifs were sometimes seen as late as the 17th century, these were relatively uncommon. Iconographic and archaeological evidence of *albarelli* from this period confirm that replica Faenza style jars were not popular. Blue and white Delftware was particularly common as well as more colorful Dutch wares exhibiting various motifs. Most of the *albarelli* recovered from *Batavia* can be definitively attributed to the replica Faenza tradition based on their decorations. The fact that each of these jars was painted in a rather outdated and unpopular style supports the theory that they were all created by the same potter, perhaps as a single cohesively styled family. Why the maker would choose to decorate them in such a manner is unclear. Since the simple geometric shapes composing Faenza motifs are uncomplicated and easy to paint, perhaps these jars were less expensive and therefore more readily chosen by the VOC to stock their medical chests. The waning popularity of this style, rendering them less appealing to the general public, may have meant that they were easy to find in the large quantities needed by the Company and priced desirably as well.

Though the crude earthenware pots discussed above served many general purposes on land, the examples recovered from *Batavia* were very likely used for the storage of apothecary ingredients as their provenance and proximity to other medical instruments confirms. Excluding those found in isolation or those that were washed out towards the reef, most of these pots were found in association with the collection of *albarelli* and mortars resting together near Cannon 2 at the stern of the ship.

It is interesting that such pots should be chosen for this purpose when they were generally conceived of as ephemeral and disposable containers. No effort appears to have been made to augment them for their use aboard ship and their inclusion in the surgeon's supplies. They were still quickly and economically crafted with imperfections and swirls from the potting process left intact. Since these pots would have been very easy to find and purchase in the city, they were likely initially selected out of convenience rather than for their suitability.

With glaze only applied to their interior surfaces, pots of this type were more permeable than their *albarello* counter parts that were coated with tin glaze inside and out. This would have made them less appealing for the long-term storage of wet ingredients and salves. However, since a standard journey to the Indies took an average of eight months, it is possible that these containers served their purpose well for such a limited time span and were used for only one voyage before being discarded. If this is true, then the pots needed to be switched out at Batavia for the return voyage or at the very least be replaced with new containers every time a ship returned to the Netherlands.

Perhaps this is the reason that white pots appear to be the popular form of *zalfpotten* on later voyages. Though the evidence may be skewed due to a lack of intact ceramic finds, it appears that *Vergulde Draak*, which sunk twenty-seven years after *Batavia*, was not carrying any crude earthenware pots in its medical stores, but three complete white pots were recovered. Whether from the desire for more impervious containers or because the VOC had seen prosperous years and no longer needed to supply their medical chests with cheaply made ceramics, there is a shift to these miniature tin glazed *albarelli* during the second half of the 17th century. In addition to the finds from *Vergulde Draak*, the excavations of VOC shipwrecks *Avondster* (1659)(Parthesius 2003:42) and *Amsterdam* (1749)(Gawronski 1996:217) both yielded intact white pots with no evidence of crude earthenware pots similar to those from *Batavia*.

The *Ordre en Instructie voor de Chirurgyens* issued in 1695 is dedicated mostly to describing the daily responsibilities of the shipboard surgeon and touches only lightly on the instruments of his toolkit. Revisions in 1739 and 1750 expand greatly on the instruments used for the storage and preparation of medicines since surgeons were still little experienced with this on land. Gawronski (1992:235) provides an in-depth interpretation of the *Ordre en Instructie voor de Chirurgyens* issued in 1750 which states that twenty five *witte potjes* or white pots were included in every surgeon's chest.

Since the supplying of these jars was not completely standardized until this later date, the presence of crude earthenware *zalfpotten* on board *Batavia* was likely an effect of a personal decision made by the storekeeper of the Amsterdam chamber who was charged with stocking the chest. As evidenced by the choice to use outdated *albarelli* and crude *zalfpotten*, these decisions were heavily influenced by economic factors. Future excavations of surgeon's supplies from early VOC ships will likely exhibit collections of apothecary jars that prove to be inconsistent when compared to one another. After many voyages had been undertaken and different types of apothecary jars were put to the test, white pots gained popularity and were eventually deemed the official form of *zalfpotten* included in the Company-supplied medical chests.

