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The d'Oignies herbarium: contents and origins of an early 18th-century plant collection from the Netherlands

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ABSTRACT

A little over 200 years ago, an anonymous 18th-century herbarium was bought at auction by the National Library in The Hague, the Netherlands. Until recently, nobody knew where this herbarium originated, with its carefully dried plant specimens accompanied by ornamental urns and garbled names. In 1868, it was handed over to the National Herbarium, an institution that later became part of the Naturalis Biodiversity Center. The lack of scientific attention seemed at odds with the beauty and the possible historic relevance of this herbarium. We studied the 796 digitised specimens and identified 618 unique plant species. The high number of exotic, and non-medicinal Dutch plants was remarkable. By determining the species' native range, comparing the herbarium with other contemporary collections, studying the paper and bindings, tracing the identity of one-time owner Simone d'Oignies, and in particular tracing the origin of the plant names, we were able to assess when the herbarium was made and its scientific and societal value. Jakob Ligtvoet (1686–1752), head gardener of the Leiden botanic garden, owned a herbarium with all the characteristics of the d'Oignies collection at the time of his death. Comparison with the very similar Zierikee herbarium, convinced us that the d'Oignies herbarium matched the description of the herbarium once owned by Ligtvoet. Both collections were created and kept by the gardeners of the Leiden botanic garden and are of great scientific and societal value.

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Introduction

In the 17th and 18th century, a great number of exotic plant species were introduced into the Dutch Republic from all over Europe and overseas territories (Karstens and Kleibrink 1982; Hook 2007). The many herbarium collections and botanical publications from that period testify to the ongoing discussion about the classification and naming of plant species, which ended with the gradual but general acceptance of the binomial classification methods published by Linnaeus (1753) in his *Species Plantarum*. Prior to this publication, Linnaeus spent 4 years in the Dutch Republic (1735–1738), where he published the *Hortus Cliffortianus* (Linnaeus 1737). He benefited considerably from studying the large garden collection and herbarium at the manor, the "Hartecamp", owned by George Clifford (1685–1760), a wealthy Dutch banker and merchant, as he made clear in the prefaces to his major botanical publications (Linnaeus 1737, 1753). The botanical activities, herbaria and publications produced by neighbouring botanic gardens also contributed to his understanding of plants, their nomenclature, and their classification, as is apparent from his correspondence with curators and professors associated with these gardens (Linnaeus 1736; Blunt 2001). One of these gardens was the Leiden botanic garden, where subsequent curators and gardeners looked for ways to cultivate a wide variety of plant species and a systematic way to describe them.

Recent digitisation efforts have made many 18th-century herbaria accessible for scientific research (Van Andel 2017). The 3709 specimens of the Clifford herbaria have been published online and partially studied (Ek 2011; Jarvis 2016a; Thijsse 2018). The specimens attributed to Herman Boerhaave (1668–1738), curator of the Leiden botanic garden and professor of Botany (Offerhaus et al. 2023a) and the 3059 specimens of Nicolaas Meerburgh (1734–1814), gardener in the Leiden botanic garden under curators Adriaan (1704–1779) and David van Royen (1727–1799), and Sebald Brugmans (1763–1819) have been published on the online herbarium database of Naturalis Biodiversity Center (https://bioportal.naturalis.nl/). The 9719 specimens associated with Adriaan and David van Royen have been partially studied and published online (Thijsse et al. 2023).

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In 1818, a six-volume 18th-century book herbarium was bought at auction in The Hague by the National Library of the Netherlands (Koninklijke Bibliotheek: Register B, Anno 1817–1830). On the flyleaves of all six volumes, it is written: "*Herbarius vivens a Simone d'Oignies, Chirurg.Batail.inclit.de Murray etc. anno 1780*", or "a living herbarium belonging to Simone d'Oignies, surgeon in the battalion of the famous De Murray etc. in the year 1780". A separate index exists in the same hand. The herbarium contains a plethora of exotic and native Dutch plant species, meticulously mounted, and decorated with various cut-out paper elements with the names in alphabetical order.

After being transferred in 1868 to the National herbarium (now housed by Naturalis), the collection attracted some attention in 1907, when it was displayed during an exposition (Van Leersum et al. 1907). It was only after restauration and digitisation in 2013 that research on the first two books of the herbarium was carried out (Bertin 2016).

This paper aims to uncover the origin of the d'Oignies herbarium and its possible links to the Leiden botanic garden, by studying its form, botanical content, and plant nomenclature and by comparing it with contemporary herbaria, in particular the Zierikzee herbarium (Offerhaus et al. 2021), which is almost identical in outlook and content. The latter herbarium, restored and housed by the Stadhuismuseum Zierikzee (Zeeland), was attributed to Jakob Ligtvoet (1686–1752), gardener at the Leiden botanic garden from 1702 till his death in 1752 under the curators Petrus Hotton (1648–1709), Boerhaave and Adriaan van Royen. The Leiden botanic garden was put forward as the place of origin of the Zierikzee herbarium (Offerhaus et al. 2021). Could the d'Oignies herbarium have a similar origin? What are the differences and similarities between the two collections?

Our research contributes to the understanding of the period leading up to the publication of Linnaeus' *Species Plantarum*, when important and groundbreaking collecting work was carried out in gardens in and around the Leiden to find a universal way of classifying and naming plant species (Sprague 1939; Uittien 1939).

Materials and methods

Plant identification

High-resolution digital images were consulted of all 544 herbarium sheets of the d'Oignies herbarium, as well as the pages of a separate, handwritten booklet containing an index to the entire herbarium. When necessary, the original herbarium specimens, stored in the Rare Book Room at Naturalis, were physically examined. To identify the specimens, we consulted floristic literature (Eggelte 2007; Blamey and Grey-Wilson 2008; Manning 2008; Thorogood 2016, 2019; Jäger et al. 2017; Duistermaat 2020), literature on 18th-century botany (Wijnands 1983), botanical websites (https://wilde-planten.nl/.; https://www.florealpes.com/.; https://pza.sanbi.org/.), and digital specimens of the Naturalis herbarium, which are online available (https://bioportal.naturalis.nl/). For the identification of bryophytes, lichens, bryozoa and algae, we relied on taxonomic experts from Naturalis and the Ecomare museum on Texel.

Plants of the World Online (POWO 2024) was used to establish the native range of each plant species and update scientific names. The Standard List of the Dutch Flora (Duistermaat et al. 2021) was used to establish which species were indigenous in the 18th century. Information about the distribution of algae and lichens and adventitious bryozoa and bryophytes was retrieved from the World Register of Marine Species (https://www.marinespecies.org/.) and Discover Life (https://www.discoverlife.org/pa/).

