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Hubertus Fischer, Volker Remmert, Joachim Wolschke-Bulmahn (eds.)

Gardening and Knowledge

Landscape Design and the Sciences in the Early Modern Period

Symposium

September 17-19, 2012

Abstracts and CVs

Zentrum für Gartenkunst und Landschaftsarchitektur
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IZWT Interdisziplinäres Zentrum für Wissenschafts- und Technikforschung
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Contents

Abstracts and CVs

Introduction

Hubertus Fischer, Volker Remmert, Joachim Wolschke-Bulmahn

Gardening and Knowledge. Landscape Design and the Sciences in the Early Modern Period – An Introduction

Whether medicine, mathematics or botany: a systematic investigation into the connections between knowledge and gardens has yet to be undertaken. Despite numerous case studies, basic analyses are not even available for individual knowledge formations, for generating and systematising, for transferring and for applying specific forms of knowledge to horticulture and garden art. The research project "Landscape Design and the Sciences in the Early Modern Period – Mathematisation and Scientization in Early Modern Garden Art" is intended to fill in a sensitive gap for the 16th to 18th centuries. It is being jointly organised by the Centre of Garden Art and Landscape Architecture (CGL) of the Leibniz Universität Hannover and the Interdisciplinary Centre for Science and Technology Studies (IZWT) of the Bergische Universität Wuppertal.

The interdisciplinary symposium "Gardening and knowledge. Landscape design and the sciences in the Early Modern Period", funded by the Volkswagen Foundation, is to launch the project and will discuss research issues and research hypotheses and define sub-projects to be worked on as qualification theses. Based on a preliminary assessment, these could include, for example, practical geometry as a key technology in garden art and the connections and interrelations between theoretical aspects of the mathematical sciences and garden theory, but would also include aspects of perspective, optics, acoustics, astronomy/astrology and hydrology. They could be case-studies on individual artists and scientists or also contexts of knowledge in literary genres of the time, which explore and reflect on connections between gardens and sciences on a different level. Finally, a comparative look at the role and function of mathematics/geometry in the garden art of the cultures of the Orient could also be contemplated.

There are options for linking up with other projects in the Royal Garden of Herrenhausen Library project, which has already started, in which the dissertation project entitled "Der Berggarten – seine wissenschaftliche Bedeutung und sein Stellenwert als botanischer Garten im (exemplarischen) Vergleich zu anderen bedeutenden Hofgärten und akademischen Gärten" (The Berggarten – its scientific importance and significance as a botanical garden in comparison with other important court gardens and academic gardens) brought new results and insights regarding the paradigm of 'botanical knowledge'. There are also possible points of contact in the direction of Modernism, inasmuch as the conference on "Modernism and Landscape Architecture, 1890-1940", organised by the CGL in collaboration with the National Gallery of Art, Washington D.C. in 2008, investigated for the first time the influence of ecology, including plant ecology, plant geography and plant sociology on the

garden architecture of the late 19th and early 20th centuries. An important contribution to the topic of "knowledge transfer" has already been made by Bianca Maria Rinaldi in her dissertation on "Jesuits and Europe's Knowledge of Chinese Flora and Art of the Garden in the 17th and 18th Centuries", which was written at the CGL and was supported with a grant from the Klosterkammer Hannover.

The IZWT, too, has a strong interest in the various exchange processes between early modern landscape design and the early modern sciences as reflected in research projects such as "Botanical Knowledge at the Court of Cosimo III" and "John Evelyn's Elysium Britannicum and Early Modern Science".

The study of Early Modern garden history continues to attract much interest. In the past twenty years, its research has developed quite dramatically and has shown itself open for different methodological and theoretical influences from the humanities and social sciences. Thus a traditional perspective geared to art history, with a tendency to be narrowly focussed, has gradually been replaced by more interdisciplinary approaches to the history of gardens. One of the foremost supporters of these developments and of the systematic broadening of research perspectives to encompass the history of garden culture and garden art was the Harvard research institute of Dumbarton Oaks in Washington D.C. with its Studies in Landscape Architecture Department, today Garden and Landscape Studies. Dumbarton Oaks is now partner of the CGL in a joint-edition project with special regard to garden technology.

In the context of this research and of the research conducted by other institutions, mathematics and the natural sciences in general have repeatedly been examined in connection with garden art and garden culture; however they were rarely the subject of systematic and in-depth efforts that enabled issues to be developed comprehensively and investigated in a larger interdisciplinary research group.

The presentations on the occasion of the symposium "Gardening and knowledge. Landscape design and the sciences in the Early Modern Period" cover a broad range of topics, reaching from John Evelyn, the Elysium Britannicum and the generation/creation of knowledge, to water technology, the increase of knowledge and its impact on gardens in the time of the Renaissance, to botanical illustrations and the cultivation of botanical knowledge in the early modern era, theory of perspective in Early Modern garden art and, in general, the scientific approach and professionalism in garden art historiography in the Early Modern Period.

We hope that the symposium, which marks the beginning of a more intense co-operation of the CGL and the IZWT, will promote future research and, hopefully, encourage collaboration on joint research projects on issues of gardening and knowledge, landscape design and the sciences in the Early Modern Period as well as the periods to follow.

We would like to thank the Volkswagen Foundation for funding this symposium in such a generous way. We owe a great thank you to Dr. Sabine Albersmeier, director of the CGL-office, and her team who took care of the organisational preparation of this event as well as of getting this brochure published for the speakers and participants of the symposium.

Abstracts and CVs

Alexander Ditsche

Water-powered Musical Automata in Prestigious European Gardens of the 16th to 18th Century

In ancient Greece, knowledge about complex hydraulic mechanisms began to flourish for the first time. Incidentally, this was also the age during which automata with moving objects were developed. Furthermore, the invention of the hydraulis – a precursor to our modern organ – was a vital element of occidental history. Initially used as a popular musical instrument at large events and competitions, it quickly became an imperial medium of representation. At the Byzantine court, in particular, organs and other means of mechanical sound production were held in high esteem. While the technology later became obsolete among the European cultures of the Middle Ages, it continued to be appreciated and developed in the Arab cultural sphere.

During the Italian Renaissance many ancient inventions were rediscovered, such as the basic principles of hydraulics and well construction. It is hence not surprising that it was an Italian garden, the Villa d'Este in Tivoli, that in 1566 became the backdrop for a merger between water-powered sound production and music automatons. The popularity of ancient texts (by Heron of Alexandria, Vitruvius, etc.) no doubt played a major role in this context. The extent to which Arab culture contributed to this development is a matter for further research.

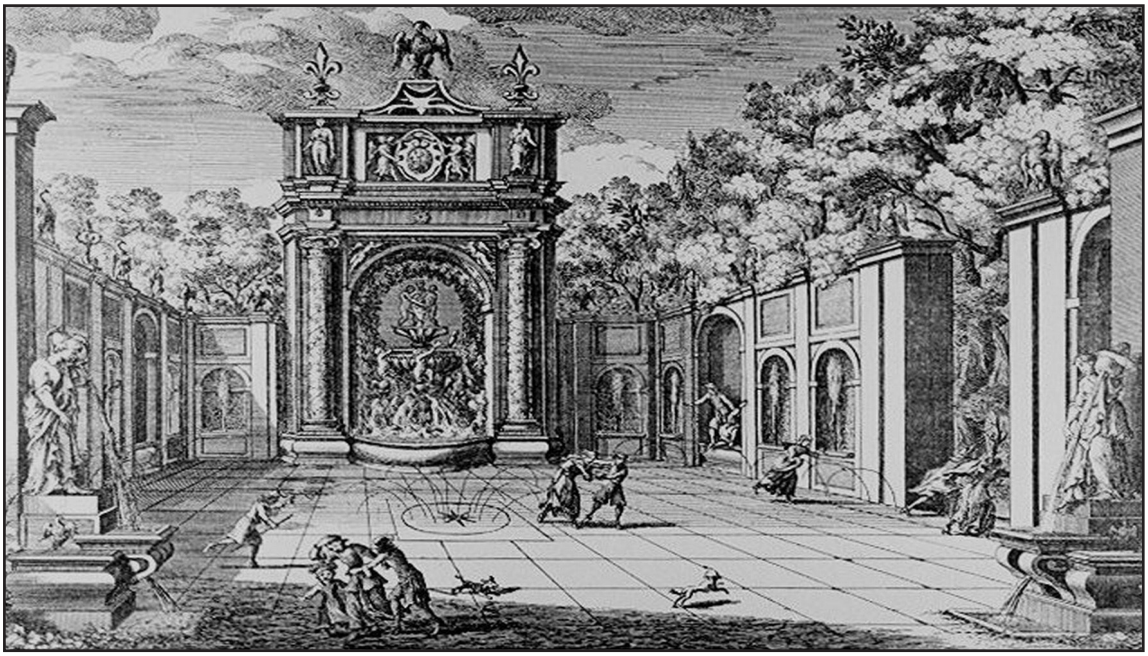


Fig. 1: Villa d'Este, Fontana della civetta, copper engraving (G.F. Venturini, 1691)

The first fountain to be built in the gardens of the Villa d'Este was the *Fontana della civetta*, a well system with the moving figure of an owl and the twittering of birds produced by small pipes and water (Fig. 1). It was based directly on a model described by Heron of Alexandria (Fig. 2). Also in 1566 construction began on the *Fontana dell'Organo*, a large fountain with a water-powered musical automaton in the form of an organ at its center. A piece of music with five voices was stored on a roll pin which thanks to the ingenious mechanism of an Aeolic chamber could be continuously played for days (Fig. 3).

A contrasting and indeed competing attraction in many travelogues was the Villa Medicea in Pratolino, which was built a few years later for Francesco de Medici. The estate featured a Parnassus with an integrated water organ, as well as several automatons with moving statues and water-powered background music that were installed in the cavernous basement of the villa and throughout the main part of the garden. Pratolino was the figure-dominated counterpart to Tivoli's rather more acoustically dominated system.

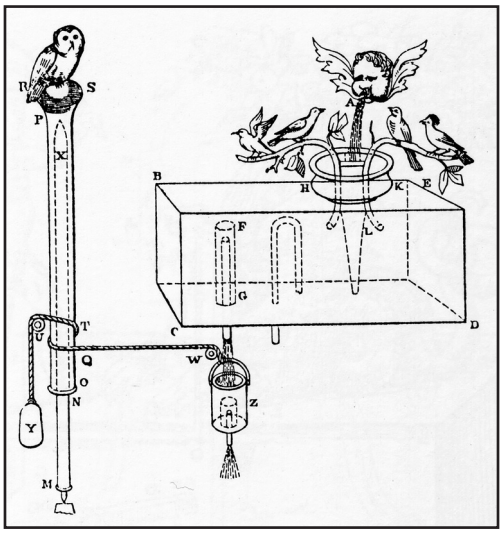


Fig. 2: Functional sketch of a Birds-Fountain as described by Heron of Alexandria (Heckmann, Herbert: *Die andere Schöpfung. Geschichte der frühen Automaten in Wirklichkeit und Dichtung*, Frankfurt am Main 1982, p. 43)

These gardens inspired a rapid spread of hydro-pneumatic automatophones even beyond the Alps to the north, a phenomenon reflected in the monumental organ in the Quirinal Palace in Rome (built under Pope Clement VIII), the Villa Aldobrandini in Frascati (the family home of Pope Clement VIII) and Chateau-Neuf in Saint-Germain-en-Laye near Paris (under Henri IV). Other important sites include the famous grottos of Hellbrunn Palace in Salzburg (built by Archbishop Marcus Sitticus, Count of Hohenems), the Hortus Palatinus in Heidelberg (commissioned by Friedrich V, Elector Palatine), Wilton House, Wilton (built under Lord Philip Herbert, 4th Earl of Pembroke), the Grotto of Thetis at Versailles (built under Louis XIV) and Wilhelmshöhe Park in Kassel, Germany (developed under Charles I,

Landgrave of Hesse-Cassel.) Traces of the existence of hydro-pneumatic automatophones can also be found along a north-to-south axis from London to Naples as well as along the east-to-west line between St. Petersburg and Seville. However, the actual extent to which they spread across Europe is still a matter of speculation.