Apothecary Weights

The proper weighing and dosing of internal medicines has been of particular importance to medical practitioners throughout the existence of the field. When medical treatises began to be published in the 16th century, they almost always contained a bold warning to take care and adhere to the proper measurements. The reason for stating such an obvious precaution was that a laymen or an inexperienced surgeon may not be aware that medicinal weights followed a different metrology. During the middle ages when Europe shifted to accept the avoirdupois pound of 16 ounces as a standard measurement, the medical field continued to adhere to the old Roman pound of 12 ounces. In the 17th century this system was still in practice and apothecaries used a completely different set of weights from the rest of the working community.

Medicinal weights not only had their own metrology, but a separate set of symbols indicating their values. The pound was 12 ounces or *uncia*, and each ounce broke down into 8 drachms, or 24 scruples, or 48 obols, or 480 grains (Table 2). Symbolic values for obols and grains were never used and weights bearing these markings have not been found. Such small measurements were generally

represented by dividing a larger value. Additional symbols were portrayed after the value's mark to denote half measurements (S or β for $\frac{1}{2}$) and lower case Roman numerals were to express multiple quantities (ii or ij for 2). When standard Arabic numerals are used for the same purpose they are provided before the symbol for the measurement. In addition to the changing format described above, sometimes the symbols for a drachm or scruple were reversed and displayed backwards or even stylized so that they were barely recognizable.

For all the emphasis placed on the importance of accurately measuring drugs, some estimation still existed when it came to the smaller dosages. Woodall (1617:37-38) makes a specific complaint against the inaccuracy of surgeons and their scales. He observes that most surgeons are little acquainted with the use of scales because they are only accustomed to creating topical curatives in which exact measurements hardly matter. He goes on to say that for any "inward" medicines weights are needed and that ship surgeons specifically should have two sets of these and scales that measure to half grain accuracy. However, he agrees that any good professional can safely estimate, by hand scale, between four to eight grains of accuracy. Since very few weight sets go so small as to include weights for grains, he suggests that this quantity should be measured by the counterweight of a peppercorn.

Pharmaceutical weights generally came in matching sets commonly composed of square or round pieces of metal marked with their corresponding measurement. In more elaborate collections the metal weights themselves were formed into the symbols that represented their value. Though the latter would have been very easy to identify, due to their more intricate nature they were likely a more costly option. These weights were used in conjunction with standing scales as seen in use on the counter of Figure 41, or with hand scales like those being used by the subject of Figures 28 and 11. The *Ordre en Instructie voor de Chirurgyens* only calls for *1 schaalte met gewicht* or one scale and weights and does not specify in any edition which form of scales were included in the surgeon's chest

(Gawronski 1992:235). However, since hand scales were collapsible and took up less space they were likely the preferred form for shipboard purposes.

Table 2: Pharmaceutical Measurements and Equivalents

Name	Metric Equivalent	Symbol	Pharmaceutical Equivalent
pound	373g	℔	12 ounces or uncia
ounce or uncia	31.1g	ʒ	8 drachms or dragmes
drachm or dragme or dram	3.89g	ʒ	3 scruples
scruple	1.296g	ʒ	2 obols or 20 grains
grain	64.8mg	gr.	

The evidence of measuring equipment recovered from *Batavia* and *Vergulde Draak* is slim, with only a few examples of possible weights and a single artifact that may be a hand scale. Two small, square, brass artifacts which the author believes to be pharmaceutical weights were recovered from *Batavia* along with a number of brass and lead parallels which may be weights, but could also have been gaming pieces. The confirmed and speculative uses of these artifacts will be discussed below.

