

Classic Texts in the Sciences

John Woodall

The Surgions Mate

The First Compendium on Naval
Medicine, Surgery and Drug Therapy
(London 1617). Edited and Annotated by
Irmgard Müller

 Birkhäuser

The Surgions Mate

Classic Texts in the Sciences

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John Woodall
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Table of contents

| | |
|--|----|
| I. Introduction: The English Surgeon John Woodall (1570-1643) as pioneer of naval medicine, surgery and treatment with drugs at sea | 1 |
| II. John Woodall: The Surgions Mate (1617): | 25 |
| II. A: List of Contents¹ | |
| Preface 1 (p. I) | |
| Preface 2 (p. V) | |
| Preface 3 (p. VII) | |
| [1] The Office and Duty of the Surgions Mate (p. X) | |
| [2] A Note of the particular Ingredients of the Surgeons Chest (p. XV-XXI) | |
| Ingredients for the liddle of the Chest (p. XV) | |
| For their particular uses (p. XVI) | |
| Necessaires for the Barber of the ships Company (p. XXI) | |
| [3] Of the Instruments and their use (p. 1-39) | |
| [4] Of the Medicines, and their uses (p. 40-122=130)² | |
| Emplaisters (p. 40-43) | |
| Unguents (p. 44-53) | |
| Waters or liquors (p. 54-68) | |
| Salia (p. 69) | |
| Oyles ³ (p. 69-74) | |
| Chymicall Oyles (p. 74-77) | |
| Syrups (p. 78) | |
| Conserves, Electuaries, and Opiats (Theriak) (p. 80-87) | |
| Succus (p. 88) | |
| Pilulae/ trochisci, purgatives (p. 89-96) | |
| Certaine other Simples (p. 97) | |
| Semen, fruits, spices (p. 99-103) | |
| Gummes and resins (p. 104-110) | |
| Mineralls and chemicals (p. 111-115) | |
| Ferni (Farinae), Baccae (p. 115-118) | |
| Herbae, Radices (p. 119-122=130) | |
| Calx viva, Album grecum (p. 122=130) | |
| [5] List of the Authors, Woodall had used (p. 123 = 131) | |
| [6] Wounds and their Cures (p. 125-146) | |
| Gunshot Wounds (p. 140-145) | |
| Burnings (p. 145-146) | |
| [7] Apostumes, and their Cures (p. 147-156) | |
| [8] The Cure of Ulcers and Fistulaes (p. 157-160) | |

¹There is no Index in Woodall's work, the following table of contents is put together by the editor I. M. after the headlines of the text. About the pagination see p. 263).

²The subdivision is very coarse, because Woodall did not keep clear arrangements.

³The section contains vegetable and chemical oils.

| | |
|--|-----|
| [9] Fractures, and their Cures (p. 160-167) | |
| [10] Dislocations, and their Cures (p. 167-171) | |
| [11] Dismembring, or Amputation (p. 171-176) | |
| [12] Of the Scuruy (lat. Scorbutum) (p. 177-202) | |
| Name and Causes (p. 178-180) | |
| The signes (p.181-191) | |
| Of lotions, oyles, unguents (p.191-196) | |
| Of Ulcers in those that have the Scuruie (p. 197-202) | |
| [13] Of the Fluxes of the bellie (p. 202-232) | |
| Of Diarrhoea (p. 204-216) | |
| Certaine Signes, Prognostications [...] concerning Fluxes (p. 216-223) | |
| Laudanum Opiat Paracelsi, and the Vertues thereof (p. 224-232) | |
| [14] Iliaca Passio (p. 232-236) | |
| [15] Collica passio (p. 236-241) | |
| [16] Tenasmus (p. 241-244) | |
| [17] The falling of the fundaments (progressus ani) (p. 244-247) | |
| [18] Of the Callenture (p. 247-249) | |
| [19] Of Salts and their Vertues (p. 250 = 270-291) | |
| Certaine Plaine Verses [...] in praise of Salt (p. 291) | |
| [20] Of Sulphur and his Vertues (p. 292-296) | |
| In praise of SVLPHVR or Brimstone (p. 293-296) | |
| [21] Of MERCVRVY and his vertues (p. 297-307) | |
| Poem with picture of Mercurius (p. 297) | |
| Mercurie in Generall (p. 298-301) | |
| Poem: In Laudem Mercurij (p. 301-306) | |
| Conclusion touching Sal, Sulphur, and Mercurie (p. 306-307) | |
| [22] Of The Seven Mettals (p. 308-310) | |
| [23] Treatise of the Characters and tearmes of Art (p. 311=315-328) | |
| [24] Certaine Chemicall Verses (p. 329-337) | |
| [25] The Termes of Art Recited Formerly in Verse [...] (p. 338-348) | |
| [26] The Table (without page numbers, 12 pp.) | |
| II. B: Transcription of the original text | 25 |
| III. Commentaries | |
| A. Commentary 1: Index of names | 263 |
| B. Commentary 2: List of drugs | 284 |
| IV. Bibliography | 327 |
| V. Index of sentences | 341 |
| VI. List of Illustrations | 343 |

I. Introduction:

The English Surgeon John Woodall (1570–1643) as Pioneer of Naval Medicine, Surgery and Treatment of Drugs at Sea

Since the beginning of overseas expansions at the mid-sixteenth century, England ranked among the important seafaring nations; and so the British merchant recognized early that the success of transatlantic trading companies and campaigns of conquest essentially depended on the health of the seamen⁴. Therefore, when in 1600 the English East India Company was founded and supplied with special Royal privileges,⁵ it stands to reason that fitting the ships with adequate medical equipment was essential. One of the first to be appointed by the trading Company was John Woodall (1570–1643)⁶, who in 1612 started his work in the trading Company as surgeon-general of the fleet. He had gained experience at several seats of war abroad. Above all he had cooperated at the risk of his life in the fight against the 1603 plague raging in London, and had given a very good account of himself. So Woodall was given an official order to take over the medical care of all possible sailing vessels and to determine suitable instructions for the surgeon's chest, including convenient drugs and necessary surgical instruments. In addition to that he should take care of the education of capable ship's doctors and surgeons. For this reason he wrote a medical compendium for use at sea, that was published in 1617 in London under the title "The Surgion's Mate" (Fig. 1a, b); the manual represented the first official medical guide for the cure of seamen during their long sea voyages to the East and West Indies⁷. This early textbook of medical and surgical practices at sea stands not only at the beginning of tropical medicine but is remarkable for its diffusion of Paracelsian thoughts and conjectures about the behavior of medicine at sea. Although English Surgeons, above all the historian of science G. Debus, pointed out Paracelsian ideas in Woodall's medical rules on board ships⁸, there exists amazingly a great lack of Woodall's reception of Paracelsian ideas in the German literature⁹, which had dealt with Paracelsus so excessively. Therefore in the following the Paracelsian influence in Woodall's works shall be considered in greater detail¹⁰.

⁴About the history of the medical service at the navy over the centuries see the essential work in four volumes edited by Keevil (vol. 1 and vol. 2, 1957–1958), Lloyd and Coulter (vol. 3 and vol. 4, 1961–1963).

⁵See Keevil (1957, vol. 1) p. 239.

⁶After the results of Appleby's research the date of birth is 1570 instead of 1556/1557 as always supposed, see Appleby (1981).

⁷cf. Woodall (1617); the text is reprinted in 1639 as second edition of Woodall's work. The new edition contained in addition to the print of 1617 Woodall's treatise of 1628: "Viaticum, being the pathway to the surgeon's chest", and two other publications: "A treatise, faithfully and plainly declaring the way of preventing [...] disease called the plague", and as a brief paper: "A treatise of gangrena and sphacelos, but chiefly for the amputating or dismembering of any member [...]". This comprehensive edition of the year 1639 was reprinted in London in 1655.

⁸Debus (1962); - Debus (1965) p. 99–101; p. 125–127; - Debus (1977) p. 117–126, 179f.

⁹apart from the brief dissertation of Peter Michael Moll (1968), where Paracelsus is only mentioned with ten lines: p. 58.

¹⁰see introduction p. 15ff

THE
SURGIIONS
MATE,

OR

A TREATISE DISCO-
uering faithfully and plainly the due
contents of the SURGIIONS Chest, the uses of the
Instruments, the vertues and operations of the
Medicines, the cures of the most frequent
diseases at SEA:

Namely

Wounds, Apostumes, Vlcers, Fistulaes, Frac-
 tures, Dislocations, *with the true maner of Amputation,*
 the cure of the Scuruie, the Fluxes of the belly,
of the Collica and Iliaca Passio, Tenasmus,
 and exitus Ani, the Callenture;

WITH A BRIEF E EXPLANATION
 of Sal, Sulphur, and Mercury; with certaine
 Characters, and tearmes of Arte.

Published chiefly for the benefit of young Sea-Surgions,
 imployed in the *East-India* Companies affaires.

By *John Woodall* M^r in Chirurgery.

LONDON

Printed by EDWARD GRIFFIN for *Lawrence Lisse,*
 at the *Tyggers-head* in *Pauls Church-yard,* 1617.



1b

Fig. 1: Title page of Woodall's book (1617, 1a) and his portrait (Woodall, 1639, 1b).