Their special historical significance is manifested, for one, in their use on ceremonial occasions. The enormous investment and maintenance costs of these objects doubtless meant they were status symbols. For another, water-organs and other hydro-pneumatic automatophones represented a technical innovation and were living proof of their owners' connoisseurship. Maybe they were considered to be curiosities in terms of the equipment of a Wunderkammer (chamber of curiosities), too. Although only little is known about hydro-pneumatic automatophones today, they certainly had a significant influence on the design and use of many 16th to 18th century gardens.

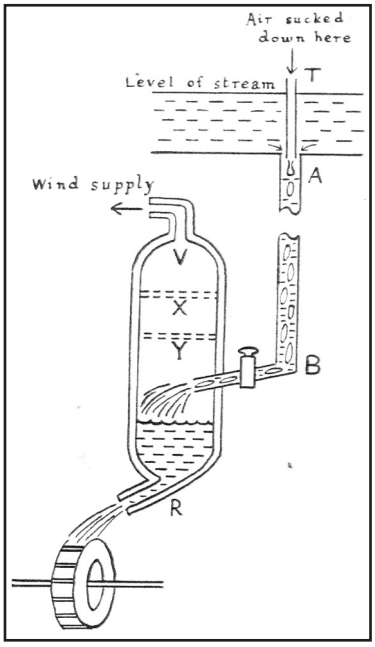


Fig. 3: Functional sketch of an Aeolic chamber (Jeans, Susi and Oldham, G.: Water-blown Organs in the 17th Century in: *The Organ* 1958 (38), p. 156)

CV

Alexander Ditsche, born 1977 in Bonn. Internship as a financial consultant in banking business and continuous employment in a bank to this day. From 2002 onwards additional studies in art history, musicology and economic sciences at the University of Bonn. Since 2010 he is working on a dissertation about water-powered music-automata (Department of Art History, University of Bonn). Besides his work as a choir director and conductor he additionally holds a lectureship in compositional techniques and analysis of music at the Department of Musicology (University of Bonn) since 2010.

Alette Fleischer

Gardening Nature, Gardening Knowledge: Early Modern Gardens and the Rise of Natural Knowledge

This paper focuses on the parallel and interactive processes of making gardens and natural knowledge robust. Gardening entails collecting and controlling nature within an enclosure at a specific site, whereas the construction of natural knowledge entails an accumulation, stabilization, and circulation of nature. To put it in Latourian terms, cultivators of nature and knowledge reshaped nature in mutable and immobile gardens and simultaneously transformed natural knowledge into immutable and mobile materials, such as books and prints.

Making something robust meant creating a durable, resilient, long-lasting object that contained knowledge (of plants, of the laws of nature, of gardens, etc). Furthermore, the level of robustness is culturally determined, as gardeners combined, adapted, and constructed different natural or artificial elements of nature and knowledge. Before a change can be made, it needs to be made robust. Making materials and knowledge robust could be done for multiple - and sometimes related - purposes. A robust object allows others to see or handle the same object or knowledge; for example, a robust garden in another season is still the same garden, even if the flowers are not in bloom. A robust object can be transportable; i.e. a bulb or seed that is carefully packed, can be shipped, and planted in gardens elsewhere. Produced knowledge, rendered immutable and mobile, contained on paper, is consumed by other cultivators elsewhere.

This ongoing circulative process can, at any time, affect one of its parts that, in turn, can change other elements. The interconnected processes of making knowledge and materials robust were firmly tied to an ongoing adaptation, production, consumption, and circulation, of objects, nature, and knowledge. A change of insights, obtained through the manipulation and contemplation of nature, could replace existing beliefs. This paper will pair the act of gardening with the rise of natural knowledge by discussing the gardens of two Dutch estate owners (diplomat and courtier Hans Willem Bentinck's Zorgvliet in The Hague and statesman Hieronymus van Beveringh's Oud-Teylingen near Leiden), and the scientific activities of the Dutch botanist-merchant Jacob Breyne in Danzig (Poland) and Dutch mathematician Christiaan Huygens in Paris.

In the seventeenth century, humans believed that they had the tools and knowledge to improve the earth by reworking nature. Gardeners (be that: garden owners, amateurs, mathematicians, merchants, gentlewomen, doctors, artisans, painters, etc.) showed their dominion over the earth through gardening. The challenge was to change nature by waxing seedlings indoors or under glass domes, to use manure as a fertilizer and keeping tender plants warm, to create sheltered walkways to protect visitors from rain or sun, and

to plant local and exotic shrubs, trees, and bulbs that blossom or bear fruit in different months of the year. The act of transforming nature by using art could also take the shape of an architectural garden structure, such as a grotto. Through art nature could be made robust, while at the same time gardeners used art to change and explain (the laws of) nature.

A garden can be considered a laboratory, a unique site for the production and consumption of natural and material knowledge. In this 'laboratory' local conditions are minimized as much as possible, in favour of constructing an environment in which a gardener hoped to achieve the same (botanical) results as in any other such space, regardless of the actual geographical setting.[1] Cultivators of knowledge and nature found ways to make nature and natural knowledge robust and transportable for others to see, to understand, to (re-) use it, to adapt it and comment on it. In order to facilitate this intertwined process of hand and mind gardeners established communal grounds where to exchange, collect, and communicate their mental and manual findings.

In order to map the process of mobile and immobile, mutable and immutable and how this is tied to making knowledge and nature robust, this paper moves between gardens, botanists, gardeners, and books. On one end of the spectrum there are the immobile and mutable gardens, and on the other end the immutable and mobile books. Books and gardens are interconnected as garden owners, botanists, and gardeners, who, through their activities produce and consume knowledge and nature. This entailed getting into an actual garden, collecting and publishing books, and adapting and circulating nature and knowledge.

Since gardens are confined by time and space, one option to exchange material and knowledge was to do that *in situ*. For instance, George London, the gardener to the Bishop of London, toured through Holland in the mid-seventeenth century and collected plants from private and botanical gardens in The Hague, Amsterdam, and Leiden. London visited Oud-Teylingen, an estate with "gardens, orchards, planted trees, canals, and waterworks, of about five *morgen* (ten acres)" near Leiden, listing each plant he took.[2] It was owned by the retired statesman and amateur Hieronymus van Beveringh (1614-1690), who was an avid collector and cultivator of exotic plants and of botanical books to further examine and enjoy nature's riches. Later, the English botanist and physician Leonard Plukenet tran-

1 A number of historians and sociologists of science have commented on this process where human and environmental spaces are standardized in order to accommodate the production of scientific knowledge. David Livingstone sums this up by calling laboratories 'placeless places' (see: David N. Livingstone, *Putting Science in its Place, Geographies of Scientific Knowledge* (Chicago/London: The University of Chicago Press, 2003), p. 23).

2 H. Veendorp and L. Baas Becking, *Hortus Academicus Lugduno Batavus, the development of the gardens of Leyden University 1587-1937* (Haarlem: Joh. Enschedé, 1938), p. 82 (Regionaal Archief Leiden: Archiefnr. 512, inventarisnummer 687).

scribed London's notes into a schematic overview of Dutch gardens and their collections of exotic plants. This act made these botanical findings robust for Plukenet's patron, the British Queen (fig. 1).

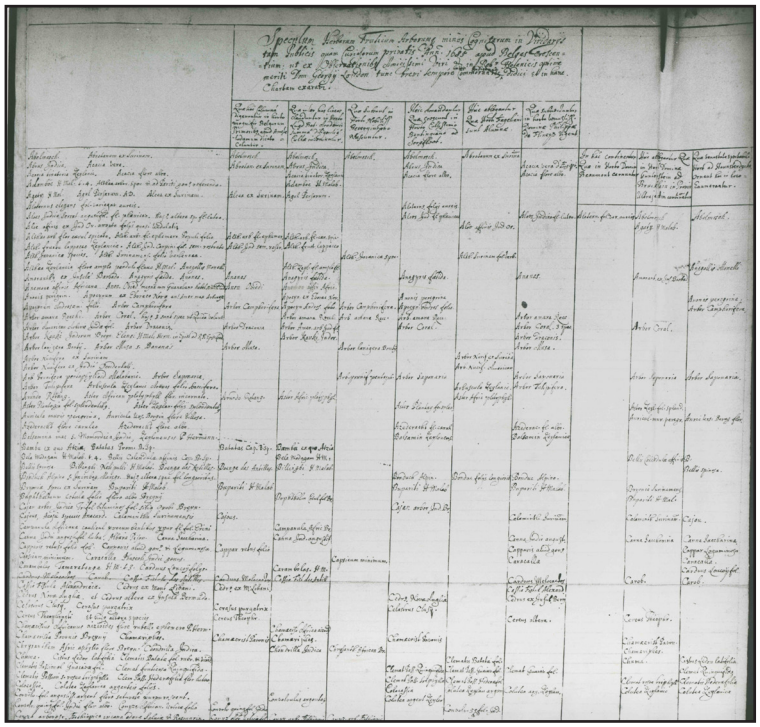


Fig. 1: Leonard Plukenet, S*peculum Herbarium Fruticum (etc)*, 1685 (ms Sloane Herbarium, Natural History Museum London)

Beverningh frequently received touring gardeners and botanists who were interested in his garden and his collection of botanical books. The Dutch merchant and botanist Jacob Breyne, living in Danzig (Poland) was a frequent visitor of Beverningh's estate. Breyne (1637-1697) was a garden lover with a passion for botany. This led to a growing collection of plants (dried and alive), drawings, and plant books. He published several books on botany which he financed himself in the second half of the seventeenth century. His books filled with dried plants were a step along the way for him to transform flora to fit into a wider network of natural knowledge. In his published books, Breyne referred to older botanical publications, this way of working allowed him to compare flora to each other and notice similarities and differences, thereby contributing to a further understanding of nature.[3] Breyne, thus, made his botanical findings robust by publishing books. However, he used and adapted parts of the knowledge contained in earlier publications, making this knowledge less robust along the way (fig. 2).

3 Jacob Breyne, *Exoticarum aliarumque minus cognitarum Plantarum centuria prima* (Danzig, 1678); Jacob Breyne, *Prodromus Fasciculi Rariorum Plantarum* (Danzig: David Fridericus Rhetius, 1680); Jacob Breyne, *Prodromus Fasciculi Rariorum Plantarum, Primus et Secundus* (Danzig: Thom. Joh. Schreberi, 1739).

Gardeners, including physicians and apothecaries, produced books on garden theory, 'how-to' manuals, and plant types, their medicinal use and characteristics. Botanical amateurs like the Dutch merchant Jacob Breyne compiled and collected herbals of dried or painted exotic and local plants with names (usually in several languages) and their provenance. In the form of books, paintings, and prints, natural materials and knowledge were made solid, transportable and consumable, not only for contemporaries but for also for humans today. Through the production of plant books, unfamiliar flora became more visible and known to others, while it made earlier findings less robust.