BAT3295

This small brass tab weighs 5.85 g and measures 15.6 mm long and 15.3 mm wide with a thickness of 2.9mm (Figure 71). It is marked with a clearly impressed vertical number “1” above a horizontally oriented number “1”. These symbols are solidly cast into the surface of the brass. Beneath this, faintly etched in a spotty tapping pattern is the number “2”. Taken together, these markings equate to the symbol “1/2” (Figure 72). Many parallels exist in which the same Arabic numerals are used on apothecary weights to represent a half measurement. Pharmaceutical weights recovered from *Hollandia* include similar brass examples showing “1/2” placed before the symbol for the measurement (Gawronski 1996:217). However, the artifact in question does not contain any additional symbols or any further indication of what unit of measurement it represents one half of.

This weight does not equate directly to any single apothecary’s measurement nor does it represent one half of any commonly known denomination. However, at a 5.85 g it is almost the exact weight of one and a half drachms (5.83 g). The fact that the number 2 impressed on the bottom portion of the weight appears to be an afterthought added by hand may indicate a certain amount of modification. A one and a half unit weight was not common, nor can the author find any evidence that such a weight was ever included in an apothecary’s set. However, if the surgeon aboard *Batavia* commonly found himself needing to measure out 1 ½ drachms of medicine, he may have reduced a larger weight to create this denomination. Perhaps he lost his ½ drachm weight and filed down a larger 2 or 3 drachm weight to create this artifact. He could then place a single drachm weight on the side of the scale containing ingredients and use BAT3295 on the opposite side to create the necessary counter balance allowing him to measure out exactly ½ drachm of medicine. How this weight came into being and why its markings have been altered are speculative, but its mass is undeniable.

