

The Art of Natural History

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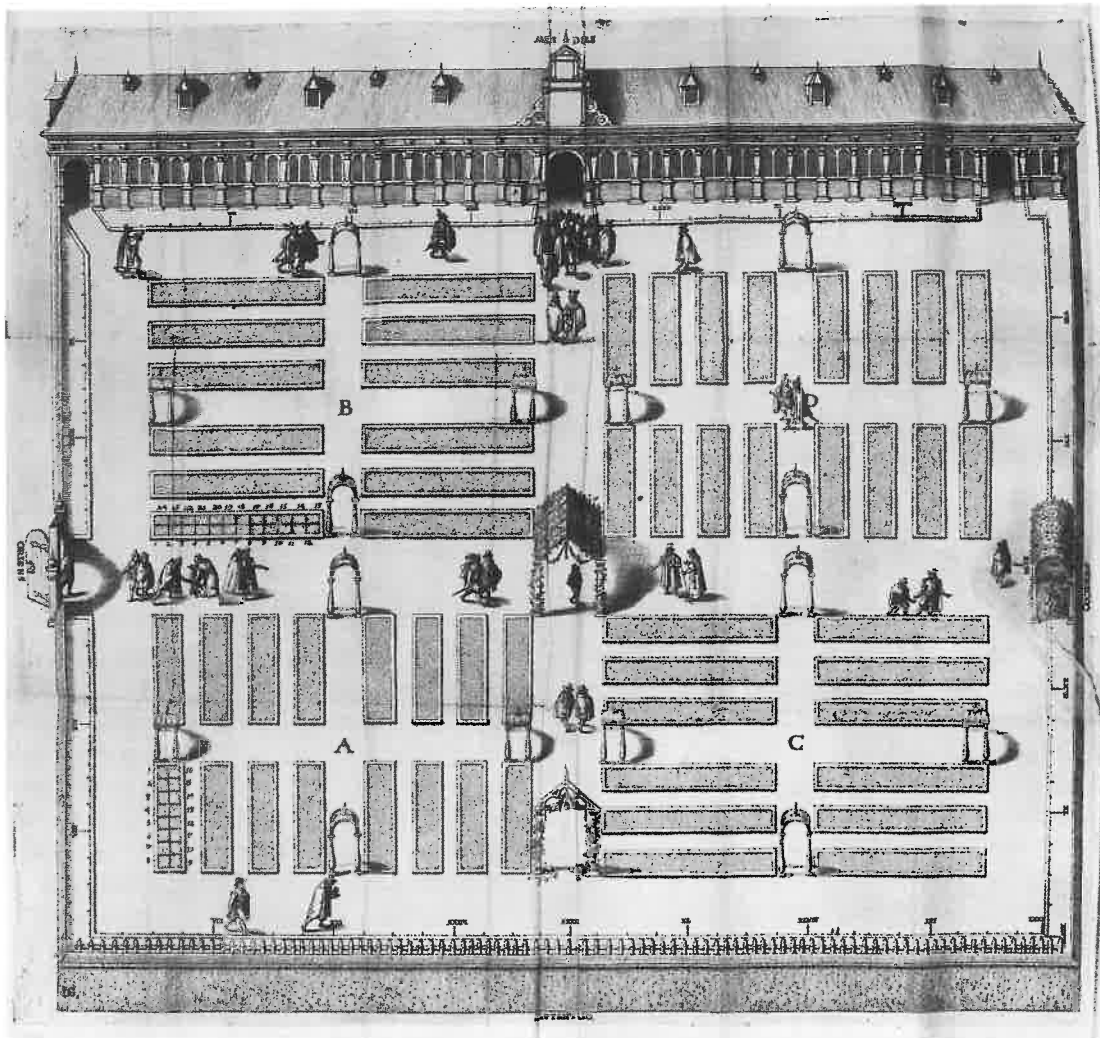
The Uses of Botanical Treatises in the Netherlands, c. 1600

The period that extended from the introduction of the movable-type press in the last decades of the fifteenth century to the middle of the seventeenth century was, in northern and southern Europe alike, an era of illustrated natural history: some of its most familiar products are encyclopedic herbals laden with pictures, generally in the form of woodcuts and, later, engravings. Throughout the early modern period, botanical treatises played a key role in the scholarly experience and the study of the natural world. Enterprising publishers across Europe issued herbals in which recently recorded specimens hailing from the New World were catalogued and illustrated alongside indigenous European plants that had not already been charted by such classical luminaries as the Greek naturalists Theophrastus (third century B.C.E.) and Dioscorides (first century B.C.E.), Galen (second century C.E.), and the Roman author Pliny the Elder (d. 79 C.E.). Numerous plant varieties not described by these classical authors were “discovered” by European medical professionals and natural historians and were factored into a growing body of botanical knowledge that was disseminated, emended, and perpetuated in print.¹ Alongside published works, unpublished treatises—consisting of images alone or a combination of text and images—also attest to the ways and means by which early modern natural historians charted and made sense of the plant world. Natural

history treatises were repositories of information gathered by reading and observing, and through correspondence and discussion with fellow scholars of the natural world. The improvements these writers made over their classical precedents resulted from an ongoing process of revision, a process that was as much a factor of the production of these treatises as it was of their reception and use.

Much has been written about the many catalogues of the natural world published and disseminated in rapid succession throughout Europe at that time. The numerous early modern botanical, zoological, and ichthyological volumes are significant not only for the numbers in which they were produced and their ambitious scope, but also for the nature of the descriptive means they employed. In general, these texts consist of verbal descriptions accompanied by morphological images—catalogues of a sort unthinkable in the absence of print technology. Vagaries of appearance were recorded, (medicinal) effects were noted where known, and the discovery of new members of the various classes of nature—animal, vegetable, and mineral—was declared. Most important, emphasis was consistently placed on the description of the specimens under review. The case of botany is exemplary. The realization that varieties of indigenous European flora had not been recorded by ancient authorities—Theophrastus, Galen,

Anonymous, *Paeonia femina* (*Paeonia officinalis*; peony), c. 1590, from *Libri Picturati*, A.25, folio 59, watercolor
Jagiellon University Library, Kraków



1. Jacques de Gheyn II, *Plan of the Leiden University Garden*, 1601, engraving
National Herbarium of the Netherlands, Leiden

and Dioscorides first among them—provided an incentive to produce the first generation of modern herbals, and print technology offered the means to disseminate, emend, and test new descriptions of specimens on an international scale. While specimens from outside Europe were initially registered in terms of their pharmacological uses, observation was ultimately emancipated from practical exigencies and acquired disciplinary status through the study of similarities and differences between appearances and internal structures.² In the initial flush of descriptive botany, the visual record played a critical role. The dissemination by means of print technology of what historian William M. Ivins, Jr., memorably termed “exactly repeatable pictorial statements” enabled documentation of the varieties of

the natural world unknown to the ancients and provided stable points of reference for cataloguers and later taxonomists.³

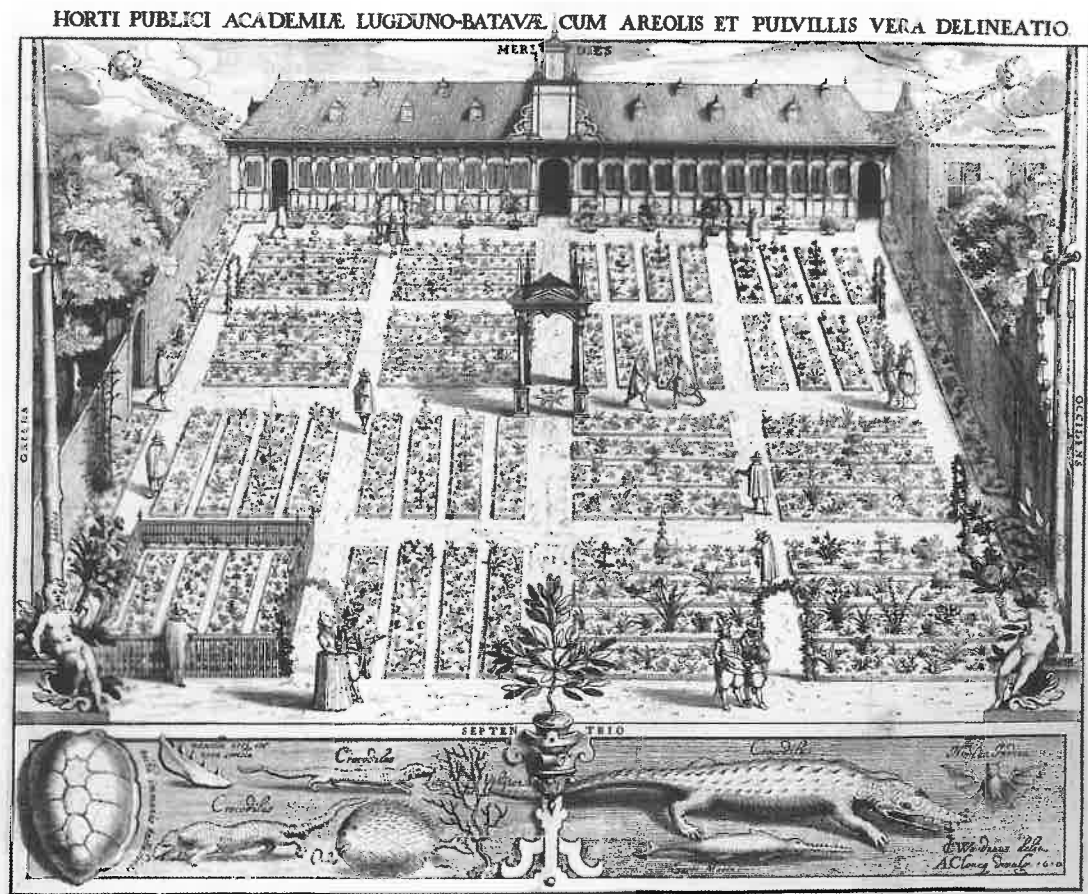
A variety of botanical treatises—printed, painted, folio size, field-guide format, pedagogic, and personal—were produced in the Netherlands in the later sixteenth and early seventeenth centuries. This essay surveys a number of Dutch botanical treatises, offering a sort of group portrait of some of the types available, paying special attention to the different ways in which they were used and the approaches to the natural world from which they grew and which, in turn, they fostered. Because most of the authors and purveyors of treatises discussed here were affiliated with the botanical garden of Leiden University—the nexus of botanical study in the northern Netherlands c. 1600—and

because the garden fostered modes of observation and study reflected in the treatises, we begin within its walls. Over the course of about four decades on either side of the turn of the seventeenth century, different kinds of botanical knowledge and different forms of interest in the plant world were cultivated at Leiden. The range of approaches to the plant world and its investigation can, in turn, be traced to different botanical treatises produced there.

