*Gardens' Bulletin Singapore 71(Suppl. 2):87-107. 2019*
doi: 10.26492/gbs71(suppl. 2).2019-08


# Georg Rumphius' *Herbarium Amboinense* (1741–1750) as a source of information on Indonesian plants for Carl Linnaeus (1707–1778)

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ABSTRACT. The *Herbarium Amboinense* (1741–1750) and the supplementary *Herbarii Amboinensis Auctuarium* (1755) of Georg Eberhard Rumpf (Rumphius) (1627–1702) provided detailed descriptions and illustrations of the plants of the island of Ambon, then a Dutch colony in the Maluku Islands (Moluccas) of Indonesia. The initial work, published in six volumes, contained a great deal of new botanical, medicinal and ethnographical information from a part of the world then little-known. Published in the Netherlands long after Rumphius' death by the Director of the Amsterdam Botanic Garden, Johannes Burman, the work appeared prior to Carl Linnaeus' *Species Plantarum* (1753) in which the consistent use of binomial names was introduced. However, in that work, Linnaeus referred to only a handful of Rumphius' species accounts. More detailed studies by Linnaeus of Rumphius' work soon followed, notably in the dissertation *Herbarium Amboinense* (May 1754; November 1759). In all, only about 100 of the nearly 700 taxa illustrated by Rumphius were referred to by Linnaeus in his various publications, though many of those that were cited serve as nomenclatural types for their corresponding Linnaean binomials. The reasons for Linnaeus' apparent neglect of such an important source of novel information are explored.

***Keywords.*** Ambon, Carl Linnaeus, Georg Rumpf, nomenclatural types, *Species Plantarum*

## Introduction

In 2002, on the 300th anniversary of the death of Georg Everhard Rumpf (or Rumphius), the botanist Jan-Frits Veldkamp described him as "the undisputed patriarch of Malesian botany, zoology and geology. No-one has had such a wide and integrated knowledge of these sciences and he was also well-versed in pharmaceutical, architectural, judicial, ethnological, linguistic, historical and religious matters, including astrology and magic". Veldkamp (2002) provided a highly readable review of Rumphius' life and work based on extensive bibliographical research and detailed botanical knowledge of the flora of Indonesia, subsequently complemented by the masterwork on Rumphius' *Herbarium Amboinense* by Beekman (2011).

Born in Germany in 1627 but with a Dutch family background, Rumphius left Europe aboard a ship of the Verenigde Oost-Indische Compagnie (VOC; United East India Company) in 1652, calling at the Cape of Good Hope (where he collected plants), and by the following year was established in Amboina, one of the Spice Islands, at a VOC trading post. Although initially employed as a military engineer, he soon

switched to a civilian role and, by 1662, held an extremely lucrative position as Senior Merchant. He had broad interests in natural history and medicine and the following year started work on the *Herbarium Amboinense*, partly with the aim of improving knowledge of local cures for diseases, and established a Physic Garden. However, a succession of personal disasters were to affect him. In 1670, he fell blind, and four years later lost his wife and two of his daughters in an earthquake. With the help of his son and assistants from the VOC, Rumphius had continued working but, in 1687, fire destroyed the town of Amboina and with it his library and most of his manuscripts. A significant part of the manuscript and drawings of *Herbarium Amboinense*, however, survived. The initial part of the work was sent to Batavia in 1690 where a meticulous copy was made, a decision that proved both fortunate and prescient because the original manuscript was lost when the ship carrying it to the Netherlands was sunk by the French in 1692. Rumphius continued to prepare additional material for the book, the final part of the manuscript reaching the Netherlands safely in August 1697. In it were described and illustrated some 1200 species, most of them of some practical, medicinal or economic use.

Once in its hands, however, the VOC was initially reluctant to see it published, presumably out of fear that rival colonial powers, learning more about the valuable natural products of the area, might try to supplant the Dutch. Five years later, in 1702 (and at about the same time that Rumphius died), the Company relented but their terms for permitting publication were onerous (there could be no cost to the Company) and it would be 1736 before Johannes Burman, the youthful Director of the Amsterdam Botanic Garden, took on the task of making Rumphius' work available to a wider audience.

## Linnaeus in the Netherlands

At this point, the Swedish botanist Carl Linnaeus enters the picture. He had left Sweden, accompanied by his friend Claes Sohlberg, for the Netherlands in early June 1735, primarily to obtain a medical degree. During a four-day stay in Amsterdam, they visited the Botanic Garden and briefly met Burman. Linnaeus and Sohlberg then sailed to the small Dutch town of Harderwijk where Linnaeus registered at the University, handed in a thesis, submitted an exposition on two of Hippocrates' Aphorisms, diagnosed a case of jaundice and was accepted as a medical candidate. His thesis was then sent for printing and, three days later, Linnaeus defended it at a public examination and was awarded the degree of doctor, all within a week.

In July, Linnaeus paid a return visit to Burman in Amsterdam. The two men took a liking to one another and Linnaeus accepted an invitation to stay in Burman's house and to assist him with the preparation of the latter's *Thesaurus zeylanicus* (Burman, 1737b), an account of the plants of Sri Lanka. In turn, Burman helped Linnaeus with the latter's manuscripts of *Bibliotheca Botanica* (Linnaeus, 1736a) and *Fundamenta botanica* (Linnaeus, 1736b) that he had brought with him from Sweden, and Linnaeus was given free access to Burman's fine library and collections. However, despite the

attractions of Burman's house and hospitality, Linnaeus was severely short of money and, in September 1735, he accepted the offer of a generous salary from the Anglo-Dutch banker (and a Director of the VOC), George Clifford, and moved out to live on his large estate, the Hartekamp, near Haarlem, as Clifford's personal physician, and Superintendent of his stunning gardens and hothouses.

## Publishing Rumphius' manuscripts

At the time that Linnaeus left Amsterdam, Burman was attempting to persuade the VOC to allow him to edit and publish Rumphius' manuscripts but it was only a year later, in August 1736, that Burman was finally able to lay hands on them. Burman's letters to the Swede give a commentary on his progress in preparing the work for publication (which involved providing a parallel Latin text alongside the original Dutch, as well as commissioning engravings from Rumphius' original coloured drawings).

On 26 September, Burman (1736) wrote to congratulate Linnaeus on the latter's return to the Netherlands from his short visit to England, and informed him that if the printing of his own *Thesaurus Zeylanicus* could be completed in the following year, he would then think about starting to edit Rumphius' manuscript. From subsequent letters, it seems that Burman did not begin work on them until 1737 at the earliest (and probably later). Around 5 April, Burman (1737a) wrote that he had found four booksellers interested in printing the *Herbarium Amboinense*, as well as four engravers "but these scoundrels are so expensive and have so high opinion of themselves, that they demand 25 florins for each plate. So, with the whole work consisting of more than 800 plates, the plates alone would cost more than 20,000 florins". Burman wrote that he intended to try to get the printing started in a more economical way.

Linnaeus and Burman continued to keep in close contact, with Burman evidently a regular visitor to the Hartekamp. However, Linnaeus' visits to Amsterdam seem to have been less frequent and it is clear that Clifford was keeping his employee hard at work, chiefly in preparing the *Hortus Cliffortianus* (Linnaeus, 1738), an account of the plants growing in Clifford's garden accompanied by fine copperplates executed by the artist Georg Dionysius Ehret. After its completion, Linnaeus spent the winter of 1737–1738 in Leiden, working on a new systematic arrangement for the Botanic Garden with its Director, Adriaan van Royen, and also helped the botanist Johan Gronovius with a study of a collection of plants from Virginia made earlier by the British-born Clerk of Gloucester County, John Clayton (see Gronovius, 1739–1743; Jarvis, 2007: 134, 182–183, 198–199). In May 1738, Linnaeus finally left the Netherlands for home.

After Linnaeus' arrival in Sweden, Burman (1738) wrote to him indicating that the printing of his own *Rariorum Africanarum Plantarum* (Burman, 1738–1739) was well-advanced. Once completed, he hoped to start with the *Herbarium Amboinense* and, the following spring, Burman (1739) wrote that he had made an agreement with a bookseller to print Rumphius' book by subscription.

There follows a long hiatus of some 15 years in the correspondence between Burman and Linnaeus. It is clear that Burman was angry with the Swede, particularly

because Linnaeus had failed to give him a long-promised set of specimens that Linnaeus had collected in Lapland in 1732 (see Jarvis, 2007: 65–67, 176–177). Linnaeus' great friend Abraham Bäck, President of the Swedish Collegium, met Burman in the Netherlands in 1742 and reported that Burman was unhappy with Linnaeus, from whom Burman felt he had deserved better treatment after having provided him with free accommodation in his house for so long. In comparison with Adriaan van Royen and Johan Gronovius, Burman felt he had been treated by Linnaeus in an unfriendly and ungenerous way. No further exchange of letters between Burman and Linnaeus is known until 1754.