Fig. 2: Jacob Breyne, *Herbarium Planta rariorum Borussia et Cassubia*, Danzig 1673

Next to plant books, there was a vast market for prints of gardens. Usually with a garden's general layout, specific sections, and details. Hans Willem Bentinck (1649-1709) ordered the artist Johan van den Aveele (1655-1727) to make a series of large and small etchings of his garden in the 1690s. Bentinck's garden at The Hague consisted of "delicate Gardens, Walks, Ponds, Motes, Grottoes, Fountaines and figures, Bridges and Gates and great Plenty of fruit and flowers very Curious and various; A place so neatly composed that here Art and Nature seem to go 'hand in hand'."[4] Passing visitors could purchase these etchings in local print shops to show friends at home the latest garden designs in Holland. Bentin gave prints away as gifts to foreign dignitaries to show (off) his garden.[5] Having prints made was a sign of wealth and power, the ability to control nature, and a display of one's refined taste and upbringing; and garden owners liked to collect prints themselves. It was a way to further distribute the latest insights on gardening, as it showed the garden owner's aesthetic interpretation of God's Creation, his knowledge of nature, and his ability to manipulate nature. The transformation of a garden into prints, made it robust and transportable, so other gardeners were able to consume an otherwise immobile object (fig. 3).

Parallel to gardens, prints, and books, garden structures such as architectural or sculptural objects equally consisted of mutable and mobile elements. One specific ornament in Bentinck's garden was the grotto of Ganymede. It had the shape of a small classical pavilion: a rectangular building with a symmetrical façade divided into four sections with

4 T. Penson, Harl. MS. 3516, f 14, quoted in R.C. Temple (ed.), *The Papers of Thomas Bowrey 1669-1713*, (London: Hakluyt Society, 1927), p. 52.

5 Japikse, *Correspondentie van Willem III en van Hans Willem Bentinck, eersten graaf van Portland,* deel 2, Rijks Geschiedkundige Publicatiën, kleine serie 24 ('s-Gravenhage: Martinus Nijhoff, 1928), p. 382, letter no. 376, 17 May, 1699, Henri Jules de Bourbon, Prince de Condé thanked Bentinck for the etchings.

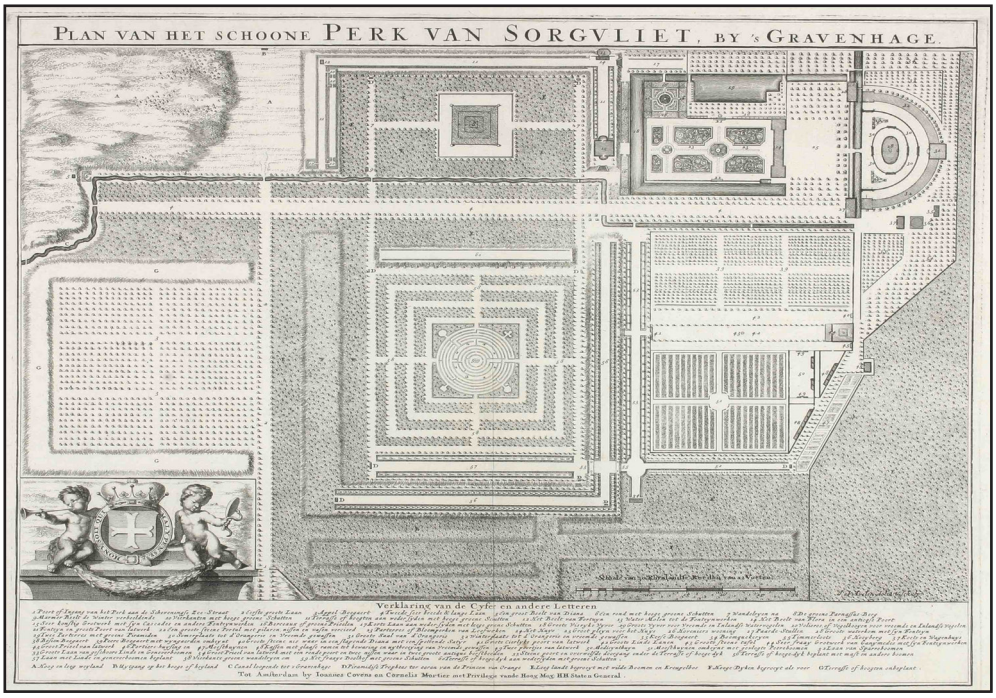


Fig. 3: Jan van den Avelen, *Map of Zorgvliet*, circa 1690 (no. z.gr. 191, Haags Gemeentearchief, Den Haag)

pilasters. It was "sett Curiously with Shells, Rock Corall and Lookinglasses, and in it a Fountain."[6] The grotto was also filled with crystals, and some ceramic lizards and snakes. Its makers tried to aesthetically evoke a real cave. It was partly compiled with materials from a disused grotto from another estate, which was shaped like a small domed mountain, made from boulders, and in it a room with the same shells, ceramics, and mirrors. In Bentinck's grotto these materials were resituated to show a geometrical explanation of nature instead of nature's irregularity (fig. 4).

Simultaneously, mathematician Christiaan Huygens (1629-1695) worked with crystals to explain the working of light. He combined his findings on light and crystals with Erasmus Bartholinus' publication on Iceland crystals.[7] Both Iceland crystal and rock crystal were admired and examined for the laws of nature they contained. For gardeners of nature and knowledge it was certain that crystal followed mathematical rules and by examining it nature's 'truths' or 'divine order' could be revealed. Huygens built his thesis by using parts of published works of others that he then transformed and adjusted. He then made it robust in his book *Traité de la Lumière* (Leiden, 1690). The parallels between Bentinck's garden grotto and Huygens' publication were that in both cases the nature of light was

6 *The Papers of Thomas Bowrey* 1669-1713, p. 50.

7 Fokko Jan Dijksterhuis, "Christiaan Huygens en de mechanica van het licht," *Doorbraken in de natuurkunde*, eds. Machiel Keestra and Anne Löhnberg (Amsterdam: Nieuwezijds, 2001), pp. 57-80, p. 64, Erasmus Bartholinus *Experiementa crystalli islandici disdiaclastici*.

explained. The mental and manual rendition of light's workings could only be given thanks to earlier examples. A garden grotto was just as mutable and (partially) mobile, as the publication on light proved to be.

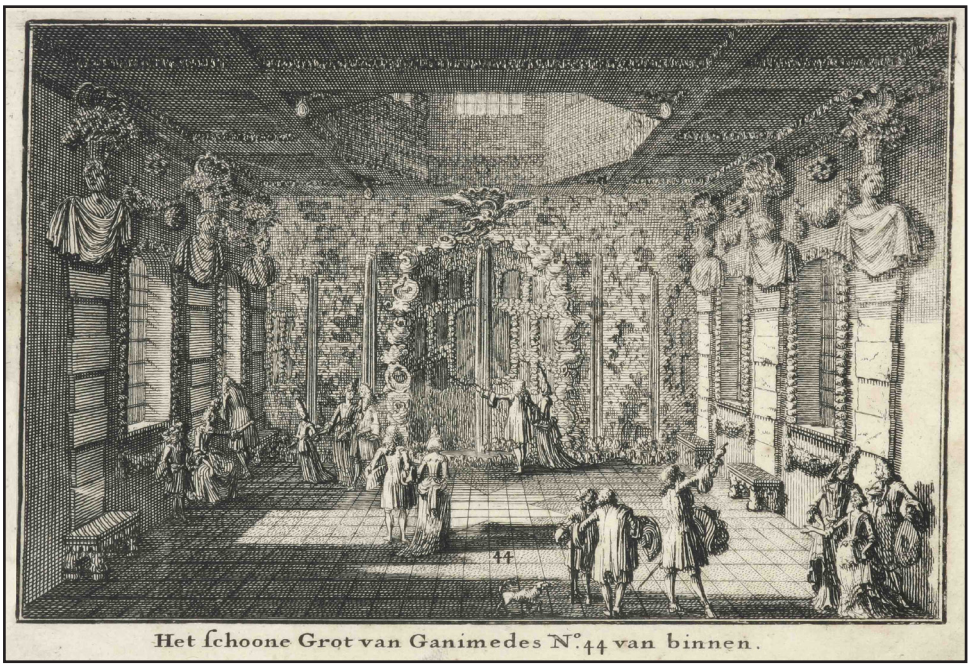


Fig. 4: Jan van den Avelen, *Grotto of Ganymede*, interior, circa 1690 (no. kl. B 1514, Haags Gemeentearchief, Den Haag)

Gardeners, thus, found ways to make gardens, nature, and knowledge robust; nature, arrested in time and as printed material, transcended place and time. For gardens and natural knowledge to circulate, gardeners had to stabilize them, while simultaneously establishing reliability and trying to agree on nomenclature or natural laws. Authors of books referred to established publications to validate their own writings while adding their findings to a growing body of natural knowledge.[8] Circulating materials and knowledge underwent translation and transformation as others adapted them to meet local requirements or combined them with new findings. In turn, the transformed and augmented materials and knowledge could again be transported to other gardeners.[9] Other insights into garden grottos, nomenclature, explanations, and plants fuelled an ongoing change in gardening and gardens, and in the production and consumption of natural knowledge.

For producers and consumers, gardens and books jointly formed fertile soil for further natural inquiry. One site allowed for the enjoyment and examination of nature that was

8 Daniel Margocsy, "'Refer to folio and number': Encyclopedias, the Exchange of Curiosities, and Practices of Identification before Linnaeus," in: *Journal of the History of Ideas*, 71 (2010), pp. 63-89.

9 Livingstone, *Putting Science in its Place*, pp. 12 and 16.

mutable and fixed on one location: gardens. The other allowed for the contemplation and manipulation of nature that was flexible and mobile: material objects. Neither site could be constructed without the other, nor without the vast network of 'gardeners' who transformed nature to render it either temporarily or (semi-)permanently robust for others to see.

CV

Alette Fleischer is an independent scholar and is a part-time educator at the Amsterdam Royal Palace Foundation. She holds a MA in art history and a PhD in the history of science and technology. Her research connects the histories of natural inquiry and technology in the Low Countries in the seventeenth century by focusing on gardens. Here, people from different backgrounds came together to construct, examine, accumulate, and explain nature's workings, for reasons that could be both pleasurable and profitable. These actors ranged from merchants, philosophers, physicians, apothecaries, nobles, patrons, engineers, gardeners, botanists, and artisans, who were all guided by their own goals and interests to garden nature. In the mindful hands and in the skilful minds of various men and women, nature was scrutinized and transformed which enabled a hybrid of knowledge and material production and consumption, that could, in turn be circulated for others to see, contemplate, consume and use.