Plant name analysis

To establish the origin of the herbarium and define the period in which the herbarium was created, we looked at the names used to describe the specimens and listed in the index. We checked POWO (2024) for the first publication date of the species name or one of its synonyms. *Species Plantarum* (Linnaeus 1753) was used as a starting point, which generally led us – via the *Hortus Cliffortianus* (Linnaeus 1737) or the *Florae Leydensis Prodromus* (Van Royen 1740) – to the *Index Alter Plantarum* (Boerhaave 1720), the second edition of the Leiden garden catalogue, which gives a comprehensive list of pre-Linnean publications. With these sources, we were able to trace the source of most names in the d'Oignies herbarium. We prioritised sources, choosing, for instance, Boerhaave (1720) over the original Tournefort (1700). We also consulted various pharmacopoeias from the Low Countries to establish the origin of names used in the herbarium. These are digitally available on the Time Capsule website (https://timecapsule.science.uu.nl/timecapsule/#/sources.).

Paper, watermarks and binding

Characteristics of the paper of the d'Oignies herbarium and its index, such as size, watermarks, sieve structure (chain and laid lines) and the homogeneity and purity of the paper pulp were compared with paper of other historic herbaria to establish the period in which the herbarium was created. This comparative research was often restricted by the presence of fragile plant specimens and the fact that, by the end of the 19th

century, many historical specimens were remounted on new paper. If the specimen was attached with glue to the original paper, the paper was sometimes cut to size and glued to a new sheet. The watermarks in the paper of the herbarium and in the index enabled us to establish the period in which the paper was manufactured. The watermarks were compared with the Bernstein database (https://memoryofpaper.eu/.) and surveys of historical watermarks from paper manufactured in the Dutch Republic (Churchill 1935; Heawood 1950; Voorn 1960, 1973, 1985; Laurentius and Laurentius 2008). For the bindings, we consulted Herre de Vries from the conservation studio "Restauratie Nijhoff Asser", who restored the herbarium in 2013 (2021 report from Herre de Vries to AO; unreferenced).

Comparison with contemporary herbaria

To substantiate our identifications of the specimens, and to assess paper, decorations and nomenclature we compared the d'Oignies specimens with those of other 18th-century herbaria, such as the Zierikzee herbarium (Offerhaus et al. 2024), the London Clifford herbarium (Jarvis 2016a), the Leiden Clifford herbarium (Ek 2011), the Clayton herbarium (Jarvis 2016b), the Linnean collections (https://linnean-online.org/Linnean_herbarium.html.), the Linnean herbarium (http://linnaeus.nrm.se/botany/fbo/welcome.html.en.), the Bergius herbarium (Wikström 2016), the Boerhaave specimens (Offerhaus et al. 2023a), the Van Royen collection and the Meerburgh herbarium (https://bioportal.naturalis.nl/). The Wasteau herbarium was also consulted. This herbarium contains specimens, collected by Abraham Wasteau around 1689 in the Leiden botanic garden (https://sammlungen.uni-goettingen.de/index/). Wasteau was a Leiden student of medicine under Paul Hermann (1646–1695), curator and professor of Botany from 1680 till 1695. The original specimens can also be consulted upon request via the Naturalis collection management (collections@naturalis.nl). Due to the overwhelming number of specimens our comparison was not exhaustive. For the specific comparison of decorations, the codex *Hortus Regius Honselaerdicensis* (Cosijn 1688), an illustrated flora, and the *Phytanthoza iconographia* (Weinmann 1737–1745) were consulted, as well as literature on the use of decorations in 17th- and 18th-century herbaria (Van Ooststroom 1941; Wijnands 1988, 1992; Wijnands and Heniger 1991; Thijsse 2018, 2021).

The search for the original collector and consecutive owners

In search of the creator of the d'Oignies herbarium, we looked at gardeners active in the Netherlands (Berkhout 2020) and specifically in the Leiden botanic garden under curators Boerhaave and Adriaan van Royen (Molhuysen 1913; Veendorp and Baas Becking 1990). We also consulted publications on the history of the Leiden botanic garden (Karstens and Kleibrink 1982), and documents from the city archive (https://www.erfgoedleiden.nl/.). An article about Jakob Ligtvoet and his library (Hoftijzer 2009) provided us with information on his life, his social status and the scope of his knowledge. To verify the identity of the one-time owner of the herbarium, Simone d'Oignies, we consulted online sources of the Austrian army in the Netherlands (Österreichisches Staatsarchiv: https://www.archivinformationssystem.at/suchinfo.aspx). Browsing auction catalogues from the 18th century via Delpher (https://www.delpher.nl/.) rendered information on the sale of herbaria and the possible identification of the d'Oignies herbarium.

Results and discussion

Physical aspects of the herbarium

The separate herbarium books contain quires, consisting of seven separate, loose sheets and differing from the more usual quires of folded sheets. This type of binding was common from the late 16th century well into the 18th century (2021 report from Herre de Vries to AO; unreferenced). The paper sheets measure 485 by 305 mm and show deckle-edges on three sides. On the left side, the paper has been cut, suggesting the original size was 485 by 610 mm. The cartridge paper itself is thick, rough, and grainy and has a characteristic sieve structure with extra lines next to the regular chain lines, probably caused by the use of a reinforced mould. The paper shows an uneven, "cloudy" distribution of the pulp and contains small, dark-coloured spots. Watermarks are visible in a minority of the sheets, consisting of a monogram of Pieter van der Ley (PVL), indicating that the paper was produced by the firm Van der Leij (Figure 1 near here).

These "PVL" watermarks were used from the end of the 17th till the beginning of the 19th century. Since no identical watermarks could be found in the databases consulted, specifying the production date of the paper was not possible.

The paper used in this herbarium is sturdier than the finer, whiter, and probably more expensive paper used by Clifford, Boerhaave and the Van Royens. For a gardener or a garden herbarium, however, this paper would have been an acceptable choice. Paper with the same characteristics as in the d'Oignies herbarium, including the typical sieve structure and the PVL watermark, is also used in part of the herbarium compiled by Nicolaas Meerburgh. Its paper was probably obtained from the same source as the paper of the d'Oignies herbarium.

Figure 1. One of the watermarks from the paper firm Van der Ley, as found throughout the herbarium, with combined letters 'P', 'V' and 'L'.