## Rumphius' *Herbarium Amboinense* and Linnaeus' *Species Plantarum*

In the meantime, Burman arranged for the publication of Rumphius' book in six volumes which appeared at intervals between 1741 and 1750 (vols 1 and 2 in 1741; 3 and 4 in 1743; 5 in 1747 and 6 in 1750). However, Linnaeus was apparently unable to see or acquire copies of them until 1753, the year in which the Swede's ground-breaking *Species Plantarum* (Linnaeus, 1753a) was published. Linnaeus was desperate to be able to include Rumphius' new species in an Appendix to it and, in an effort to procure the book, he sent three letters in a single week to Abraham Bäck. On 25 May (Linnaeus, 1753b) asked Bäck to send him a copy "well-packed, by a ship bound for Uppsala if you have no faster possibility". Four days later, Linnaeus (1753c) repeated his request, stressing the urgency of his request. However, the six volumes evidently failed to arrive because, three days later, Linnaeus (1753d) wrote again, this time in an exasperated tone, pointing out that as Lars Salvius would soon have completed the printing of the *Species Plantarum*, there would shortly be no possibility of including any information in it from Rumphius' book. Linnaeus also proposed asking Count Carl Gustaf Tessin to help him obtain it.

This last letter seems finally to have done the trick for, in a letter dated 5 August, Linnaeus (1753f) thanked Tessin for his gift of the six volumes of Rumphius' work, which had been delivered by Bäck. Linnaeus had read the books and was impressed by the author's descriptions of locations, qualities and nature.

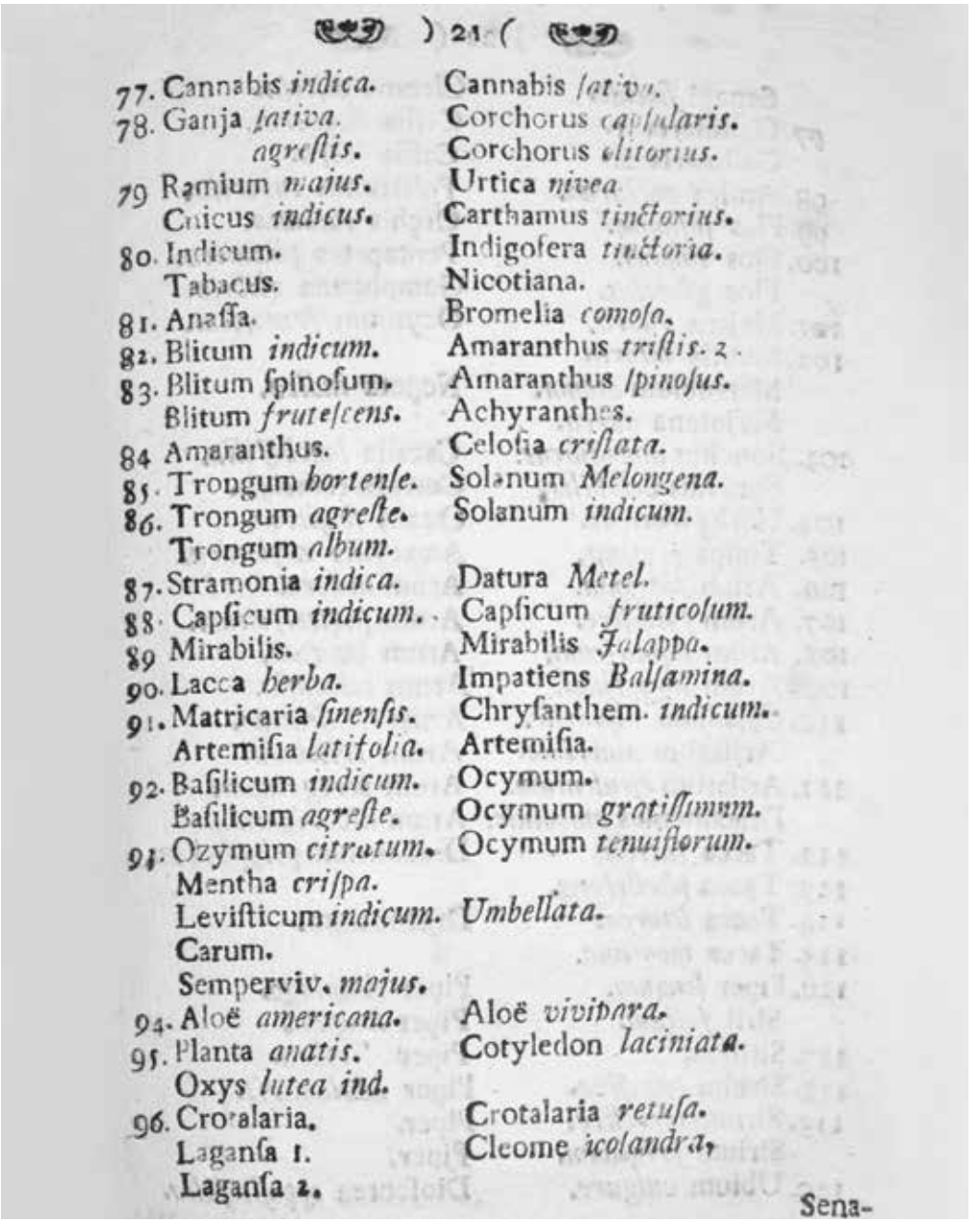
*Species Plantarum* comprised two volumes, the first appearing on 1 May 1753, prior to receipt of the six Rumphius volumes. By the time they arrived, printing of the second volume (pp. 561–1189, with an Appendix (pp. 1190–1199) and Addenda (p. 1200), published in August 1753) was well advanced as the 15 included Rumphius references are all near the end. A Rumphian fern ('Millefolium aquaticum') was listed (p. 1070) by Linnaeus as a synonym of his *Acrostichum siliquosum* (a species he believed he had already seen in Paul Hermann's Ceylonese collections), and accounts of six of Rumphius' palms are cited (pp. 1187–1189), but only as additional synonyms for species which Linnaeus believed he already knew from other published sources, notably Hermann (1698, 1717) and Rheede (1678–1693). Seven of the remaining references to Rumphius appear in the Appendix and, while three are cited as synonyms, four Linnaean binomials (*Convolvulus peltatus* (p. 1194), *Croton variegatus*

("*variegatum*"), *Quercus molucca* (both p. 1199) and *Rubus moluccanus* (p. 1197) were based solely on Rumphius' accounts, as was that of *Hibiscus surattensis* in the Addenda. Appended to the account of *Croton variegatus* is a statement confirming that Linnaeus did not obtain a copy of *Herbarium Amboinense* until after the printing of *Species Plantarum* had been completed ('Opus eximium beati Rumfii... ad me accessit primum absolute a typographo opera, cujus itaque synonyma alibi seorsim tradere animus est.'). Also in the Appendix, Linnaeus coined *Rumphia amboinensis* (p. 1193) in honour of Rumphius (unfortunately a name based on a description and plate of Rheede that has caused great difficulties of interpretation to later botanists).

An intriguing aspect, however, concerns volume one of *Species Plantarum*. As noted by Merrill (1917) and Veldkamp (2002), although published before Linnaeus acquired his copy of *Herbarium Amboinense*, the protologues of five species contain explicit references (page and plate numbers) to the first volume (1741) of Rumphius' book, raising the question as to how Linnaeus could have obtained this information. The protologue of *Garcinia mangostana* (Linnaeus, 1753a: 443–444) offers no clues; in an earlier account of this species (Linnaeus, 1738: 182), there is no mention of Rumphius. However, two of the other names, *Cynometra cauliflora* and *C. ramiflora* (Linnaeus, 1753a: 382), contain reference to earlier accounts in Linnaeus' *Decem Plantarum nova Genera* (Linnaeus, 1741: 78–79) and *Flora Zeylanica* (Linnaeus, 1747: 74, nos 166, 167) in both of which the corresponding Rumphius figures are cited. The 1747 descriptions are accompanied by a statement indicating that Linnaeus had seen images of both species among the drawings of Paul Hermann's Ceylon collections (four volumes of specimens and one of drawings had been borrowed by Linnaeus and formed the basis for this publication — see Jarvis, 2007: 87, 181–182, 211). Further, he indicates that these were copied from Rumphius drawings ("pulchre etiam delineata a Rumpfio" and "itidem a Rumpfio tradita"). Comparison of the Hermann drawings consulted by Linnaeus (now at the Natural History Museum in London) and Rumphius' published plates, however, show little evidence of linkage. Perhaps examination of Rumphius' original drawings (in various archives in the Netherlands) would shed some light on this question. Van Andel et al. (2018) have recently demonstrated strong links between Rumphius' drawings and specimens and Paul Hermann's collections so it seems likely that the key to the puzzle lies here somewhere (though it is still unclear how the page and plate numbers could have been known to Linnaeus).