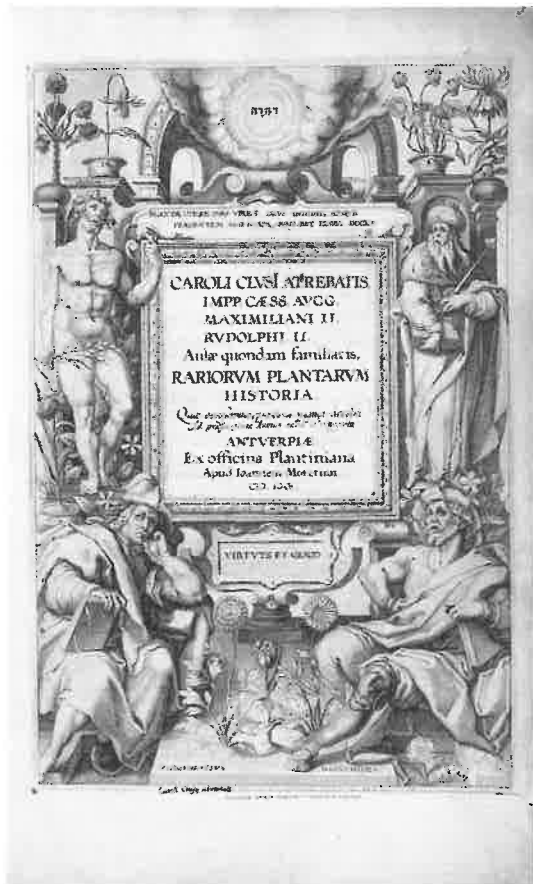
The Botanical Garden at Leiden

The primary arena of botanical study in the northern Netherlands at the turn of the seventeenth century was a plot of land in the heart of the city of Leiden that measured 30 by 40 meters (roughly 98 by 131 feet)—the Leiden University garden (figs. 1, 2).⁴ Established in 1574 as the first university founded in what would become the Dutch Republic, Leiden University attracted a tremendous constellation of scholars; it also

housed the principal botanical garden north of Paris. Founded in 1593 to accommodate instruction in materia medica, the Leiden garden grew rapidly in scope and renown. By 1599, a long gallery, called in seventeenth-century documents an ambulacrum, had been constructed at the western edge of the garden to house the more delicate foreign plants and to exhibit a range of related objects, from maps and prints to the kinds of natural specimens that were part and parcel of scientific collections at the time: dried blowfish, coral, crocodiles, ethnographic items, and a collection of minerals (fig. 2; note the items depicted in the lower register). The Leiden garden, much like the coeval university anatomical theater, served as a locus for teaching medicine (one of the principal disciplines taught at the young university), allowing for the kind of eyewitness, or autoptic, experience that became a hallmark of early modern science and its instruction.⁵ Classes were taught on site in both the garden and the theater and in



2. Willem Swanenburgh after Jan Cornelisz Woudanus (Jan Cornelisz van't Woudt), *Leiden Garden*, 1610, engraving
Rijksmuseum, Amsterdam



the presence of the subjects of instruction, whether plants or anatomical specimens. By virtue of its contents, its keepers, and the circulation of information it inspired and supported, the Leiden University garden became the fulcrum for the production of botanical knowledge at the turn of the seventeenth century in the Netherlands.

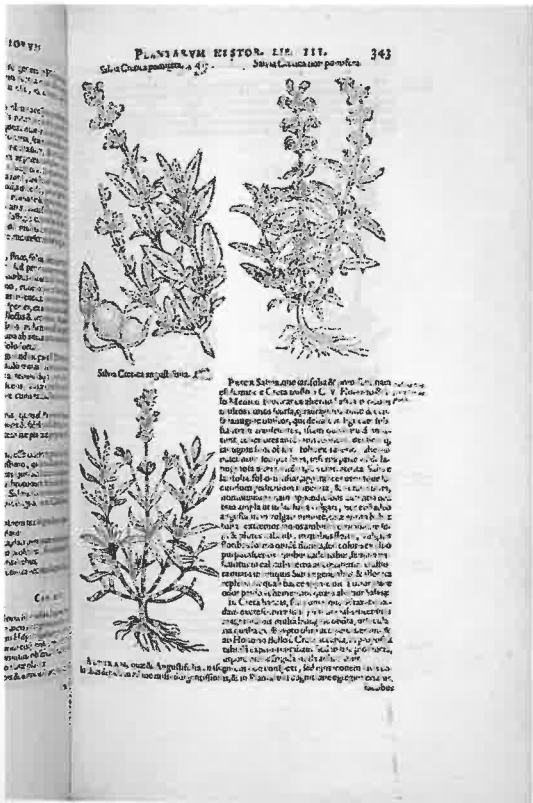
3. Title page from Carolus Clusius, *Rariorum plantarum historia* (Antwerp, 1601), engraving
Amsterdam University Library (UvA), Special Collections

The *Rariorum plantarum historia*

One of the best-known Dutch natural history treatises dating from the turn of the seventeenth century is the *Rariorum plantarum historia* (Leiden, 1601) by the Flemish botanist Carolus Clusius (Charles de l'Escluse; 1526–1609) (figs. 3, 4). This weighty tome was published nearly a decade into Clusius' tenure as director of the Leiden University garden. Having distinguished himself by publishing a number of works on regional flora (of Austria and Spain), as well as by translating early texts on New World materia medica into Latin and by serving as imperial gardener in Vienna, Clusius was a fine catch for the Dutch university, whose garden he directed from 1593 until his death in 1609. The *Rariorum* is exemplary of the generously illustrated, widely distributed editions issued throughout the later sixteenth century by the Antwerp publisher Christophe (Christoffel) Plantin (1520–1589). Along with Rembertus Dodonaeus (Rembert Dodoens; 1517–1585) and Matthias Lobelius (Mathieu de l'Obel, 1538–1616), both of whom also wrote monumental herbals in the later sixteenth century that Plantin printed with copious woodcut illustrations of individual plants, Clusius is frequently hailed as one of the fathers of Netherlandish botany.⁶

Like his colleagues Dodonaeus and Lobelius, Clusius assembled his *Rariorum* much as he had composed the flora before it and much as he assembled his later *Exoticorum libri decem* (Leiden, 1605)—by compiling individual descriptions, both verbal and visual, of specimens culled from the natural world (figs. 5, 6). The descriptions were based on information about specimens provided by a network of colleagues, friends, and fellow amateur naturalists, who are cited throughout the text. Clusius' use of images in his publications is both

4. Anonymous, *Salvia cretica pomifera*, *Salvia cretica non pomifera*, and *Salvia cretica angustifolia* (varieties of aromatic sage), from Carolus Clusius, *Rariorum plantarum historia* (Antwerp, 1601), volume 3, page 343, woodcuts
University Library, Leiden, 755 A3





5. Title page from Carolus Clusius, *Exoticorum libri decem* (Leiden, 1605), engraving

Amsterdam University Library (UvA), Special Collections

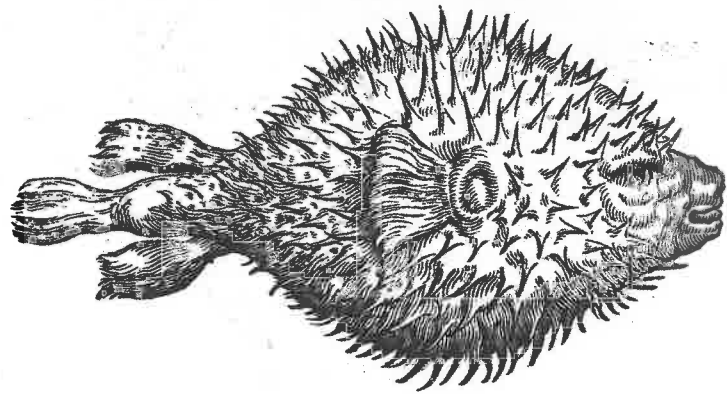
6. Anonymous, *Spiny Pufferfish*, from Carolus Clusius, *Exoticorum libri decem* (Leiden, 1605), page 138, woodcut

National Herbarium of the Netherlands, Leiden

noteworthy and consonant with contemporary science and its products: that most of his entries on individual plants or other specimens are illustrated with a woodcut reflects a conviction, amplified in his text, that images convey information crucial to description and to some form of rudimentary classification.⁷

In his *Rariorum*, Clusius supplemented his descriptions of plants and flowers with considerations as to their relative scale, the time of the year in which they bloom, and their provenance; but the characteristics most crucial to their classification are those that can be observed in the immediate presence of the specimen—those that can be recorded pictorially.⁸ In his groundbreaking chapter on tulips, Clusius describes a variety of dwarf tulip within the category of the “intermediates”; it blossoms between the “early” and the “late” varieties. This class is described generally as follows:

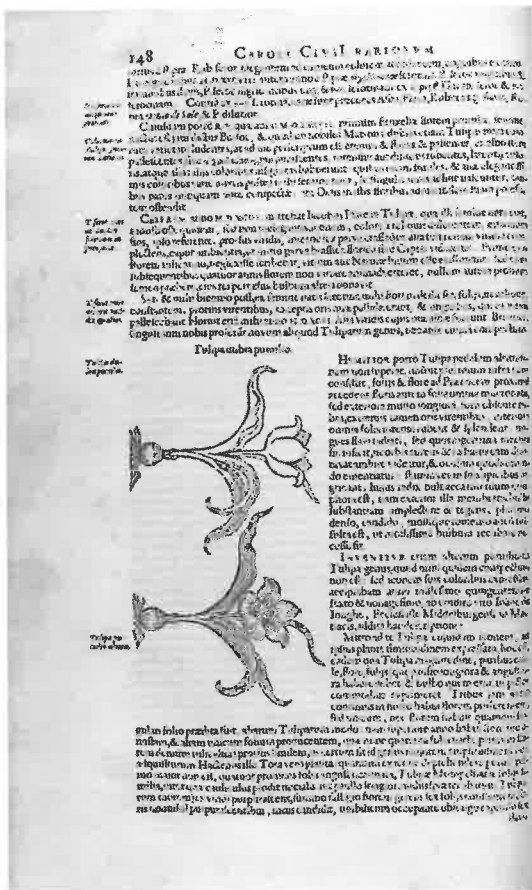
The dwarf [intermediate] tulip is not more than a foot high, usually even less, and in its leaves and flower it strongly resembles the early tulip.