Biographical Annotations

About Woodall's early ages there is little known¹¹: born 1570, at the age of 16 or 17 years he took an apprenticeship as barber-surgeon in London; then at the age of 19 years he became a surgeon in Lord Willoughby's regiment which was involved in the French wars of religion and supported the Protestant Henry IV of France (1553–1610) in the struggle against the Catholic League of Normandy. After one year Woodall was moved to Poland, after which he stayed in Germany for several years, where he led a surgical practice at Stade near Hamburg. As he himself reported, he practiced there medicine and surgery for more than eight years¹². Afterwards, in 1599 Woodall came back to London; occasionally he worked in the Netherlands also, but there is no certain record¹³. When in 1603 the plague broke out in London he did not avoid the epidemic as a good deal of his colleagues did, but took care of

¹¹concerning Woodall's biography and works cf. John Aikin: (1780) p. 238–249; - Gurlt (vol. 3, 1898) p. 377–381; - Moore (1900) p. 382f; - Crawford (1914) p. 17–26; - Power (1928); - Keevil (1957, vol. 1) p. 177, p. 199–205, p. 216–226 and p. 229; - Keynes (1967) p. 15–33; - Moll (1968); - Appleby (1981); - Druett: (2000), p. 9–24; - Hazlewood (2003); - Brown (2011) p. 19–40.

¹²Woodall (1617) p. 6: there he criticizes that "the Germane Surgeon vse no *Trapan*" and he adds as confirmation, that euer he could see it "in my eight yeares liuing amongst them, though they both speake and write of it".

¹³He himself in the praeface to his second edition (1639, "An Epistle of Salutations" (not paginated) refers: "[...] having in may younger daies lived in France, Germany, Polonia, and other forreigne parts, for divers yeeres together".

the sick and worked very long hours and suffered the consequences himself¹⁴. According to his own revelation he contracted the plague twice, however he was able overcome the epidemic.

Note that the particulars within this place mentioned, are usually placed in the lowest part of the CHEST.

The present appearance of the Chest with the order of every medicine as they are placed here demonstrated.

The middle part, which cannot be here expressed, I leave to the *surgions* experimental view.

| | | | | | | | | | | | | | | | | | | | | |
|-----------------------------|-----------------------------|-------------------------------|--------------------------|-----------------------|-------------------------|------------------------|-------------------------|---------------------------|----------------------|--------------------|----------------------|-------------------|----------------------|---------------------------|--------------|-----------------|-----------------|-------------------------|-------------------|-----------------------------|
| Richardus Diction piperion. | Pulvis re- stringens minut. | Vngt-contra ignem. | Vnguentum Nucum. | Pur: de pumpe- ligno. | Disfer- den. | Mel de parais. | Cumbril- ligit. | Lacini capulati. | Syrup rejarum. | Balsam orisje. | Osmel. | Accum Rosarum. | Aqua Ab- finthij. | Aqua Ro- farum rub. | | | | | | |
| Theriac Dausien. | Vnguentum Dialher. | Asangia Cerat. | Vnguentum Aegyptia- cum. | Pur: An- reum. | Cofers rejarum. | Rhabar- cilis. | Lipum- ligitum. | Oleum tharum. | Oleum lavatru- rum. | Mel ra- surum. | Olei Cha- momill. | Olei Ro- farum. | Aqua An- gelicæ. | Aqua Plantagin. | | | | | | |
| Theriac Londacis. | Vnguentum Alban. | Asangia Porcina. | Vnguentum Porcibic. | Linum Arce. | Cofers barbric. | Cofers pumpe- rum. | Labran- turum. | Syrup Cinam. | Oleum viridum. | Ol. Lem- bricæ. | Olei Sam- bucorum. | Olei An- thil. | Aqua Li- moniorum. | Aqua Car- dai bonæ. | | | | | | |
| Terribilis Venetæ. | Vnguentum Populæ. | Vnguentum Arragon. | Vnguentum Pectorale. | Mel fa- pum. | Cofers barbric. | Succus Astaræ. | Crana- mentum. | Oleum pumpe- rum. | Oleum papaveris. | Oleum lina- rum. | Olei Ab- finthij. | Aqua Ci- namomi. | Succus Li- moniorum. | Aqua Menthæ. | | | | | | |
| Vnguentum Basilicæ. | Vnguentum Apollinarum. | Vnguentum Aureum. | Vnguentum Alb- Campb. | Vnguentum Nutritum. | Vnguentum Dialhericæ. | Vnguentum Populeum. | Vnguentum contra Ignem. | Vnguentum Pectorale. | Vnguentum Porcibic. | Vnguentum Arragon. | Vnguentum Martiarum. | Linamentum Arcei. | Mel Spani- nis. | | | | | | | |
| Vnguentum Aegyptiacum. | Syr rejar. | Syrup con- ducum. | Oleum rejar. | Me- thridæ. | Dial- hericæ. | Cofers barbric. | Cre- tin mure. | Pulvis cocleæ. | Pulvis em- stige. | Pulvis ruffi. | Ru- barbe. | e-Ay- racum. | Alu- min. | Aber. | Afr- rha. | Maf- tiber. | Can- plera. | Tro- chisq. alban- dal. | Pulvis Iccer- ce. | Vnguentum dia- pompholigon. |
| Asangia cerat. | Syr: pum- peris. | Syrup: lani. | Cofers rejar. | Theri- acum. | Theri- acum. | Dis- aban- con. | Cofers pumpe- rum. | Pulvis ruffi. | Pulvis ruffi. | Cam- bria. | Sta- mmeis. | Syr: mac- tis. | Terra sabbæ- ra. | Mer- curius subli- matus. | Terri- acum. | En- abran- tum. | Pulvis Br- uis. | Pulvis alban- dal. | Afr- rha. | Vnguentum contra icoburnum. |
| Species Diar- io piperion. | Species Dia- sulfuron. | Species Theri- acæ Londensis. | Conferva Rosarum. | Conferva An- thos. | Conferva Bala- nularum. | Conferva Pra- telorum. | Conferva Cha- nionum. | Pulvis rellin- gus maior. | Pulvis antheri- cus. | Pulvis Tama- rind. | Succus Licioicæ. | Methridæ. | Theriac Venetæ. | | | | | | | |

(Transcription see Fig. 10)

Fig. 2: Plan with distribution of the remedies for the use on board (Woodall, 1639).

Only a little later Woodall accompanied a diplomatic delegation towards Poland and Russia, which was commanded by Sir Thomas Smythe (Smith) (ca. 1558–1625); he was the governor of the East India Company, which had received a Royal privilege from Queen Elizabeth I on December 31, 1600 and was thus the oldest among the European East India Companies. A meeting with this powerful trading partner, to whom Woodall dedicated his first book of ships surgery¹⁵, proved to be favourable because assumedly Sir Thomas Smith acted as an important mediator for Woodall’s further duty at the East Indian Company. Probably he also was involved in Woodall’s appointment as First Surgeon-General of that corporation which followed in 1614. With this trustworthy position the selection and calling of all ship’s doctors for the ships of the East India Company and control over the equipment of the medicine chests for the use at sea were connected. Whether Woodall himself had undertaken longer voyages to East or West India could not be positively verified, but from his specific knowledge in the medical conditions aboard it can be concluded that he himself sailed into the East. Altogether Woodall was on active duty for 30 years of the East India Company; for a short period of time however his employment was interrupted, because he was arrested as a result of severe conflicts with the association of surgeons and for dubious transactions. Nevertheless Woodall continued to be an experienced surgeon who among other things worked for St. Bartholomew’s Hospital at London, where he was a colleague of the famous

¹⁴cf. Woodall (1639) p. 330, also in the reprint (1655) p. 330.

¹⁵“To the fare renowned(!), vertous, and worthy Knight, Sir Thomas Smith; Gouvernour of the East-India Company, may singular good Patrone”, Woodall (1617) Preface [p. 1].

scientist who discovered blood circulation, William Harvey (1578–1657).¹⁶ Even though Woodall mentioned this English physician with great respect in his publications¹⁷ and although he himself was a subordinate to Harvey's strict instruction, yet he did not give up his passionate protest against the deep-rooted division of the surgical and medical responsibilities that were predominate in this period of time. So Woodall made it perfectly clear what he thought:

“Each man will conceive that medicine is a principall part of healing and curing of sores, diseases and sicknesses: for who is hee that can cure a wound, a tumor, an ulcer, yea, but an ague with his hand only, without fitting medicines? Surely no man: Then it must necessarily follow that *Chirurgia, Dieta & Pharmacum, viz.* Surgery, Diet and Medicines (I meane both outward and inward) are unseparable companions, and therefore all to be used in the art of curing mans body; and that in the person of one man.”¹⁸

Woodall practiced not only at the Royal Hospital of St. Bartholomew, but was on duty at three other hospitals in London also. Although in those days the use of a single physician at different medical institutions was not exceptional, nevertheless the concurrent occupation at several places required a considerable planning and organization.¹⁹

Together with the enlargement and expansion of the naval forces and their armament at the first quarter of the seventeenth century Woodall got his most important assignment: in the year 1626 a resolution was passed to pay a fixed sum for the equipment in the medical chest as determined for use on board and to entrust Woodall with supervision of all the equipment to be used by sea-surgeons - a responsibility which Woodall would hold until the end of his days (1643).