## Rumphius' *Herbarium Amboinense* and Linnaeus' post-1753 publications

Although only 19 of the ca. 5,900 species names that appeared in *Species Plantarum* made any reference to Rumphius' work, Linnaeus was clearly impressed with it and soon made a more methodical study of the plants it described and depicted. This appeared in the form of a dissertation, entitled *Herbarium Amboinense* (Linnaeus, 1754), written by Linnaeus and defended on 11 May 1754 by his student, Olaf Stickman. The work has a twin-column format with Rumphius' plates listed in sequence in the left-hand column and, in the right-hand column, observations by Linnaeus (Fig. 1). These



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| | |
|---|---|
| 77. Cannabis *indica.* | Cannabis *ſativa.* |
| 78. Ganja *ſativa.* | Corchorus *capſularis.* |
| *agreſtis.* | Corchorus *olitorius.* |
| 79 Ramium *majus.* | Urtica *nivea* |
| Cnicus *indicus.* | Carthamus *tinctorius.* |
| 80. Indicum. | Indigofera *tinctoria.* |
| Tabacus. | Nicotiana. |
| 81. Anaſſa. | Bromelia *comoſa.* |
| 82. Blitum *indicum.* | Amaranthus *triſtis.* 2. |
| 83. Blitum ſpinoſum. | Amaranthus *ſpinoſus.* |
| Blitum *fruteſcens.* | Achyranthes. |
| 84 Amaranthus. | Celoſia *criſtata.* |
| 85. Trongum *hortenſe.* | Solanum *Melongena.* |
| 86. Trongum *agreſte.* | Solanum *indicum.* |
| Trongum *album.* | |
| 87. Stramonia *indica.* | Datura *Metel.* |
| 88. Capſicum *indicum.* | Capſicum *fruticoſum.* |
| 89 Mirabilis. | Mirabilis *Jalappa.* |
| 90. Lacca *herba.* | Impatiens *Balſamina.* |
| 91. Matricaria *ſinenſis.* | Chryſanthem. *indicum.* |
| Artemiſia *latifolia.* | Artemiſia. |
| 92. Baſilicum *indicum.* | Ocymum. |
| Baſilicum *agreſte.* | Ocymum *gratiſſimum.* |
| 93. Ozymum *citratum.* | Ocymum *tenuiflorum.* |
| Mentha *criſpa.* | |
| Leviſticum *indicum.* | *Umbellata.* |
| Carum. | |
| Semperviv. *majus.* | |
| 94. Aloë *americana.* | Aloë *vivipara.* |
| 95. Planta *anatis.* | Cotyledon *laciniata.* |
| Oxys *lutea ind.* | |
| 96. Crotalaria. | Crotalaria *retuſa.* |
| Laganſa 1. | Cleome *icolandra,* |
| Laganſa 2. | |

Sena-

**Fig. 1.** A page from the Linnaean dissertation *Herbarium Amboinense* (1754: 21) showing the twin-column format with the plate number (from volume 5) and Rumphian name to the left, and the corresponding Linnaean binomial to the right. Although most of the listed binomials had been published a year earlier, *Bromelia comosa* L., *Capsicum fruticosum* L. and *Aloë vivipara* L. appear here for the first time. (Reproduced with kind permission of the Linnean Society of London).

sometimes take the form of references to publications by other authors (particularly Rheede), but well over 300 of Rumphius' plants are allocated a Linnaean binomial name. Although most of these binomials had already been published the previous year in *Species Plantarum* (understandably without any reference to Rumphius), thirty binomials were newly published in this dissertation, validated by the references to Rumphius' descriptions and illustrations. Fig. 1 shows the place of original publication of three binomials, *Bromelia comosa* L., *Capsicum fruticosum* L. and *Aloë vivipara* L.; the Rumphius plate on which the first of these is based is shown in Fig. 2.

Shortly after the dissertation appeared, the correspondence between Burman and Linnaeus resumed, with the Dutchman reporting (Burman, 1754) that he was now working on a supplementary volume of Rumphius' work, the *Auctuarium,* which he hoped would be published shortly. Linnaeus responded by sending Burman a copy of his recent *Herbarium Amboinensis* dissertation and Burman (1755) subsequently responds that he has sent, as a gift, a copy of the *Auctuarium* (Rumphius, 1755). This included a further 30 descriptions and plates, accompanied by an index to the names featured in both it and the previous six volumes of Rumphius' publication (and incorporating most of Linnaeus' identifications — see Fig. 3).

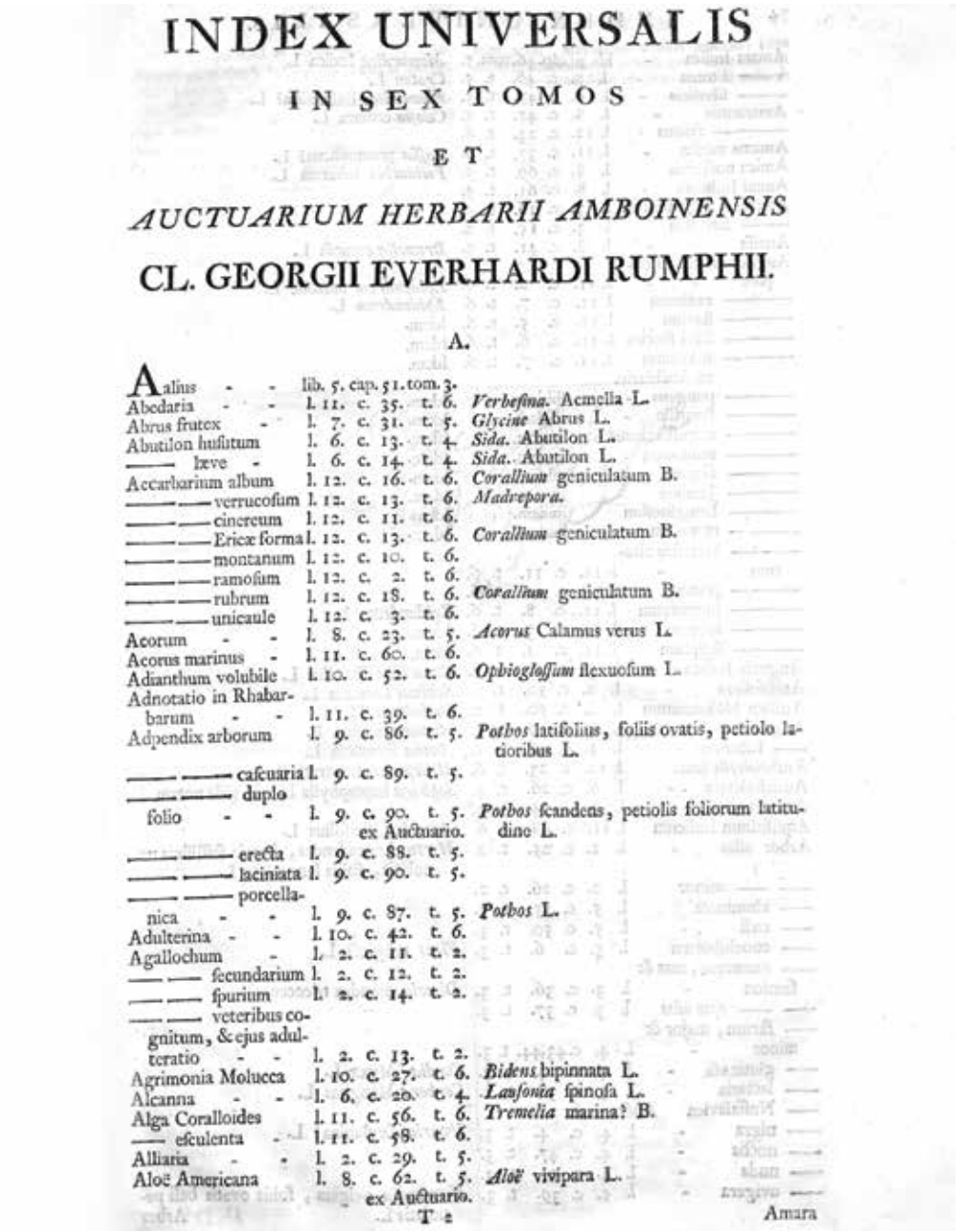
In a revised version of the original 1754 dissertation (Linnaeus, 1759b), Linnaeus added identifications for some of the plates of the *Auctuarium*, as well as revising and correcting some of the determinations he had published previously for species featured in the initial six volumes. Seven new binomials were published here, including *Canarium indicum* L., *Casuarina equisetifolia* L., *Phaseolus cylindricus* L. and *Lagerstroemia chinensis* L. Linnaeus also added a list of Rumphius' plants organised following the Linnaean sexual system.