ERAT porro ab extremo ore ad caudæ initium, five radicem, viginti uncias longus, medio corporis ambitu viginti novem crassus, squamis carens, & cute five corio albescente dumtaxat tectus, undique firmis & acutis spinis obfitus, quarum basis in duas alias breves & sub cute latentes desinebat: oris aperti diameter trium unciarum erat, & aliquid prominebat, labra rugosa, binaque ossa pro dentibus habebat, supernè unum, infernè alterum, utrumque fornicatum, & anteriore parte nonnihil . . . ut oris rictus; pro-

All its segments are pointed, but the outer ones are much longer, externally dull red but at the outermost margins greenish; the inner segments are of a brilliant, fiery red throughout. The claws are yellow and radiating, but marked with a jet-black patch in such a way that the latter appears encircled by a mere golden aureole and bears some likeness to an eye; the filaments and their anthers are blackish. It should be noted that its bulbous root is woolly; the outer membrane enveloping and covering the substance of the bulb is so tightly filled with an abundance of dense, white, soft stuffing that it must form a very soft resting place for the bulb.⁹

From the opening sentence of his description, Clusius encourages the reader to imagine the plant as described. The dwarf tulip resembles the early tulip in its overall appearance; and in the more specific rendering of the appearance of this flower, the reader is led from part to part by gradations and shifts of color. At the center of the plant and of the description (while looking into the tulip from above, observing the appearance of the golden aureole), the reader



encounters, in an almost specular manner, “some likeness to an eye.” Clusius helpfully provides an image to corroborate the verbal evidence he summons (fig. 7), which offers at least partial confirmation of the substance of his description.

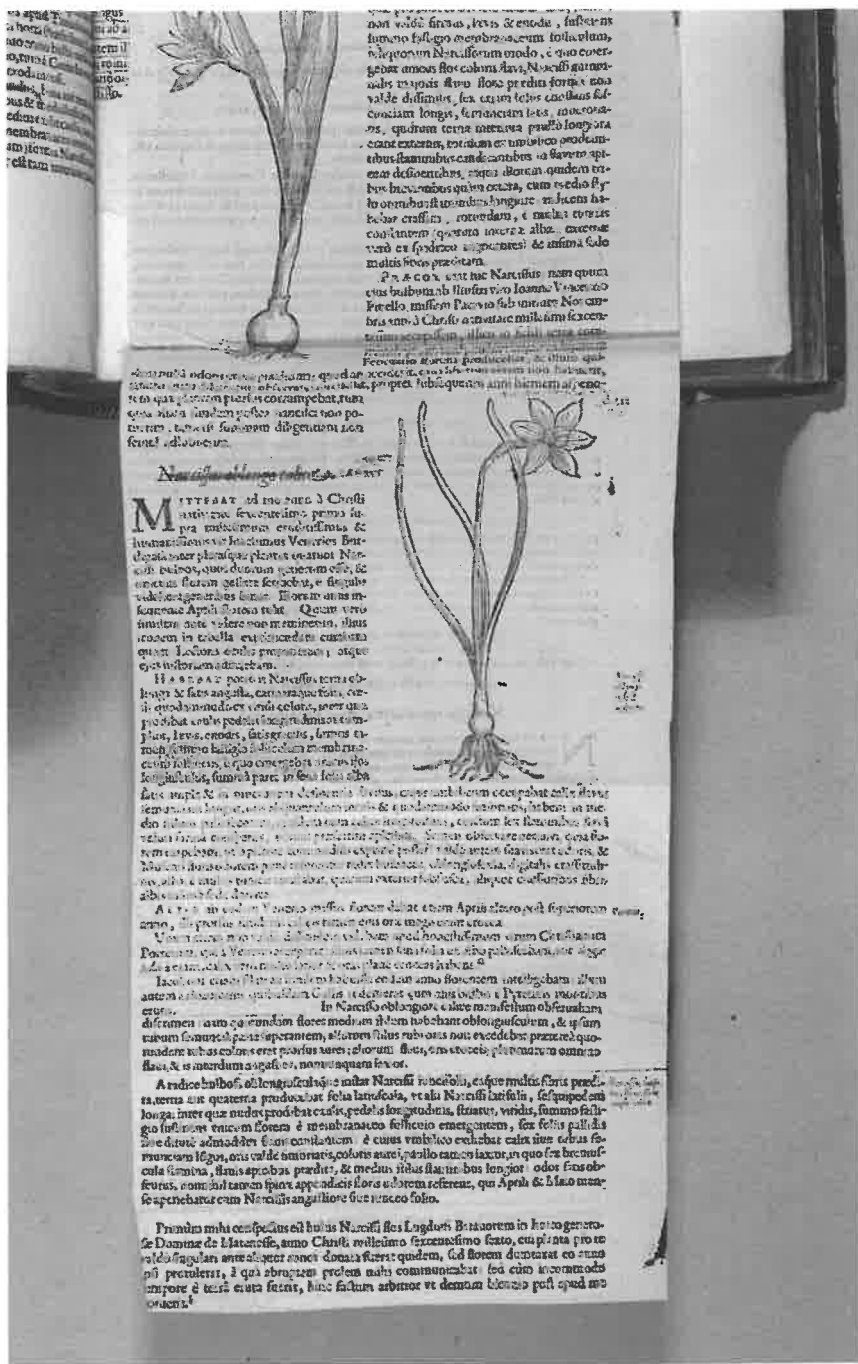
Within the context of late sixteenth-century natural history, the combination of text and image here is typical, and Clusius’ descriptive method exemplifies the industry standard. Verbal and visual descriptions are coupled throughout natural history writing of the time, in which external, observable characteristics are adduced in attempts to describe and classify the specimens recorded. Throughout Clusius’ *Rariorum* and *Exoticorum*, as in most contemporary natural history publications, images served to complement verbal description; where images were the only available evidence, they also served as a basis for description, as well as for classification.¹⁰ The close affiliation between word and image in such treatises attests to the authors’ commitment to a morphological account of the natural world. Clusius and his published works embody the effort, undertaken throughout Europe at the time, to understand the natural world by describing it.

A copy of the *Rariorum* preserved in the Leiden University Library contains Clusius’ emendations to the published text. Clusius continued to accumulate information about the plants represented in his catalogue after its publication in 1601: the entries grew and changed and, by means of cutting and pasting, were relocated as well (figs. 8, 9).¹¹ These pages from Clusius’ own redacted copy of the *Rariorum* further exemplify the sort of early modern natural history treatise represented by the *Rariorum* and the *Exoticorum* in their published forms. The catalogues of the natural world produced by the fathers of Netherlandish botany and published by Plantin and his heirs were accumulations—more or less elaborately illustrated collections—of information about the natural world. In the texts of both the *Rariorum* and the *Exoticorum*, Clusius made frequent reference to individuals across Europe who had sent him specimens, as well as to his contemporaries in whose collections, homes, or shops he had observed the specimens he described. Clusius’ treatises, to

7. Anonymous, *Tulipa dubia pumilio* (dwarf tulip), from Carolus Clusius, *Rariorum plantarum historia* (Antwerp, 1601), page 148, woodcut Amsterdam University Library (UvA), Special Collections



8. Page with handwritten insert, from Carolus Clusius’ *Rariorum plantarum historia* (Antwerp, 1601), pages 134–135, pen and ink and woodcut University Library, Leiden, 755 A3



9. Page with printed insert, from Carolus Clusius' personal copy of *Rariorum plantarum historia* (Antwerp, 1601), pages 158–159, woodcut
University Library, Leiden, 755 A3

an even greater extent than those of Lobelius or Dodonaeus, were almost entirely devoid of information about the (medicinal) uses of the individual specimens represented; consider, again, the example of the dwarf tulip. Clusius typically offered descriptions of the morphology and the source or origin of the items he catalogued. Not trained as a medical doctor and largely uninterested

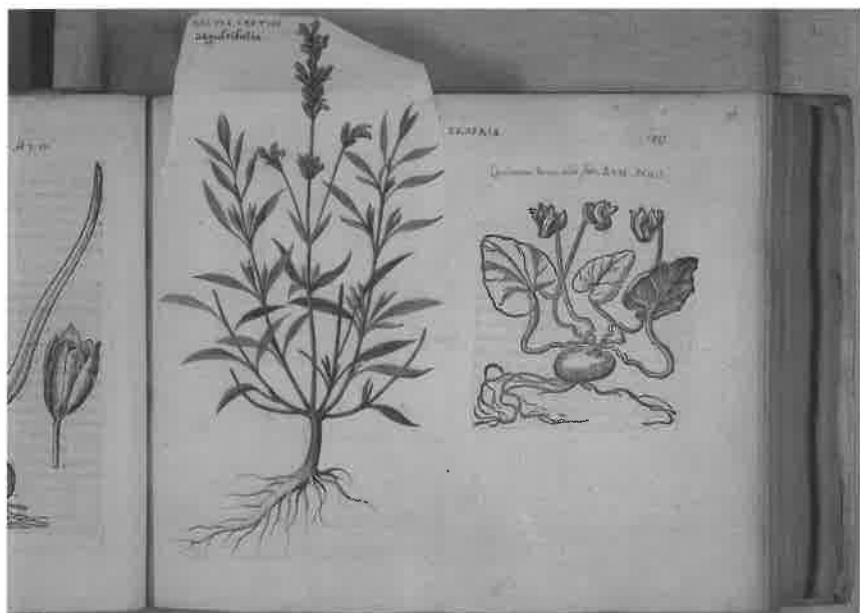
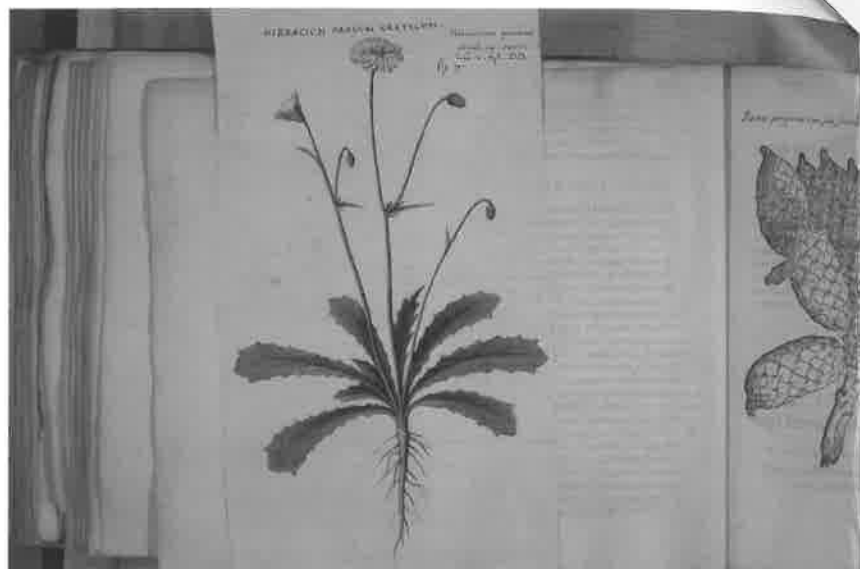
in the practice of medicine, Clusius structured his botanical treatises as collections of specimens of the natural world, whose distinguishing characteristics he described and compared. His emendations consist of additions to the record—in the form of units of text and image. By cutting and pasting, he could reassemble entries without substantial changes to their overall structure, which served more or less as a container. The blocks of text and image could be shuffled and new ones inserted, and the overall catalogue would retain its catchall form.