Botanical contents

We identified 754 of the 796 specimens in the six-volume d'Oignies herbarium to species level, including separate leaves, inflorescences and adventitious organisms. A total of 38 specimens were identified to genus level only, and four specimens remained unidentified. In Supplementary Table S1, we list the 796 specimens with their current names, their unique identifiers (barcodes starting with an "L", e.g. L.4512094), their names in the d'Oignies herbarium, the sources of those names, and the geographic origin of the species. The 618 unique plant species we identified are divided among 133 families and 466 genera. The most species-rich plant family is the Asteraceae (65 species), followed by Apiaceae (48 spp.), Lamiaceae (46 spp.), Fabaceae (28 spp.) and Rosaceae (26 spp.). Most families, however, are represented by only one or two species. A few algae and one lichen species are present in the herbarium. We also identified some occasional Diptera, Hydrozoans, Bryozoans and Cnidaria.

The majority (60%) of the 618 species are native to the Eurasian continent, of which 44% was native to the Netherlands in the 18th century, followed by a comparatively high percentage of Mediterranean species (17%). Circa 12% of the species originate in the Americas, with 7% in North America, while 6% of the species have their native range in South Africa. A small (2%) percentage of marine species is also present. There is no mention as to where or when the living plants were cultivated or collected. If all plants were cultivated and collected in the same place, there would be no need to indicate collection localities. One exception is an undecorated specimen of *Ziziphus jujuba* L. (L.3961033), described on the sheet as "pl. Chinos. incognit.", "an unknown Chinese plant", and referred to in the index as "*ex horto D^no^ Holie*", "coming from the garden of the lord of the manor Holy" (Figure 2 near here).

There are 18 specimens, specifically mentioned as coming from America ("*ex America*"), all undecorated and rather casually mounted in the margins of the sheet, suggesting that they were not cultivated locally but sent by letter and added later. A specimen of *Lobelia siphilitica* L. (L.4512148), in the index referred to as "*Lobila Calmijae ex amer*," is accompanied by a French text that translates as "it is said that in America one cures syphilis with this plant".

A few specimens belong to species that could not be cultivated in the Netherlands because the right climatic conditions could not be reproduced at the time. These specimens were either collected in their native range and sent by post or purchased from *simplicia* cabinets kept by pharmacists (Van Der Ham and Bierman 2017). Specimens of *Cinnamomum* Schaeff. (L.4512155) and *Nardostachys jatamansi* (D.Don) DC. (L.4518549) are two examples of specimens that were probably taken from an apothecary source (Figure 3 near here).

The Sri Lanka cinnamon, *Cinnamomum verum* J. Presl is mentioned as "*Cassia Cinamomea*" in the garden catalogue of the Leiden curator Hermann. During the years 1672–1679 hermann worked as physician for the Dutch East Indian Company in Sri Lanka, where he collected specimens (Van Ooststroom 1937; Van Andel and Barth 2018). According to Hermann (1687), "*Cassia Cinamomea*" was cultivated in the Dutch gardens of Bentinck (-1649–1709) and Van Beverningh (1614–1690) as well as in the Leiden botanic garden, but all specimens perished after a few years due to a sudden onset of winter frost. *Cinnamomum verum* is absent in the catalogues of Boerhaave (1720) and Van Royen

Figure 2. Left: a branch of *ziziphus jujuba* L. (L.3961033); middle: an excerpt from the index to the herbarium; center: the place of origin, the manor holy in the borough of Vlaardingen. The watercolour of the manor was made in 1738 by Cornelis Pronk (1691–1759), when the manor was inhabited by Maerten Weveringh (1679– 1756) (source: collection city archive Vlaardingen).

Figure 3. Two examples of specimens that were probably taken from a *simplicia* cabinet: to the left leaves of *Cinnamomum* Schaeff (L.4512155) and on the right rhizomes of *nardostachys jatamansi* (D.Don) DC. (L.4518549).

(1740). *Nardostachys jatamansi*, or "*Nardus indica*" as it was called at the time (Bauhin 1623; Pharmacopoea Hagana 1738) is absent from all catalogues. This species of spikenard primarily grows in the Himalayas at high altitudes.

Based on the catalogue of Boerhaave (1720), in which medicinal species are indicated by underscoring the number attributed to the plant, 25% (154 out of 618) of the species in the d'Oignies herbarium turned out to be medicinal. The overwhelming presence of non-medicinal plant species strongly suggests a botanic garden as a place of origin, where plant species were cultivated and studied for their botanical characteristics, and not so much as herbal simples (Offerhaus et al. 2023b).

The most fragile plant parts have been thoroughly fixed with no traces of glue, and the decorations have been cut with a precision that comes from professional practice (Verhave and Verhave 2008). The delicate structure of some specimens is highlighted by the careful manner of mounting. Plant parts are mounted separately to show botanical details, such as the underwater parts of *Stipa pennata* L., the spotted stem of *Conium maculatum* L. and the silvery underside of the leaves of *Populus alba* L. (Figure 4 near here).

Plant names

Almost half of the plant names (318 out of 752) on the sheets and in the index are misspelled. Sometimes the

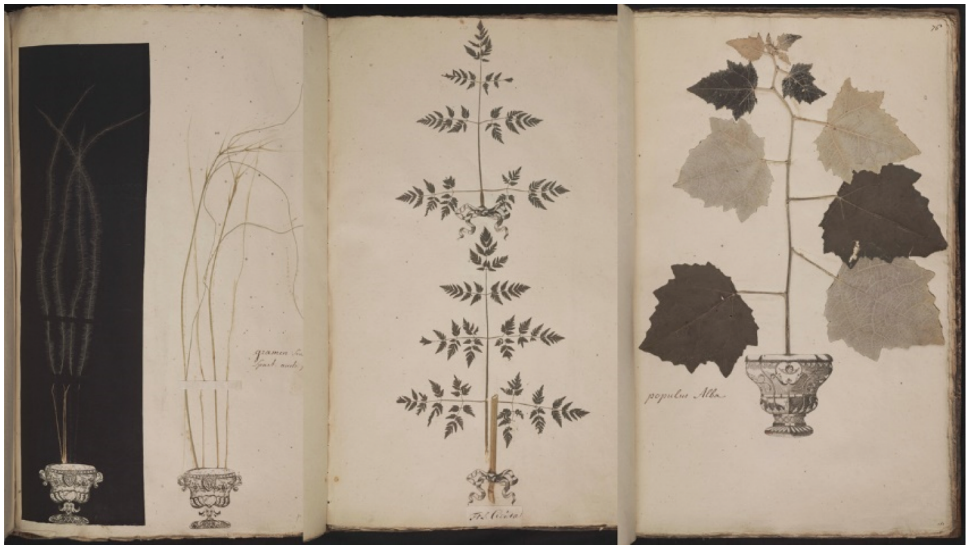

Figure 4. From left to right, explicit botanical details of specimens of *stipa pennata* L. (L.4512036 and L.4512037), *conium maculatum* L. (L.3961042) and *populus alba* L. (L.4512273).