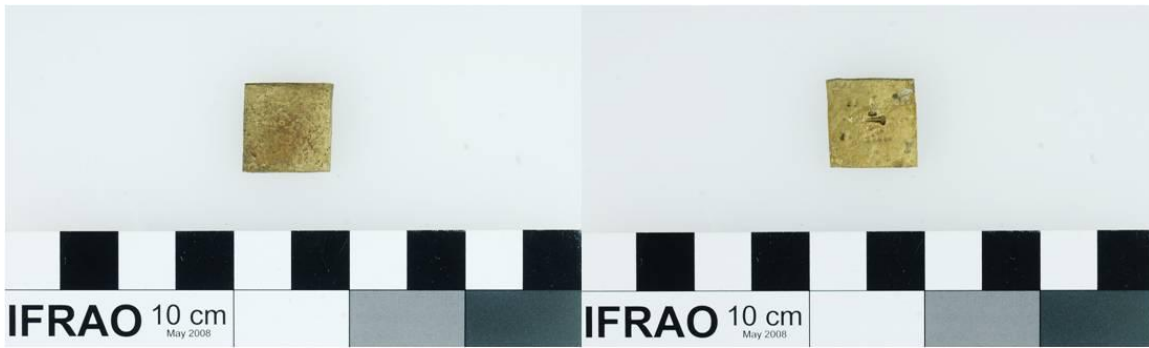


Figure 71: BAT3295

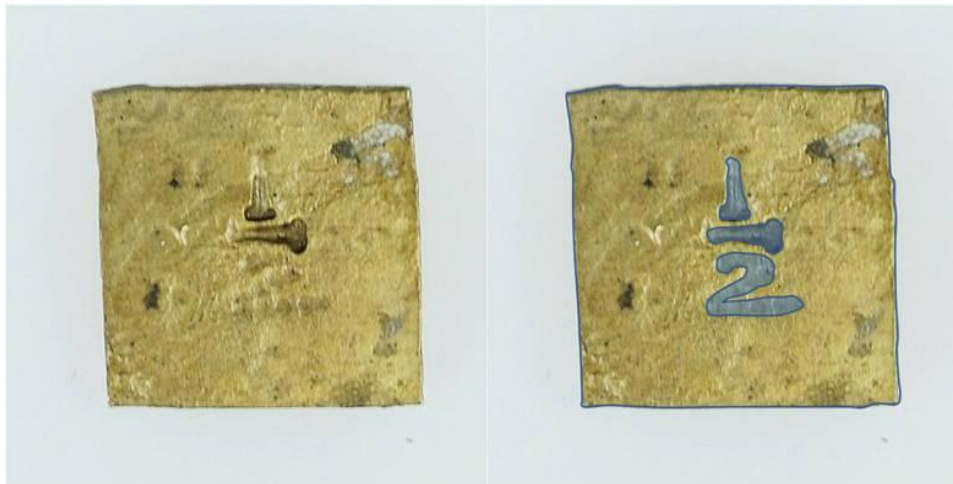


Figure 72: BAT3295 Detail

BAT3296

This small brass tab weighs 2.58 g and measures 15.0 mm long and 15.3 mm wide with a thickness of 1.5 mm (figure 73). Its surface is slightly pitted and bears an interesting mark that is difficult to fully differentiate from the marred surface. Green (1989:165) identifies this symbol to be an encircled representation of the Roman numeral III. Depending on the orientation of the weight, this symbol could be interpreted in a number of different ways. There may be as many as five individual

short lines represented, but some of these are curved or fractured due to the effects of corrosion on the brass.

Though its symbol is inscrutable, BAT3296 is most likely an apothecary's weight representing two scruples. A two scruple weight would equate to 2.59 g in the metric system and this artifact is strikingly at close to that at 2.58 g. Pharmaceutical sets commonly contained weights equaling two scruples. Contemporary parallels of two scruple weights bear various symbols to indicate their count including Roman numerals, Greek symbols and written text (Kish 1965:141-142, Crawforth 1984:50-53). An example of a similar weight marked with Arabic numerals can be found in the collection from *Hollandia* (Gawronski 1996:217).



Figure 73: BAT3296

With this information in mind, the symbol represented on the weight warrants additional interpretations. Instead of a Roman numeral III as Green suggested, perhaps there is a more intricate symbol present. When viewed in a different orientation it is possible to perceive the symbol for a scruple below two short horizontal lines (Figure 74). Parallels of two scruple weights marked in a

similar fashion are numerous, but these generally show the scruple symbol followed by two vertical markings such as 3ii or 3ij. As with BAT3295 the deciphering of the symbol is speculative, but the weight of the artifact is factual.



Figure 74: BAT3296 Detail

BAT7067, BAT3948, BAT7066, BAT3948, BAT3935, GT984 and BAT3159

There were a number of small lead tabs recovered from *Batavia* and one from *Vergulde Draak*, all with proportions similar to the two brass weights above (Figure 75). None of the tabs from *Batavia* have any markings and the single lead piece from *Vergulde Draak* is only marked with a cross hatch on one side. BAT7067 weighs 25.92 g, BAT3948A weighs 16.65 g, BAT7066 weighs 8.84 g, BAT3948B weighs 6.96 g, BAT3935 weighs 6.43 g, GT984 weighs 6.39 g and BAT3159 weighs 2.87 g. None of these examples even remotely align with any full unit or half unit apothecary measurements. They are mentioned here to further illustrate by comparison the high probability that

BAT 3295 and BAT3296 are indeed apothecary weights. There is an extremely small chance of a metallic tab perfectly aligning with pharmaceutical units, as is the case with BAT3295 and BAT3296.

BAT568

This is a shallow pewter basin or basket with an estimated diameter of 13.2 cm has twisted brass wire attached to four equidistant points on its rim (Figure 76). The wires meet and are looped to join together above the basket's center. This artifact may be one half of a hand scale. Two baskets like this would have hung from either end of a rod with a hook at its center where the surgeon held the scale. Medicines were placed in one basket and weights in the other. The surgeon then added or removed ingredients until the two sides leveled out.

The basin has a depth of 36 mm at its lowest point. Though this may seem shallow for a set of scales, apothecary scales measured out small volumes of medicine and did not require large weighing dishes to accomplish this. Similar shallow, small volume hand scales used to measure coinage and medicines are illustrated in a number of publications (Graham 2003, Kisch 1965, Crawforth 1984). Little is known about the provenance of this artifact so it may very well have part of a scale used for the measurement of spices, coinage, or precious metals. Since it was not found in direct association with other medical artifacts it is unclear if this particular weighing dish was part of the apothecary equipment but it is likely that the surgeon aboard *Batavia* used a set of scales with very similar dishes.