Raphelengius' Codex

Another volume in the Leiden University Library offers a vivid example of a different but related sort of botanical treatise—a more interactive work that served as a resource in the comprehension of the natural world and in the construction of further models of its organization. This codex consists of roughly two hundred pages of woodcuts excerpted from the publications of the great Netherlandish trio of authors on the plant world: Dodonaeus, Lobelius, and Clusius. Here, the illustrations have been cut and pasted in an original order. In some cases the woodcuts are replaced by pen-and-ink and watercolor drawings or accompanied by drawings affixed to pages along with pasted-in woodcuts (figs. 10, 11). Compiled by Franciscus Raphelengius II (Frans van Ravelingen the Younger, d. 1628; grandson of Christophe Plantin), heir to the publisher's works and himself an amateur botanist, this volume is a minor masterwork of cutting and pasting. According to the introductory text in Raphelengius' hand, the volume grew out of his attempt to collate the nomenclature and illustrations used by his predecessors.¹² This codex is a fascinating document for many reasons, not the least of which is that it exemplifies the appropriation of existing botanical treatises by authors and publishers in the early modern era. The slow and steady process of classification carried out here with knife, glue, and pen constitutes an extreme example of scholarly or scientific use of such treatises, in which the process of interactive reading becomes a practice of cutting and pasting. Aside from representing the initial stages of a treatise that

Raphelengius may have intended to publish, the codex was also an exercise in studying the plant world. As he states in the introduction, he “certainly . . . gained a great deal of knowledge about the vegetable kingdom through this exercise.”¹³

In some instances, Raphelengius supplemented the woodcuts he garnered from the publications of the three fathers of Netherlandish botany with drawings that must also have been used as the basis (the designs) for woodcuts that were published by Clusius in his *Rariorum* (compare figs. 4 and 11). The genealogy of these images is too complex to unravel fully here, but it is clear that the botanical enterprises represented by Clusius and Raphelengius, respectively, built on a common stock of materials; botany was a cumulative undertaking. Throughout the sixteenth century, publishers reused existing woodblocks in subsequent publications on the plant world; the effort to produce new images for each edition would have been all too time-consuming and expensive. In the particular case of these Leiden books, we may surmise that Raphelengius came into the possession of watercolors that Clusius may have commissioned himself, but in any case these were the designs for the woodcuts that illustrated his treatises.¹⁴ We must bear in mind that a direct association between the two men can be traced via Plantin, Clusius’ publisher and Raphelengius’ grandfather. There are also instances, in Raphelengius’ paste-book, of drawings that appear as woodcuts in Clusius’ own redacted copy of the *Rariorum* but were not previously published; they do not appear in other copies of the 1601 volume (see figs. 10 and 12). The correspondences between drawings and woodcuts are too striking to ignore; moreover, for each case in which a relationship can be traced, the woodcut is a mirror image of the drawing, making it all the more likely that the drawings served as models for the prints. Why did Raphelengius include drawings as well as woodcuts in his codex? Conversely, why did he fail to include the woodcuts to which Clusius clearly had access when he revised the *Rariorum*? The answers to both questions may ultimately remain elusive. Still, Raphelengius’ use of images is symptomatic of one mode of participation in natural



history. By reshuffling existing sources and supplementing them with new ones, Raphelengius aimed to clear a path out of the confusion that had accrued to botanical works of the time. In a handwritten preface to future owners of his work, he declared that he set out to rectify errors and distractions that had resulted from the fact that, in the books his grandfather had published, “Lobelius and Dodonaeus had made use of the same illustrations more than once and often given them the same botanical name, but also often a different and several times a completely opposite name.”¹⁵ Where the

10. Anonymous, *Hieracium parvum creticum* (hawkweed), inserted in Franciscus Raphelengius’ codex, c. 1618, watercolor University Library, Leiden, MS BPL 948, fol. 97v

11. Anonymous, *Salvia cretica angustifolia* (aromatic sage), inserted in Franciscus Raphelengius’ codex, c. 1618, watercolor University Library, Leiden, MS BPL 948, fol. 46r

12. Anonymous, *Hieracium parvum creticum* (hawkweed), inserted in Carolus Clusius' personal copy of *Rariorum plantarum historia* (Antwerp, 1601), pages cxlii–cxliii, woodcut University Library, Leiden, 755 A3

dependence on images had once allowed confusion to build (where single woodcuts were reused to represent multiple varieties of plants, for example), in Raphelengius' hands, that same dependence on images served to clarify such confusion.

The Contributions of German Natural History Writers

The examples of botanical treatises cited thus far all participate in what had, by the turn of the seventeenth century, become a relatively conventional mode of writing natural history. Committed to images for the morphological information they could convey, this empirical endeavor is exemplified by illustrated treatises. As early as the third decade of the sixteenth century, German authors spearheaded the production of illustrated texts aimed to offer as much morphological information as could be conveyed in brief verbal descriptions and woodcut illustrations. Otto Brunfels (1488–1534) was the first of several authors to publish extensive accounts of local flora that included systematically descriptive images.¹⁶ In its organization and text, Brunfels' *Herbarum vivae eicones ad naturae imitationem* (Strasbourg, 1532–1536) differed little from its classical sources (especially Pliny and Dioscorides), but the images—the very subject of the book's title—heralded an entirely new form of engagement with nature. In 1542 Brunfels' compatriot Leonhard Fuchs (1501–1556) published *De historia stirpium*, in which roughly 550 plants were recorded and illustrated (fig. 13). Fuchs outlined his descriptive project in a page-long qualifying subtitle, where he explained that his (verbal) descriptions of the habitats, nature, and medicinal properties of plants were accompanied by the most artful and expressive illustrations, made *ad naturam* (from life).¹⁷ Like Brunfels, who referred to the images of plants in his book as “portrayed with great diligence and artifice,” Fuchs advertised the artistic quality of the woodcuts he published. The degree of artistry was closely monitored, however. Fuchs specified that “shading and other less crucial things with which painters sometimes strive for artistic glory” have been discouraged in the interest of making “the

13. Anonymous, *Papaver errati* (poppy), from Leonhard Fuchs, *De historia stirpium commentarii insignes* (Basel, 1542), page 516, woodcut Newberry Library, Chicago



pictures correspond [more] to the truth."¹⁸ Apparently Fuchs was concerned that signs of individual authorship not occlude faithful transcriptions of the natural world and, indeed, most natural history illustrations of this era were unsigned.¹⁹

Although complaints about the ability of static images to capture the variable forms of nature continued to be lodged, a characteristically pictorial natural history asserted itself in the sixteenth and seventeenth centuries.²⁰ These images served a variety of uses, among them description, identification, instruction, substitution for the real item (in collections, for example, where images supplanted unavailable specimens), and elicitation of wonder. Both Clusius' *Rariorum* (like his later *Exoticorum*) and Raphelengius' pastiche codex represent a form of engagement with the natural world that is central to early modern efforts to catalogue it.

Distinctions among the Dutch Treatises

While similarities among Dutch treatises around the turn of the seventeenth century abound, distinctions among them can also be drawn. In this author's view, they can best be drawn along practical lines. That is to say, as the remainder of this essay aims to demonstrate, the uses of treatises—in the library as opposed to the field and garden—are captured in their form. Whereas the encyclopedic format of Clusius' (and Plan-tin's other botanical) publications made them eminently suitable for consultation at a table or behind a desk and encouraged collation with other published sources, and whereas the interactivity encouraged by the Raphelengius volume was solitary, intellectual, and devoted to the task of classification, other coeval treatises attest to a different approach to the forms of nature described.

Clusius, although the first director of the Leiden University garden, was not the university's first choice (fig. 14). The position was first extended to Bernardus Paludanus (Berent ten Broecke, 1550–1633), the prominent physician of the northern port town of Enkhuizen, who was also an avid collector of naturalia. Nevertheless, Paludanus—whose links to overseas trade and whose interest in



In Effigiem Nobilis Doctissimiq; Viri
CAROLI CLUSII

ATREBATUM decus, et nobis nova gloria fecit
CAROLVS hic Legatus CLUSIVS or a gerit.
Haberam vnae Orbi dedit ille figuram,
At CLVSIVSVM GHYNIVS effigiem.
BON. VVEGANIVS

14. Jacques de Gheyn II,
Portrait of Carolus Clusius,
1601, engraving
Amsterdam University Library
(UvA), Special Collections

natural history were renowned throughout Europe—declined the post. Clusius had been informally approached by friends in Leiden who wished him to be nominated, but he put them off by stating firmly in private correspondence that nothing could convince him to take on public responsibility to teach or even to manage a public garden.²¹ Meanwhile, a second candidate was discussed by the trustees of the university—Dirck Outgaertszn Cluyt (Theodorus Clutius, 1546–1598), a pharmacist in Delft (fig. 15). Like Paludanus, Cluyt possessed a fine collection of dried specimens, which he would have been required to bring with him to Leiden had he become director of the garden. However, Cluyt's lack of an academic degree prevented the trustees from offering him the position. After lengthy negotiations, Clusius was hired in the fall of 1592, and he moved to Leiden from Frankfurt in the fall of 1593.²²

The official offer of employment made to Clusius specified that he would be exempt from teaching any formal classes but would be required to give daily lessons in the garden in the summer, "when the plants are vital and fresh," during the course of which he would name the plants and relate their

histories and properties. In the winter, he was expected to give lessons twice weekly on “spices, stones, soils, metals, and other things used by doctors.”²³ It was suggested that if Clusius found the latter task too imposing, he might share this responsibility with the professors who taught the subject publicly at the time—Pieter Pauw (1564–1617) or Gerard de Bont (1536–1599). In his response to these stipulations, Clusius insisted that he would under no conditions in his sixty-sixth year commence teaching, for he had never taught in his life. He offered to accompany students on botanical walks, since he acknowledged that it was important to study plants in their native habitats, but insisted that he be excused from the responsibility of teaching in the winters since he knew nothing, he wrote, of metals.²⁴

Clusius certainly added luster to the Leiden *hortus*; he was in no way, however, the representative of the revived study of materia medica that the trustees and mayors had sought as director of the garden. Throughout his tenure at Leiden, Clusius’ efforts were focused on accumulating plants and other artifacts for the collections of the university. Teaching was never his province. Moreover, Clusius’ early years in Leiden were particularly trying on account of explicit tensions between him and his colleague Pieter Pauw, professor of anatomy and botany (fig. 16). It may have been, as documents suggest, that Pauw was an arrogant, jealous man and Clusius an unbending crank. But the tension between them was also broader and more intellectual. Clusius was not trained in medicine and adamantly refused to play an active role in teaching it. Determining or teaching the medicinal properties of plants was never foremost among his interests. The title of his *Rariorum plantarum historia*, published at Leiden in 1601, is indicative of his botanical interests, which favored the aesthetic or, at least, morphological qualities of plants over their medicinal properties or uses.²⁵