error seems to be due to poor auditory perception of the name. "*Simbolaria*," for instance, is used to refer to *Cymbalaria* (L.4518529), and *Buphthalmum* is spelled as "*Buftalmum*" (L.3960980). Occasionally, the initial faulty perception of the name appears to be compounded by its incorrect copying, leading from "*Scutelaria*" (originally: *Scutellaria*) to "*Sentilavia*" (L.4518512) or from *Oenanthe* via "*Aenanthe*" to "*Aenauster*" (L.3960866 and L.3960867).

The author of the herbarium names used roughly twice as many pre-Linnean names as Linnean names. There are a few plant names with unclear provenance and descriptions that must have sprung from the mind of its creator because we could not link them to any publication. Those names that were only found in specific pre-Linnean sources indicate that whoever attributed these names to particular specimens appeared to be a proficient and literate botanist, or at the very least closely cooperated with someone who was (Table 1) near here.

The creator of the herbarium seems to have recorded his personal observations of the plant (Table 1). *Hieracium cerinthoides* L., a Mediterranean hawkweed, is described as "*Hieratium amplo aurantio*" (L.4512075), "a hawkweed with big, yellow-golden flowers". A specimen of *Arctium tomentosum* Mill. (L.3960939) is described as a "*Bardana capsula aragnoid*," "a burdock with cobweb-like flower heads." Occasionally, pre-Linnean names are supplemented with those found in Van Royen (1740) or Linnaeus (1737). A specimen of *Yucca gloriosa* L. is described as "*Juca fol: aloes 3: cordyline*," a combination of the description found in Boerhaave (1720), "*Yucca foliis aloes*," and "*Cordyline*," a genus conceived by Van Royen (1740). Sometimes specimens of the same species carry two different pre-Linnean names. One specimen of *Anthyllis vulneraria* L. (L.4518596) is described as "*Anthyllis Sentifol: Seu: Lent: simil: prior*," "an 'Anthyllis' with lentil-like leaves or the first (one, which is) similar to Lentil", found in Dodoens (1583), and another (L.4518615) is named "*Vulneraria rustica*," found in Boerhaave (1720). The name "*Mijrchis aquicolorum nova*," "a new Myrrh from [the region] Aequium," was originally formulated by Colonna (1616) and used as a source reference by Boerhaave (1720) and Linnaeus (1737) for *Anthriscus caucalis* M. Bieb. Here, it is used to describe a specimen of rough chervil, *Chaerophyllum temulum* L. (L.4512202).

A total of 73 specimens have names or numbers that refer to the Leiden garden catalogue by Van Royen (1740), often identified by the letters "*v:v:R:*," an abbreviation for "*vide van Royen*," "see Van Royen," followed by a number that generally matches the number within the genus in this catalogue. Sometimes "*v:v:R:*" seems to have been added erroneously. "*Chamaedrys 6:v:v:R:*" (L.3961031) is used here to describe a specimen of *Teucrium chamaedrys* L., but it cannot refer to the *Prodromus* (Van Royen 1740) because Van Royen considered the genus "*Chamaedrys*" obsolete. There is, however, a sixth Chamaedrys listed in the catalogue of Boerhaave (1720), whose description is also used for a Boerhaave specimen of *Teucrium chamaedrys* L. (L 0142396) (Offerhaus et al. 2023a) and this shows that "*Chamaedrys 6*" refers to Boerhaave and not to Van Royen.

A specimen of *Gillenia trifoliata* (L.) Moench (L.4512090) is described as "*Ipecacuanha*." The origin of this name is probably the *Flora Virginica* by Gronovius (1739), who in turn based his work on the description of specimens collected in America by John Clayton (1694–1773). Clayton described *Gillenia trifoliata* as "*Ipecacuanha or Indian physick*" (Jarvis 2016b). "*Ipecacuanha*" is originally an indigenous Brazilian Tupi name and refers to *Carapichea*

Table 1. Sources of plant names in the herbarium, arranged according to author, publication date and quitation frequency. The entries rendered in bold type are Linnean.

Author	Year of publication	Frequency of quotation
Clusius	1576	2
Dodoens	1583	45
Clusius	1583	1
Lobelius	1591	41
Gerard	1597	1
Clusius	1601	3
Besler	1613	1
Colonna	1616	1
Caspar Bauhin	1623	48
Parkinson	1640	2
Bodaeus a Stapel	1644	1
Johann Bauhin	1650	24
Vallot	1665	1
Morison	1672	1
Boccone	1674	1
Hermann	1687	14
Plukenet	1692	1
Ray (Historia II)	1693	2
Lémery	1697	43
Commelin	1698	4
Morison (Historia III)	1699	2
Tournefort	1700	1
Boerhaave	1710	1
Barrelier	1714	1
Boerhaave	1720	111
Pharmacopoea Hagana	1738	5
Pre-Linnean	–	34
Gronovius (Clifford herbarium)	–	1
Pharmacy	–	11
Unclear	–	195
Linnaeus	**1737**	**5**
Linnaeus	**1737–53**	**56**
Gronovius	**1739**	**2**
Van Royen	**1740**	**73**
Linnaeus	**1753**	**11**

Barrelier J. 1714. Plantae per Galliam, Hispaniam et Italiam observatae, iconibus aeneis exhibitae. Parisiis [Paris]: Apud Stephanum Ganeau.
Bauhin J, Cherler JH. 1650–1651. Historia plantarum uni- versalis Tomus I–III. Ebroduni [Yverdon-les-Bains]: Iuris vero publici fecit Fr.Lud.A Graffenried.
Besler B. 1613. Hortus Eystettensis.
Bodaeus à Stapel I. 1644. Theophrasti Eresii de Historia Plantarum Libri Decem. Amstelodamum (Amsterdam): Apud Henricum Laurentium.
Clusius C. 1576. Rariorum aliquot stirpium per Hispanias observatarum Historia. Antverpiae [Antwerp]: Ex offi- cina Christophori Plantini Architypographi Regii.
Clusius C. 1601. Rariorum Plantarum Historia. Antverpiae [Antwerp]: Ex offinica Plantiniana apud Joannem Moretum.
Commelin C. 1698. Caspari commelin horti medici amstelaedamensis plantarum usualium catalogus. Amsterdam: [Publisher unknown].
Commelin J. 1697-1701. Horti medici amstelodamensis rariorum. . ..descriptio et icones ad vivum æri incisæ. Amstelodami [Amsterdam]: Apud P. & J. Blaeu.
Morison R. 1672. Plantarum umbelliferum distributio nova. Oxonii [Oxford]: E Theatro Sheldoniano.
Parkinson J. 1640. Theatrum botanicum. London: printed by Tho.Cotes.

ipecacuanha (Brot.) Andersson, which was used similarly (). *Gillenia trifoliata* is still used as emetic today (Gruenwald et al. 2000).