John Woodall's Treatises About Naval Medicine and Surgery

Woodall's major work, the treatise about naval medicine and surgery was printed in 1617 and is reproduced in the original version, quickly developed into the standard work of naval medicine in the first half of the seventeenth century. It is not only a mixture of methods of surgical treatment and medical therapeutics, but it contains many remarkable observations about special diseases at sea, particularly of tropical origin. About 20 years after the first edition, Woodall published a second enlarged edition (1639), containing two treatises: one about gangrene and the other about plague²⁰. Furthermore the new edition includes a third medical report which for the first time was published in 1628 and titled “Viaticum, being the pathway to the surgeon's chest”.²¹ In 1655, many years after Woodall's death a reprint of Woodall's Surgeon's Mate of 1639 was published²², - a fact, that speaks for the value and improvement of Woodall's compendium among the sea surgeons.

¹⁶cf. Paget (1846) p. 22, p. 29, p. 42.

¹⁷cf. Woodall (1617) p. 91 and p. 96.

¹⁸cf. Woodall (1639) Preface, without pagination.

¹⁹cf. Appleby (1981).

²⁰cf. Woodall (1617; 1639), see introduction p. 20.

²¹cf. Woodall (1628).

²²see Woodall (1655); this reprint contains an extra chapter “Certain Fragment concerning Chirurgerie and Alchymie” (p. 233–246), which is not included in the first edition of 1617.

The Edition of 1617

Woodall's first work of 1617, which is transcribed in the original spelling, comprises four principal parts and as a supplement an annotated glossary of alchemical terms. The four sections concern the following subjects:

1. Description of the office and duty of the surgeons mate and of the surgical instruments, also of the ingredients in the medical chest which are intended for use at sea²³. The most important instruments are lancets, scissors, saws, forceps, needles, probes, syringes, specula ani, oris et linguae; instruments for the extraction of bullets, arrows and bone fragments, also scales and weights. The selection of drugs contains 160 various preparations with detailed accounts of the application.²⁴ About that there are various sorts of plasters, more than 20 ointments, many powders, essential oils, syrups, pills, opiats and a few chemiatrical preparations which were necessary for working with the equipment. Also some drugs of the new World and East Asia such as radix Chinae, radix sarsaparillae and lignum Guajaci are quoted.

2. This part is followed by brief remarks about special surgical problems as the medical care of gunshot and thorax wounds, burns, as well as the treatment of apostumes, ulcers, fistulas and fractures, also the dangers of difficult operations such as amputation and trepanation are explained.²⁵

3. The third part starts with a detailed treatise about scurvy²⁶, followed by accounts of precarious case studies as "fluxes of the bellie (leienteria, diarrhoea, disenteria)" with special references for young beginning doctors at sea.²⁷ Then Woodall discusses in great details the causes and treatment of most painfull diseases as "Iliaca Passio, Colica Passio, Tenasmus, Falling of the Fundament and Callenture".²⁸ Because many of the mentioned diseases cannot be cured without an active analgesic, Woodall added an essay about the composition, preparation, effect and application of the highly esteemed "Laudanum opiat Paracelsi".²⁹

4. In the fourth part Woodall deals with the salts, sulphur, mercury and their vertues³⁰. They give Woodall the urge to include instructions about the alchemical theory of the four (terra/earth, aqua/water, ignis/fire, aer/air) and the Paracelsian three elements (sal/salt, sulphur/brimstone, mercurius/quicke-silver) together with the interaction among each other. (Fig. 3). But Woodall is not willing to get involved too much in the alchemical discussion and he dissociates himself clearly from the three- or four-elements-theory. At the end of his chemical explanations he skillfully interprets the coexistence of the three- and four-elements-theory³¹, and for pragmatical reasons he avoids accepting either one or the other concept as to be true or binding:

²³(Without pagination:) "The office and dvty of the svrgions mate" (5 pp.). Afterwards (6 pp., without pagination as well): "A note of the particular Ingrediencies due to the Surgeons Chest, and of other necessary Appendixes seruing for Chirurgicall vses, whereof these next recited may be placed on the lidde of the Chest, if the Surgeon will haue it so." Than follow pp. 1–39: "CERTAINE BREIFE (!) Remembrances touching the particular Instruments for the SVRGIONS CHEST, and the vses of the same." In addition the edition of 1639 has a picture of the chirurgical instruments and an outline of the medicine chest (see Figs. 2 and 3).

²⁴Woodall (1617) p. 40–132.

²⁵Woodall (1617) p. 133–177.

²⁶Woodall (1617) p. 177–202.

²⁷Woodall (1617) p. 202–223.

²⁸Woodall (1617) p. 232–249.

²⁹Woodall (1617) p. 224–232.

³⁰Woodall (1617) p. 250–307.

³¹Woodall (1617) p. 308–313.

“[...] the question litle concerneth the cure of diseases by youg Surgeons, wherefor I will conclude this point my selfe, intending neyther to quarrell for to prove three, nor foure, let there be foure or three, eyther of both shall content me”.³²

5. In the following part Woodall gives an astrological-alechemical list of the seven planets/metalls, which are closely connected with the three plus four = seven parts of the elementary theory. Beyond it the table contains a selection of alechemical and chemical terms with their alechemical symbols and brief definitions.³³ As the author announces in the preface the list should help to improve the knowledge of young seamen and to entertain them during their long sea voyages, because

“they not onely containe profitable instructions for youth, but by their nouelty and varieties doe partly refresh the minde of those readers as delight themselues in that part of practise” (p. 311).

The end furnishes a long poem of the author, chosen for young surgeons at sea, and rich in hints at the alechemical labyrinth, where the the author promises to guide the adepts.³⁴ That Woodall took a very critical view of the alechemical theory demonstrates the four lines on p. 344 (= p. 336) which he had pasted into his poem, but did not declare the origin³⁵.



Fig. 3: Plan of the surgeons chest for the use on board (Woodall 1639).

Special Surgical Instruments Invented by Woodall

Woodall described the “Spathula mundani” (Speculum ani) as one of the best surgical instruments, which he himself had outlined and constructed (Fig. 3). The simple but useful

³²Woodall (1617) p. 310; about Woodall’s position of the Paracelsian doctrine see below, p. 13

³³Woodall (1617) p. 313–328.

³⁴Woodall (1617) p. 329–348: “Certaine Chemicall Verses, or Good will to young Artists”. There Woodall dissociates himself from the Paracelsian sal, sulphur, mercury-theory quite openly (p. 331): “[...] Thus have I in one Period/ anatomized plaine:/ True medicines how thou maist prepare,/ if thou wilt take the paine./ But if that any further seeke,/ in true Philosophie:/ The Minerals fix and pure to make/ that is no worke for me./ I to my Latchet will returne,/ and rest me in a meane:/ Good medicines onely to prepare,/ I holde sufficient gaine.”

³⁵Woodall says here: “Alchimia est ars sine arte,/ cuius subiectum est pars cum parte,/ Proprium eius probè mentiri,/ et ultimò mendicatum iri” (p. 344=336), see the annotation in the introduction p. 19f and the index of sentences p. 342.

tool should serve for the extraction of hard accumulated excrements in the rectum “if the glisters cannot have passage”³⁶. The explanation of the instrument and its function Woodall connects with a lot of accurate observations about obstructions and constipations, which is often the case at sea, as Woodall explains. Also for the opening of the skull Woodall developed a special surgical instrument, which he called “Trafine”, because it had three ends, which served different purposes (Fig. 4).³⁷ The advantage of this fabrication over the known trepan laid in the construction of the gear rim, which was not formed cylindrically but conically, so as to prevent the problem of the gear rim so that after the perforation of the cranial bone it would not break through the dura mater into the interior of the skull.

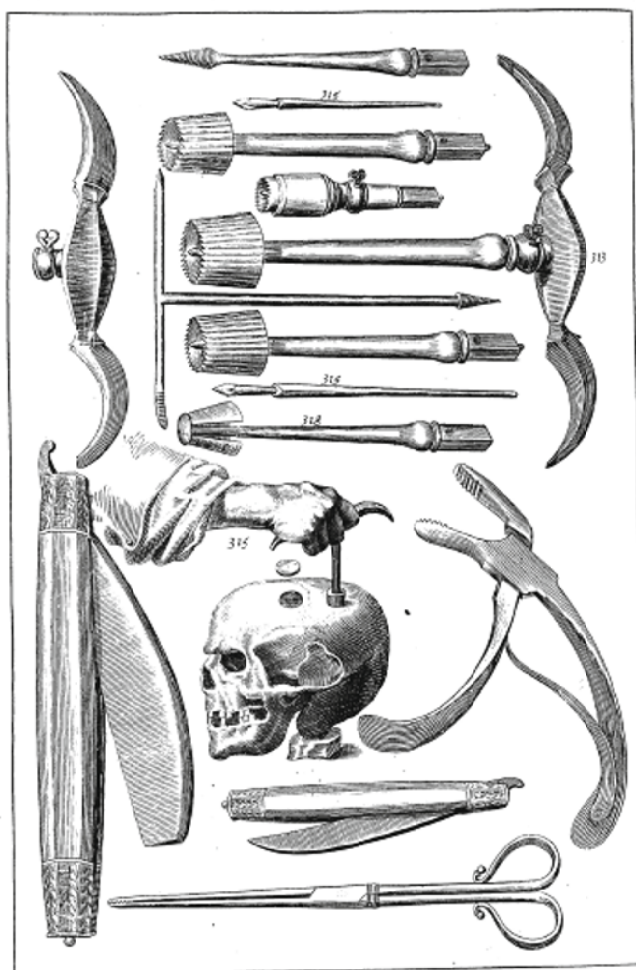


Fig. 4: Surgical Instruments for trepanation (Woodall, 1639).