A further 35 new binomials, based at least partly on Rumphius plates, were published in other Linnaean publications. They include, for example, *Dolichos sinensis* (Linnaeus, 1756), *Epidendrum terrestre* (Linnaeus, 1759a), *Menispermum crispum* (Linnaeus, 1763), *Chalcas paniculata* (Linnaeus, 1767) and *Xylophylla longifolia* (Linnaeus, 1771), so it seems clear that Linnaeus continued to consult Rumphius' work over an extended period. Further evidence for this is provided by an unpublished draft, in Linnaeus' hand, of a treatment of *Zalacca*, a new palm genus containing six species (Linnaeus, undated; Fig. 4). Both the generic name and the specific epithets of each of the species, are taken from Rumphius (1747, vol. 5). All of these 'new' species had been treated as unnamed varieties of *Calamus rotang* L. by Linnaeus (1762: 463) suggesting that this page represents a later reappraisal by Linnaeus of these palms with the conclusion that they were both specifically and generically distinct. 'Zalacca' was subsequently validated by Reinwardt (1830).

## Annotated publications in Linnaeus' library

Linnaeus' own copy of Rumphius' *Herbarium Amboinense* survives in his Library at the Linnean Society of London, as does a copy of Linnaeus' 1754 dissertation, both of which carry some annotations by him. Rumphius' plates often bear binomial

**Fig. 2.** 'Anassa domestica' from *Herbarium Amboinensis* (5: t. 81. 1747), the basis (and the nomenclatural type) of *Bromelia comosa* L., now *Ananas comosus* (L.) Merr., the pineapple, an early introduction from the New World. (From the collections of the Natural History Museum, London and here licensed under a Creative Commons Attribution licence (CC-BY)).



# INDEX UNIVERSALIS

## IN SEX TOMOS

## ET

## *AUCTUARIUM HERBARII AMBOINENSIS*

## CL. GEORGII EVERHARDI RUMPHII.

### A.

| | | |
|---|---|---|
| Aalius - - | lib. 5. cap. 51. tom. 3. | |
| Abedaria - - | l. 11. c. 35. t. 6. | *Verbesina.* Acmella L. |
| Abrus frutex - | l. 7. c. 31. t. 5. | *Glycine* Abrus L. |
| Abutilon hirsutum | l. 6. c. 13. t. 4. | *Sida.* Abutilon L. |
| —— læve - | l. 6. c. 14. t. 4. | *Sida.* Abutilon L. |
| Accarbarium album | l. 12. c. 16. t. 6. | *Corallium* geniculatum B. |
| —— verrucosum | l. 12. c. 13. t. 6. | *Madrepora.* |
| —— cinereum | l. 12. c. 11. t. 6. | |
| —— Ericæ forma | l. 12. c. 13. t. 6. | *Corallium* geniculatum B. |
| —— montanum | l. 12. c. 10. t. 6. | |
| —— ramosum | l. 12. c. 2. t. 6. | |
| —— rubrum | l. 12. c. 18. t. 6. | *Corallium* geniculatum B. |
| —— unicaule | l. 12. c. 3. t. 6. | |
| Acorum - - | l. 8. c. 23. t. 5. | *Acorus* Calamus verus L. |
| Acorus marinus - | l. 11. c. 60. t. 6. | |
| Adianthum volubile | l. 10. c. 52. t. 6. | *Ophioglossum* flexuosum L. |
| Adnotatio in Rhabarbarum - - | l. 11. c. 39. t. 6. | |
| Adpendix arborum | l. 9. c. 86. t. 5. | *Pothos* latifolius, foliis ovatis, petiolo latioribus L. |
| —— cascuaria | l. 9. c. 89. t. 5. | |
| —— duplo folio - - | l. 9. c. 90. t. 5. ex Auctuario. | *Pothos* scandens, petiolis foliorum latitudine L. |
| —— erecta | l. 9. c. 88. t. 5. | |
| —— laciniata | l. 9. c. 90. t. 5. | |
| —— porcellanica - - | l. 9. c. 87. t. 5. | *Pothos* L. |
| Adulterina - - | l. 10. c. 42. t. 6. | |
| Agallochum - | l. 2. c. 11. t. 2. | |
| —— secundarium | l. 2. c. 12. t. 2. | |
| —— spurium | l. 2. c. 14. t. 2. | |
| —— veteribus cognitum, & ejus adulteratio - - | l. 2. c. 13. t. 2. | |
| Agrimonia Molucca | l. 10. c. 27. t. 6. | *Bidens* bipinnata L. |
| Alcanna - - | l. 6. c. 20. t. 4. | *Lawsonia* spinosa L. |
| Alga Coralloides | l. 11. c. 56. t. 6. | *Tremella* marina? B. |
| —— esculenta - | l. 11. c. 58. t. 6. | |
| Alliaria - - | l. 2. c. 29. t. 5. | |
| Aloë Americana | l. 8. c. 62. t. 5. ex Auctuario. | *Aloë* vivipara L. |



**Fig. 3.** Johannes Burman's 1755 Index to the names in both *Herbarium Amboinense* (1741–1750) and *Auctuarium Herbarii Amboinensis* (1755) correlated with (right hand column) binomials coined by Linnaeus ('L') and himself ('B'). This is the earliest instance of the adoption of Linnaean binomials by an author other than Linnaeus. (Reproduced with kind permission of the Linnean Society of London).

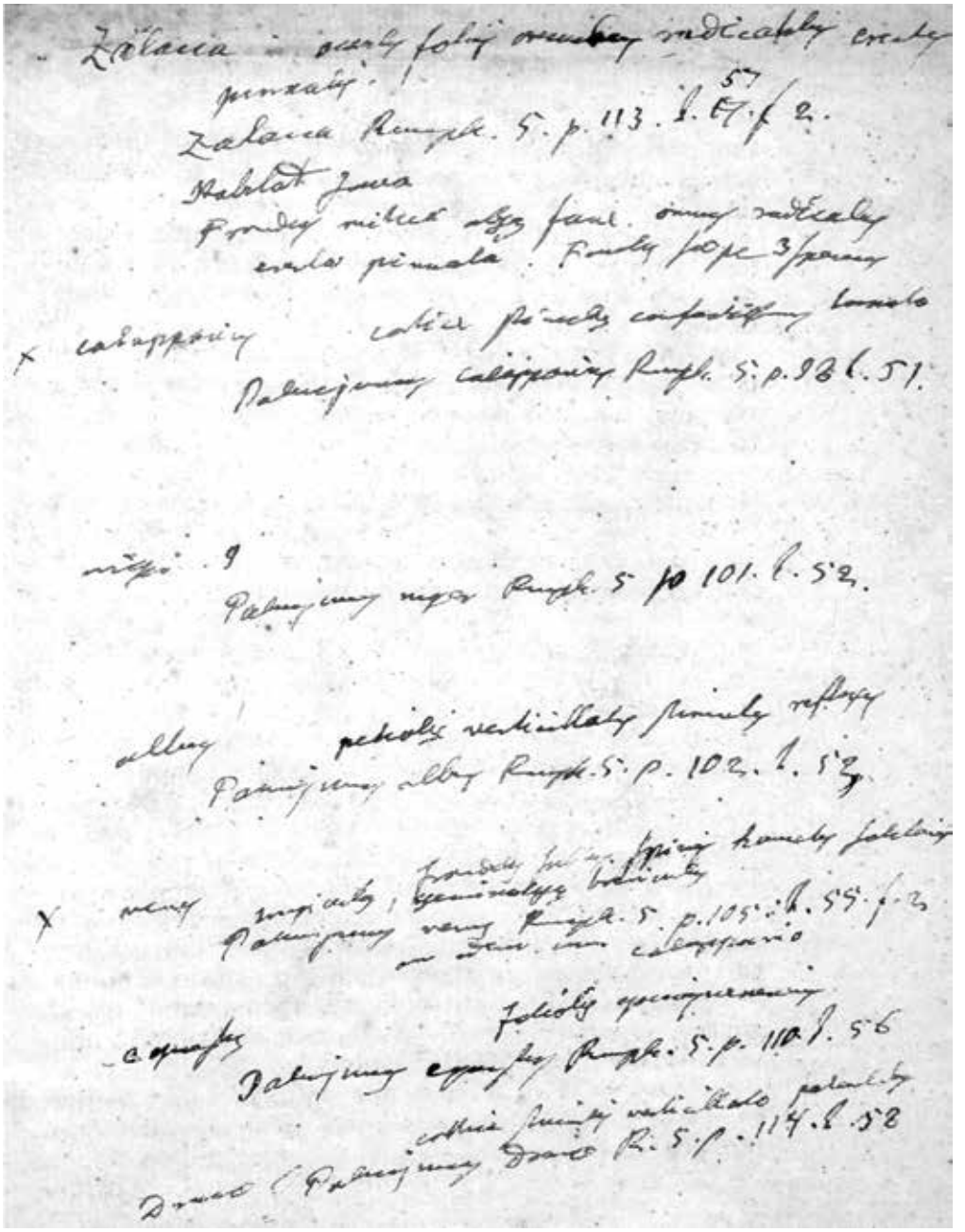


**Fig. 4.** Manuscript fragment in Linnaeus' hand of an unpublished draft for a new palm genus 'Zalacca' and its six species, all based on species described and figured by Rumphius. (LM/LP/BOT 6/8, reproduced with kind permission of the Linnean Society of London).