Who was Simone d'Oignies?

It is evident that it was d'Oignies himself who wrote "*Herbarius vivens a Simone d'Oignies, Chirurg.Batail. inclit.de Murray etc. anno 1780*" on the fly-leaves of the six separate books, and the names and numbers in the upper right corner of virtually all sheets of the herbarium. He also compiled and wrote the index, at the beginning of which it reads "*Herbarius Vivens in form. Dixionario ex bibliotheca D^{o} D'Oignies Chirurgus Bataillionis incl: De Murraij & Trautt.*," "a herbarium in the form of a dictionary from the library of Mr D'Oignies, surgeon in the battalion of the famous De Murray and Trauttmansdorff" (Figure 5 near here).

Considering the number of spelling mistakes and the incorrectly attributed plant names, d'Oignies appears to have had a limited grasp of Latin and botany. These mistakes were central to the alphabetic arrangement of the sheets and the binding in six volumes, for which he was ultimately responsible.

Even though he named himself "Simone", he was registered as Simon Joseph d'Oignies, born in Leuven

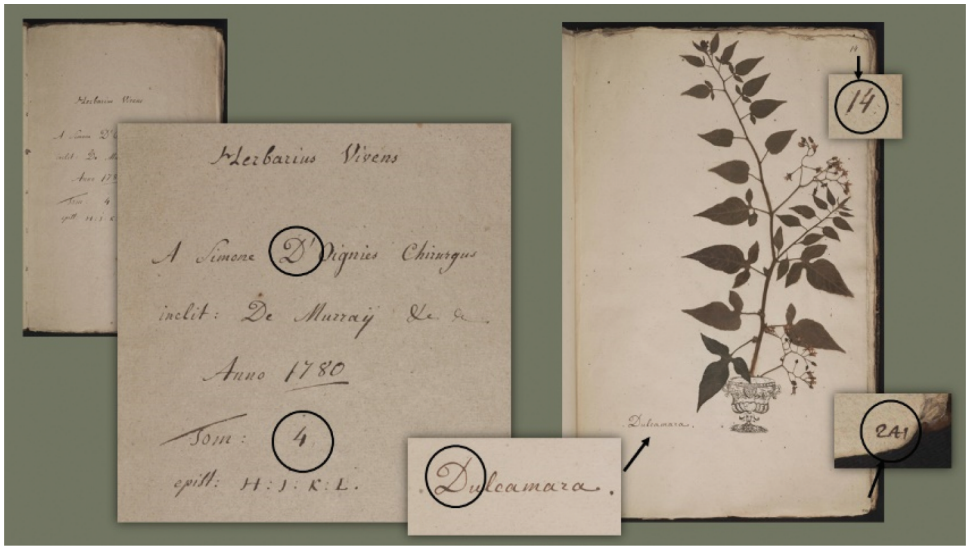

Figure 5. Excerpts from the fly-leaf with example from d'Oignies' handwriting, also visible on the sheet with a specimen of *Solanum dulcamara* L. (L. 4511962). The numbering in the lower right corner is written in a different hand.

(Belgium) in 1738. In 1756, 17 years old, he enlisted in the Austrian army. From 1760 onwards, he served in the Chevauxlegers regiment no 4, a merger of three regiments within the Dutch army, and from 1766 he was registered there as an assistant surgeon. After his transfer in 1771 to the Regiment no. 55, led by general De Murray, he was registered simultaneously as a medical assistant and as a surgeon (Österreichische Staatsarchiv: ML IR 55(a), 1772, Stab (Karton Nr. 10.542)). This regiment was stationed at Namur (Belgium). In 1781 he was examined by "*proto-medicus*" Terentius Brady and passed his test as assistant surgeon. By then he was already a member of the regimental staff and living or active in Antwerp (Österreichische Staatsarchiv: ML IR 55(a), 1780, Stab (Karton Nr. 10.546) and ML IR 55(a), 1782, Stab (Karton Nr. 10.548)). Before or in 1780, d'Oignies acquired the herbarium, copied the names on the sheets, created an index, rearranged the specimens alphabetically, and had everything bound in six volumes. The joy of possessing such a wonderful herbarium was short-lived. After a short sickbed, he died on 9 May 1782 in Namur, where his regiment was officially stationed. There he was buried, in the church of Our Lady of Harscamp (Österreichische Staatsarchiv: ML IR 55(a), 1782, Stab (Karton Nr. 10.548); ST IR 55(a), Monatstabelle Mai 1782, Stab (Karton Nr. 10.570); Sterberegister Murray Infanterie AB 02123, Seite 23). The use of a watermark in the paper of the index from the Gelderland mill-maker Hendrik Roes, who was only active between 1776 and 1781, confirms that d'Oignies wrote the index no earlier than 1776 (Voorn 1985; https://www.nikkelsweb.nl/papiermakers/velp.html/). Assuming that d'Oignies bought this paper shortly after he purchased the herbarium, the composition and the writing of the index must have taken place between 1776 and 1780, the year on the fly-leaves of the newly bound herbarium.

Organisation of the d'Oignies herbarium

Initially, the herbarium collection will have consisted of loose sheets with decorated plant specimens, arranged by numbers in the bottom right corner in a different hand, the purpose of which is not entirely clear (Figure 5). These numbers range from 1 to 961, but several sheets have the same number, and there are significant gaps between number 597 and 961. No apparent relation is perceptible between these numbers and the order in which the specimens appear, their names, or possible groups, such as families, habit, native range, or properties. As they must have been assigned with some purpose in mind, they may have been related to an index that listed the yearly sowing (Offerhaus et al. 2023a).