Others who studied the plant world at Leiden—Pieter Pauw and the pharmacist Dirck Cluyt among them—did embody reformed medical study. For Pauw, the Leiden *hortus* served as an arena for teaching—as a *hortus medicus* or *hortus academicus*. The

difference between Clusius’ study of the plant world and Pauw’s engagement in it is borne out in documents, in images, and in treatises. As their roles evolved, it became painfully obvious that Clusius would not carry out any of the day-to-day operations of the garden, and in 1594 the second candidate for the directorship—Dirck Cluyt—was hired as *hortolanus*, “to promote and maintain the university garden” and “to serve and further medical studies.”²⁶ Cluyt, like Pauw, was vitally engaged in the cultivation of and instruction in the materia medica,



15. Anonymous, vignette showing Dirck Outgaertszn Cluyt and Carolus Clusius in the Leiden Garden, from Dirck Outgaertszn Cluyt, *Van de byen, haer wonderlyke oorspronk, natuer, eygenschap, krachtighe, onghehoorde en seltsame werken* (Leiden, 1597), frontispiece, woodcut

National Herbarium of the Netherlands, Leiden

16. Anonymous, *Pieter Pauw*, from *Succenturiatus anatomicus* (Leiden, 1616), engraving

Amsterdam University Library (UvA), Special Collections

while Clusius acted as figurehead for this new arena of medical instruction. Clusius' orientation differed effectively from that of the agents who mediated the garden's use. In turn, these differences are reflected in the botanical treatises produced by and for these various agents.

A number of volumes of watercolors were used in the course of medical instruction at Leiden in the last decade of the sixteenth century. Through such use, students learned to identify plants for their medicinal purposes. Among these volumes were botanical watercolors owned by Cluyt, who was prefect of the university garden from 1594 until his death four years later.²⁷ A document submitted by the medical students at Leiden to the trustees (*curatores*) of the university in 1598 cites "six painted books of all sorts of herbs and flowers [painted] from the life, which serve us instead of the garden in winter." In the wake of Cluyt's sudden and premature death in 1598, the students rallied to ensure that the volumes would remain accessible to them. The students' formal request detailed the potential loss of valuable academic resources resulting from Cluyt's death. Referring to Cluyt as "our most sedulous and intelligent herbalist . . . a very clever, experienced, and diligent simplicist necessary to this university and the likes of which are known to no other," they requested that the university name Cluyt's eldest son, Outgaert, who was only twenty-one at the time, as his father's successor. By doing so, the university would be able to preserve the collections and the volumes of images as well as "numerous chests with at least 4,000 *simplicia* [simples], which [Outgaert's] father had carefully collected throughout his entire life up to the age of fifty-two."²⁸ These items, the students stated, were in the home of the deceased, and his widow intended to pass them on to Outgaert in order to help secure her son's professional success. Along with this formidable collection of dried specimens, the volumes of images—the winter garden—were deemed indispensable to the course of study. The students' request to the trustees indicates that Cluyt's stock of watercolors was used to teach the identification of plants during the winter months, when the renowned botanical garden was dormant.

In this respect, the watercolors shifted the terms of the standard medical curriculum, conventionally divided between *lectura* (reading) and *ostensio* (demonstration), so that texts were studied in one season to prepare students for practical exercises in the presence of actual specimens in another (i.e., anatomical texts were studied in warmer months and cadavers in the winter; botanical texts were the subject of winter classes, and live plant specimens were studied in the garden during warmer months).²⁹ By dint of substitution, Cluyt's watercolors of plants and flowers provided information about specimens whose availability was otherwise limited by the cycle of the seasons and the whims of weather. The images effectively bridged the distance between the study of pharmacological texts and the study of nature, between *lectura* and *ostensio*. The text of the students' petition has substantial bearing on a broader discussion of the practice of medical study at the close of the sixteenth century, as well as on the uses of naturalistic representation at this point in its history. It also has particular significance for the history of the role of images within scientific curricula during this period.

Elsewhere, I have argued that the watercolors Cluyt is known to have owned may be identical with a body of works currently housed in the Jagiellon University Library, in Kraków (essay frontispiece, and figs. 17 and 18).³⁰ These watercolors, known as the Libri Picturati watercolors by virtue of their longtime classification under that rubric, are extraordinary documents of early modern investment in naturalistic pictorial records of the natural world. The drawings in the Libri Picturati represent a wide array of specimens of the plant world, ranging from ferns, mosses, and lichens to fruit and nuts (in both fresh and dried form), and from spices (such as those sixteenth-century European imports that inspired wonder and pharmaceutical speculation) to ornamental plants, many of them bulbous, that were soon to become all the rage among collectors and gardeners. Varieties of orchids, lilies, and narcissi are depicted, as are vegetables and fungi, grasses and trees.³¹

The plants are attentively rendered in color, and their forms are organized in such a way that their various surfaces—the backs

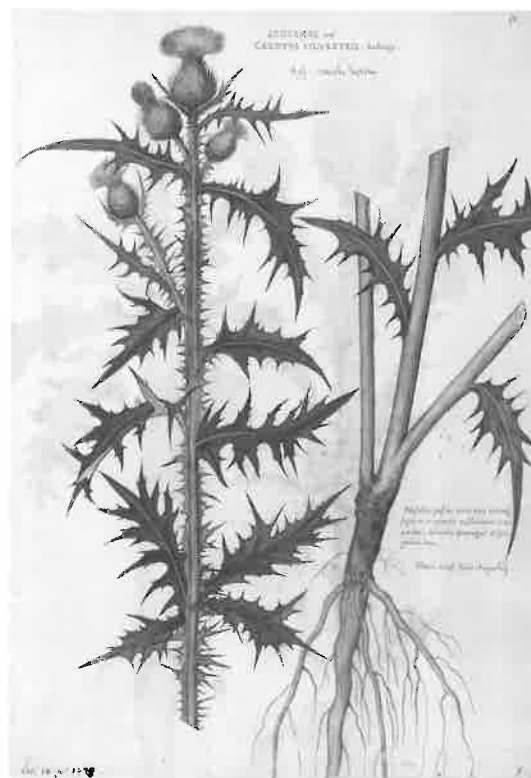
17. Anonymous, *Paeonia femina* (*Paeonia officinalis*; peony), c. 1590, Libri Picturati, A.25, folio 59, watercolor
Jagiellon University Library, Kraków



and fronts of leaves and the variegated forms of stems and petals—are fully visible.³² Nearly without exception, the root structures are described as carefully as any of the other features of the plants, and are shown in full. The roots are firm and tuberous in some instances, and in others wispy, fibrous root elements dangle or spread, according to their actual growth patterns. In some cases, as on A.22.71 and A.22.72 (*Iris silvestris* and *Iris maritima*), the tuber is represented as if it had been cut, which serves to show the interior structure and color of the root. In a number of cases, plants are depicted within the same image at various stages of maturity. For example, two sorts of cherries, *Cerasa acida* and *Cerasa dulcia*, are each represented by a substantial portion of a branch, cut to show its inner structure, which bears fruit (A.20.80v). Separated by a few millimeters from the fruit-bearing branches are twigs in blossom. The means by which a plant is represented in both its flowering and its fruit-bearing stages is employed consistently; a barely perceptible break in a branch separates it from the other portion of the plant, shown at a different stage of maturation. One additional feature of these drawings that merits comment is that many of the stems of the plants thus

depicted are cut so that the entire plant can be shown and drawn to scale. In many cases, then, the drawings mimic the compositions of dried herbals, where stems are bent or cut in order to fit a given specimen onto a page; they are eminently legible insofar as there is little loss of figures into rendered depth and portions of plants are not obscured by others. In all, more than six hundred specimens are painstakingly labeled and inscribed.

With some exceptions, these drawings were never published. (A very few are identical to woodcuts that appeared in Plantin publications.) Internal evidence suggests that if they were not intended solely for instructional purposes, they nonetheless suited that purpose ideally. A significant number of the Libri Picturati watercolors bear inscriptions, and many of them are in at least two hands (though they may well have been written by a single individual). These inscriptions can be separated into four sorts, each of which dates to a different period. What concern us here are the first sort—in what has been called a “professional” hand—which record the names of the plants; and the second sort—in the same hand—which record citations of published



18. Anonymous, *Carduus sylvestris* (*Carduus crispus*; creeping thistle), c. 1590, Libri Picturati, A.27, folio 4r, watercolor
Jagiellon University Library, Kraków

authors relevant to the plants depicted. The names of the plants depicted are recorded in majuscules at the upper center of the sheets in Greek or Latin or both. Directly below, the abbreviations for a variety of European languages (Italian, French, German, and Flemish being the most common) are followed by the plant names in those languages. In a number of cases there are also inscriptions—generally located in the lower portion of the sheets—that describe the natural habitats of the plants depicted and indicate when they flower or seed. These inscriptions are, again, in the same hand as the names and the citations. Frequently, these lengthier inscriptions specify the relative scarcity or abundance in the North of the plants depicted, contain references to “our gardens,” and indicate that the plants depicted were the subject of study by medical students. Oddly enough, the fact that these inscriptions include references to “our gardens” or that any of them includes a reference to medical students has been passed over in silence by scholars.³³

The authors cited by book and section number in the “professional” hand of the first sort of inscriptions are classical—Dioscorides, Galen, Theophrastus, Pliny. In the later sixteenth century, these classical authors were studied most conscientiously by those engaged in the reform of pharmaceutical practice. Moreover, the lengthier inscriptions that accompany many of the sheets (which specify where the plants depicted grow and mature) seem to indicate that these images were structured to accommodate a specific form of study. The information (both visual and verbal) they convey conforms to the kind that authors such as Clusius worked to compile. However, there is no extensive cross referencing to contemporary authors, nor are broad taxonomic issues addressed in the inscriptions. The images and their inscriptions simply serve to identify the specimens described and, in so doing, would have made them ideally suited to direct consultation. In my judgment, the form of study that these sheets accommodated was the same form practiced by members of the medical community, whose interests ranged from the strictly pharmaceutical to the incipient botanical. The consistent references to “the gardens” or

“our gardens” in the inscriptions suggest that the core group of watercolors under discussion represented a local project. They are at once the record of the contents of these gardens (or garden, if the collective plural can refer to various plots of a single garden) and the record of a broad selection of natural specimens. They are structured in such a way that medical students, for example, whose study of pharmacology necessarily involved the study of the identification of plants and of the stages of their maturation, could indeed make use of these images as a virtual garden.