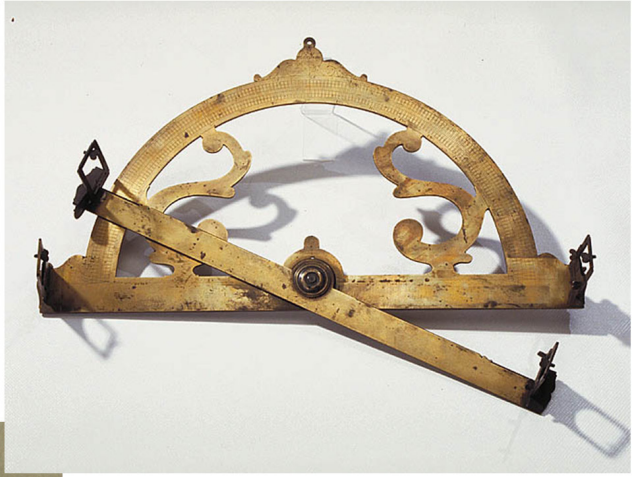
On this topic she has published the following:

"Trading Places: (ex)changing nature and knowledge at Cape of Good Hope, circa 1652-1700," *Centres and cycles of accumulation in and around the Netherlands during the early modern period*, ed. L.L. Roberts, (Münster: LIT Verlag, 2011, pp. 110-127).
Rooted in fertile soil: Seventeenth-century Dutch gardens and the hybrid history of material and knowledge production, dissertation University of Twente, 2010.
"(Ex)Changing Knowledge and Nature at the Cape of Good Hope, Circa 1652-1700," *The Dutch Trading Companies as Knowledge Networks, special issue of Intersections; Interdisciplinary Studies in Early Modern Culture*, 14 (2010), pp. 243-265.
"Into the Light: constructors and examiners of nature and a Dutch 17th century garden grotto," in: *History of Technology*, 29 (2009), pp. 113-139.
"The Beemster Polder: conservative invention and Holland's great pleasure garden," in: *The Mindful Hand: Inquiry and Invention from the Late Renaissance to Early Industrialisation*, eds. L.L. Roberts, Simon Schaffer, and Peter Dear, (Amsterdam: KNAW, 2007, pp. 145-166).
"The garden behind the dyke: land reclamation and Dutch culture in the 17th century," in: *ICON, Journal of the International Committee for the History of Technology*, 11 (2005), pp. 16-32.

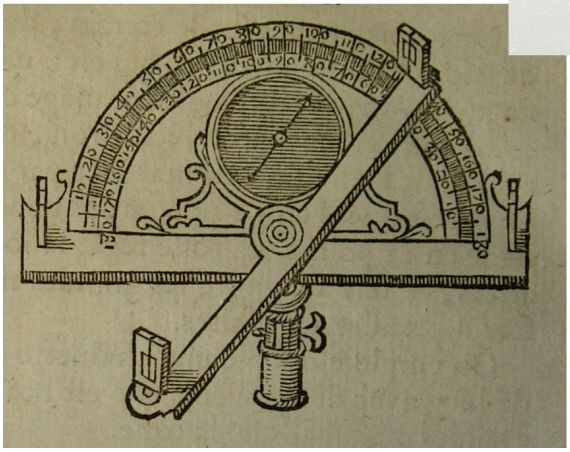
Anthony Gerbino

The Topographical Survey and the Formal Garden: Cartography and Landscape in 17th-century France

The French formal garden is typically understood to have originated in a series of exemplary works of the early to mid-seventeenth-century. The most famous examples include designs by Jacques Lemercier at Richelieu, François Mansart at Maisons, and André Le Nôtre at Vaux-le-Vicomte. In comparison to their predecessors, these gardens are marked by a greater degree of unity between the château and the grounds surrounding it. In particular, the garden appears as the climax of a new, monumental approach to the house, with both elements subordinated to the same compositional symmetry and linked by a common axis. The new style appears to have originated, above all, in a desire for grand visual effects produced by manipulating the landscape on a previously unknown scale.



Graphomètre, 18th c., Collections of the Observatoire de Marseille



Graphomètre, from Dezallier d'Argenville, *La theorie et la pratique du jardinage* (1709)

Thierry Mariage was the first to draw attention to the technological context of this shift. In his influential book of 1990, *L'univers de Lenôtre*, he argued that one of the things that allowed gardeners to expand the scale of their work was a surveying instrument equipped

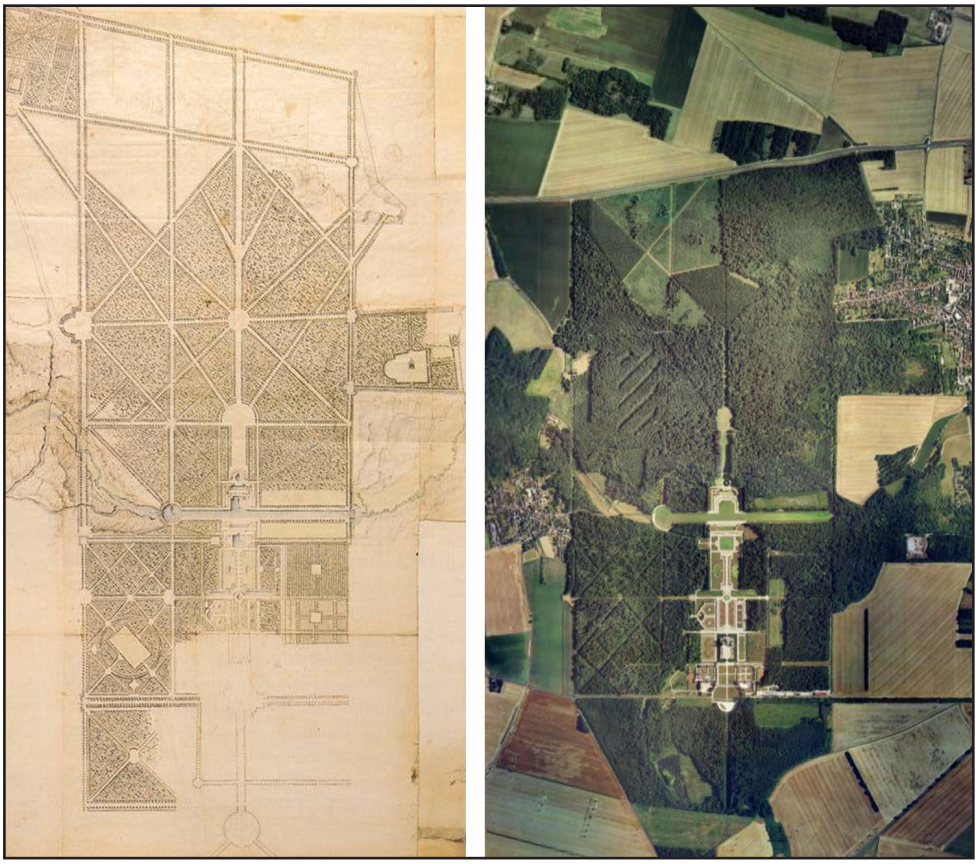
with sights, the *graphometre*, used to measure angles between distant objects. As Mariage pointed out, the device was originally developed in the late sixteenth century for use in cartography, to plot the distances between localities often many kilometers apart by means of linked or overlapping triangles. Marriage's insight raises a number of salient questions that historians have not yet fully developed. To what extent was the history of the French formal garden linked to contemporary advances in surveying? Were the architects of these spaces familiar with the practical mathematics that such techniques demanded? How might they have gained such knowledge?

To answer these questions, this paper proposes to look at the archival record, that is, at extant drawings of gardens in relation to actual surveying practice in the early seventeenth century. I focus, in particular, on the use of geometrical survey and proportionate scale in local, topographical maps. My analysis rests on a preliminary analysis of a large archival collection. The Series N of the Archives Nationales in Paris constitutes the major holdings of the *Department des cartes et plans* and contains some 3500 documents. It is conveniently catalogued and many of the entries are dated, so it is a fairly straightforward process to locate those early maps from the period of interest to us. There is, moreover, a good representation not only from the frontiers, where harbor and fortification projects are typically located, but also from the rural interior of the country. This latter group is useful because it includes provincial maps, estate surveys, and architectural plans produced by and for local inhabitants. Indeed, the collection's great value lies in the comparison it allows between the more sophisticated cartographic techniques used by royal engineers and by the landscape practitioners of the Paris basin with the work of provincial surveyors and architects throughout France.

When juxtaposed with this broader body of material, the extant plans for large-scale formal gardens stand in sharp relief. Exemplified by Le Nôtre's early plans for Vaux-le-Vicomte, these drawings show that the major breakthrough in the development of the French formal garden was the creation of large-scale project drawings that functioned, at the same time, as *plans d'arpentage*, products of a measured survey on the scale of an entire estate, a *seigneurie*. It was this technical innovation of architectural drawing that allowed the scale of the house to be applied consistently throughout the garden, allowing both to be seen in reciprocal relationship.

Where did this technique originate? Where was it learned? The paper considers the other professional communities concerned with the geometrical mapping of terrain in seventeenth-century France — namely surveyors, cartographers, architects, and military engineers. These groups were differentiated in terms of corporate identity, professional formation, and, not least, their level of mathematical knowledge, but they were all ultimately concerned with the same practical ends. Real advances in surveying and mapping depended on a process of competition and collaboration between professions, whereby

instruments and techniques exclusive to some were over time adopted by others. The development of the French garden — Le Nôtre's contribution, in particular — owes its origin to precisely this process.



Preparatory plan for Vaux-le-Vicomte, early 1650s, Institut de France

Fig. 1.

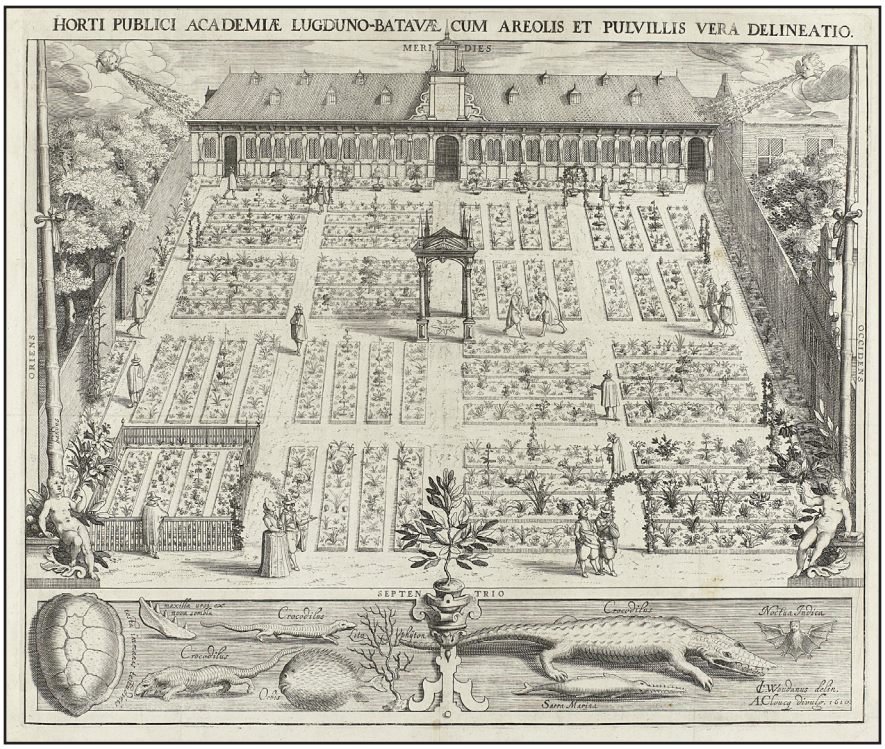
CV

Anthony Gerbino is a historian of early modern architecture in France and England. He received his BA from the University of California at Santa Barbara, an MPhil from the University of Cambridge, and his PhD from Columbia University. His research focuses on the role of architecture in seventeenth-century scientific and academic circles and on the technical and mathematical background of early modern architects, engineers, and gardeners. His more general interests lie in the interaction of art, science, and technology; the professional and intellectual world of early modern artisans; architectural treatises and the culture of the printed book; cartography and its relation to landscape; and the urban history of Paris. He has recently published François Blondel: *Architecture, Erudition, and the Scientific Revolution* (Routledge, 2010) and, with Stephen Johnston, *Compass and Rule: Architecture as Mathematical Practice in England* 1500-1750 (Yale University Press, 2009).