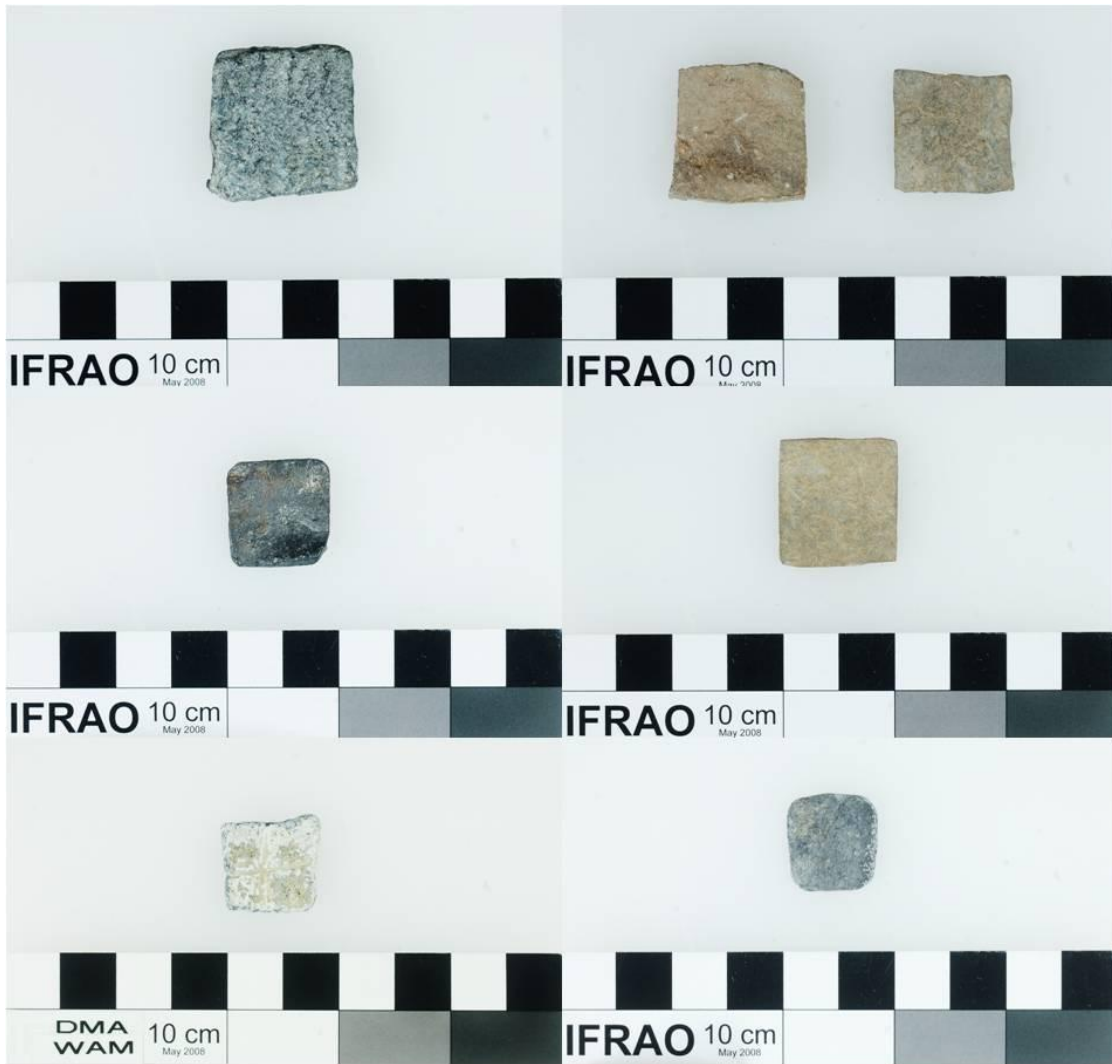


Figure 75: Comparison of Metal Tab Artifacts. BAT7067, BAT3948A and BAT3948B, BAT7066, BAT3935, GT984 and BAT3159 (from left to right)