names added in a tiny script at the base of the plates, these identifications generally matching those published in the 1754 dissertation and its 1759 successor. However, some binomials that first appeared in later Linnaean works are also present, e.g. *Stipa spinifex* L. (Linnaeus, 1767). There are some additions and discrepancies, and evidence of some accidentally introduced errors. For example, based on Rumphius' 'Cepa silvestris' (6: 160, t. 70. f. 1. 1750), Linnaeus (1754: 28) published the new binomial *Pancratium narbonense*, his choice of specific epithet, however, a seemingly inappropriate one for a plant from the Moluccas. A year earlier (Linnaeus, 1753a: 291), Linnaeus had published the name *Pancratium amboinense* based on a description of material in cultivation in Amsterdam (Commelin, 1697: 77, t. 39). In Linnaeus' own copy of Rumphius' book (Fig. 5 & 6), t. 60, f. 1 is annotated as *P. amboinense*, not *P. narbonense*, while in his copy of the 1754 dissertation, Linnaeus has crossed out '*narbonense*' and replaced it with '*amboinense*' (Fig. 7). It therefore seems clear that the use of '*narbonense*' arose accidentally, perhaps as a result of a misreading of Linnaeus' handwriting by the printer.

## Rumphius specimens

Although it is unclear whether Rumphius had his own herbarium, no such specimens appear to have survived (Baas & Veldkamp, 2014). However, in 1682, Rumphius sent from Amboina to the Grand Duke of Tuscany, Cosimo III, six large wooden boxes, well fastened with strong iron bands containing "rare things from afar" which included shells, corals, minerals, fishes, exotic woods and artificial fruit models "fit to satisfy the grand-ducal scientific curiosity" (Martelli, 1903). Three of these terracotta fruit models, apparently of Chinese origin, survive (see Baldini, 2009: 229–230, fig. 1–3) in Florence, along with some plant specimens. The latter are difficult to identify having lost their original labels but two palm fruit collections survive (Chiara Nepi, pers. comm.), one of them identifiable as the species for which Linnaeus was intending to propose the name 'Zalappa calapparius', a species which still bears Rumphius' epithet as *Daemonorops calapparia* (Mart.) Blume.

## Other sources of information on southern Asian plants

Linnaeus' perception of the importance of Rumphius' publication would inevitably have been influenced by how the plant descriptions and illustrations it contained related to the information he already possessed from other sources, both from herbarium specimens and publications.

*The Ceylon specimens of Paul Hermann (1646–1695)*

Paul Hermann made one of the earliest scientific collections of plant specimens from Ceylon (Sri Lanka), where he was Medical Officer to the VOC between 1672 and 1677. Although largely restricted to plants from the area around Colombo, and

including a number of foreign introductions in gardens, the collection is nevertheless of great scientific importance. After his return to Europe, Hermann took up the Chair of Botany at the University of Leiden in 1679 where he spent the rest of his life. Specimens survive in the Netherlands but a separate collection (now at the Natural History Museum in London), comprising four bound volumes containing pressed plants and a volume of drawings, was loaned to Linnaeus (see Jarvis, 2007: 181–182, 211) who set about describing and identifying the many new plants they contained, and the result was his *Flora Zeylanica* (Linnaeus, 1747).

*Jacobus Bontius, Historia Plantarum (1658)*

The earliest significant publication on Indonesian plants is that of the Dutchman Jacobus Bontius (1592–1631) who in 1626 was appointed physician, apothecary and supervisor of surgeons at the VOC's new Javan capital, Batavia. During his time there he produced a number of commentaries on medicinal and biological matters. One on plants, describing 70 species, was subsequently published in 1658, long after Bontius' death, by the physician Willem Piso (1611–1678). The multi-authored publication in which Bontius' account appears has been deservedly described by Beekman (2011) as "one of those omnibus volumes which are the despair of bibliographical scholars". Bontius, the first natural historian to write about Indonesian plants, included descriptions of plants from Java accompanied by a small number of woodcuts. Linnaeus cited descriptions and illustrations from it, e.g. in the protologue of *Piper siriboa* L. (Linnaeus, 1753a: 29) where Bontius' figure is cited, with the species epithet 'siriboa' taken from it. Bontius was commemorated by Linnaeus in the generic name *Bontia*, for a shrub of coastal thickets occurring in the Antilles.

*Hendrik Adriaan van Rheede tot Draakenstein, Hortus Malabaricus (1678–1693)*

A far more significant publication for Linnaeus was that of Hendrik Adriaan van Rheede tot Draakenstein (ca. 1636–1690). A detailed, highly illustrated account in Latin of the plants of the Malabar Coast of India, Van Rheede's 12-volume work contains extensive descriptions, notes on practical uses of the species concerned, and vernacular names in several languages, as well as 794 copperplates (see Nicolson et al., 1988; Manilal, 2003). These species accounts were cited extensively by Linnaeus in his own publications and about 100 of them serve at nomenclatural types for Linnaean binomials.

Apart from publications dedicated to plants from South Asia, accounts of species native to the area also appeared in publications with a slightly different focus (e.g. plants cultivated in botanic gardens). The Dutch were understandably in the forefront of these activities with plants from their colonies being brought into cultivation. Many exotics from the Old World were in cultivation in the Amsterdam garden, some of them featuring in the *Horti medici Amstelodamensis* (Commelin, 1697).

*Paradisus Batavus* (Hermann, 1698), an account of plants growing in the botanic garden at Leiden, similarly included numerous South Asian plants. For instance, an illustrated description of an orchid named 'Orchis amboinensis, floribus albis fimbriatis' is Rumphius' celebrated "Flos susannae", the orchid Rumphius named


**Fig. 5.** 'Cepa sylvestris' from *Herbarium Amboinensis* (6: t. 160, f. 1. 1750, left hand figure) from Linnaeus' own copy of the book, with his annotation 'Pancratium amboinense' in tiny lettering at the base. (Reproduced with kind permission of the Linnean Society of London).