Gregory Grämiger

Reconstructing Order: Architecture, Layout and Plants of the Botanical Garden in Leiden during its First Hundred Years

In 1610 four copper engravings were published in Leiden. They showed the newest spaces erected by the university in the previous decade: its library, the botanical garden, the theatre of anatomy and the fencing school. These institutions played a decisive part in putting the young university into the major league of European academies and formed a complete body of the necessary research and teaching typologies. The garden took a key role in achieving this goal.

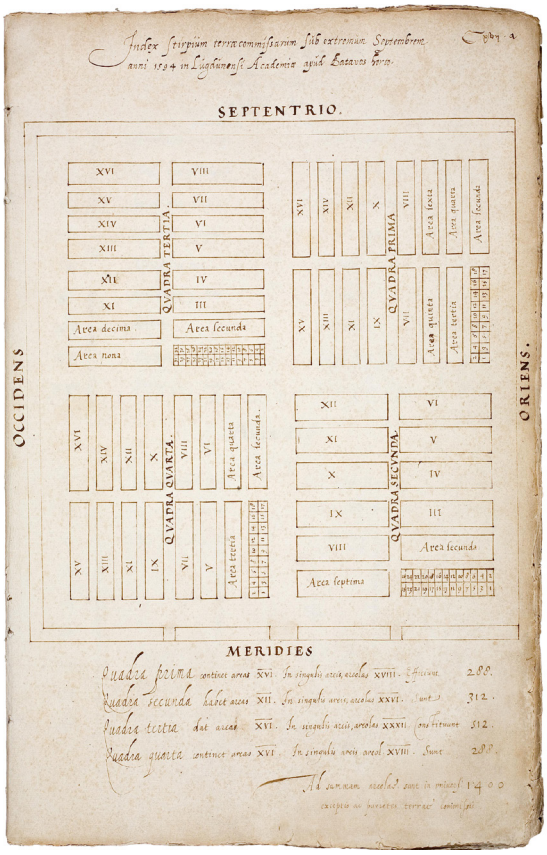


Rijksmuseum, Amsterdam

Being one of the world's oldest institutions of this kind, the history of the construction of the *hortus botanicus* in Leiden serves as a good example of why and how early botanical gardens were laid out. Plans for erecting a garden were present since 1587, but it took years to construct it. Some major problems had to be solved. First of all plants had to be acquired. Secondly, the necessary knowledge in the field of botany had to be present in the form of a suitable teacher. Because the field of botany was in formation, it was not easy to fulfill those tasks. After several years the university could appoint the famous botanist Carolus Clusius as professor of medicine and the pharmacist Dirck Outgaerstz Cluyt to be responsible for the actual gardening. These two persons were also in charge of gathering a good stock of herbs and plants, using their private collections and their network

to obtain seeds and bulbs from all known regions of the world. The garden therefore could host from its opening in 1594 onwards a wide range of indigenous and exotic plants. It was primarily used as a teaching device for the students of medicine, but was also open to the general public which soon became fond of the exotic specimens cultivated there. It was therefore both, a special collection in the field of medicine and a public *locus amoenus*.

The spatial layout of the garden was discussed during its establishment. In the end, it was based on an almost quadratic scheme. Completely surrounded by one narrow band of beds, the main area was divided in four similar looking parts which were rotated to each other. These parts (*quadrae*) were then subdivided into smaller groups of again four similar looking areas, formed by three to four stripes each. Their structure resembled the main layout, incorporating similar looking smaller units into the main one. The stripes themselves contained two rows of small beds for the plants. The garden therefore formed a rational and geometrically defined grid in which the plants could be set and found. During the teaching given in the garden a certain bed and therefore a certain species was the topic of the lecture.



Surviving catalogues from different years allow to reconstruct the spatial distribution of the plants. The catalogues were used to make an inventory of the plants and as a teaching

tool for the students during the lectures. Different methods on transforming the spatial grid of the built garden into a paperish counterpart were set up. The inventories show that the grid of the *hortus* was not used in a totally rigid way. Thanks to its spatial layout it was possible to link together different stripes and plots and therefore to establish relations between adjacent plants in different directions. Furthermore, it has to be mentioned that not only scientific considerations could be found in the garden. Aesthetic values and security concerns were also applied in the arrangement of the herbs, trees and flowers.

To protect the most exotic and valuable species during the cold months, a heatable building had to be erected after a disastrous first winter. This simple wooden construction was transformed in 1600 into an elaborated stone building following the wish of the new *praefectus* of the garden, Pieter Pauw, who was also responsible for a new disposition of the plants and for the first printed catalogue of the *hortus*. The building typology and the terms to describe it show a reference to classic role models. But soon the gallery was also used to display exotic animals, minerals and other curiosities gathered from all over the world and it became one of the first public museums in the Netherlands. The exhibits completed the botanical world with its mineral and animal counterparts.

The architecture of the garden took reference to well-known architectural examples. Its high walls not only protected the valuable plants from thieves, but generated also a *hortus conclusus*, a well-known typology of the age. Furthermore, different references were made to interpret the garden as a reconstruction of Paradise, which contained all the botanical creation of God and where Adam first gave all plants their original names. Naming plants was a problem with which all botanists of the time had to deal with.

The other scientific collections printed in 1610 were established at the same time as the garden and took a close relationship to its botanical collection: the library complemented the book of nature present in the garden with the descended wisdom, while the theatre of anatomy with its displayed *memento mori*-like skeletons were important counterparts in the teaching of medicine and of moral justice. Therefore, the collections not only complemented the garden on a scientific level but also on a symbolic one. The collections and their architecture formed an integral system.

CV

Gregory Grämiger, born in 1980, studied architecture at the ETH Zurich. After working as an architect, he is since 2008 a research and teaching associate at the Institute for the History and Theory of Architecture (gta) at the ETH Zurich. He has been teaching elective courses in the history of art and architecture and is writing his doctoral thesis on „The Architecture of Scientific Collections, 1575–1700", focusing on the early library, botanical garden and theatre of anatomy of Leiden University.

Iris Lauterbach

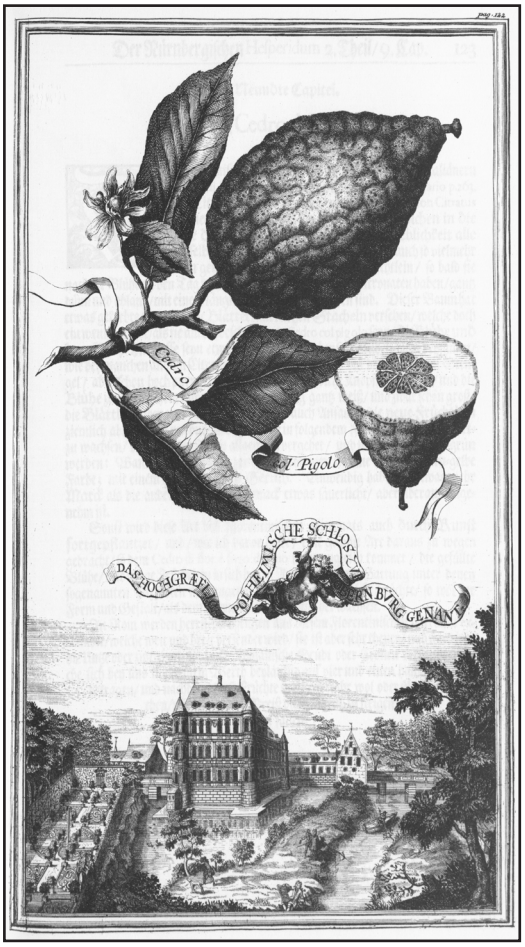
Commerce and Erudition: Bourgeois Self Representation by Botany and Garden Culture in Germany, 16th to 18th centuries

The talk deals with the role of botany and horticulture within the self representation of German cities in the early modern era.

Since its beginnings, botanical research largely depended on international networking, as can be seen since the 16th century in the correspondence and publications of Central European researchers and botanists, for example in the Swiss naturalist Conrad Gesner's publication „De hortis Germaniae" (1561). Commercial contacts and communication among scholars undertaking their research at prestigious Italian universities were crucial to the cultural transference between Italy and Germany that took place from the 16th century onwards in the fields of horticulture and botany. In many descriptions and chronicles of the early modern era, the vegetation and flora are used on a metaphorical level in order to describe the prosperity of the cities. In this civic and urban context, and outside the princely courts in Vienna, Prague, Munich, Stuttgart or Dresden, since the late 16th century horticulture gained importance. The blooming vegetation is shown as a result of a successful city government. Local patriotism is at the origin of horticulture and botany as practised by the citizens and patricians of the Free Cities of the Holy Roman Empire, such as Augsburg, Nürnberg, Frankfurt, or Leipzig. Florilegiums and plant lists refer to certain cities or regions; scientific botany became an instrument of civic selfrepresentation.

Fig. 1: Johann Lösel, *Plantas in Prussia*, Königsberg 1654, frontispiece

Physicians and apothecaries from the cities who had studied at the famous European universities in Italy or in France were interested in the therapeutic properties of the plants and therefore were often excellent botanists. Among other examples the talk will focus on the Volkamer family from Nürnberg, whose members were successful merchants and



physicians dealing and networking with many learned naturalists all over Europe. Johann Christoph Volkamer's publication on the fruits and the cultivation of citrus („Nürnbergischen Hesperides", 1708-1714) is the result of the botanical research of a rich merchant and passionate amateur establishing horticulture and the cultivation of the citrus in praise of his native city Nürnberg.

Fig. 2: Cedro col pigolo/Schloss in Oberbürg bei Nürnberg, in: Johann Christoph Volkamer, *Nürnbergische Hesperides*, vol. 1, Nürnberg 1708, pl. pag. 122

CV

Iris Lauterbach studied art history, French and Italian philology at the universities of Mainz, Pavia (Collegio Ghislieri) and Paris (Paris IV); 1985 PhD, dissertation on French gardens in the second half of the 18th century; 1986-1987 assistant curator at the Staatliche Museen Preußischer Kulturbesitz Berlin; 1987-1989 assistant teacher at the Institute of Christian Archaeology, Albert-Ludwigs-Universität Freiburg im Breisgau; 1989-1991 postgraduate fellow at the Bibliotheca Hertziana, Rome (Max-Planck-Institut); since 1991 she is a member of the research department of the Zentralinstitut für Kunstgeschichte, München; since 2001/02 she also teaches garden history at the Institute of Landscape Architecture at Munich Technical University.

Her fields of research are European garden history from the 16th to 20th centuries, architecture and the visual arts in National Socialism, and cultural policy in postwar Germany (1945-1949).

Michael Leslie

The Uneasy Paradise: Why Couldn't John Evelyn Complete the Elysium Britannicum?

The manuscript of the *Elysium Britannicum* is extraordinary and almost painfully expresses John Evelyn's struggles to create, correct, and reorganize what he hoped would be a masterwork on gardens and gardening. His difficulties and dissatisfactions are evident on page after page, recognizable even in facsimile but even more powerful when the original manuscript is seen.