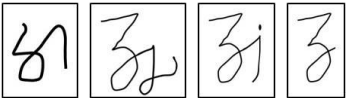
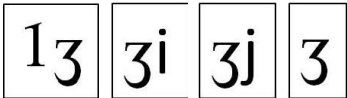




Figure 76: BAT568

Discussion

Apothecary weights are sometimes difficult to properly identify due to the variation and stylization of the unit symbols with which they are marked. These can include combinations of Arabic and Roman numerals as well as Greek symbols. The order in which they are represented and the script the symbols are shown in also vary greatly (Table 3). Because of this, pharmaceutical weights are commonly misidentified or deemed an “unknown weight”. In his dissertation, Smith describes two small bronze weights excavated from the 17th century ruins of Port Royal, Jamaica as bearing the cursive initials of “WR” (1995:278-279). If oriented properly, flipped vertically from how they are represented by Smith, it becomes clear that these weights actually bear the stylized symbol for two drachms (Table 3).

Table 3: Various Symbolic Representations for Drachms

	Stylized	Printed
One Half Drachm		
One Drachm		
Two Drachms		

Apothecary weights, especially those without easily identifiable pharmaceutical symbols, are sometimes misattributed to being used for the measurement of precious metals, coinage and gems. This is because there are some similarities between the Troy system of units used for the weighing of such goods, and the apothecaries' system of units. The Troy system also retained the 12 ounce pound when the avoirdupois system was adopted throughout Europe. Because of this, pounds and ounces are identical in the Troy and apothecaries' systems (373 g and 31.1 g metric equivalents, respectively). Beyond this point however, these systems use completely different units of measurements. After the ounce, Troy units include pennyweights and grains neither of which aligns with any denomination of pharmaceutical weights. Furthermore, the two systems do not share any symbols. The symbols discussed in this section were only ever used for representing medicinal measurements.

The metric weights of BAT3295 and BAT3296 do not align with the metric equivalents of any single, multiple or half unit in the Troy system. Nor do they equate to any commonly used avoirdupois units. Since both artifacts are brass they were not heavily affected by the corrosive

processes of the underwater environment and both are in very good, if not perfect condition. Being in such pristine condition, it is unlikely that their original weight changed much before they were recovered from the wreck site. It has been shown that the symbols used in the apothecaries' system are particularly diverse and difficult to identify, so the empirically obtainable weight of these artifacts is the most important fact on hand. BAT3295 and BAT3296 align with pharmaceutical units and are almost definitely examples of the apothecary weights included in the surgeon's chest aboard *Batavia*.

CHAPTER VII

CONCLUSION

The first goal of this thesis was to identify the equipment used by the surgeons aboard *Batavia*, *Vergulde Draak* and *Zeewijk* in order to fulfill their tri-part role as the ship's barber, surgeon, and apothecary. This was done largely in part by using the catalogs previously published by Green (1977, 1989) and Ingelman-Sundberg (1978) to divide the tools of the surgeon's trade and speculate on the uses of some unidentified or possibly misrepresented artifacts. Where physical remains of certain instruments did not exist, the *Ordre en Instructie voor de Chirurgyens* as interpreted by Gawronski (1992) was consulted to provide a full illustration of the tools that were found in a complete surgeon's chest.

The barbering bowls from *Batavia* were definitely among the surgeon's equipment and the presence of two combs removed from the concretions of these bowls suggests that the artifacts were used in conjunction with one another. Little other evidence of shipboard barbering was found from the artifact collections belonging to these three ships. No razors were recovered from *Batavia* or *Vergulde Draak* and it was determined that the razors and scissors from *Zeewijk* most likely represent items intended for Company use or personal trade in the Indies. Though additional combs were found on *Vergulde Draak* and *Zeewijk*, their provenance and association as common personal possessions indicates that they were probably not part of the surgeon's equipment. This evidence, along with Bruijn's (2009) study on the lack of razors recovered from surgeon's possessions, suggests that shaving crew members was not nearly as important to VOC surgeons as it was to those employed by the EIC.