³⁶Woodall (1617) p. 14, p. 20, p. 198.

³⁷Woodall (1639) p. 313–318, fig. opposite p. 313; - the construction explains Moll (1968) p. 19–23.

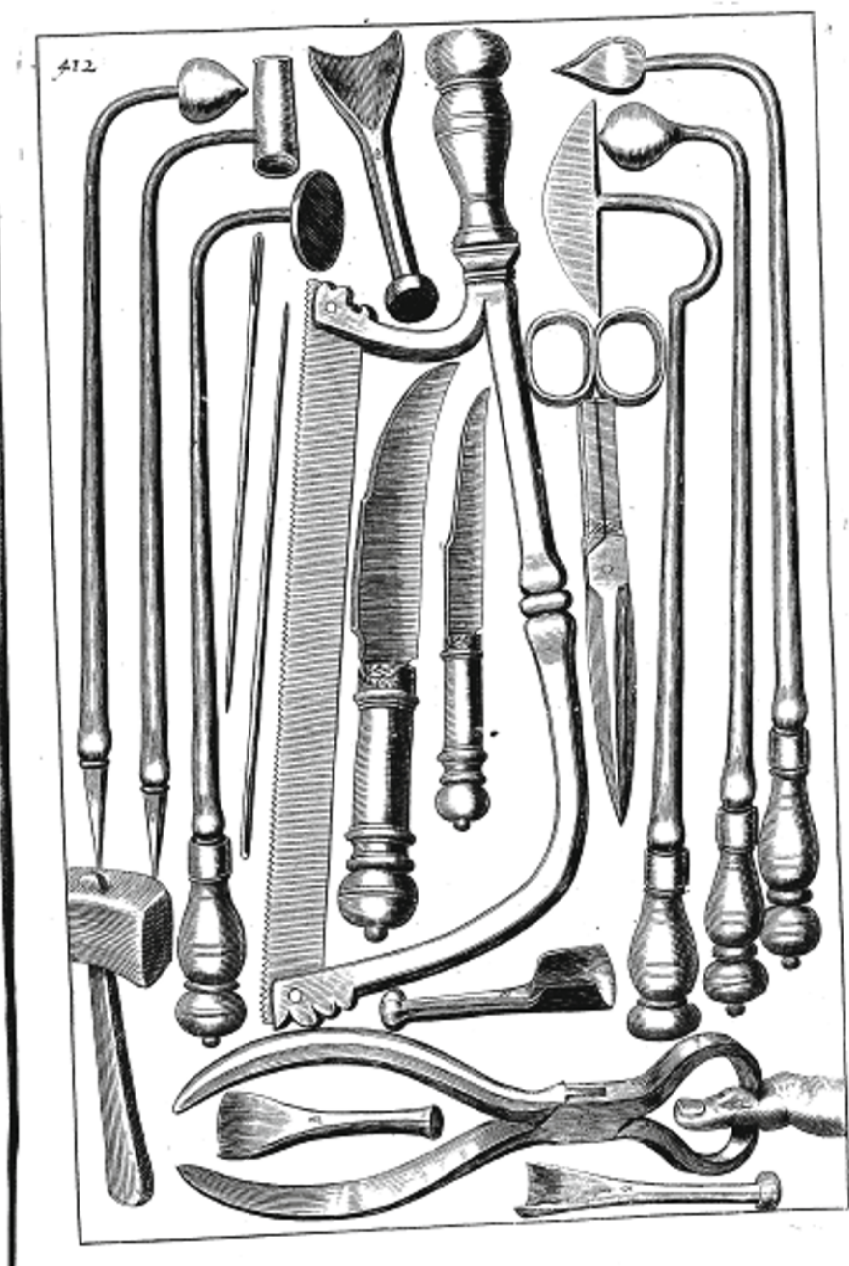


Fig. 5: Instruments for amputation (Woodall, 1639).

John Woodall's Report About Amputation

In particular Woodall's report of 1617 stresses that careful description of a new risky and very dangerous surgical procedure, the amputation: "the most lamentable part of chirurgery, it were therefore the honour of a Surgeon neuer to vse dismembing at all if it were possible for him to heale all hee vnderooke"³⁸. Woodall, who managed the operation with only two assistants at sea, not only encouraged the young ships surgeons to have his instruments ready every day and to see that the "saw be alwaies in a readinesse, well filed, and cleane kept in oyle clouts to saue it from rust", but he calls also to "craue mercie and help from the Almighty, and that heartily (Fig. 5). For it is no small presumption to Dismember the Image of God"³⁹. Not without pride Woodall reported in his second edition (1639) that he managed successfully more than a hundred operations in this way. At the same time as a result of his activity as surgeon at the London St. Bartholomew's Hospital he added the astonishing comment that he did not lose any patient because of hemorrhage after amputation:

"And I my selfe may truely say, have from more than a hundred persons, cut off from some a legge, yea both the legges, a hand, a foot, a toe or toes, an arme, a finger, etc. of such rotten members, being all dismembred in the rotten part, of which not one hath dyed in the cure [...]"⁴⁰.

Satisfied with the results of his 50 years of activity as a surgeon he came to the conclusion, that in England or elsewhere he has never seen the horrible practice of cauterization of sensible and living parts at the end of a stump.

Woodall's Invention of an "Enema Fumosum" ("Tabakrauchklistier")

In the second edition of the handbook, which was published in 1639, Woodall reported about another remarkable device, which was an apparatus of his own making; it served to produce tobacco smoke for injection with a syringe ("enema fumosum" or a "fumous glistier")⁴¹ to treat obstruction (Fig. 6). Obviously Woodall was very familiar with tobacco and its use as an economic factor and effective stimulant in medicine, because he was a member of the Virginia Company (since 1623), which was involved in tobacco production and commerce with great success.⁴² In the year 1686 Johann Andreas Stisser (1657–1700), professor of medicine and botany in Helmstedt, published a paper "De machinis fumiductoriis curiosis sive fumum impellendi intra corpus instrumentis"⁴³, in which he declared himself to be the inventor of a new instrument to inject tobacco smoke into the anus for treatment of colic etc.; although the apparatus looks very much like Woodall's construction (Fig. 7) Stisser did not refer to Woodall. He speaks of the "Anglicanum instrumentum" and the English only, which have introduced the machine. Also the Professor of medicine in Gießen, Michael Bernhard Valentini (1657–1729), published a treatise about "Clysteres Tabacini" in 1701⁴⁴, which contains a picture of Stisser's instrument (Tab. II, p. 72). He pointed out that these machines are very widespread in England, but he did not mention Woodall, who it seems was no longer present.

³⁸Woodall (1617) p. 171, see also Keevil (1957) p. 217f.

³⁹Woodall (1617) p. 172.

⁴⁰Woodall (1639) p. 391; - about Woodall's surgical activities see also Moll (1968) p. 39-41.

⁴¹Woodall (1639) fig. between p. 26 and 27. The explanation is not paginated [see Illustration 5]

⁴²see Appleby (1981).

⁴³Stisser (1686)

⁴⁴Valentini, Michael Bernhard: Disputatio V. De Clystere Tabacino. In: Valentini (1701), p. 71–73.