The *Elysium Britannicum* is a fascinating phenomenon both for what Evelyn writes and for what he either doesn't write, or doesn't complete, or chooses to delete. Its unique character is very much a product of its author's confrontation with his 'moment', or rather his 'moments': first, the intellectual, political, and social circumstances in which Evelyn embarked on its creation and then the long period, effectively 50 years, in which those circumstances changed, and changed again, as he attempted to revise and complete the work. In one sense, the *Elysium Britannicum's* greatest interest lies in the fact that it is a failure, remaining unprinted until the end of the twentieth century.

Understanding the phenomenon of the Elysium requires us to explore a wide, varied, and interlocking range of contexts. These include:

> The project's origins in particular histories of garden and plant writing; the work's uneasy status as those traditions changed and were superseded. The framing expectations for garden writing were revised or discarded.
>
> The rapidly-changing status of the concept of the garden as a scene or a key 'place' in the life of an individual or a society.
>
> Challenges to the stability of framing political and religious ideas and myths, which were crucial to the 'imaginary' of the author and his contemporaries.
>
> Profound changes to concepts of knowledge and epistemology, and the physics that underlay both.
>
> And consequent changes to attitudes to the dissemination of knowledge.

John Evelyn embarked on what he surely believed would be his magnum opus at a time when all the social, religious, and political certainties of his youth had been overturned. His attitudes and *mentalité* had been formed by those certainties; and the creation moment of the Elysium was one in which he was faced with the possibility that it would be necessary to sweep aside the shattered fragments and embrace ideas and attitudes

incompatible with the world he had lost. Evelyn's identity was profoundly entwined with his social status and political affiliations. The raw and unwelcome new environment of the British Civil Wars and their republican aftermath was one in which neither he nor his attitudes to knowledge were likely to flourish.

The knowledge network into which he found himself thrown by the outcome of the Civil Wars was one in which he was emphatically an outsider, uneasy and unwilling. The high ground of plant science, garden writing, and agriculture was occupied not by members of his own social group, but by a diverse cast of characters who prized 'ingenuity' often without regard to social origins or status, or with much reverence for tradition. Even after the monarchy returned in 1660, the world of knowledge in which he found himself was one that had embraced (often reluctantly and to some degree deliberately obscurely) attitudes to gardens, the physical world, and knowledge itself that he found inimical.

Evelyn wanted to be accepted into the ranks of the ingenious, even though he hankered for an earlier world that posed fewer challenges to his cherished notions of society, state, and church. His role in the deliberations and publications of the Royal Society displays the tensions: though *Sylva*, the Society's first publication, was largely coordinated by him, his own contributions looked back insistently to the classics as the source of authority, even though his fellow authors increasingly gave prominence to experiment and observation. Evelyn showed considerable interest in practically-derived knowledge, but he was always reluctant to let go of an appeal to the traditional authority of a late humanist education. It is instructive to compare Evelyn with his younger contemporary Nehemiah Grew (c. 1641-1712), whose *Anatomy of Plants* (1682) displays an utterly different attitude to plant physiology, or the botanist Stephen Hales (1677-1761) of the next generation.

Nehemiah Grew was the son of a distinguished Dissenting minister, and his religious non-conformity contrasts with Evelyn's intense commitment to the established Church of England. This contrast leads directly into Evelyn's problems with the Elysium. To what degree could the pursuit of knowledge be divorced from acceptance of the doctrines of Anglicanism, Christianity more widely, and the traditional values of the central Western philosophical tradition?

For Evelyn, these questions had been posed most powerfully in the period immediately before he began composing the *Elysium*. A friend of Walter Charleton (1619-1707), Evelyn more than dabbled in the ideas of Epicurus, newly fashionable in Europe in the first half of the seventeenth century. Epicureanism's bracing scepticism suited a period in which apparent certainties of politics and religion had been overturned; and Epicurean theories of the atomic nature of the physical world exercised a powerful attraction. Evelyn translated the first book of Lucretius's *De rerum natura*, commenting with a carefully calculated Epicurean playfulness and no serious resistance to the atheist implications; and Evelyn

was lightly disguised by the name of Lucretius, spokesman for Epicureanism, in Charleton's *The Immortality of the Human Soul Demonstrated by the Light of Nature* (1657).

Evelyn was not alone in being attracted to the logic of Epicureanism's explanations, while also responding fearfully and defensively when the implications became unavoidable (Robert Boyle, his friend, fellow-scientist, and fellow member of the Royal Society, suffered equally from anxiety about the embrace of corpuscularianism). Evelyn's response also coloured his attitude to the dissemination of knowledge: throughout his life he resisted the broadening of the availability of knowledge to all kinds and classes of men, seeking to preserve modes of communication that restricted access to those of his own class. In this he was once more at odds with the very societies of which he was a member. The tension was one he never resolved and the *Elysium Britannicum* is its monument.

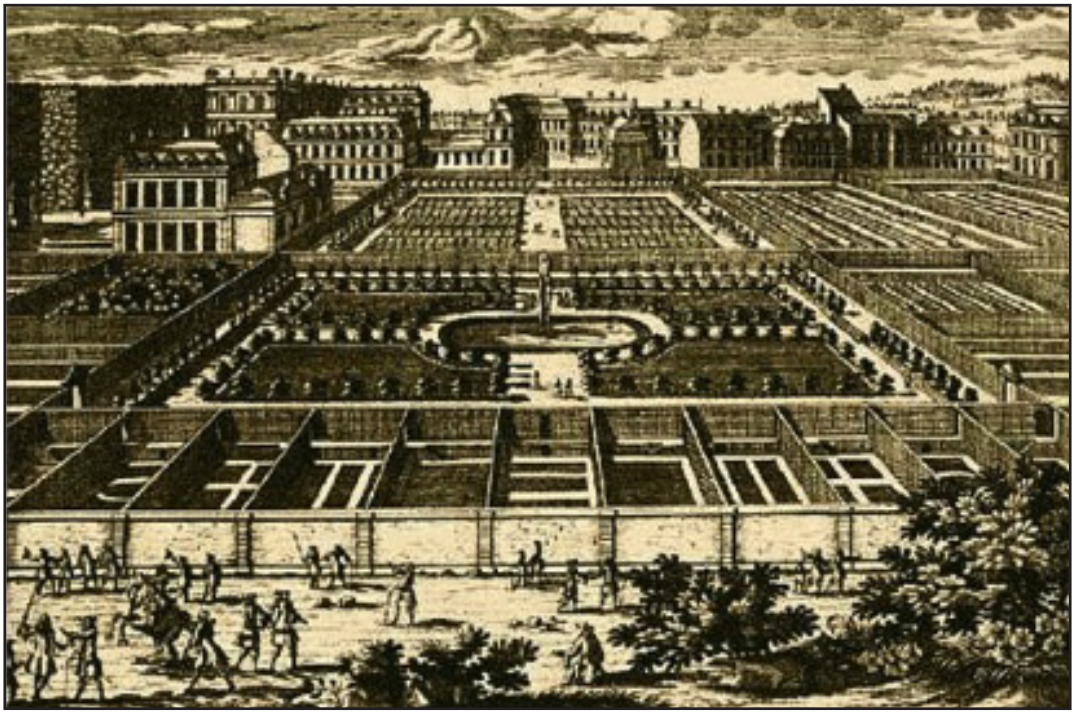
CV

Michael Leslie was educated at Leicester and Edinburgh Universities, and he has taught at Bedford College, University of London, Sheffield University, and Rhodes College in Memphis, Tennessee, where he is now Professor of English and Dean of British Studies. His book, *Spenser's „Fierce Warres and Faithfull Loves": Martial and Chivalric Symbolism in „The Faerie Queene"*, was published in 1984; an edited collection, *Culture and Cultivation in Early Modern England: Writing and the Land* appeared in 1992; another, *Samuel Hartlib and Universal Reformation: Studies in Intellectual Communication* was published in 1994. He was a founding assistant editor of the *Journal of Garden History* (now *Studies in the History of Gardens and Designed Landscapes*) and co-editor of *Word & Image: A Journal of Verbal/Visual Enquiry*. In 2003-4 he was founding section editor for the seventeenth century of the internet-based resource, Literature Compass. In 1987 he founded and was thereafter Director of the Hartlib Papers Project, to edit and publish the surviving papers of the seventeenth-century polymath Samuel Hartlib, the fruits of which were issued on two CD-Roms in September 1995 as *The Hartlib Papers: A Complete Text and Image Database of the Papers of Samuel Hartlib (c.1600-1662)* (second, enlarged, edition, 2002; third online edition appearing shortly); and in 2010 he published editions of two plays by the forgotten seventeenth-century dramatist Richard Brome – *The Weeding of Covent Garden* and *The New Academy* – as part of an entirely web-based complete edition of Brome's works (http://www.hrionline.ac.uk/brome/). He was a Senior Fellow in Landscape Architecture at Dumbarton Oaks (Harvard University) in Washington D.C. from 1996 to 2002 (chairing the Committee of Senior Fellows in Landscape Architecture, 1998-2002). Early 2013 will see the publication of the 6-volume *Cultural History of Gardens*, of which he is co-Senior Editor, editor of the volume on the medieval period, and contributor to three volumes.

Chandra Mukerij

The Potager du Roi and the Garden of the Sun King

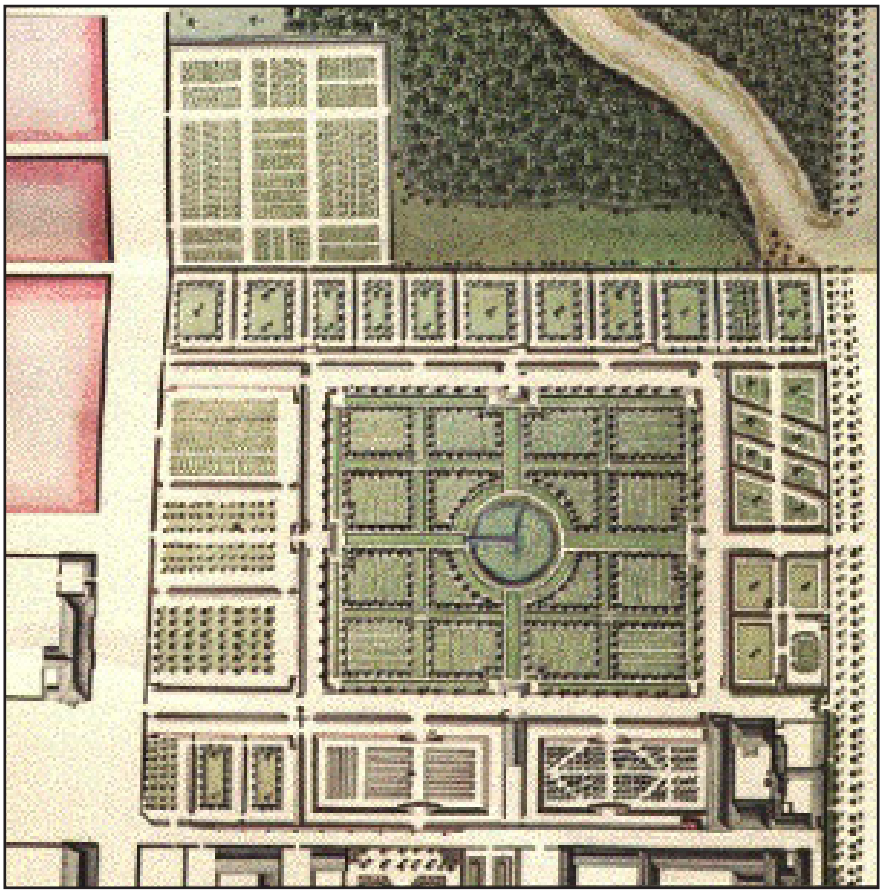
Gardening at the *potager du roi* at Versailles, the kitchen garden for Louis XIV, was a site of experiments in botany and horticulture under the supervision of Jean de la Quintinie. The experiments were important because the kitchen garden at Versailles was not only to provide food for Louis XIV and his court, but to be a source of wonders, marvels and surprises not only to please a demanding monarch, but help promote his standing as a semi-deity, the Sun King.[1] To this end, the *potager du roi* was designed to use the sun for maximum effect. It was a sunken garden with thick walls, glass-covered hot beds, and fabric coverings for trees set against warm walls, creating micro-climates in which rare exotic species could thrive in a cold valley of northern France and delicacies like peas, for example, could be forced to grow earlier in the spring than they did even in the warmer Mediterranean region.[2]



1 Jean de la Quintinie, *Instructions Pour Les Jardins Fruitiers Et Potagers* (Amsterdam: Henri Desbordes, 1692).

2 Chandra Mukerji, *Territorial Ambitions and the Gardens of Versailles*, Cambridge Cultural Social Studies (Cambridge; New York: Cambridge University Press, 1997).