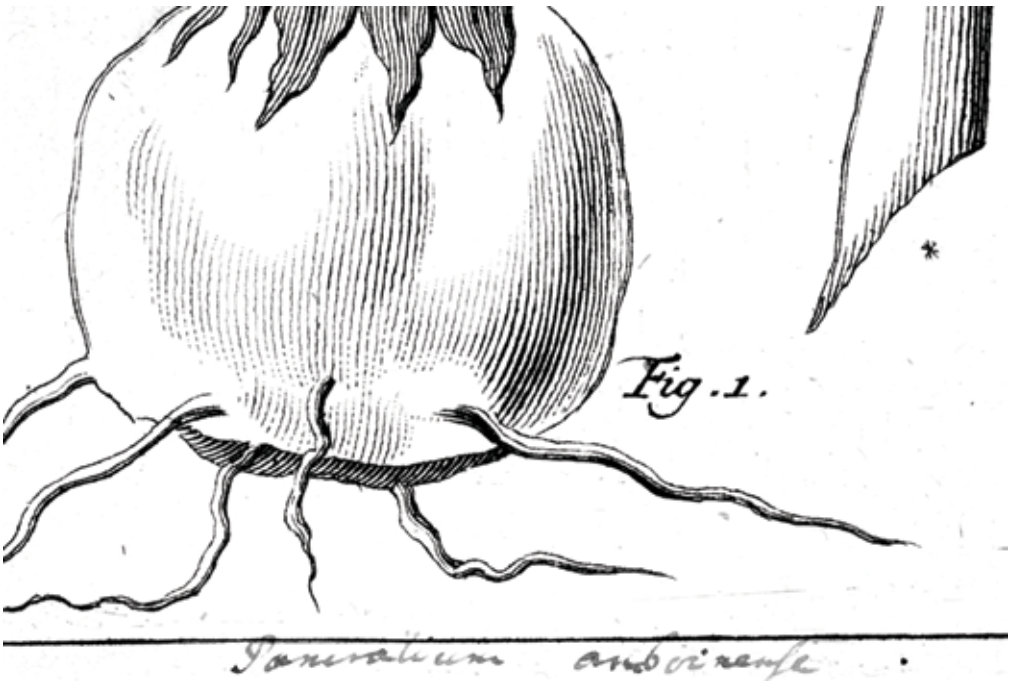


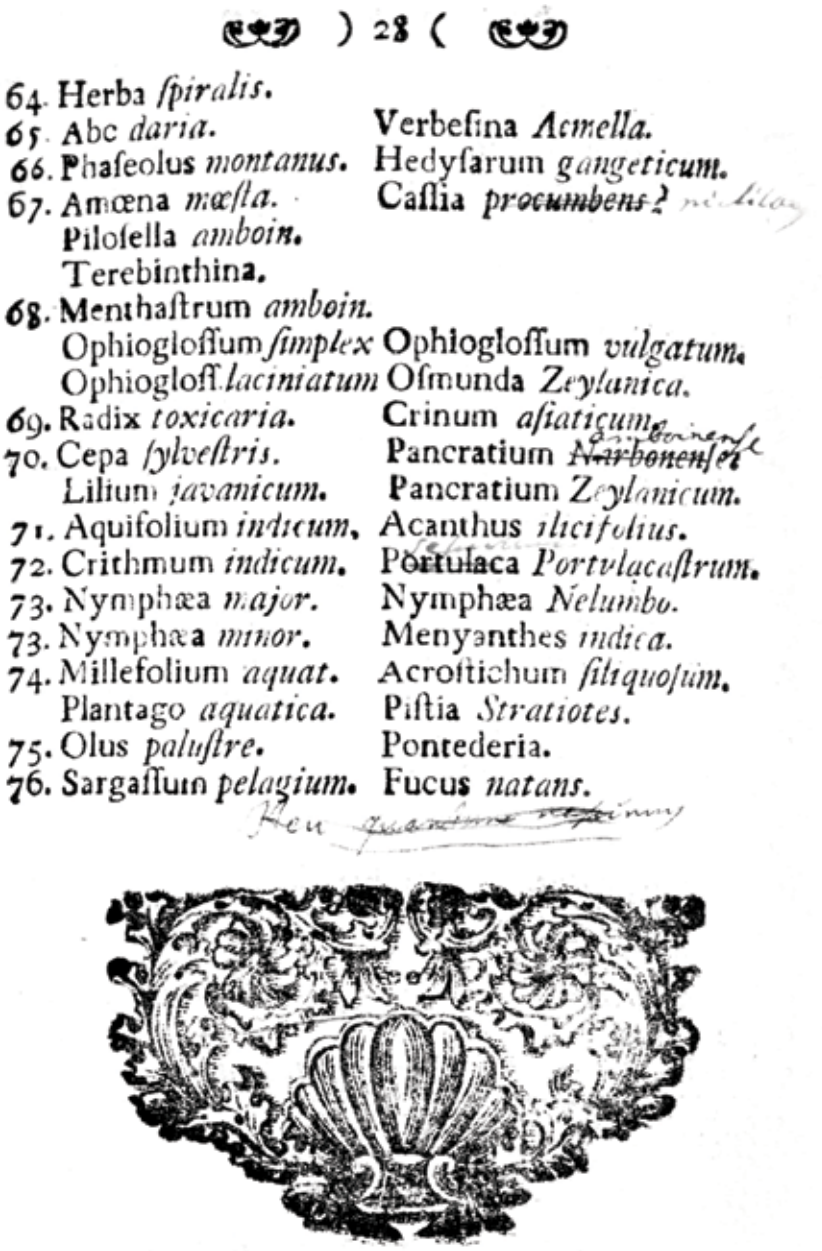

**Fig. 6.** Detail of Figure 5 showing Linnaeus' annotation 'Pancratium amboinense'. (Reproduced with kind permission of the Linnean Society of London).

for his late wife. Hermann noted that as the plant had not yet flowered in the garden, the figure he published had been taken from Rumphius' illustration. Comparison of the Hermann plate with the engraving commissioned by Johannes Burman shows some differences. In publishing the binomial *Orchis susannae* L., Linnaeus evidently drew his information from Hermann's account rather than that of Rumphius.

## Collectors in Britain

Aside from the information obtained directly or indirectly from Rumphian sources, there were people other than the Dutch who were interested in the natural curiosities of Asia. The British collectors, Hans Sloane, Leonard Plukenet and James Petiver, were all assiduous in developing their contacts among traders, surgeons, ships' officers and other travellers to augment their collections. James Petiver, a London apothecary, was particularly single-minded and acquired numerous plant specimens (and, in some cases, drawings of plants) from places such as Madras, Vietnam, islands in the South China Sea such as Pulo Condore, Chusan and Amoy, and the Philippines.

For example, material came to England from Georg Joseph Kamel (1661–1706), a Moravian-born lay brother who travelled to the Philippines in 1688 where he took up the study of natural history and medicine. A correspondent of both John Ray and James



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64. Herba *ſpiralis.*
65. Abc *daria.* Verbeſina *Acmella.*
66. Phaſeolus *montanus.* Hedyſarum *gangeticum.*
67. Amœna *mœſta.* Caſſia *procumbens?*
Piloſella *amboin.*
Terebinthina.
68. Menthaſtrum *amboin.*
Ophiogloſſum *ſimplex* Ophiogloſſum *vulgatum.*
Ophiogloſſ. *laciniatum* Oſmunda *Zeylanica.*
69. Radix *toxicaria.* Crinum *aſiaticum.*
70. Cepa *ſylveſtris.* Pancratium ~~*Narbonenſe*~~
Lilium *javanicum.* Pancratium *Zeylanicum.*
71. Aquifolium *indicum.* Acanthus *ilicifolius.*
72. Crithmum *indicum.* Portulaca *Portulacaſtrum.*
73. Nymphæa *major.* Nymphæa *Nelumbo.*
73. Nymphæa *minor.* Menyanthes *indica.*
74. Millefolium *aquat.* Acroſtichum *ſiliquoſum.*
Plantago *aquatica.* Piſtia *Stratiotes.*
75. Olus *paluſtre.* Pontederia.
76. Sargaſſum *pelagium.* Fucus *natans.*

**Fig. 7.** Linnaeus' annotated copy of his dissertation *Herbarium Amboinense* (1754: 28) showing various corrections including, under t. 70, f. 1, the deletion of the epithet 'Narbonense' and its replacement with 'amboinense'. (Reproduced with kind permission of the Linnean Society of London).

Petiver, he sent them large numbers of specimens and descriptions (particularly of plants and insects), and also hundreds of well-executed drawings. Although Linnaeus never saw this material, John Ray (1704) published detailed descriptions of a large number of Kamel's species, and Petiver published figures based on the material. Interestingly, Linnaeus annotated the Kamel entries in his own copy of Ray's book with cross-references to the corresponding figures in Petiver's publications, suggesting that they were a valuable source of information to the Swede. Certainly he cited many of them; *Adiantum philippense* L. (Linnaeus, 1753a: 1094), for example, is based on material collected by Kamel and described and illustrated by Petiver (1702: 8, t. 4, f. 4).

## Discussion

What can we conclude about the use made by Linnaeus of Rumphius' descriptions of plants? Given that they included members of a rich tropical flora from a comparatively remote region little-known or understood by Linnaeus, rather fewer of them than might be anticipated seem to have been cited by Linnaeus. This appears to have been due to three main factors.

Firstly, Linnaeus did not have time to make a detailed assessment of the names ahead of the publication of *Species Plantarum*. Had he not fallen out with Johannes Burman on leaving the Netherlands in 1738, Linnaeus would have had the Rumphius volumes in his hands years earlier and would have had plenty of time to assess the descriptions and plates, almost certainly resulting in the inclusion of a much greater number in 1753. As it was, Linnaeus did assess them for his 1754 dissertation, though this exercise, too, resulted in the recognition of only 30 new species (though additional binomials that were based at least in part on Rumphius' plants were published in various Linnaean works over the next 15 years or so).

Secondly, many of Rumphius' illustrations and descriptions, though detailed, lacked specific information on the floral structure, features that, for Linnaeus, were absolutely fundamental in placing new species within his sexual system. If such details were missing for a given species, however unusual, it would be impossible to place it in the correct Class and Order, so Linnaeus was forced to disregard it until further information became available. In his Introduction to the first two volumes of Rumphius' work, Johannes Burman explained some of the reasons for the lack of such information [quoted from the translation by Beekman (2011)]:

"I must admit that our Rumphius did not always carefully consider the parts of the flowers and fruit that serve for generation, and put together those that were the same in this, and separated those that differed, and put them in a particular order in accordance to what the Herbalists considered a genus or a family, but the gentle Reader should remember that, as the Author himself confesses, his parents did not raise him to that end, nor was he tutored by a master in the same, and therefore was not a Botanist". Burman adds: "I will also admit that not every illustration depicts a plant with all its

parts completely, but the kind Reader should impartially consider and allow that such was completely beyond the powers of the Author because, first of all, one will find many rare plants in this Herbal that were seen only once, and which were brought from the remotest of Islands, tallest mountains, nearly inaccessible rocks and beaches, even from howling wildernesses and the densest of forests, and at a time when they did not always show their flowers or fruits, and one should also consider that some trees spread out so far and wide, and rise so far above all others, that they cannot be climbed and thus refuse to yield their flowers and fruits".