The majority of the sheets (73%) contain only one specimen, centrally mounted and decorated. The remaining 151 sheets contain two to seven specimens that are grouped according to alphabet, genus, morphology or habitat. The specimens that are mounted in the margins of the sheet were probably added later. There are specimens with separate leaves and inflorescences, sheets with only marine species or moss and lichen species, and sheets with duplicates. Most specimens display stem, leaves and flowers, but a few consist of single leaves or rhizomes. On the basis of previous research, we now know that the specimens from the similar Zierikzee herbarium have been minutely secured with hot glue made from piscine bladders or animal bones. Their still vibrant colours would suggest they were mounted fresh and dried directly on the paper (De Valk 2010).

The names attributed to the specimens have been alphabetically arranged. This alphabetical order is partly based on incorrectly copied (55 times) and incorrectly attributed names (37 times). Several names were switched, and specimens ended up with names belonging

to other specimens in the herbarium. A *Malvaviscus arboreus* specimen (L.3961037) was described as "*Chrysosplenium fol: amphoribg.*" and as a consequence placed in the "C" section.

Loose name tags

We suggest that the specimens were originally accompanied by unattached individual tags. We encounter such separate name tags in various 17th- and 18th-century herbaria, such as those of Wasteau, Meerburgh, the Van Royens and Boerhaave). The botanical slips of paper that Linnaeus used to arrange his herbarium also come to mind (Charmantier et al. 2014). The Boerhaave and Van Royen specimens show us that such tags were glued onto the sheets for conservation purposes around 1900 (Offerhaus et al. 2023a). After d'Oignies copied the names on the sheets and in an index, they were probably discarded (Figure 6 near here).

Labels

A total of 86 specimens in volumes 1 and 2, all starting with the letters A-C, and three specimens in book 3, 5 and 6 are accompanied by labels made from cut-out pieces of paper, half of which represent plant names taken from the Pharmacopée universelle by Nicolas Lémery (1697). Others are based on publications by Dodoens (1583), Lobelius (1591), Casper Bauhin (1623), Johann Bauhin (1650–1651), and on the *Pharmacopoea Hagana* (1738). The author of these labels must have been literate in botany and well versed in Latin, but he was most likely a pharmacist, considering his general use of the – alphabetically ordered – pharmacopoeia and because he only described medicinal species, such as *Symphytum officinale* L. and *Prunella vulgaris* L. A fifth of the specimens were incorrectly identified. Unfortunately, the rest of the labels either got lost or the efforts of the author seem to have fizzled out at the end of book 2, with an occasional description in book 3, 5 and 6. Once he uses a Linnean name, describing a *Lonicera xylosteum* L. as "*Chamaepericlymenum* of *Lonicera*" (L.3960888), with "*Chamaepericlymenum*" the pre-Linnean and "*Lonicera*" the Linnean name. The use of the word "*of*" ("or" in Dutch) and the description of a *Vachellia nilotica* specimen: "*de gom die daaruyt vloeijt zoude zijn g: arabic: vermic*" ("the gum that flows from it, is, allegedly, Arabic gum"), indicates he spoke Dutch. We assume that the author was one of the owners of the herbarium in the period between 1752 and 1776–1780, before it was purchased by d'Oignies.

Decorations

The use of paper ornaments, particularly vases, to embellish herbarium vouchers became popular in the first half of the 18th century (Wijnands and Heniger 1991; Wijnands 1992; Thijsse 2018), although they were already present in illustrated floras at the end of the 17th century (Cosijn 1688; Wijnands 1988; Oldenburger-Ebbers 2010). These ornaments are all characterised by naturalistic elements, sometimes inspired by (biblical) mythology, and elegant attributes, such as bows and ribbons. Dutch herbaria from the 18th century owe their characteristic outlook to these decorative elements (Figure 7 near here).

In the d'Oignies herbarium, there are 16 different decorative elements, displaying vases, ribbons,

Figure 6. Two pages of the index composed and written by Simon d'Oignies.

Figure 7. A survey of ornaments used in the d'Oignies herbarium (O), in the Zierikzee herbarium (Z) or in both herbaria (Z&O). The printed page with leiden ornaments designed by Van der Mij and executed by Van der Spijk is visible in the upper right corner of the figure.

a bow and a decorated frame (Suplementary Table S2). A number of them are also used in other contemporary herbaria (Zierikzee, Clifford, Boerhaave, Van Royen, Meerburgh and De Gorter). Seven elements were designed by Leiden painter Hieronymus van der Mij (1687–1761), who started his professional career in 1710, and these designs were converted into engravings by print-artist Johannes van der Spijk, who set up practice in Leiden in 1716 (Waller 1938). The manufacture of these paper ornaments was sustained by a printing industry that produced numerous theses of students graduating at Leiden University (Pettegree and Der Weduwen 2019). The Naturalis archive holds several printed pages and large numbers of cut-out decorative paper vases and ribbons produced by Van der Mij and Van der Spijk (Figure 8).

Figure 8. Left: a specimen of *Reseda lutea* L. (L.4512300) decorated with a vase resembling the vase from Weinmann's *Phytanthoza*; center: an ornamental vase used in *Phytanthoza* (Weinmann 1737–1745) to adorn a tub plant, *aloe brevifolia* var. *Depressa* (Haw.) Baker. The plant appears to have been copied from a survey of rare plants by Commelin (1706), visible on the right. The image is mirrored here to show the resemblance.

It is not known who designed the other nine elements and where they were produced. The presence of one particular vase, "VB" in Supplementary Table S2, in the *Phytanthoza* by Weinmann (1737–1745) was used as evidence to date the d'Oignies herbarium in the period after 1734 (Thijsse 2021). The depicted plant in the relevant vase, however, is a rather crude copy of an image from the Amsterdam catalogue of rare plants (Commelin 1706). If the picture of the plant is so obviously a copy, it is likely the vase was copied as well.

The d'Oignies herbarium has the highest number of decorations (10) in common with the Meerburgh herbarium, followed by the collection attributed to Adriaan van Royen (8) and the Gronovius herbarium (6). Two decorations are unique to the d'Oignies herbarium (Supplementary Table S2).

Similarities with the Zierikzee herbarium

The Zierikzee herbarium is remarkably similar to the d'Oignies herbarium (Offerhaus et al. 2021). The paper of this collection corresponds to a high degree with that of the d'Oignies herbarium in size and appearance. The same sieve structure and the watermark (PVL) indicate that there was a common source of production and supply, as well as a single buyer, such as the Leiden botanic garden. The Zierikzee herbarium has six decorative elements in common with the d'Oignies herbarium, two of which (OA and VC) are exclusive to these herbaria and one (OG) is only used in the d'Oignies, the Zierikzee and the Meerburgh herbarium (Supplementary Table S2).