The garden at Versailles as a whole was symbolically organized around the equation of Louis XIV with Apollo, the Sun King, and thematic designed as an Olympus, a world apart from the ordinary. This symbolism positioned Louis XIV as superhuman, but also a natural force that brought light and heat to the world. In histories of the French garden, the *petit parc* or formal garden at Versailles is generally analyzed as separate from the *potager du roi.* But the *potager* was explicitly included in the king's itineraries for formal promenades by foreign visitors to the court. In his eyes, it was continuous. And I want to argue that this was in part because of the importance of the sun's powers to the experiments in the kitchen garden.



For this reason, I want to look at the experiments with heat and glass in the *potager du roi* at Versailles as an extension of the political symbolism of the garden as a whole. Gardening itself had political meaning, demonstrating the king's effectiveness as steward of his kingdom –his duty as part of man's Christian duty for stewardship over Creation. Making plants flourish and be abundant was the definition of stewardship, and exactly what the gardens at Versailles continually demonstrated. At the same time, the *potager* was built like a fortress, turning wall systems used for military purposes into heat sinks, linking

France's military power to its capacity for stewardship. And experiments in the *potager* had an additional capacity for demonstrating Louis XIV's superhuman powers as a Sun King to the extent that they used the sun to make "nature" more abundant. Scientific experiments in this part of the garden, then, were both a form of caring and a use of nature for the expression and expansion of royal power.[3]

The stewardship practices in the gardens were developed from French and Dutch gardening literature and market gardening practices brought to Versailles and perfected by La Quintinie. He took techniques of horticulture used by market gardeners and outlined in *mesnagement* literature about estate management, and pushed these natural experiments even farther. Market gardeners were already concerned with bringing fruits and vegetables to market earlier than other sellers and raising the rare exotics for which they could get the highest prices and attract the most elite customers. But fruits and vegetables at the court of Louis XIV had to be even more wonderful and exotic. La Quintinie collected multiple kinds of fruit trees to create a diversity of tastes and feed the court with sweet delicacies over a longer season. To make this work, and manage the fruiting time of trees

3 Chandra Mukerji, „Material Practices of Domination and Techniques of Western Power," in: *Theory and Society* 31.1 (2002).

and vegetables, La Quintinie used the heat of the sun captured in walls, earth, and glassed boxes to create micro-climates while protecting plants from pests.[4]

The experiments in capturing the heat of the sun in the *potager du roi* had effects on plants, but also important political value. La Quintinie was given the budget to use so much glass because the glittering garden, reflecting the sky, served the representation of the king as Apollo. Reflecting and using the sun ingeniously was an important element of the park as a whole. The *Grotte de Versailles*, the early garden feature that linked Louis XIV to Apollo, was famously described by Félibien as reflecting the setting sun. The gates at the entrance of the grotto were gilded and had lines radiating from an image of the sun containing a portrait of the young Louis XIV. The grotto was turned in such a way that sometimes the setting sun would catch it, and the gates would start to glow brightly.[5] Creating reflections of the sun in the garden was important elsewhere. It contributed to the beauty and significance of the *Parterre d'eau*, and many other fountains. In fact, the fountains at Versailles were typically reflecting ponds with jets more layered basins of water in the Italianate style, and this provided opportunities in the garden to see reflections of the heavens embedded in the king's lands. Significantly, when the grotto at Versailles had to be torn down to expand the chateau, it was replaced by the Hall of mirrors—the other site at Versailles besides the *potager* with large expanses of glass.[6]

It is in this context that we can begin to see the experiments in forcing plants to fruit early and growing exotics on French soil as more than botanical and horticultural works of finesse. The method of experimentation in horticulture employed by La Quintinie fit and served the political theme, equating Louis XIV with Apollo. La Quintinie took ideas about the use of glass from Olivier de Serres,[7] who wrote about gardening as stewardship and tried to push techniques of market gardeners for his patron, Henri IV. La Quintinie simply pushed the experiments in gardening and politics on a grand scale, creating a world of light and heat befitting the garden of the Sun King. He demonstrated the power of the sun at Versailles, and while providing the court with delicacies to eat, also confirmed the political equation of Louis XIV with Apollo.[8]

4 Mukerji, *Territorial Ambitions and the Gardens of Versailles*.

5 André Félibien, *Description De La Grotte De Versailles* (Paris: S. Mabre-Cramoisy, 1672).

6 Mukerji, *Territorial Ambitions and the Gardens of Versailles*; Quintinie, *Instructions Pour Les Jardins Fruitiers Et Potagers*; Jean-Marie Apostolidès, *Le Roi-Machine: Spectacle Et Politique Au Temps De Louis XIV* (Paris: Editions de Minuit, 1981).

7 Olivier de Serres, *Le Theatre D'agricvltvre Et Mesnage Des Champs* (Paris,: I. Métayer imprimeur ordinaire du roy, 1600).

8 Chandra Mukerji, „Space and Political Pedagogy at the Gardens of Versailles," in: *Public Culture* 24.3 (2012).

In this paper, I will look in more detail at the collection of plants and methods of horticulture used in the *potager du roi* to see how knowledge of the natural world was put to political use, and how experiments in harnessing the power of the sun through horticulture were conducted to this end.

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CV

Chandra Mukerji is Distinguished Professor of Communication and Science Studies at the University of California, San Diego. She is author of several books on materiality, culture and power, including *From Graven Images: Patterns of Modern Materialism* (1983), *Territorial Ambitions and the Gardens of Versailles* (1997), and *Impossible Engineering: Technology and Territoriality on the Canal du Midi* (2009). The last is co-recipient of the 2012 American Sociological Association Distinguished Book Award.

Katharina Peters

‚From Seeing to Science' or ‚Learning by Doing' – Discovering and Sharing Botanical Knowledge in the 19th Century (Looking at the Hanoverian Berggarten)

"During the period of his stay he visited lectures on natural history, botany, cryptogamia, physics, pure and applied mathematics, geometry, logic, oeconomia and geografia, with outstanding diligence and attention [...], and [...] was laudable and exemplary".[1] This is the way it has been written in the testimonial of the Hanoverian court gardener Heinrich Ludolph Wendland (1792-1869) issued by the University of Göttingen in 1819. Before studying in Göttingen, Wendland served his apprenticeship as a gardener and further improved his skills by working as an assistant in distinguished gardens like the botanical gardens in Vienna and Kew (London). After having finished his scientific studies Heinrich Ludolph Wendland was expected in his birthplace Herrenhausen by the governance of King George III. (1738-1820) to follow in his father's footsteps as court gardener of the royal botanic Berggarten.

Fig. 1: View of the historical and current landmark of the botanical Berggarten. In former times, the pavilion contained the scientific memory of the Royal Gardens of Herrenhausen: The 'Royal Garden Library Herrenhausen' (Königliche Gartenbibliothek Herrenhausen) (Foto: Sophie von Schwerin)

1 Gottfried Wilhelm Leibniz Bibliothek/Niedersächsische Landesbibliothek, Nachlass Wendland, Noviss. 452,2,1,6, *Zeugnis der Universität Göttingen für Heinrich Ludolph Wendland, 1819.*

At that time, the royal botanic Berggarten had already come to fame because of its extraordinary scientific research in the field of botany. However, contrary to common practice this botanic garden was not the result of the endeavours of a scientist or, to be precise, a botanist[2], but the tradition of collecting foreign plants at the site of the Berggarten and conducting significant botanical research was due to a gardener named Johann Christoph Wendland (1755-1828). He did not have a fundamental academic education like his son Heinrich Ludolph Wendland, but he found his own way to accumulate substantial botanical knowledge and carried out groundbreaking morphological and methodical studies in regard to the exotic plant collections.

Taking into account the copious estate of the Wendland family and especially the 'Royal Garden Library Herrenhausen' (Königliche Gartenbibliothek Herrenhausen)[3], which was recently opened to the expert audience and analysed by an extensive research program of the Centre of Garden Art and Landscape Architecture (CGL) at the Leibniz Universität Hannover in cooperation with the Gottfried Wilhelm Leibniz Bibliothek Hannover, the presentation will focus on how Johann Christoph Wendland, his son Heinrich Ludolph Wendland and afterwards his grandson Hermann Wendland (1825-1903) took their paths from pre-professional autodidacts to distinguished scientists and carried out their extraordinary professional careers.

It will tell a story of professionalization and scientification and also a fascinating story of bringing to life a botanical garden as probably one of the closest ties between garden culture and natural sciences.

2 Cf. the definition of 'botany' and the reference to the interpretation of Carl von Linné (1707-1778) in: Gerhard Wagenitz, *Wörterbuch der Botanik*, Nikol Verlag, Hamburg, 2008[2], p. 50f. Cf. also the opinion of Albert Dietrich, who states that no gardener could be a real scientist because he may be fully engaged with garden culture; but Dietrich admits that someone who may assemble genius, erudition and practical efficiency could at least work successfully in science and in garden culture. Albert Dietrich, *Botanik für Gärtner und Gartenfreunde. Erster Theil: Allgemeine oder theoretische Botanik*, Verlag von Friedrich August Herbig, Berlin, 1837, p. 12f.

3 'The Royal Garden Library Herrenhausen' (Königliche Gartenbibliothek Herrenhausen KGBH) is the former research library of the Hanoverian court gardeners. Once resulting from the private library of Johann Christoph Wendland and acquired by the government at the end of the personal union between the Kingdom of Great Britain and the Kingdom of Hanover, it includes a unique collection of horticultural, botanical and architecturally writings: 691 printed books and 51 bundles of handwritings, drawings plus herbariums. In 2007 the KGBH was transferred into public property and important parts of it were accommodated at the Gottfried Wilhelm Leibniz Bibliothek Hannover. With generous funding from the Lower Saxony Ministry of Science and Culture, the KGBH had been well-arranged and analysed in terms of the Berggarten and the court gardener's scientific work (cf. Heike Palm, Geschichte der Sammlung "Königliche Gartenbibliothek Herrenhausen", in: Hubertus Fischer, Georg Ruppelt and Joachim Wolschke-Bulmahn (eds.), *Königliche Gartenbibliothek Herrenhausen. Eine neue Sicht auf Gärten und ihre Bücher*. Sonderband 104 of the Zeitschrift für Bibliothekswesen und Bibliographie, Vittorio Klostermann, Frankfurt am Main, 2011, p. 19-64).