Thirdly, Linnaeus believed that many of the species described by Rumphius had already been written about by earlier authors, notably Rheede and Hermann, so they lacked novelty, even if the engravings themselves were of good quality. Of course, Linnaeus' assumption that superficially similar plants from the Moluccas and the western coast of India belonged to one and the same species we now know often to have been wrong, for the plants of Rheede and Rumphius placed in synonymy by Linnaeus frequently turn out to belong to different species. In naming an East Indian palm *Borassus flabellifer*, Linnaeus included Indian, Sri Lankan and Indonesian elements within his species concept. While the Indian and Sri Lankan plants belong to the species that continues to bear Linnaeus' name, the plant that Rumphius described is now recognized as a different species, *Borassus sundaicus* Becc. However, Linnaeus should not be judged too harshly on this account. He had, after all, seen almost no herbarium material from east of Sri Lanka and had to rely on the sparse published accounts of other authors in forming his species concepts which, as a result, were frequently very broad.

Consequently, while Rumphius' descriptions and illustrations did not feature as extensively in Linnaeus' writings as they may have deserved, this is probably because they did not readily lend themselves to being used in the particular task that Linnaeus had set himself — ordering the natural world created by the Almighty according to Linnaeus' own system, providing a logical and consistent naming system for the individual organisms within it.

## 'Borrowing with impunity'?

As has been shown here, it is possible to document much of the use Linnaeus made of Rumphius' work through a study of the correspondence between Linnaeus and Burman and the explicit citation in Linnaeus' publications of species descriptions and illustrations from the *Herbarium Amboinense*. It is clear that Linnaeus left the Netherlands long before Burman was able to begin publishing Rumphius' manuscript, and that Linnaeus did not acquire the six printed volumes until August 1753. Rumphius' original manuscripts came into Burman's possession in August 1736 and Linnaeus' assumed access to them between then and his departure from the Netherlands in May 1738 has led to suggestions that the Swede, without due acknowledgement, "borrowed from the great Ambonese-Dutch scholar with impunity" (Raven & Margulis, 2009).

Beekman (2011: 139–145) is particularly scathing of what he sees as Linnaeus' scruple-free character, comparing him most unfavourably with (the undoubtedly more modest and likeable) Rumphius.

However, little evidence has been put forward in support of this claim. Beekman suggests that Linnaeus' adoption of the generic name *Musa* (Linnaeus, 1736c) in the latter's account of the successful flowering of a banana at George Clifford's garden was due to his having appropriated the name from Rumphius' manuscript. However, the application of *Musa* to the banana clearly pre-dates Rumphius as it was already in use by Carolus Clusius (1605: 229), whose account Linnaeus cites in his treatment of *Musa paradisiaca* (Linnaeus, 1753a: 1043). While Linnaeus would have undoubtedly taken a keen interest in Rumphius' manuscript and the exotic plants it described, and the drawings would have been immediately informative, Rumphius' accompanying text was written exclusively in Dutch, a language in which Linnaeus made little progress during his three-year stay in the Netherlands. Following an argument between Linnaeus and the publisher of his *Flora Lapponica*, Salomon Schouten, Burman suggested that the Dutch printer may not have understood what Linnaeus had said to him, pointedly adding that Linnaeus was not very good at Dutch. And in a later letter to Bäck, Linnaeus (1753e) complains that a plant list he has received from the Netherlands is of no use to him because the names of the plants are in Dutch, and they can only be understood by Dutchmen. It seems, therefore, that Linnaeus would have struggled to comprehend Rumphius' text before it was translated into Latin by Burman, and consequently unable to "borrow" any significant amount of content without acknowledgement. If, between 1736 and 1753, Linnaeus had indeed "borrowed" from Rumphius' manuscript (as Beekman, and Raven & Margulis claim), one might expect to find recognisably Indonesian species described by Linnaeus without any reference to Rumphius or *Herbarium Amboinense*. However, these seem not to exist. Veldkamp (2002: 17–18) noted that Adriaan van Royen, too, would doubtless have had access to the Rumphius manuscripts at about the same time but, although there were many exotics present in the garden at Leiden, no mention is made of Rumphius by him (Van Royen, 1740). Veldkamp suggests that there was a gentlemen's agreement between Linnaeus and van Royen that they would not "mention taxa based on the Rumphian manuscripts until Burman had published them".

## Rumphian names and epithets

As with the botanical names of most pre-Linnaean authors — those employing a generic name in combination with a descriptive phrase in Latin — most of Rumphius' names did not survive the transition to Linnaean nomenclature intact. However, we can still trace Rumphius as the source of some of the formal names that were adopted by Linnaeus. A few are generic names, notably *Globba* L., *Quisqualis* L. and *Xylophylla* L., along with a number of examples of specific epithets. These include *Ricinus mappa* L. (from 'Folium mappae' Rumph.), *Ricinus tanarius* L. (from 'Tanarius minor' Rumph.), *Hernandia ovigera* L. (from 'Arbor ovigera' Rumph.), *Stilago bunius* L.

(from 'Bunius sativa' Rumph.), *Menispermum flavum* L. from 'Tuba flava' Rumph.), *Piper decumanum* L. (from 'Sirium decumanum' Rumph.), *Maranta galanga* L. (from 'Galanga major' Rumph.), *Cucumis anguinus* L. (from 'Petola Anguina' Rumph.), *Epidendrum scriptum* L. (from 'Angraecum scriptum' Rumph.) and *Carissa carandas* L. (from 'Carandas' Rumph.). And, of course, about 60 of Rumphius' plates serve as nomenclatural types for Linnaean binomials, with a further 300 being the types of binomials described by later authors.

Contributions on the modern identities of the plants described and illustrated by Rumphius include those of Merrill (1917), Boedijn (1959), De Wit (1959) and Zaneveld (1959), and more recently by Beekman (2011). Information on those Rumphius plates that serve as types of Linnaean binomials can be found in Jarvis (2007).

In his *Philosophia Botanica*, Linnaeus (1751) makes rather few references to Rumphius, perhaps because he did not have copies of the published book to hand. So while Rumphius is omitted from Linnaeus' list of "principal botanists" (Aph. 6), and illustrators (Aph. 11), his name does appear in the context of the Indies along with that of van Rheede, among the "describers" whom Linnaeus says "have produced sketches of vegetables". Rumphius' work from Amboina is also included among those of the Travellers (Aph. 17) [who] "have gone to remote regions to investigate plants", though as one of what he calls the "selective" works, a category evidently inferior to "outstanding" works. This was written before Linnaeus had seen Burman's published version of Rumphius' work. However, in the second edition of *Species Plantarum*, Linnaeus (1762) elevated Rumphius to the group of "Fundadores", suggesting that Linnaeus kept going back to Rumphius' work and reinterpreting his descriptions and illustrations precisely because he valued it highly.

ACKNOWLEDGEMENTS. This contribution is based on a lecture prepared for an international conference, *Visions from the Blind Seer of Ambon — a celebration of Georg Everhard Rumphius (1627–1701) and his Ambonese Herbal*, held in London in May 2011. I am grateful to Pieter Baas for his invitation to speak on that occasion, and to the editors of this volume for the opportunity to publish the work in this Festschrift for Professor David Mabberley. Thanks are also due to the staff of the Linnean Society of London for providing access to copies of Linnaeus' manuscripts and books, and to Chiara Nepi for information on surviving Rumphius specimens in Florence.

## References

Baas, P. & Veldkamp, J.F. (2014). Dutch pre-colonial botany and Rumphius's Ambonese Herbal. *Allertonia* 13: 9–19.

Baldini, E. (2009). I modelli pomologici (Pomological models). In: Raffaelli, M. (ed.) *Il Museo di Storia Naturale dell'Università degli Studi di Firenze. Volume II. Le Collezione Botaniche*, pp. 228–235. Firenze: Firenze University Press.

Beekman, E.M. (2011). *The Ambonese Herbal*. 6 vols. New Haven: Yale University Press and National Tropical Botanical Garden.