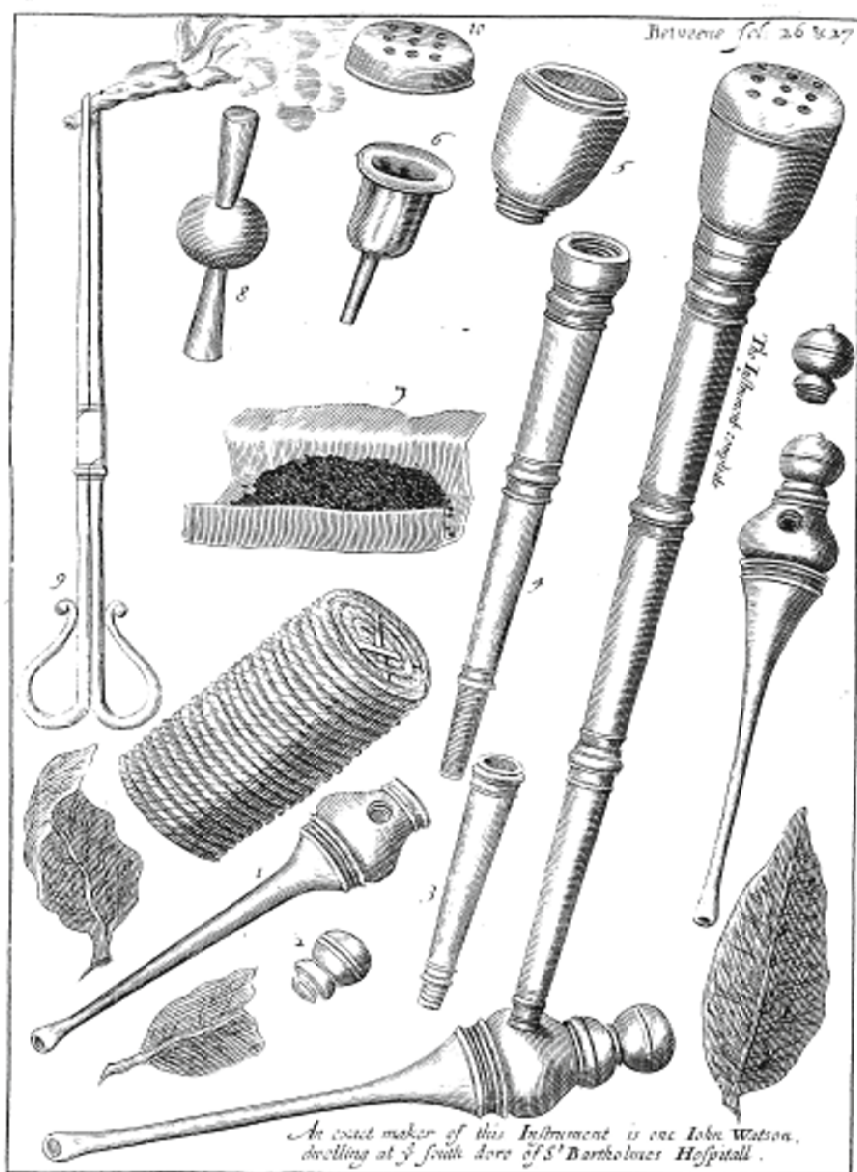


Fig. 6: "Enema fumosum or a fumous glisten" to applicate tobacco smoke.(Woodall, 1639)

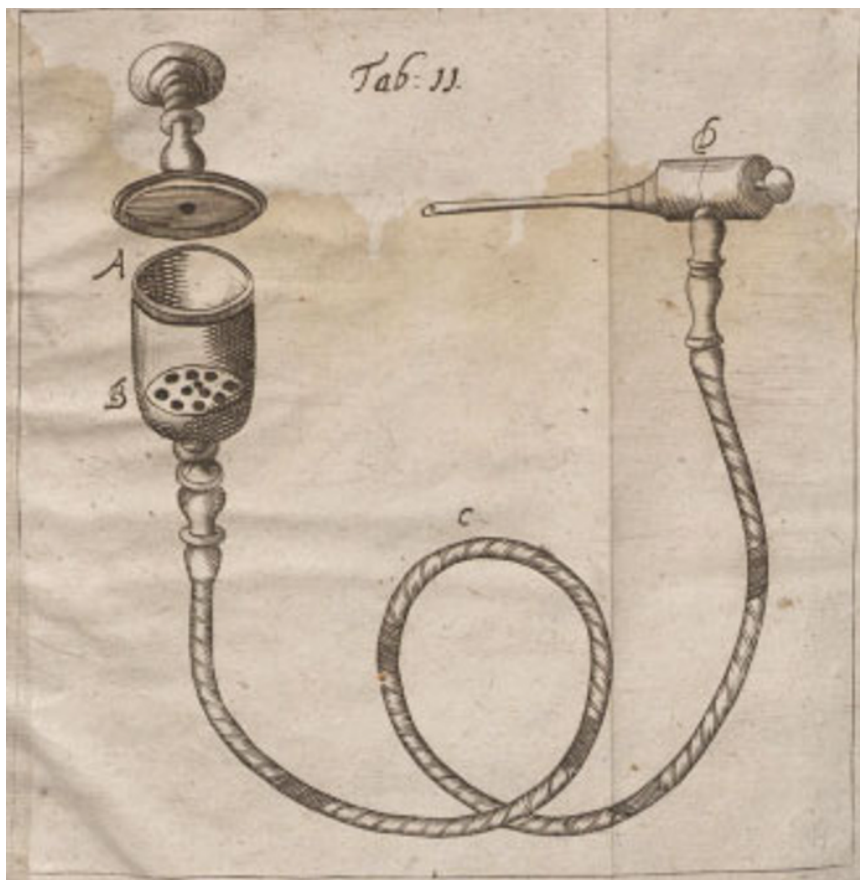


Fig. 7: Instrumentum Anglicum pro succione fumi tabaci. Tab. II (Stisser, 1686).

Woodall's Treatment of Scorbatic Patients with Citrus Fruits

The most amazing part of Woodall's work was his medical report on scurvy (p. 181ff). His 20 page description of the complaint included one of the first reports about the effect of citrus fruits as a specific remedy against the bad aftereffects of scurvy.⁴⁵ The account was hardly surpassed by other contemporary writers. Woodall ascertained that above all the seamen were attacked by the scurvy and he gave a most realistic description of the sickness at sea. Woodall explained the disease as an obstruction of the liver mainly, and sees his diagnosis confirmed by the "certaine signes of the scurvie by the dead opened" that the "livers utterly rotted" (p. 182). Obviously Woodall dissected on board, which was a great exception at this period.

Woodall was much surprised that so far nobody among the seafaring physicians had announced the real causes, symptoms, treatment or preventive measures. How he saw things himself led to many excellent antidotes in Britain against scurvy, which are rich in vitamin C, as we know today. Above all, as Woodall emphasized, scurvy grass (*Cochlearia officinalis*, Brassicaceae), which is rich in Vitamin C, and water cress, nasturtia aquatica (*Nasturtium officinale*, Brassicaceae) too, are the most important antidotes against that plague at sea.

⁴⁵Woodall (1617) p. 177–202.

However the horse radish (*radix raphani silvestris*: *Armoracia rusticana*, Brassicaceae), which Woodall likewise considered to be an antiscorbuticum, does not contain vitamin C but allyl mustard oil which is responsible only for the sharp taste. Finally Woodall stated wormwood (*Artemisia absinthium*, Asteraceae) as antiscorbuticum. The herb had, since the days of the Ancient World been in high regard as a medicinal plant. Mainly it was applied as appetizing, digestive and menstruation-promoting medicine, but in this herb, vitamin C could not be demonstrated.⁴⁶

It attracts attention that Woodall very often prescribed citrus fruits as remedies against diseases that were thought to be scurvy. Woodall's extended account of this illness shows that he was one of the first medical practitioners to have clearly recognized the healing effect of those fruits on long sea journeys. He himself called the *succus limonum* "the most pretious helpe that euer was discovered against the *Scurvy* to bee drunke at all times".⁴⁷ It may be that the decription of scurvy or a similiar sickness can be traced back to the thirteenth century, but as a disastrous mass disease it appeared first with protracted expeditions at the end of the fifteenth century, which often meant several months at sea. As "sea plague" or "Seepest" in German, scurvy was suffered for centuries by this horror and a constant companion of navigation. The references of the sickness however - also by Woodall - are not always easy to understand, for example: an important characteristic feature of this suffering included enlargement of the spleen, but this symptom could be at the same time a sign of malaria so that likewise there could be a mistake or a mixture with other diseases.⁴⁸ Due to the ignorance of the etiology of scurvy, very different diseases such as syphilis, malaria, stomatitis ulcerosa, ergotismus gangraenosus, rheumatism and rickets were summed up under the term scurvy till the nineteenth century. The Prussian medical officer and professor of medicine at Marburg, Ernst Gottfried Baldinger (1738–1804), has accurately labelled the growing confusion in view of the mass hysteria at sea nominated scurvy, when he named the scurvy as "Asylum ignorantiae Practicorum".⁴⁹

Without doubt Woodall had compiled under the term scurvy a plenty of different diseases too, but all the time he had emphasized the curative effect of citrus fruits and oranges as the best therapy for that plague.⁵⁰ Already about 1600, James Lancaster (1554–1618), the commander of the first Indian expedition of the British East Indian Company, had observed the specific antiscorbutic quality of the citrus fruits⁵¹, but also he could not prevent the loss of 105 of the total of 278 seamen only because of scurvy. Although Woodall did not mention Lancaster's name explicitly, it is to be believed that Woodall knew the disastrous effects of this journey, undoubtedly he had clearly in mind the risks of long voyages at sea for all aboard,⁵² and he always tried to search for new answers to the problems.

⁴⁶Of the abundance of literature about the history of scurvy shall be cited only some surveys for a general idea: Müller (1976, 2015); - Carpenter (1986, 1988); - Mayberry (2004); - Streller/ Roth (2009); - Mayer (2012).

⁴⁷Woodall (1617) p. 89.

⁴⁸Woodall (1617) p. 179–182.

⁴⁹Baldinger (1774) p. 437.

⁵⁰Still 150 years later the English sea surgeon David MacBride (1726–1778), who in the succession of James Lind (see p. 13f) tried to enlighten the cause of scurvy, acknowledged Woodall's cure of the scurvy as exemplary: "Appendix. An Extract from that Part of Woodall's work which treats of the Scurvy." See: MacBride (1764, p. 171–200 and p. 201–210); see also the German translation (1766).

⁵¹"And the reason why the generals men stood better in health than the men of other ships was this: he brought to sea with him certaine bottles of the juice of limons, which he gave to each one as long as it would last, three spoonfuls every morning fasting, not suffering them to eate anything after it till noone. This juice worketh much the better if the partie keepe a short dyet [...]", see Markham (1877) p. 62.