Both herbaria were originally loose-leafed. The numbering in the lower right corner of the sheets, present on 69 sheets of the Zierikzee herbarium and on all sheets of the d'Oignies collection, is in an identical handwriting. The similarly delicate and precise manner of mounting makes these two herbaria stand out (Figure 9 near here).

Specimens of *Hermannia althaeifolia* L. were incorrectly identified in both herbaria as "*Andryala integrifolia*" (Zierikzee herbarium, no. 70) and "*Andriala*" (the d'Oignies herbarium, L.3960899). This seems a significant misidentification of this much treasured South-African herb, named by Boerhaave in honor of Hermann, because of the obvious difference between the two species, *Andryala* belonging to the Asteraceae and *Hermannia* to the Malvaceae, suggesting that the person who identified the "*Andriala*" specimen must have misunderstood the species name. It is evident that these two identical mistakes were made by the same person. A high number of identical species (178) is found in both herbaria (Figure 9). The collections appear to complement each other, whereby one herbarium has several species of a particular genus while the other has different species from that same genus. The presence of specific species related to the Leiden botanic garden is also indicative of a common origin. Rare and iconic plants such as the South African *Clutia pulchella* L. (L.3961055; L.4512229; no 344) was named after Augerius Clutius (1578–1636), son of one of the founders of the Leiden botanic garden.

Figure 9. Striking similarities between the Zierikzee and the D'Oignies herbarium, with regards to the ornaments, the distribution of the specimen across the page and the careful application. From left to right with the upper row from the d'Oignies herbarium and the lower row from the Zierikzee herbarium: *Coffea arabica* L. (L.3961059 and no 352), *Stachys germanica* L. (L.4512160 and no 82), *Bistorta officinalis* Delarbre (L.3960976 and no 40), *Yucca gloriosa* L. (L.4512092/L.4512093 and no 106) and *Chamaerops humilis* L. (L.4511946 and no 52).

Table 2. The ratio of unique plant species and their different categories within the two herbaria and within the two herbaria taken as a whole.

Unique species categories	Number	Percentage
Species D'Oignies herbarium	618	67
Exotic species	303	49
Indigenous species	315	51
Medicinal species	154	25
Non-medicinal, indigenous species	158	26
Species Zierikzee herbarium	306	33
Exotic species	146	48
Indigenous species	160	52
Medicinal species	143	47
Non-medicinal, indigenous species	48	16
Combined species D'Oignies and Zierikzee herbarium	755	
Combined medicinal species	237	31
Combined indigenous species	338	45
Combined non-medicinal, indigenous species	190	25

Other examples of rare plants are *Gillenia trifoliata* (L.) Moench (L.4512090; no 99) from North America, *Cedronella canariensis* (L.) Webb & Berthel. (L.4512178; no 97) from the Canary Islands and different cultivars of *Asplenium scolopendrium* L. (L.4512136–40; L.4512150; no 164). The two herbaria contain equal percentages of exotic and indigenous plant species (Table 2 near here).

The percentage of more widely known medicinal plant species, is much higher in the Zierikzee herbarium (47%) than in the d'Oignies herbarium (25%). The presence of 190 species in the two herbaria that are native, but not medicinal, suggests that these specimens must have been collected on account of their botanical value. A species like *Draba verna* L. with a seemingly non-descript habit and no known medicinal properties was still deemed interesting enough to be collected.

In both herbaria, plant names were switched. Without the necessary botanical knowledge, the original loose name tags were eventually misplaced. A garden herbarium that was meant to facilitate plant identification and register which species had been successfully cultivated could only benefit from the presence of loose name tags. The surviving labels in both herbaria were applied afterwards by consecutive owners looking for a fixed order, rather than a dynamic nomenclature. Both herbaria were bought by people who described the medicinal specimens with the help of pharmacopoeias. The labels in the Zierikzee herbarium refer to the *Pharmacopoea Hagana* (1738; Thijsse 2021) and those in the d'Oignies herbarium for the most part to the *Pharmacopée Universelle* (Lémery 1697).

The sale of two herbaria in the 18th century

Two herbaria that originated in the Leiden botanic garden were sold at auction: one in 1739 after the death of Boerhaave (Luchtmans 1739) and the other in 1752 after the death of head-gardener Ligtvoet (Haak 1752; Hoftijzer 2009). Based on our research, we assume that these correspond with the Zierikzee and the d'Oignies herbarium. Initially, we concluded that the Zierikzee herbarium was the collection mentioned in the auction catalogue of the library of Ligtvoet (Haak 1752) and the d'Oignies herbarium the six-volume collection ("*Herbarius vivus, 6 voll.*") in the auction catalogue of Boerhaave's possessions (Luchtmans 1739), which seemed to neatly correspond with the six bound volumes housed by Naturalis (Offerhaus et al. 2021). In hindsight, we now know it was d'Oignies himself who was responsible for arranging the specimens according to the alphabet and dividing them into six books. The term "*voll.*" ("*volumines*"), mentioned in the auction catalogue of Boerhaave's library, can translate as "part", as well as "books" (for which the term "*libri*" *was used*). With the d'Oignies herbarium being described as consisting of 13 bundles ("*tredecim fascibus*") and the Zierikzee herbarium made up of six parts, it makes more sense to identify the "Ligtvoet" collection as the larger d'Oignies herbarium (546 sheets divided over 13 bundles) and the "Boerhaave" collection as the smaller Zierikzee herbarium (348 sheets divided into six parts). References to the *Prodromus* (Van Royen 1740) – as in the d'Oignies herbarium – would be plausible for herbarium sheets produced up to 1752, the year of Ligtvoet's death, but in 1739, when Boerhaave's possessions were sold, Van Royen's *Prodromus* had not yet been published. The Zierikzee herbarium only contains labels with names from a pharmacopoeia (Pharmacopoea Hagana 1738) and later applied labels with Linnean names. With the upcoming sale of Boerhaave's library, a selection was made from the Leiden garden herbarium. Whoever made this selection chose as many duplicates as possible (Fig. 10).

Ligtvoet was a well-informed gardener with an extensive library, containing numerous botanical works, several written in Latin. His long-lasting and successful career at the Leiden botanic garden (1703–1752) provided him with enough standing and capital to buy a canal house at Rapenburg 58, opposite the

Leiden botanic garden (Hoftijzer 2009). His botanical knowledge and horticultural know-how acquired during nearly 50 years must have been invaluable for the curators of the Leiden botanic garden.