The *Hortus publicus academiae Lugduno-Batavae*

The single horticultural or botanical publication authored by Pieter Pauw, *Hortus publicus academiae Lugduno-Batavae* (1601), is also symptomatic of a close relationship between a particular kind of treatise and the use of the garden at Leiden.³⁴ It is, perhaps, a stretch to refer to the *Hortus publicus* as a treatise, for the only text it contains is a preface to its users. Pauw’s book otherwise consists of pages upon pages of diagrams made up of blank rectangular boxes (fig. 19). In his preface, Pauw explains that students of plants were to take the small book with them to the Leiden garden and to fill in the rectangles with the names of the plants growing in the corresponding plots of the garden. Like the catalogue of the Padua garden after which it was modeled, the *Hortus publicus* is an open catalogue of the contents of the garden: the series of printed, numbered quadrants corresponds to the quadrants of the garden as it was planted in 1601. The engraved plan of the Leiden garden by Jacques de Gheyn II (1565–1629) (see fig. 1) was commissioned by Pauw in 1600 and, folded in quarters, was inserted into copies of the *Hortus publicus*.³⁵ According to Pauw’s preface, the book was to be used by students, among others, who could fill in the names of the plants growing in the garden as they were demonstrated during the course of instruction. The print of the garden by de Gheyn functions as a highly legible plan of the garden as it appeared in 1601. This image would have served as a key for the series of printed rectangles within

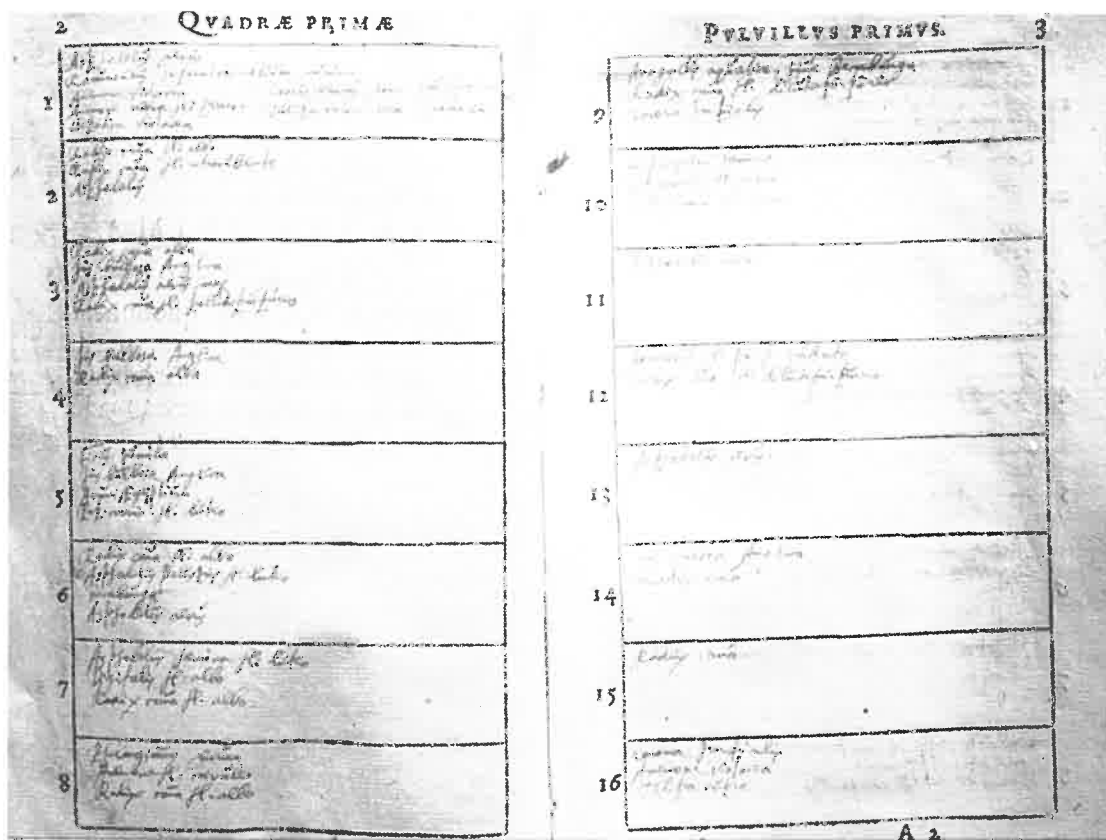
the body of the book that were to be filled in by its readers and users. Active phyto-graphs translated the users' experience of the plots (which de Gheyn represented in his bird's-eye view) into the spatially coordinated charts, or tables, of the plants contained in the *Hortus publicus*.³⁶

The *Botanologicon*

By way of conclusion, and to further evoke what was involved in early modern study of the plant world and how botanical treatises were used, it is important to examine the *Botanologicon*, by the German botanist and physician Euricius Cordus (Heinrich Ritze; 1484–1535), published in Cologne in 1534. Cordus offers a brief but telling description of a fundamental and widely practiced approach to observing the plant world. The mode of observation he evinces informs, in ways I have attempted to illustrate in the foregoing, the production and use of botanical treatises and botanical knowledge at Leiden around 1600. Cordus' *Botanologicon* is a lovely and largely ignored source of inci-

sive commentary on how medical botany was practiced and what was at stake in its practice. Much of the text is a description of a botanical expedition that the individual study of plants and the particular form of attention "good botany" should cultivate; throughout the text, Cordus is viciously critical both of arrogant medical doctors and of unlearned medical practitioners. In addition, the *Botanologicon* contains a number of references—both explicit and implicit—to the role of images in the practice of botany.³⁷ Composed as a colloquy between the author and four fellow medical students, it opens at Cordus' home, and, after some general discussion, the team of friends sets out to "botanize." Cordus encourages them outdoors, noting that he

... will follow [his] usual practice, just as if none of you were here, and take along a book or two. I take great pleasure in going into the countryside, and in comparing all sorts of herbs and plants that grow in various locales and about which I have read at home, with the images stored in my memory and observing them; and sometimes I am able to ask their



19. Anonymous, diagram from Pieter Pauw, *Hortus publicae academiae Lugduno-Batavae* (Leiden, 1601), pages 52–53, engraving National Herbarium of the Netherlands, Leiden University Branch

properties or their names from the old wives I meet along the way. On this basis—after comparing all of them with their descriptions—I am the better able to judge them clearly and come to as accurate a conclusion as possible about them. . . . If it please you, we will first enter this my little garden by the house. . . .³⁸

Cordus goes out into the fields with book in hand (note the privacy or absorption characteristic of this practice, implicit in his saying that he, "will follow [his] usual practice, just as if none of you were here." By way of comparing his reading of such texts and the pictures of their contents, which he carries in his memory, with the actual plants he encounters, and by using these treatises as a point of departure for gathering more information en route ("their properties or their names from the old wives I meet along the way"). Cordus effectively summarizes the use of such treatises in the accumulation of knowledge of the plant world, by means of virtual and actual cutting and pasting of information. "Botanizing," or "herborizing," was essential for sixteenth-century naturalists. It came to be practiced in botanical gardens and in the presence of herbaria (collections of dried plants) as well. At its heart lay the autoptic experience of nature and the process of learning it by collating one's experience with one's prior knowledge—and, indeed, with images—of the plants at hand. Cordus offers one account of the technique: texts were juxtaposed with fresh herbs, images of plants, and information gleaned from those, such as herbalists and shepherds, who plied their trade in the woods and fields. By assimilating and processing this information, the assiduous botanist worked to identify the specimens he or she might encounter. The ends of such identification were first and foremost medical, which is to say pharmaceutical. One needed, in Cordus' view as in the views of many of his contemporaries, to know the makings of medicine in order to practice it. In the pursuit of knowledge of the natural world and the ability to distinguish its elements and their properties, images such as those featured in so many publications of the time would have played a crucial role. Indeed, Cordus and his friends take along a "Dioscorides minor" and two volumes of Brunfels—which must be the first two

volumes of Otto Brunfels' *Herbarum vivae eicones*. Moreover, Cordus describes a mode of observation whose primary arena is the garden: he and his fellow students walk out into the garden before heading out into the fields to go botanizing.

The Leiden garden was the nexus of botanical study and representation in the Netherlands because it fostered observation of a sort that is closely aligned with the production of books and other volumes on the plant world, and because the authors and purveyors of those treatises were affiliated with it. What I hope to have demonstrated in this essay is that these records of the observation of the plant world bear the traces of practices and concerns—distinct, but not incompatible, interests. The uses of botanical treatises—whether printed volumes by Clusius or volumes of watercolors owned and deployed by Cluyt—are clearly various. And where use depends on composition (in ways that I have only begun to map out), where function and form seem to follow from one another, it is especially important to attend to the shifting priorities and uses represented by the individuals discussed here.

The longer history of pictorial natural history in print began in the late fifteenth century in Germany and came to fruition in the publications of Brunfels and Fuchs. We have seen that the fathers of German botany set an example amply expanded by their later Netherlandish counterparts. Around the turn of the seventeenth century in Holland, a number of key aspects of the cumulative enterprise that would come to be called botany were in active play. The genealogy of plant histories such as those authored by Dodonaeus, Lobelius, and Clusius—the so-called fathers of Netherlandish botany—cannot be written without acknowledging the central role of Christophe Plantin. As we have seen, however, his work bore on unpublished treatises (such as those produced by his grandson Raphelengius) as well. The practice of botany appears to have fostered the production of similar sorts of books, whether published or unpublished. To a large extent, it is the role of images in the context of descriptive accounts of the plant world that remains consistent in spite of the changing context, from such published

treatises as Clusius' 1601 and 1605 volumes, the *Rariorum* and the *Exoticorum*, to the paste-books assembled later by Raphelengius. Woodcuts and drawings alike served the purposes of contemporary efforts at taxonomy in standing in for the subjects represented. The mode of observation recorded in and supported by Pieter Pauw's *Hortus* and described earlier by Cordus in his *Botanologicicon* involved a relay between autoptic experience and accumulated knowledge (conveyed in the form of texts) for the ends of identification. For all of the stability of these patterns, which informed the production and the use of natural history treatises around the turn of the seventeenth century, there are also important distinctions—not necessarily of kind, but certainly of degree. The uses of botanical treatises in the Netherlands around 1600 pertain to broader conventions but at the same time reflect local and divergent concerns: insofar as these concerns shaped the nascent field of botany, the treatises invoked here speak volumes—not just about plants, but about their respective uses as well.