⁵²Keevil (1957) p. 110–113.

However, despite recommendations of citrus fruits as an antidote against scorbutic putrefaction, frequently the therapeutic success did not appear. An important reason for this mysterious observation laid in the different methods of preparing citrus fruits. One of the frequently used citrus-preparations was for example “sirupus limoniorum”, also “oleum et aqua limoniorum”. Certainly in these compositions vitamin C should be included only when they are freshly prepared, but Woodall looked upon the sour qualities of the citrus fruits as their most significant signs, which were the most important features for him. Hence in lack of the juice of citrus fruits he recommended to employ diverse sour vegetable extracts and other sour fruits⁵³; if these were not available, then oleum vitrioli (H₂SO₄) should be used instead. Even the succus limoni which a broadsheet praised as patent for the use aboard, and which was obviously made durable with the help of sterilisation or fermentation processes⁵⁴, could not be effective because of the loss of vitamin C in the heat. The author of that broadsheet, Sir Hugh Platt (1552–1608), was a popular writer who liked to publish moral sentences but also kept a collection of the latest novelties in chemistry and metallurgie. Among them was Platt’s announcement, that he could conserve citrus fruits by means of certain methods, especially with “philosophical fire”.⁵⁵ Also this production could not have been the solution because the antiscorbutic effect (Vitamin C) was destroyed by fire.

Fresh oranges and lemons however got aboard extreme rarely; if they occasionally were taken, there were just a few numbered specimens because of the great lack of space, and moreover these precious fruits were designated for officers only. There is a remarkable report about one of the first German East-Indian-Travellers of the seventeenth century, Johann Sigmund Wurffbain (1613–1661), which gives us to understand the special value of fresh fruits: on his return with a supply of Banda, Wurffbain took 600 fresh lemons and oranges as well as 60 grapefruits for himself and for his cabin-guests, while the rest of the crew of 127 men had the remainder of only 200 grapefruits and 400 lemons.⁵⁶ Great care with fresh citrus fruits such as Wurffbain described must have been an exception, because in this time exotic products were too expensive, therefore lemons and oranges did not belong to the obligatory equipment of ships, as Woodall’s plan for the surgeon’s chest demonstrated. Woodall recommended rather to buy fresh fruits at ports in East India and to consume them on the spot immediately. Unfortunately Woodall offered no information or numerical accounting for recovering, death or the success rates of his cures on board. There are no quantitative statements in Woodall’s work, because statistical thinking in medical practice did not rise before the end of the seventeenth century, as Ulrich Tröhler has pointed out convincingly⁵⁷. Apart from the limited availability of citrus fruits, Woodall’s latest findings of this important precaution against scurvy did not gain much acceptance, because these foreign products were not only very expensive, but also Woodall added to his recommendations the fatal comment⁵⁸:

“[...] in want of all these [juice of Limes, Oringes, or Citrons, or the pulpe of Tamarinds] vse oyle of Vitrioll as many drops as may make a cup of beere, water or rather wine [...], onely a very little as it were sower, to which you may also adde sugar

⁵³Woodall (1617) p. 185.

⁵⁴see Platt: (1607); - Keevil (1957) p. 108–109.

⁵⁵c:“How to keepe the iuice of Oranges, and Lemons all the yeare, for sauce, Iulepps, and other purposes.” In: Platt (1594) p. 36f; - see also: Platt (1653) p. 180–182; - relating to Platts work and importance cf. Thick (2010);- Mukherjee (2011) p. 69–86.

⁵⁶Wurffbain (1686, p. 271f and p. 222); as citizen of Nüremberg Wurffbain has travelled with the Dutch East Indian Company to Batavia (Jakarta) in 1632 and was appointed at first as soldier at the Moluccas, later on he was promoted to an “Oberkaufmann” of the company, and returned as wealthy man towards Nüremberg in 1646.

⁵⁷Tröhler (2000).

⁵⁸Woodall (1617) p. 185.

if you please, or some sirups, according to your store and the necessity of that disease, for of my experience I can affirme that good oyle of Vitrioll is an especiall good medicine in the cure of the Scuruy [...].”

This therapeutic advice corresponded with the iatrochemical theories conditioned by the times; after them, diseases should be created from abnormal distribution of acids and alkalies in the so-called four humours: yellow and black bile, blood and phlegm.⁵⁹ By means of neutralization of the immoderate acid or immoderate alkali with an equivalent opposite substance, the disease should be cured, according to that as criteria for the effect of the lemon juice was valid only the acidity. From that point of view Woodall’s early epoch-making knowledge, just as had James Lind’s (1716–1794) famous experiments, was more and more obscured and fell into oblivion. James Lind, the English ship’s doctor and a pioneer of naval hygiene was the first to undertake in 1753 a new controlled clinical trial which was the first ever been made: He took 12 cases of scurvy aboard and gave them, in addition to a homogenous die, different remedies against the scurvy. The consequences of the experiments were “that the most sudden and visible good effects were perceived from the use of oranges and lemons [...]”⁶⁰. But also Lind was compelled to use the preserved juice, but his antiscorbutic effect was very limited compared with the fresh fruits, which however could not be carried on board in the necessary amount. When in 1784 the Swedish pharmacist Carl Wilhelm Scheele (1742–1788) succeeded in the isolation of citric acid out of lemon juice⁶¹, it was obvious to substitute the deep and perishable lemon juice by the cheaper, durable and transportable citric acid, which took up very little space aboard. An impressive proof for this usual substitution is to be seen in the German Schiffahrtsmuseum at Westrhauderfehn. There is kept an “Anleitung zur Gesundheitspflege an Bord von Kauffahrteischiffen” of the year 1888 containing a handwritten note, which obviously records a customary practice aboard with the order: “Ein Eßlöffel voll Citronensäure in einer Weinflasche gelöst ersetzt eine Flasche Citronensaft”⁶².

The following explanation of the real connection between the use of citrus fruits and the successful cure of the scurvy cannot be traced here in detail, even though the clarification of the chemical structure belongs to important biochemical discoveries of the twentieth century; the first significant phase of the exploration history began with the isolation of vitamin C, ascorbic acid, which the Hungarian biochemist Albert von Szent-Györgyi (1893–1987) performed in 1928⁶³. Only a few years later, 1933, the Swiss biochemist Tadeus Reichstein (1897–1996)⁶⁴ synthesized vitamin C, and thus he made the industrial production of the essential chemical compound on a large scale possible.

John Woodall as Paracelsist, His Treatment with Drugs

In the light of contemporary knowledge there were fewer effective preparations in Woodall’s time that could be successfully used for long voyages at sea. Woodall had no precedents which could guide him in the treatment of unknown tropical diseases, something he had learned from the military surgeons William Clowes (1543/44–1604) and Thomas Gale (1507–1567)⁶⁵, as he himself remarks, but there were no official regulations for supplying ships with medical preparations to be used during sea voyages that often lasted several months and

⁵⁹ see Rothschuh (1978) p. 185–223.

⁶⁰ see Lind (1753) p.193; - see also Lloyd and Coulter (vol. 3 (1961) p. 299–303).

⁶¹ Scheele (1784).

⁶² Anleitung zur Gesundheitspflege an Bord (1888) p. 152.

⁶³ Szent-Györgyi (1928) p. 1387–1409.

⁶⁴ Reichstein (1933) p.1019–1033.

⁶⁵ see Index of names

longer.⁶⁶ Therefore Woodall must have counted on his own experience that he had gathered on his long travels by land and by water. In many cases he emphasized his own experience with special drugs; so he was not afraid to criticize traditional compositions, and from his own experience he often pointed to the small stability of some preparations which were well advised but wrong for use at sea. Woodall therefore put together a chest with 160 remedies (see Fig. 2 and 10, Transcription), which he thought to be effective and useful for treatment at sea. In his second (1639) he outlined how the diverse remedies could be stored realistically (see Illustration 2a, b); this list of drugs corresponded exactly with the drugs that Woodall recommended in his first edition, which is reproduced here. For his time Woodall's selection of remedies could be called as most practical and his commentary about the healing power of drugs showed that he gained much experience not only in surgery but also in the applications of sensible and useful medicines. Concerning the new unknown drugs of the Far East or of the New World he was rather reserved. He described them duly⁶⁷ but except for cambogia and citrus fruits the new drugs had no place in his surgery chest.