Boedijn, K.B. (1959). The Fungi in Rumphius's Herbarium Amboinense. In: De Wit, H.C.D. (ed.) *Rumphius Memorial Volume*, pp. 289–294. Baarn: Hollandia.

Bontius, J. (1658). Historia plantarum. In: Piso, W. (ed.) *De Indiae utruiusque re naturali et medica libri XIV.* Amsterdam.

Burman, J. (1736). Letter to Carl Linnaeus, 26 Sep. 1753 (L0096), The Linnaean Correspondence, urn:nbn:se:alvin:portal:record-225119, consulted 30 Apr. 2019.

Burman, J. (1737a). Letter to Carl Linnaeus, ca. 5 Apr. 1737 (L0159), The Linnaean Correspondence, urn:nbn:se:alvin:portal:record-222959, consulted 30 Apr. 2019.

Burman, J. (1737b). *Thesaurus zeylanicus*. Amsterdam: Janssonius-Waesburg and Salomon Schouten.

Burman, J. (1738). Letter to Carl Linnaeus, 20 Nov. 1738 (L0262), The Linnaean Correspondence, urn:nbn:se:alvin:portal:record-223189, consulted 30 Apr. 2019.

Burman, J. (1738–1739). *Rariorum Africanarum Plantarum.* Amsterdam: Henricum Boussiere.

Burman, J. (1739). Letter to Carl Linnaeus, 7 Apr. 1739 (L0282), The Linnaean Correspondence, urn:nbn:se:alvin:portal:record-223207, consulted 30 Apr. 2019.

Burman, J. (1754). Letter to Carl Linnaeus, 1 Dec. 1754 (L2637), The Linnaean Correspondence, urn:nbn:se:alvin:portal:record-227556, consulted 30 Apr. 2019.

Burman, J. (1755). Letter to Carl Linnaeus, 30 Sep. 1755 (L1942), The Linnaean Correspondence, urn:nbn:se:alvin:portal:record-225863, consulted 30 Apr. 2019.

Clusius, C. (1605). *Exoticorum libri decem*. Antwerp: Plantijn.

Commelin, J. (1697). *Horti medici Amstelodamensis rariorum ... plantarum*. Amsterdam: P. and I. Blaev and A. van Someren.

De Wit, H.C.D. (1959). A checklist to Rumphius's Herbarium Amboinense. In: de Wit, H.C.D. (ed.), *Rumphius Memorial Volume*, pp. 339–460. Baarn: Hollandia

Gronovius, J.F. (1739–1743). *Flora Virginica, exhibens plantas quas v.c. Johannes Clayton in Virginia observavit atque collegit ...* Leiden: Cornelius Haak.

Hermann, P. (1698). *Paradisus botanicus ... cui accessit Catalogus plantarum quas ... deineandus curaverat Paulus Hermannus*. Leiden: Abraham Elzevier.

Hermann, P. (1717). *Musaeum Zeylanicum, sive Catalogus plantarum in Zeylana sponte nascentium ... descriptarum a ... Paulo Hermanno*. Leiden: Isaacus Severinus.

Jarvis, C. (2007). *Order out of chaos — Linnaean plant names and their types*. London: Linnean Society of London with the Natural History Museum.

Linnaeus, C. (1736a). *Bibliotheca Botanica*. Amsterdam: Salomon Schouten.

Linnaeus, C. (1736b). *Fundamenta Botanica.* Amsterdam: Salomon Schouten.

Linnaeus, C. (1736c). *Musa Cliffortiana*. Leiden: privately published.

Linnaeus, C. (1738). *Hortus Cliffortianus*. Amsterdam: privately published.

Linnaeus, C. (1741). Decem Plantarum nova Genera. *Acta Soc. Regiae Scient. Upsal*. 1741: 77–84.

Linnaeus, C. (1747). *Flora Zeylanica*. Stockholm: Laurent Salvius.

Linnaeus, C. (1751). *Philosophia Botanica*. Stockholm: Laurent Salvius.

Linnaeus, C. (1753a). *Species Plantarum.* Stockholm: Laurent Salvius.

Linnaeus, C. (1753b). Letter to Abraham Bäck, 25 May 1753 (L1579), The Linnaean Correspondence, urn:nbn:se:alvin:portal:record-225063, consulted 30 Apr. 2019.

Linnaeus, C. (1753c). Letter to Abraham Bäck, 29 May 1753 (L1577), The Linnaean Correspondence, urn:nbn:se:alvin:portal:record-225066, consulted 30 Apr. 2019.

Linnaeus, C. (1753d). Letter to Abraham Bäck, 1 June 1753 (L1606), The Linnaean Correspondence, urn:nbn:se:alvin:portal:record-225103, consulted 30 Apr. 2019.

Linnaeus, C. (1753e). Letter to Abraham Bäck, 7 July 1753 (L1613), The Linnaean Correspondence, urn:nbn:se:alvin:portal:record-000000, consulted 30 Apr. 2019.

Linnaeus, C. (1753f). Letter to Carl Gustav Tessin, 5 Aug. 1753 (L1636), The Linnaean Correspondence, urn:nbn:se:alvin:portal:record-225119, consulted 30 Apr. 2019.
Linnaeus, C. (1754). *Herbarium Amboinense.* Uppsala: L.M. Höjer.
Linnaeus, C. (1756). *Centuria II Plantarum.* Uppsala: L.M. Höjer.
Linnaeus, C. (1759a). *Systema Naturae*, ed. 10, vol. 2. Stockholm: Laurent Salvius.
Linnaeus, C. (1759b). Herbarium Amboinense. *Amoenitates Academicae* 4: 112–143. Stockholm: Laurent Salvius.
Linnaeus, C. (1762). *Species Plantarum*, ed. 2, vol. 1. Stockholm: Laurent Salvius.
Linnaeus, C. (1763). *Species Plantarum*, ed. 2, vol. 2. Stockholm: Laurent Salvius.
Linnaeus, C. (1767). *Mantissa Plantarum*. Stockholm: Laurent Salvius.
Linnaeus, C. (1771). *Mantissa Plantarum Altera*. Stockholm: Laurent Salvius.
Linnaeus, C. (undated). Manuscript LM/LP/BOT/6/8, Linnean Society of London.
Manilal, K.S. (2003). *Van Rheede's Hortus Malabaricus — English Edition — with Annotations and Modern Botanical Nomenclature*. 12 vols. Kerala: Thiruvananthapuram.
Martelli, (1903). *Le collezioni di Giorgio Everardo Rumpf acquistate dal Granduca Cosimo III de'Medici ed una volta esistenti nel museo di Fisica e Storia Naturale di Firenze.* Firenze: Tip. Luigi Niccolai.
Merrill, E.D. (1917). *An interpretation of Rumphius's Herbarium Amboinense.* Manila: Bureau of Printing.
Nicolson, D.H., Suresh, C.R. & Manilal, K.S. (1988). An interpretation of Van Rheede's Hortus Malabaricus. *Regnum Veg*. 119: 1–378.
Petiver, J. (1702). *Gazophylacium Naturae,* Dec. I. London: Chr. Bateman.
Raven, P.H. & Margulis, L. (2009). The herbal of Rumphius. *Amer. Scientist* 97(1): 7.
Ray, J. (1704). *Historia Plantarum,* Tomus Tertius. London: Sam. Smith and Benj. Walford.
Reinwardt, C.G.C. (1830). *Zalacca*. In: Roemer, J.J. & Schultes, J.A. (eds) *Systema Vegetabilium,* ed. 15 bis, 7(2): 1333. Stuttgart.
Rumphius, G.E. (1741–1750). *Herbarium Amboinense ... pars prima (-sexta),* ed. J. Burman. Amsterdam: Franciscum Changuion, Joannem Catuffe, Hermannum Uytwerf.
Rumphius, G.E. (1755). *Herbarii Amboinensis Auctuarium,* ed. J. Burman. Amsterdam: Mynardum Uytwerf, S. Schouten.
Van Andel, T.R., Mazumdar, J., Barth, E.N.T. & Veldkamp, J.F. (2018). Possible Rumphius specimens detected in Paul Hermann's Ceylon herbarium (1672–1679) in Leiden, the Netherlands. *Blumea* 63: 11–19.
Van Rheede tot Draakenstein, H.A. (1678–1693). *Hortus Indicus Malabaricus*, 12 vols. Amsterdam: Van Siomeren, Van Dyck.
Van Royen, A. (1740). *Florae Leydensis Prodromus*. Leiden: Samuel Luchtmans.
Veldkamp, J.F. (2002). 15 June 2002, 300th anniversary of Rumphius's death. *Fl. Males. Bull.* 13: 7–21.
Zaneveld, J.S. (1959). An identification of the algae mentioned by Rumphius. In: De Wit, H.C.D. (ed.) *Rumphius Memorial Volume*, pp. 277–280. Baarn: Hollandia.