NOTES

1. For general information on early modern printed botanical treatises, see Agnes Arber, *Herbals, Their Origin and Evolution: A Chapter in the History of Botany, 1470–1670*, ed. William T. Stearn (1912; 3rd rev. ed., Cambridge, 1986); Wilfred Blunt and William T. Stearn, *The Art of Botanical Illustration, An Illustrated History* (1950; reprint New York, 1994); and David Landau and Peter Parshall, *The Renaissance Print: 1470–1550* (New Haven, 1994), especially "Printed Herbals and Descriptive Botany," 245–259. On Netherlandish publications, see *Botany in the Low Countries (End of the 15th Century–ca. 1650)* [exh. cat., Plantin-Moretus Museum] (Antwerp, 1993).
2. On "the epistemological precedence experienced by botany," see Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences* (New York, 1970), 137; and F. David Hoeniger, "How Plants and Animals Were Studied in the Mid-Sixteenth Century," in *Science and the Arts in the Renaissance*, ed. John W. Shirley and F. David Hoeniger (Cranbury, N.J., 1985), 130–148, especially 137. On the shift from pharmacology to botany, see Arber 1986; the excellent work by Armand Louis, *Geschiedenis van de Plantkunde: Eerste Periode, De Plantkennis in dienst van Farmacie en Landbouw, Van Oudheid tot Renaissance* (Ghent, 1977; Antwerp, 1993); Alan G. Morton, "Renaissance of Botany in Europe: From Herbal to Flora (1483 to 1623)," chap. 5 in *History of Botanical Science* (London, 1981); Karen M. Reeds, *Botany in Medieval and Renaissance Universities* (New York, 1991); and Jerry Stannard, "The Herbal as a Medical Document," *Bulletin of the History of Medicine* 43 (1969): 212–220.
3. William M. Ivins, Jr., *Prints and Visual Communication* (1953; reprint Cambridge, 1969), 3. Without prints, Ivins writes, "we should have very few of our modern sciences, technologies, archaeologies, or ethnologies—for all of these are dependent, first or last, upon information conveyed by exactly repeatable visual or pictorial statements." See also Louis Marin, "Mimésis et description: Ou de la curiosité à la méthode de l'âge de Montaigne à celui de Descartes," in *Documentary Culture: Florence and Rome from Grand Duke Ferdinand I to Pope Alexander VII*, ed. Elizabeth Cropper, Giovanna Perini, and Francesco Solinas (Bologna, 1992), 23–47. Even though the images employed in the majority of these efforts changed markedly in character over time, becoming relatively elaborate when engraved rather than simply reproduced as woodcuts, they were all purported to have been done *ad vivum*. This claim had already been made in the text of the early *Gart der Gesundheit* (Mainz, 1484); these woodcuts are vastly more schematic than those published by Brunfels and his followers, all of whom invoke the same phrase. See Landau and Parshall 1994, 245–246; and Claudia Swan, "Ad vivum, naer het leven: From the Life; Considerations on a Mode of Representation," *Word & Image* 11 (1995): 353–372.
4. On the Leiden University garden, see Hesse Veendorp and Lourens Gerhard Marinus Baas-Becking, *Hortus Academicus Lugduno Batavus 1587–1937: The Development of the Gardens of Leyden University* (Haarlem, 1938); W. K. H. Karstens and Herman Kleibrink, *De Leidse Hortus: Een Botanische Erfenis* (Zwolle, 1982); *The Authentic Garden: A Symposium on Gardens*, ed. Leslie Tjon Sie Fat and Erik de Jong (Leiden, 1991), especially Erik de Jong, "Nature and Art: The Leiden Hortus as 'Musaeum,'" 37–60. See also Claudia Swan, "Medical Culture at Leiden University ca. 1600: A Social History in Prints," *Nederlands kunsthistorisch jaarboek* 52 (2002): 216–239.
5. See Reeds 1991; Nancy Siraisi, *Avicenna in Renaissance Italy: The Canon and Medical Teachings in Italian Universities after 1500* (Princeton, 1987); Paula Findlen, *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy* (Berkeley, 1994), esp. 241–287; and Brian Ogilvie, *The Science of Describing: Natural History in Renaissance Europe* (Chicago, 2006).
6. The standard reference on Clusius remains Friedrich Wilhelm Tobias Hunger, *Charles de l'Escluse (Carolus Clusius): Nederlandsch kruidkundige 1526–1609*, 2 vols. (The Hague, 1927 and 1943). See also Gyula Istvanffi, *Études et commentaires sur le code de L'Escluse, augmentés de quelques notices biographiques* (Budapest, 1900); Henriette Bosman-Jelgersma, "Clusius en Clutius," *Farmaceutisch tijdschrift voor België* 58 (1981): 41–45; Florence Hopper,

"Clusius' World: The Meeting of Science and Art," in Tjon Sie Fat and de Jong 1991, 13–36.

7. See Claudia Swan, "From Blowfish to Flower Still Life Painting: Classification and Its Images ca. 1600," in *Merchants and Marvels: Commerce, Art and the Representation of Nature in Early Modern Europe*, ed. Pamela Smith and Paula Findlen (New York, 2002), 109–136; and Brian Ogilvie, "The Many Books of Nature: Renaissance Naturalists and Information Overload," *Journal of the History of Ideas* 64 (January 2003): 29–40.

8. More generally, on the representation of variable qualities of plants, see also David Freedberg, "The Failure of Colour," in *Sight and Insight: Essays on Art and Culture in Honour of E. H. Gombrich at 85*, ed. John Onians (London, 1994), 245–262; and Sachiko Kusukawa, "Leonhart Fuchs on the Importance of Pictures," *Journal of the History of Ideas* 58 (1997): 403–427.

9. Carolus Clusius, *Rariorum plantarum historia* (Leiden, 1601), book 2, 147, as translated by W. Van Dijk, *A Treatise on Tulips by Carolus Clusius of Arras* (Haarlem, 1951), 50.

10. See Swan 2002 and Ogilvie 2006.

11. Leiden University Library, MS 755 A3. Clusius may well have intended to publish a revised edition; *Curae posteriores* (Antwerp, 1611), published two years after his death, included previously unpublished material relevant both to his *Rariorum* and to his *Exoticorum libri decem: quibus animalium, plantarum, aromatum, aliorumque peregrinorum fructuum historiae describuntur* (Leiden, 1605).

12. Leiden University Library, MS BPL 948. To the best of my knowledge the volume has been cited in only one publication to date, namely Antwerp 1993, cat. no. A1, 86–87.

13. As cited in Antwerp 1993, 86.

14. The pamphlet catalogue of Clusius' library, auctioned in Leiden after his death in 1609, contains a notice that, aside from the books, "maps [and] drawings in vivid colors of plants, flowers, fungi, fruits, animals, etc." would be sold: "Monitio ad Lectorem. Peracta Librorum auctione, in iisdem aedibus [Pauli Stochij] habebitur auctio Plantarum rariorum hortuli Caroli Clusij; qua etiam vendentur Cartae Geographicae, designationes plantarum, florum, fungorum, fructuum, bestiarum &c. vivis coloribus: olea item & liquores partim naturales, partim artificiales: Supellex praeterea numismatum, & aliquot manufacturarum peregrinorum, & imprimis fructuum, radicum, seminumque Exoticorum: mineralium insuper complurium: terrarum sigillatarum: & permulta alia similis curiositatis." *Catalogus librorum bibliothecae clarissimi viri Caroli Clusii* . . . (Leiden, 1609), folio 4r.

15. Leiden University Library BPL 948, verso of title page (original in Latin).

16. Otto Brunfels, *Herbarum vivae eicones ad naturae imitationem, summa cum diligentia et artificio effigiatae, una cum effectibus earundem, in gratiam veteris illius, & jamjam renascentis herbariae medicinae. Quibus adjecta ad calcem, Appendix isagogica de usu & administratione simplicium* (Strasbourg, 1532–1536), 3 vols. (sometimes bound as one volume). The inclusion of roots, the description of surface texture, and the effort to show leaves and flowers from a variety of angles distinguish Brunfels' work from all previous publications of the sort. Emphasis on the specific characteristics of individual specimens and the inflections of shadows were criticized, and avoided in later publications, demonstrating that the literal demands of working from life were tempered by the necessity of communicating visual information. See Landau and Parshall 1994, 254–255.

17. *De historia stirpium commentarii insignes, maximis impensis et vigiliis elaborati* . . . (Basel, 1542). For Fuchs and his publications, see Frederick G. Meyer, Emily Emmart Trueblood, and John L. Heller, eds., *The Great Herbal of Leonhart Fuchs: De historia stirpium commentarii insignes, 1542 (Notable Commentaries on the History of Plants)*, 2 vols. (Stanford, 1999); Brigitte Baumann, Helmut Baumann, and S. Baumann-Schleihauf, *Die Kräuterbuchhandschrift des Leonhart Fuchs* (Stuttgart, 2001); and Thomas A. Sprague and Ernest Nelses, *The Herbal of Leonhart Fuchs* (London, 1931).