So it was not surprising that the greater part of his remedies consisted of traditional vegetable preparations such as aquae, sirupi and electuaria, and that he was skeptical of the new chemical preparations, which the chemiatrists and the Paracelsian disciples praised. Woodall warned against alchemical/chemical compositions with mercury or arsenicum as "enemies to the life of man" (p. 114), although he did not stop their use in specific cases. In spite of his care and restraint for unknown movements in medicine and pharmacy, Woodall did not shrink from testing new ways of drug therapy. Quite often he took up prescriptions and proposals, which were also in circulation under the name of the mutinous physician Paracelsus (1493–1541) at the seventeenth century; this alchemist, doctor and philosopher was known as a quarrelsome innovator of pharmaceutical research and split the medical profession in many defenders and just as many opponents. Without doubt Woodall had great respect for the exceptional knowledge of this experimentalist, and Woodall himself was not only an expert in Paracelsian work, but also he had noticeable sympathy and admiration for the great master in medicine and surgery, which did not go unnoticed in the large number of his references to Paracelsus and his recommendations. So Woodall introduced into the chapter about plasters an enthusiastic praise of the "emplastrum stipticum Paracelsi", which he quoted as original citation in a long Latin text⁶⁸. Also at great length Woodall praised the unequalled "Laudanum Opiatum", which he prescribed especially against dysentery⁶⁹. It did not happen by chance that in the description of that very strong plaster, including several pages that Woodall quotes from Oswald Croll (1563–1609), who taught as alchemist, professor of medicine and innovator of the Paracelsian doctrines at the university of Marburg. Also he had published an extensive compendium about alchemy and chemistry in the succession of the great master in 1609⁷⁰. That Woodall himself had likewise studied the Paracelsian theories and practice intensively, he shows clearly at the end of his book: In the concluding part of his compendium Woodall discusses the elemental principles of alchemy Sal, Sulphur and Mercurius, and explains their chemical symbols⁷¹. In detail he explains the concept of three instead of four

⁶⁶see Keevil (1958, vol. II, p. 270ff).

⁶⁷see e. g. lignum et cortex guaiaci, radix chynae, sarsaparilla, sassafras, styrax.

⁶⁸Woodall (1617) p. 40f; the text is literally cited of Paracelsus' work about surgery: Paracelsus (1605, p. 673); - about Woodall's special position as Paracelsist in England see Debus (1962) p. 108–118) and Debus (1965) p. 99–101 and p. 125–127); - see also Appleby (1981).

⁶⁹see Woodall (1617) p. 224f: "Laudanum Opiat Paracelsi and the Vertues thereof".

⁷⁰Croll (1609), it is a edition without frontispiece; this first title page with picture appeared in the undated printed Latin edition of ca. 1611. The German translation appeared 20 years later, see Croll (1629); - about Croll see also: Kühlmann/Telle. (1996–1998);- about the reception of the Paracelsian concepts see Kühlmann / Telle (2001–2004).

⁷¹Woodall (1617) p. 250–310, p. 312–328.

“nun die ding zu erfahren, so nempt ein anfang vom holz, dasselbig ist ein leib; nun laß brinnen, so ist das do brint der sulphur, das da raucht der mercurius, das zu eschen wird, sal”⁷².

All things of the three worlds of nature should be composed out of these three entities in different proportions. However Woodall did not deal only with the Paracelsian doctrine of the three principles of the universe, but also he studied the doctrine of signatures (“*Signaturenlehre*”) which can be found in ancient writings and was newly propagated by Paracelsus and the Neapolitan naturalist and physician Giambattista della Porta (1538–1615). This metaphysical aid, which helped to reveal complex associations and connections in nature, based on the hypothesis that signs on account of similarities in form, colour, shape or structure could disclose hidden virtues (virtutes) or analogies. Oswald Croll has completed the Paracelsian doctrine of signatures and devoted a detailed tract to the question⁷³. Already on the frontispiece Croll symbolizes the occult correspondences between cosmic (above in the middle) and terrestrial sphere (down), which shall be decoded and utilized by means of the doctrine of signatures (it is noted in the central cartouche as link between above and down) (Fig. 8). Both equilateral triangles each sketched in a circle represent the unlimited macrocosm as a place of pure intellectual spirits (alchemical sign for fire: peak up) and the microcosm as a terrestrial sphere (alchemical sign for earth: peak down).

Alongside a chain of medallions with idealized portraits of alchemical authorities we are led from the left above to the right down, beginning with the legendary founder of astrological-astronomical wisdom Hermes Trismegistos Aegypti, continued by famous, in part fantastic, messengers of alchemical medieval knowledge such as Raimundus Lullus Hispanus (Ramon Llull, ca. 1232–1316) and Roger Bacchon Anglus (Roger Bacon, 1214–1292) till Paracelsus, whose immediate succession Croll required for himself and for his own researches.

Woodall’s orientation at this title cannot be overlooked (Fig. 9), even though Woodall’s title page is turned out far simpler: Also at the left margin the authorities of his art are lined up, but Woodall’s election did not agree on Croll’s examples. The row on the left margin is led by Aesculapius, below are sitting Paracelsus, the French astronomer and physiologist Jean Fernel (ca. 1497–1558) and Hippokrates (ca. 460–ca. 370 B.C.). The right row begins with Podalirius, Aesculapius’ son, who acted as healing God; below Raimundus Lullus, a scholarly Spanish philosopher, linguist, logician and theologian, rises above. They all rest on the imperturbable fundament of the Greek scholar and famous physician Galen (129–201/215). Compared with Croll an important change attracts attention: The self-assured Woodall has replaced the microcosm as a mirror image of the macrocosm through the portrait of his own, of the proud creator of the book, who presents the wide world of navigation, the medical

⁷²Sudhoff (1922–1933), vol. 9 (1925), p. 46 (to find out the things, so take a part of wood, this is a body, let it burn, so what is burning that is the sulphur, what there is smoking that is the mercury, what becomes ash that is salt); - for the theory and practice of the Paracelsian doctrine cf. Dilg/Rudolph (1993); - Dilg/Rudolph (1995); - Benzenhöfer (2005) p. 1101–1105.

⁷³Croll (1609): “In fine libri additus est [...] Tractatus nouus de Signaturis internis rerum, seu de vera et viva anatomia maioris et minoris mundi”.

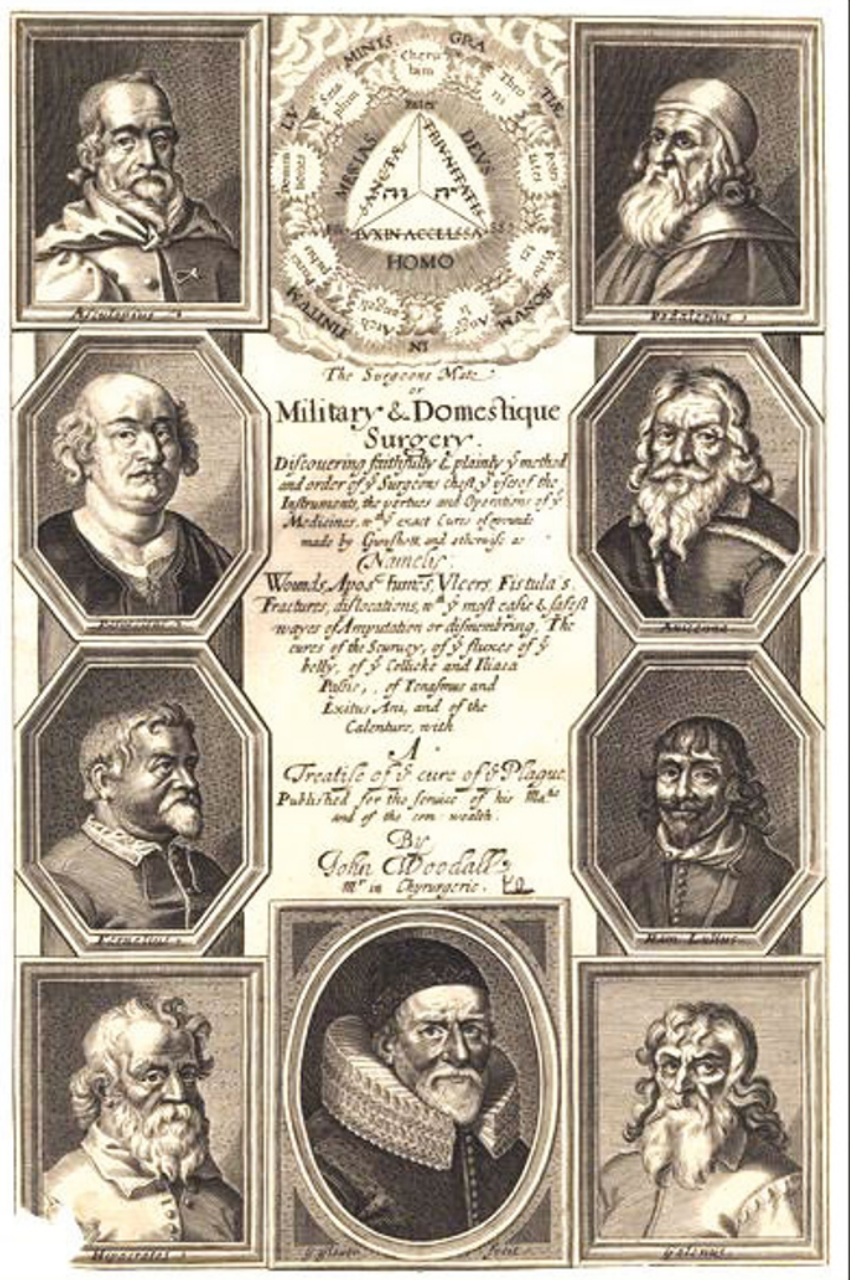


Fig. 9: Title page of the 2nd edition of the "Surgeons Mate" (Woodall, 1639).

conditions aboard as well as surgical operations and the details of adequate application of drugs at this place, instead of Croll's encrypted microcosmos. With the help of this reinterpretation Woodall decidedly dissociates from the alchemical speculations and rich imagery of his interpretations which can be found in Croll's "Basilica chymica" in a high

degree. In his practical activity Woodall disapproved resolutely of explanations or suppositions which went beyond reality; his own experience he accepted more than unchecked adoptions of theoretical instructions or traditional doctrines (Fig. 9).