The tools used by ship surgeons to perform various internal and external operations are particularly difficult to identify in the archaeological record as they were made of ferrous metal that rarely survives in the underwater environment. As virtually nothing remains of these tools from any of the three ships in question, a full description of the surgical tools required by the *Ordre en Instructie voor de Chirurgyens* was provided in order to fill in the missing components of these collections. Speculation was made as to the original function of two wooden handles recovered from among medical supplies of *Batavia*, but no surgical instruments were definitively identified.

The equipment used by the ship surgeon for preparing and dispensing medicines in his role as an apothecary is well represented in the collections of *Batavia* and *Vergulde Draak*. Artifacts included in this section include mortars and a pestle for pulverizing and mixing curatives, apothecary jars that housed basic ingredients, and weights employed in the proper measurement of internal medicines. As these artifacts were particularly well preserved, especially those from *Batavia*, they were given special attention and described in great detail. The additional research questions laid out in the introduction of this thesis are answered mainly through inferences made during the analysis of these artifacts.

The second aim of this thesis was to determine which tools were supplied by the VOC and which instruments the surgeon was expected to provide. The *Ordre en Instructie voor de Chirurgyens* indicates that the Company only provided the chest of medicinal ingredients, and that the surgeon was required to supply and maintain all additional equipment called for in the manuscript. However, Bruijn (2009) reveals that many surgeons rented tools from the Company stores. This makes the identification of surgeon-owned or Company-owned artifacts slightly more difficult when it comes to anything other than apothecary jars.

In order to clarify the ownership of equipment, the third goal of this thesis was to examine personal markings or inscriptions on artifacts and determine if these excluded the possibility of

belonging to the Company. While it would generally be believed that sentimental inscriptions would suggest personal ownership, the mortars from *Vergulde Draak* may indicate otherwise. Though they are decorated with an inscription that is often associated with wedding gifts, they also display the official VOC seal reserved for Company-owned objects. In this case it is most likely that the Company came to possess these mortars only after they had been cast and inscribed them with the VOC seal so there would be no confusion as to their ownership when they were then rented out to surgeons.

The fourth goal of this thesis was to investigate whether or not a standardization or shift in quality of Company-supplied equipment could be perceived when comparing the three collections from *Batavia*, *Vergulde Draak* and *Zeewijk*. Apothecary jars are the only artifacts that can be conclusively identified as Company-provided in all instances, but they were only recovered in abundance from *Batavia*. *Albarelli* appear to be the standard form of apothecary jar used for the storage of large amounts of ingredients on all three ships. The motifs represented on the *albarelli* from *Batavia* appear to be outdated and may be indicative of frugal purchasing decisions. The small, crude earthenware jars from *Batavia* also bespeak a leaning to disposable or inexpensive containers. However, the limited evidence of apothecary jars from *Vergulde Draak* and *Zeewijk* illustrate more finely made *albarelli* and sturdier, more impervious white pots in the place of crude earthenware jars. This indicates a shift to containers of higher quality, but whether this was done due to their availability or because of prosperity is unknown.

The ship surgeons of the VOC helped to shape the Dutch trade empire in Asia. Without them, many more vessels might have been lost to sick and faltering crews that could no longer sail the ship to its destination. Though the drive and determination of the VOC may have led to its success even without insisting on the employment of ship surgeons, the fact that their presence was deemed necessary speaks volumes to their perceived effectiveness and indispensability. The artifacts discussed in this thesis allowed surgeons to carry out their VOC-appointed tasks. In order to fully understand the shifting paradigms in shipboard medicine and the changing morphology of the tools

employed in this profession, the pool of knowledge on this subject needs to be widened through the analysis of additional collections of shipboard medical supplies.

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