18. Fuchs 1542, folio 7v.; see also Arber 1986, 206.

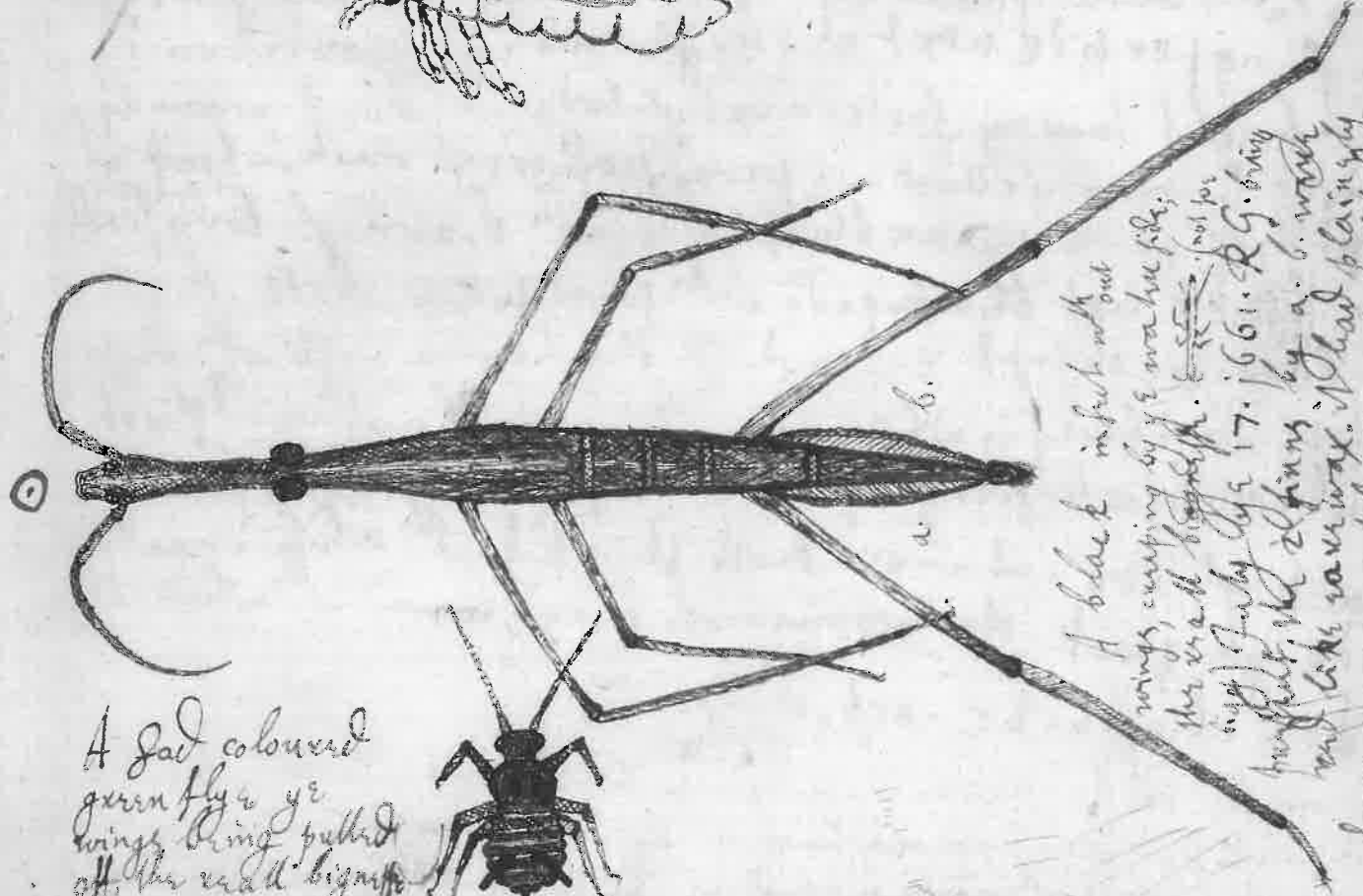
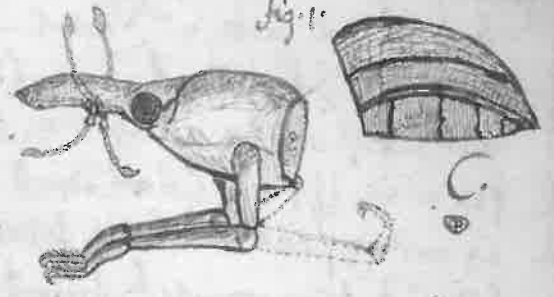
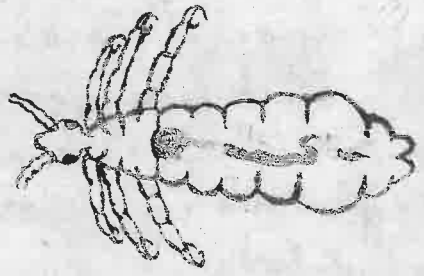
19. James Ackerman suggests that Fuchs "allowed or encouraged" the three illustrators to include their self-portraits "in compensation" for restraining "the urge . . . to express themselves at the cost of accuracy"; see Ackerman's "Early Renaissance 'Naturalism' and Scientific Illustration," in his *Distance Points: Essays in Theory and Renaissance Art and Architecture* (Cambridge, 1991), 185–207.

20. David Topper, "Towards an Epistemology of Scientific Illustration," in *Picturing Knowledge: Historical and Philosophical Problems Concerning the Use of Art in Science*, ed. Brian Baigrie (Toronto, 1996), 215–249.

21. Clusius wrote: "Nulla ratione adduci possum ut publicum docendi munus, vel adeo publici horti curam suscipiam." As cited in Philip C. Molhuysen, *Bronnen tot de geschiedenis der Leidsche universiteit*, 7 vols. (The Hague, 1913–1924), 1:193*; see also 70. On Paludanus, see esp. Friedrich Wilhelm Tobias Hunger, "Bernardus Paludanus (Berent ten Broecke), 1550–1633: Zijn verzamelingen en zijn werk," in *Itinerario: Voyage ofte schipvaart van Jan Huygen van Linschoten naer oost ofte Portugaels Indien, 1579–1592*, ed. Hendrik Kern, 8 vols. (The Hague, 1910–1957), 3 (1934): 249–268; and Florike Egmond, "Een mislukte benoeming: Paludanus en de Leidse universiteit," in *Souffrir pour parvenir: De wereld van Jan Huygen van Linschoten*, ed. Roelof van Gelder et al. (Haarlem, 1998), 51–64.

22. On Clusius' appointment, see principally Hunger 1927, 1:166.
23. Molhuysen 1913-1924, 1:205*.
24. Interestingly, Clusius argued the importance of this kind of botanical study not on medicinal grounds but because, he said, one must know where plants are to be placed in a garden when transplanted. Molhuysen 1913-1924, 1:231*.
25. See Hopper 1991.
26. Molhuysen 1913-1924, 1:294*. The document begins: "Ten opsichte van des voors. D. Clusii zwackheyt, ongesteltenisse ende onvermogentheyt als om andere redenen ende insichten den selven 't behulp van een goet naerstich ende getrouw persoon heeft moeten werden bijgevoegt. . . ." See also Bosman-Jelgersma 1981, 41-45.
27. On Dirck Cluyt, see Henriette A. Bosman-Jelgersma, "Dirck Outgaertszn Cluyt," *Farmaceutisch Tijdschrift voor België* 53 (1976): 525-548; and, by the same author, "Dirck Cluyt: De eerste Leidse hortulanus," *Jaarboekje voor geschiedenis en oudheidkunde van Leiden en Omstreken* 83 (1991): 75-88. The watercolors, now in the Jagiellon University Library in Kraków (Libri Picturati A.16-A.30), are the subject of Claudia Swan, "Lectura-Imago-Ostensio: The Role of the Libri Picturati A.16-A.30 in Botanical Instruction at the Leiden University," in *Natura-Cultura: L'interpretazione del mondo fisico nei testi e nelle immagini*, ed. Giuseppe Olmi, Lucia Tongiorgi Tomasi, and Attilio Zanca (Florence, 2000), 189-214; Claudia Swan, *The Clusius Botanical Watercolors: Plants and Flowers of the Renaissance* (New York, 1998); and Luis Ramón-Laca, "Charles de l'Écluse and the Libri Picturati A.16-30," *Archives of Natural History* 28 (2001): 195-243.
28. The relevant portion of the document reads: "Booven seeckerheyt van deze menichvuldighe kennis hebben wy ten huise van sijn [Outgaert's] vader gevonden veel kaskens met wel ruym 4000 simplicia, die sijn vader [Dirck Outgaertszn Cluyt] door sijn gants leeven tot 52 jaer toe neerstich vergadert heeft, sonder eenighe kosten daer aen te sparen, de welcke hy soo wel verstaet als sijn vader selfs deede, voorts oock ses geschilderde boucken naer t leven van alderhande cruiden en bloemen, dewelcke ons in den winter in plaetse van den thuin wesen mochte, twelck de moeder ende broeders al voor Augero bewaren willen, verhoopende hem daarmede elders tot eeren te brengen." Molhuysen 1913-1924, 1: bijlage nr. 325, 380*.
29. On the seasonal division of the curriculum, see Swan 2002.
30. See Swan 1998 and Swan 2000.
31. The present order of the folios is not original; many of the sheets are also numbered in brown ink in the upper and lower right-hand corners.
32. The rendering of these sheets is more or less consistent and, pending further research, may be attributed to two or, at the most, three hands. None of the sheets of botanical specimens is signed.
33. See Swan 1998 and Swan 2000.
34. The extended title of the small book is *Hortus publicus academiae Lugduno-Batavae eius ichnographia, descriptio, usus. Addito quas habet stirpium numero, et nominibus Operâ Petri Pawi Horti Praesidi*. A copy Pauw presented to the university, in which he himself recorded all of the plants present in the garden in February 1601, is in the collection of Leiden University (Hortus Botanicus). In 1603, a revised edition of the catalogue was printed in Leiden by Ioannes Patus (Ex. Officinâ Ioannis Patii, Academ. Lugduno-Bat. Typographi); the page size is smaller and there are minor changes to the text. The catalogue contains a total of 176 pages. See Swan 2002.
35. See Swan 2002. That de Gheyn's engraving of the garden was intended for inclusion in the book when it was first published is clear from a marginal note in the 1601 edition that reads, "ad ea quæ sequuntur, inspicienda erit Horti ichnographia, inserta pagina" (folio 7v); this marginal note does not occur in the 1603 edition.
36. When Jan Janszn Orlers, in his *Beschrijvinge der stadt Leyden* (Leiden, 1614), describes the university garden, de Gheyn's print serves as the point of reference for its dimensions and layout, even though the text is illustrated with a reduced copy of an engraving by Willem Swanenburgh after Jan Corneliszn Woudanus (fig. 2). In effect, de Gheyn's plan became the plan by which the garden was known. For the reduced version, see Orlers 1614, 143-144.
37. Peter Dilg, *Das Botanologicon des Euricius Cordus: Ein Beitrag zur botanischen Literatur des Humanismus* (Marburg, 1969). *Botanologicon* is distinct in structure and voice from Brunfels, Fuchs, and others, but was produced in their immediate context and addresses their projects both by name and in subtler ways as well. See Claudia Swan, "The Uses of Realism in Early-Modern Illustrated Botany," in *Visualizing Medieval Medicine and Natural History, 1220-1550*, ed. Jean A. Givens, Karen Meier Reeds, and Alain Touwaide (Aldershot, U.K., 2006).
38. *Euricii Cordi Botanologicon* (Cologne, 1534), 26-27; adapted from Dilg 1969, 147.

A. fig. 1. B.



A black insect with out wings, crawling by the water hole; the small blackish fly. ~~not for~~ July 17. 1661. R.G. being perfect. The skins by a 6. week and like saw wax. it had plainly four eyes, or at least 4 or 5 small white.

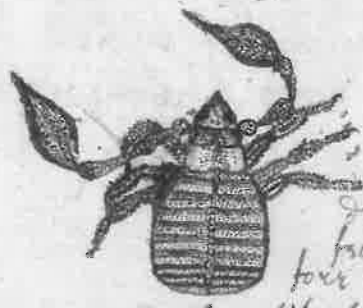
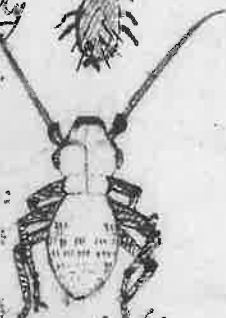
A dead coloured green fly, yr wings being pulled off, the small blackish was 8. Aug. 24. 1660. ED being perfect.



R: big. A mite July 28. 1660. D.C. being perfect.



Another sort of mite creeping on red: fern wood, this picture is in perfect in the eggs, it was of a pale downy. Col. Et. Oct. 1661. S.S. 4 pupae or forms of 4 eggs all being double jointed, and forked at yr end like S.S. they be not in their natural position.



A Kind of Tick found creeping upon paper, it was deawin dead, the right side is perfect only the right of the four legs should have been perfect yr 3d yr longest, it was of brown like to some ticks and not full of hair by all the little spots showing like S.S. it was deawin (exact) April. 11. 1661. R.H.