The elaborate Latin description of Ligtvoet's herbarium in the auction catalogue of 1752 (Hoftijzer 2009) closely follows the appearance of the d'Oignies herbarium. "The sizeable stacks", "the brilliant display of dried specimens", "the superior way they were glued onto a large folio", "the occasional mention of specific authors", and the fact that "plant species from all over the world were found, which had been growing in the Leiden botanic garden for a long time"): all fit the description of the d'Oignies herbarium. The sheets may well have been "arranged according to the system of the celebrated Boerhaave", but as they were loose, their order was not fixed. The elaborate description of the herbarium in the catalogue of Ligtvoet's library is in stark contrast with that of the Boerhaave auction catalogue (Luchtmans 1739) which only mentioned "*herbarius vivus, 6 vll.*". Taking into account that this herbarium was sold as part of the library of the world-famous Boerhaave, it probably did not need any extra publicity, contrary to the Ligtvoet collection, where the mention of "the (still) famous Boerhaave" would have helped in getting the necessary attention of potential buyers.

We now know that after its sale in 1752 an interim owner glued 84 labels next to specimens of medicinal plants, mainly using a pharmacopoeia as reference source. In 1818, the herbarium was bought by the National Library of the Netherlands at an auction, organised by the firm Scheurleer. The herbarium is the only item described in French in the catalogue, which suggests it originally came from the Austrian Netherlands. It was part of a public sale of a library, containing ca.14.000 items that belonged to "a distinguished connoisseur", who preferred to remain anonymous (Scheurleer 1818).

Conclusions

The d'Oignies herbarium consists of six large books with 796 dried plant specimens, belonging to 315 exotic and 303 native Dutch species, both medicinal and non-medicinal, meticulously mounted on sheets and adorned with hundreds of carefully cut-out paper decorations. The volumes contain sheets of a distinct rough paper that was also used throughout the Zierikzee herbarium and in part of the herbarium compiled by the Leiden gardener Meerburgh. This suggests a link with the Leiden botanic garden and strengthens our hypothesis that both the d'Oignies and the Zierikzee herbarium functioned as a garden herbarium. The predominantly pre-Linnean names were copied by Simon d'Oignies, before or in the year 1780. Half of the names are corrupted, due to initial misunderstandings on the part of the collector and incorrect copying on the part of d'Oignies. While ordering the specimens alphabetically, d'Oignies assigned dozens of names to the wrong specimens. At the root of this confusion must have been the loose and easy-to-lose name tags, that initially accompanied the specimens.

The bulk of the plant names refer to publications by Dodoens (1517–1585), Lobelius (1538–1616), Johann (1541–1613) and Caspar Bauhin (1560–1624), but a significant number refers to specific scientific botanical publications. These names, together with the general uniformity and the meticulous care with which the specimens were mounted, suggest that this was not a collection of haphazardly acquired specimens, but that the compiler of the herbarium was a literate botanist. He not only collected these specimens, dried, mounted and decorated them to perfection, but also described them using a variety of (pre-Linnean) botanical publications, such as those of Boerhaave (1720), and Van Royen (1740), garden catalogues with a limited distribution outside Leiden.

The absence of collection localities suggests a fixed place of origin. The species composition reflects a botanic garden with species from all over Europe and the Mediterranean, with special focus on plants from South Africa and North America. The know-how needed to cultivate species from other climates was present in gardens owned by rich amateur botanists, but also in botanic gardens under the jurisdiction of universities or municipalities, and in commercial gardens (Pelinck 1961). Pharmacists also owned and maintained gardens, but their trade and education were primarily based on the representation and recognition of dried herbal material (roots, bark and seeds) and not on that of living plants (Van Der Ham and Bierman 2017).

Practically all decorations used in the d'Oignies herbarium are also found in 18th-century herbaria from Leiden. They were probably produced in Leiden, where a printing industry evolved round the production of student theses in Leiden (Pettegree and Der Weduwen 2019). This leads us to conclude that the loose-leafed, decorated d'Oignies herbarium was compiled in the Leiden botanic garden in the first half of the 18th century. Both the d'Oignies and the Zierikzee herbarium started off as one collection, created well before the death of Boerhaave, by the Leiden gardener Ligtvoet under the supervision of curators Boerhaave and Adriaan van Royen. A part of this collection, half of it containing duplicates, was sold following the death of Boerhaave. After its re-emergence in 2017, this part became known as the

Zierikzee herbarium. Ligtvoet continued with what was left and over time built up a considerable collection from the garden. This explains why the two herbaria are so similar in many respects and have so many species in common. An earlier theory that the d'Oignies and the Zierikzee herbaria were created by Martinus Schwencke (1707–1785), who founded a Hortus Medicus in the Hague (Thijsse 2021) seems improbable, as several years before Schwencke died, the d'Oignies herbarium was already in possession of d'Oignies himself.

In the two herbaria, a world of shifting plant names reveals itself, and a transition to a more universal nomenclature becomes gradually visible. The road to universally accepted binomial nomenclature would have been long and winding without the knowledge and know-how of curators and garden owners in and around Leiden, such as Boerhaave, Van Royen, Clifford, De la Court van der Voort (1664–1739), their respective gardeners Ligtvoet, Nietzel and De Vinck (Johnson 2019) and a large circle of wealthy and well-informed amateur botanists with whom they surrounded themselves with. It was in Leiden where Linnaeus saw how herbaria were used to maintain a botanical system, which enabled him to put in place his ideas about the ordering of nature in practice, although there is no evidence he ever saw the collective garden herbarium, that we now know as the Zierikzee- and the d'Oignies herbarium. Gardeners, educated on the job, tried innovative cultivating techniques, created herbaria and, together with the curators/owners were jointly responsible for the enormous botanical collection, amongst others, of the Leiden botanic garden. Gardeners were not always credited for their work (Shabin 1989; Hickman 2019), even though they formed the backbone of the botanic gardens. The fact that we can now attribute both the Zierikzee and the d'Oignies herbarium to Ligtvoet, is a call to re-evaluate the contribution of gardeners in the heyday of botanical research and education in the 17th- and 18th-century Dutch republic.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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Author contributions

AO conceived and wrote the article, AB wrote her master's thesis on the first two books of the d'Oignies Herbarium, HP and AK researched the history of the paper and watermarks, and TvA and AS read the various drafts of the article and did valuable suggestions regarding content and structure.

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