So the difference between Croll's alchemical/chemical explanations and Woodall's empirical-practical methods cannot be overlooked, even if the title pages look alike. Woodall refers Croll only twice: first in a saying of Croll's book "*Basilica Chimica (Preface)*", where Croll concerns himself with the "mysteries or hidden vertues" of the medicines⁷⁴, and second in the praise of Croll's very strong remedy "*Laudanum opiat Paracelsi*" (p. 227ff), which Croll had described after the Paracelsian composition in great detail. The strong-acting preparation contained Opium, the latex of the seed capsules of *Papaver somniferum* (opium poppy)/*Papaveraceae*, as main constituent amongst many vegetable and chemical components. Woodall was devoted to the precious preparation on several pages (p. 224–232) and did not give up presenting his own experience: on the one hand he emphasized Laudanum opiatum as the most efficient remedy, but on the other hand he stressed the most dangerous effects of the therapy with opiats; he asked the sea surgeons for careful use with the ambivalent preparation and at the same time he gives infallible rules to distinguish the false and true compositions of Laudanum. Woodall's far-reaching personal experience with the undesirable effects of this Paracelsian medicine clearly appears in his apology before the Society of Physicians in London and demonstrates his conscientiousness concerning the medical therapy at sea on the whole:

"[...] In a word this Laudanum passeth all other medicines in the cure of Disentery, for which cause I haue published it to the benefit of the yonger sort of Surgeons, which aduenture their liues toward the East Indies; I know it is presumption in my selfe and deserues blame, that I should handle medicines of this nature so copiously, for which I craue pardon from the graue and learned Society of Physicians of London, whom of right I ought to reuerence, and do: excusing my selfe that I haue done it meerey for the behoefe of young Sea-Surgeons in the remote parts of the world, where they otherwise haue vsed Opium in common, without vnderstanding the danger or dose thereof, to the losse of many mens liues" (p. 227).

Also the four lines that Woodall added at the end of the book show Woodall's critical opinion on the alchemical theory: "*Alchimia est ars sine arte/ cuius subiectum est pars cum parte./ Proprium eius probè mentiri/ et ultimo mendicatum iri.*" The quotation corresponds with the almost identical verses of Andreas Libavius⁷⁵, an opponent of Paracelsus, and Joseph Hall⁷⁶, however there is an important difference: Libavius defines alchemy as "*scientia sine arte*", but as Hall also Woodall describes alchimia as "*ars sine arte*", and depreciates this area of natural philosophy plainly and distinctly expresses his disdain for this field of knowledge⁷⁷.

⁷⁴ "qualitates non semper considerandae sed earum arcana, The simple and apparant qualities of Medicines are not always respected alone, but rather companion to their mysteries or hidden vertues" (Woodall (1617) p. 196.

⁷⁵ Libavius (1599, p.126), see also Commentary 1, p. 270 and Index of sentences, p. 336.

⁷⁶ "Alchymia est ars sine arte, cuius scire est pars cum parte; medium est strenue mentiri; finis mendicatum iri." (Hall, 1607, p. 154).

⁷⁷ cf. Newman/Principe: (1998) 32–65; - Prinke (2010) p. 175–231; - see also Kopp (1886, part II, p. 197) where Kopp cites the verses of the alchemical poem as "*geflügeltes Wort*" and calls the Jesuit Jacob Gretser (1562–1625) as one of their creators (biographical information about Gretser see NDB vol. 7 (1966) p. 51–53).

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|---|---|----|----|----|----|----|----|-------------------|--|--|--|----|----|----|----|----|----|----|----|
| 1 | 5 | 9 | 13 | 17 | 22 | 27 | 32 | Lowest part part | | | | 38 | 44 | 49 | 54 | 59 | 63 | 67 | 71 |
| 2 | 6 | 10 | 14 | 18 | 23 | 28 | 33 | of the Chest | | | | 39 | 45 | 50 | 55 | 60 | 64 | 68 | 72 |
| 3 | 7 | 11 | 15 | 19 | 24 | 29 | 34 | with the order of | | | | 40 | 46 | 51 | 56 | 61 | 65 | 69 | 73 |
| 4 | 8 | 12 | 16 | 20 | 25 | 30 | 35 | every medicine | | | | 41 | 47 | 52 | 57 | 62 | 66 | 70 | 74 |
| | | | | 21 | 26 | 31 | 36 | | | | | 42 | 48 | 53 | 58 | | | | |
| | | | | | | | 37 | | | | | 43 | | | | | | | |

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | | | | | | | | | | |
| 89 | 91 | 94 | 97 | 100 | 103 | 106 | 109 | 112 | 115 | Upper part | | | | 118 | 121 | 124 | 127 | 130 | 133 | 136 | 139 | 142 | 145 |
| 92 | 95 | 98 | 101 | 104 | 107 | 110 | 113 | 116 | of the Chest | | | | 119 | 122 | 125 | 128 | 131 | 134 | 137 | 140 | 143 | | |
| 90 | 93 | 96 | 99 | 102 | 105 | 108 | 111 | 114 | 117 | | | | | 120 | 123 | 126 | 129 | 132 | 135 | 138 | 141 | 144 | 146 |
| 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 | | | | | | | | | | |

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|-----------------------------------|------------------------------|----------------------------|----------------------------|
| 1. Electrarium Diatrion piperion. | 5. Pulvis restringens minus. | 9. Unguentum contra ignem. | 13. Unguentum Martiatum. |
| 2. Theriaca Diatessera. | 6. Unguentum Diatheae. | 10. Axungia Cerui. | 14. Unguentum Aegyptiacum. |
| 3. Theriaca Londinensis. | 7. Unguentum Album. | 11. Axungia Porcina. | 15. Unguentum Potabile. |
| 4. Therebinthina Venetiae | 8. Unguentum Populeon. | 12. Unguentum Arragon. | 16. Unguentum Pectorale. |
| 17. Unguentum diapompholigos. | 22. Diascordion. | 27. Mel depuratum. | 32. Caustike liquid. |
| 18. Unguentum Aureum. | 23. Conserva rosarum. | 28. Rhabarbarum electum. | 33. Lapis infernalis. |
| 19. Linamentum Arcei. | 24. Conserva barberis. | 29. Conserva prunellorum. | 34. Puluis arthreticus. |
| 20. Oleum Lauri. | 25. Conserva Citoniorum. | 30. Pulpa tamarindarum. | 35. Puluis alchemisticus. |
| 21. Mel saponis. | 26. Confectio Hamek | 31. Succus Acatiae. | 36. Lapis medicamentosus |
| | | | 37. Crocus martis |

John Woodall's Surgeons Mate in the Second Edition of 1639

The second edition, printed in 1639, contains Woodall's complete work on navy medicine, which in contrast to the edition of 1617 is accompanied by some short treatises, which had been published as independent papers: so his study of surgical treatments named "Viaticum", a treatise this was published first in 1628 and mainly deals with the surgical treatment of gunshot wounds.⁷⁸ The text agrees with the corresponding passages in Woodall's work of 1617, but in the second edition of 1639 the chapter is enlarged and supplied with a picture of the surgical instrument which Woodall had constructed and had used as an improved trepan.⁷⁹ Furthermore the second edition includes a Treatise on the Plague⁸⁰, however this essay fails to meet the special experience about the epidemic control, which beyond doubt Woodall awarded himself. The work is chiefly composed of many antidots and drugs, whose preparations usually are copied from other works and show only a few of Woodall's personal observations. One exception however is his recommendation of a mineral secret remedy, called Aurum Vitae, which probably included gold as the name hints. Above all Woodall made good use of it during the plague epidemic at London in 1638. At the end of his book Woodall added a few records about the successful effect of his therapy with that secret in 1638.⁸¹

Conclusion

Without doubt Woodall ranks among the most important pioneers of medical service at sea and tropical medicine in the seventeenth century. Promoted from simple surgeon to Surgeon General to the East India Company in 1612, he was responsible for the medical care of the complete crew and for acquisition of appropriate equipment and medicine chests aboard the English East India fleet. Not only did he take care for a proper selection of surgical instruments, but also he chose only those remedies that seemed to be fitted and effective for the special conditions of long sea voyages. Above all he realized the advantages of the alchemical-chemical Paracelsian preparations, which he had studied during his medical practice at Germany and which he considered to be very convenient for use at sea. So Woodall recommended a vast number of iatrochemical preparations already at a time when the therapy was mainly limited to the use of aqueous medicaments, electuaries, syrups, pills etc., which not all can keep for a long time. Woodall's remarkable and repeated urgent orders to distribute on board many preparations of citrus fruits, which was because he was absolutely convinced that this was a way to avoid scurvy. Only after more than 100 years did the English ship's doctor James Lind⁸² succeed to prove experimentally what Woodall already had carefully observed and what enabled him to lay the foundation for the causally fight against scurvy.

⁷⁸Woodall (1628)

⁷⁹Woodall (1639), illustration between p. 312 and p. 313; (see list of illustrations, no. 4, p. 340).

⁸⁰Woodall (1639) p. 319–375.

⁸¹For the addition about amputation in the second edition see above, p. 10

⁸²Lind (note 48).