At the beginning, the presentation will focus on the history of the royal botanic Berggarten as a scientific garden. Particular attention will be dedicated to the learning process of the three generations of the Wendland family, which were entrusted with the care for the precious plant collections in Herrenhausen for 125 years and transformed this garden into one of the most eminent botanical gardens in the whole world at that time, with specific emphasis on the Ericaceae, Fabaceae, Orchidaceae, Arecaceae and Bromeliaceae.

The presentation will lead to the converging points between garden culture and knowledge and, for example, analyse the meaning of the scientific observations and botanical illustrations by Wendland the Elder, plunge into the science circle of the second Wendland to understand why science is always also a social activity, and, for instance, follow the youngest Wendland on his expedition to Central America to learn about the origin of knowledge and science.[4]

Fig. 2: *Pitcairnia latifolia*, detailed drawing by the court gardener Johann Christoph Wendland (1755-1828) (Johann Christoph Wendland, *Hortus Herrenhusanus seu plantae rariores quae in horto regio Herrenhusano prope Hannoveram coluntur*, Hahn, Hannover, 1801, Tab. III; Gottfried Wilhelm Leibniz Bibliothek/Niedersächsische Landesbibliothek, KGBH 601:2)

4 Hermann Wendland reached Costa Rica in 1856 where he got the opportunity to closely observe the local vegetation. This exact study of plants has always been the essence of botanical science. 'From seeing to science' describes the way of how knowledge is to be gained. The German term 'Wissenschaft' (science) comes from the Old High German word 'wizzan', which means 'gesehen haben' (to have seen) (cf. Matthias Jakob Schleiden, *Die Pflanze und ihr Leben. Populäre Vorträge*, Wilhelm Engelmann, Leipzig, 1850[2], p. 17; Brockhaus (ed.), *Brockhaus Enzyklopädie*, vol. 30, F. A. Brockhaus, Leipzig Mannheim, 2006[21], p. 200).

The example of the royal botanic Berggarten and its court gardeners Wendland will lead to general investigations in regard to the impact of knowledge in the gardener's profession. Therefore, we will see that knowledge is not only a means to an end.

Fig. 3: Even in the mid-19th century the vegetation of the magnificent conservatory imitates a tropical world and stands for the substantial botanical knowledge of the court gardeners at Herrenhausen (unproven reprint in: Karl-Heinrich Meyer, *Königliche Gärten. Dreihundert Jahre Herrenhausen*, Fackelträger Verlag, Hannover, 1966, p. 225)

CV

Katharina Peters, born in 1978, completed training as a landscape gardener and received her degree in landscape architecture from the Leibniz University Hannover. Between 2009 and 2011 she obtained a Ph.D. grant from the Lower Saxony Ministry of Science and Culture as part of the (still continuing) research project 'The Royal Garden Library Herrenhausen' (Königliche Gartenbibliothek Herrenhausen), which was realised by the Centre of Garden Art and Landscape Architecture (CGL) at Leibniz Universität Hannover in cooperation with the Gottfried Wilhelm Leibniz Bibliothek Hannover. Her studies referred to the court gardeners at Herrenhausen considering the botanical efforts of the court gardeners Wendland. Currently she works as a landscape architect and creates private gardens.

Carola Piepenbring-Thomas

Garden Visits, Observation, Reading and Excerpt –
Martin Fogel (1634–1675) of Knowledge Acquisition Techniques

The Hamburg physician Martin Fogel exemplifies the polymath of the 17th Century. Scholarship meant at that time not only the completion of studies, the care of numerous contacts and relationships with scientists in different countries. Often it also involved a voluminous correspondence and multilingualism and it meant a broad interest in various scientific disciplines. Introduced to natural history studies by his teacher Joachim Jungius, Fogel devoted his special attention not only to historical, geographical, medical and other questions but also to natural, botanical and garden issues.

Martin Fogel was born in 1634, the son of Martin and Judith Fogel, merchants in Hamburg. He graduated from the grammar school and studied theology at Giessen and Strasbourg. After returning to Hamburg, he taught various subjects including oriental languages. Having been appointed one of the estate executors of his teacher Jungius, he organized his handwritten papers. After that he worked for four years on the edition of the "Doxoscopiae". This is one of the most important works of the polymath Jungius. In the course of his four-year educational tour he graduated as doctor of medicine in Padua. Back in Hamburg he settled down as a physician. In 1675 he was appointed professor of logic at the Academic Gymnasium.

Although he probably did not have his own garden, Martin Fogel was highly interested in gardens and horticulture. He visited the garden of the Anckelmanns in Hamburg, the Gottorf garden in Schleswig and visited not only famous libraries, art rooms and buildings but also many famous gardens on his journey e.g. in Italy, France and Spain. In his diary he recorded impressions, descriptions and evaluations of these gardens and vivaria, including observations on the vegetation of the countryside, cultivation and the use of various plants. Later in Hamburg Fogel found enough time, in addition to his professional life, for experiments and observations (e.g. the color changes in Larkspur). He noted the results in a card index system and above all, he managed to collect an extraordinary library (3,600 volumes). Fogel classified about 120 works as botanical, other books he classified as the medical reference books. The travel diary, the card index system and his library are the primary sources for information on Fogel's acquisition of botanical knowledge and its organization.

After he died in 1675, at the age of 41 years, a catalog of his *library* was published for an auction. Fortunately, Gottfried Wilhelm Leibniz convinced the Hanoverian Duke Johann Friedrich of the quality of the collection and commissioned the purchase of the entire library for 2,000 thaler. In 1678 the whole library was transferred to Hanover. Today the collection of books is no longer complete because of duplicate changes with other libraries, but the botanical books habe only been slightly affected.

Even a small selection of authors shows the breadth of Fogel's collection: Cesalpinus, Ursinus, Camerarius, Bauhin, Morison, Parkinson, Ray, Royer, etc. The examination of the books and their contents and their subdivision into 14 groups shows that Fogel was less a bibliophile than a very systematic collector. The selection of books reveals a methodical understanding of the subject. It also provides an insight into the spectrum of botanical literature, which was available for the interested reader in the second half of the 17th century. Fogel received English, Italian, French and Dutch works. He used his books for intensive studies, annotated and excerpted relevant information. He placed special emphasis on the use of a unique terminology. Trained by the work on the edition "Doxoscopiae" of his mentor, he paid special attention to using logical and systematic distinctions between substantial and accidental characteristics to describe a plant. Fogel owned books by Pliny and Theophrastus, herbal books, works about vernacular plant names, locations and about living conditions, the arrangement and design of gardens, planting instructions for the gardener with illustrations of useful gardening tools. He also had many works on local flora, plant lists from botanical gardens, commercial catalogs, books with microscopic images, and finally the first publication on a single plant family, the Compositae.

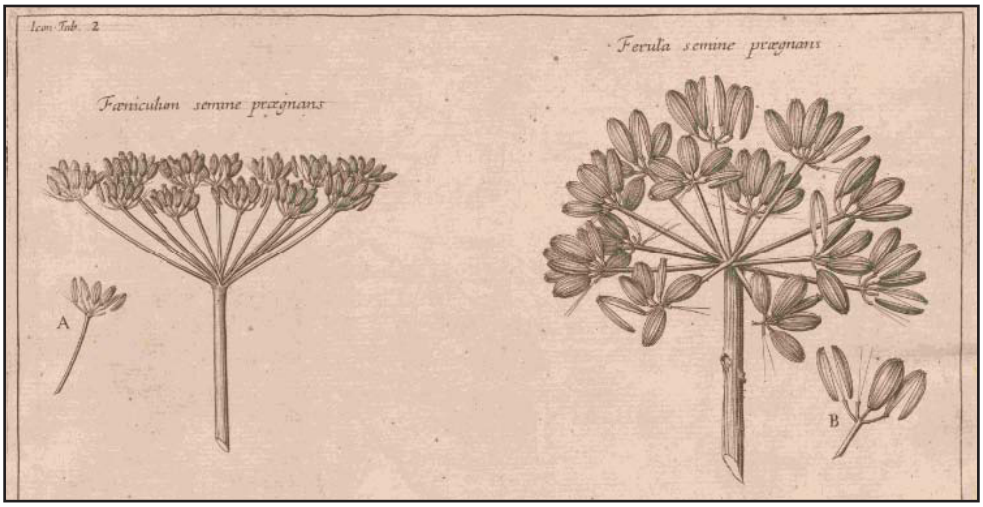


Fig. 1: Detail from Morisons monograph. (Robert Morison: Plantarum Umbelliferarum Distributio nova. Oxford: Theatrum Sheldonianum, 1672. GWLB: 10048)

Also his *card index system* shows Fogel's interest in botanical questions. In more than 20 years he collected approximately 32,500 sheets in octavo format. Of course the collection includes not only excerpts and notes on plant science, but countless further notes on his other special fields of interest. About 800 botanical sheets cover notes about plant structure, plant cultivation, etymological observations for plant names, and notes on authors and their works, notes on the use of individual plants and their fruit, on prices (especially of wood), on the geographical presence of plants (from published travelogues) and on fossillized plants. But most of the papers concern single observations of plants, their fruits, roots and seeds.

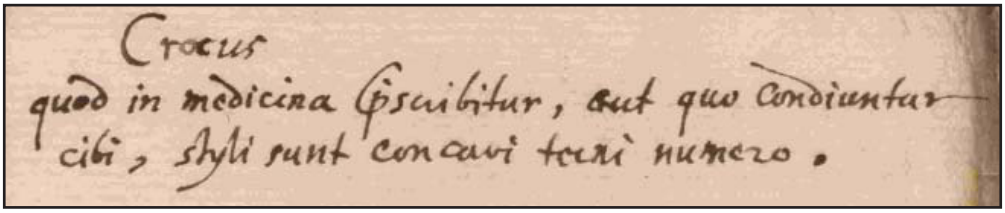

Crocus
quod in medicina Prescribitur, aut quo condiuntur
cibi, styli sunt concavi terni numero.

Fig. 2: Detail of a note on the medical use of Crocus. (GWLB: Ms XLII 1923, sigma 15 (fol. 3r))

Gardens are mentioned only sporadically, for example because of remarkable plants (lilies, tulips). Fogel used numerous sources for his notes: oral communications, letters and newspapers, but mostly he worked with his library. He excerpted and listed the authors and their works with abbreviations to identify them. For this the originals and Fogel`s work can be reconstructed. Fogel organized his notes in similar fashion to his library, but he used different categories. He developed his index only on individual subjects of interest to him and not with the ambition of systematic completeness.

Finally, the *travel diary* gives an insight into the educational grand tour of Martin Fogel (1662-1666). About 800 sheets of paper recorded the journey he undertook with the Hamburg merchant's son Martin Wevetzer. They visited well-known scholars, who sometimes functioned as a „guide". Fogel noted in his diary details about the famous gardens, inscriptions, descriptions of landscapes, monasteries and villages, records of the visited manufactories, libraries and universities.

The library, the card index faciliy and the travel diary, as sources, are only at the beginning of their scientific and scholarly evaluation. The presentation will provide a detailed insight into the rich material base and an introduction to Fogel's methodological practice.

CV

Carola Piepenbring-Thomas was born in 1961, studied fine arts, history and philosophy in Aachen and Hanover, and obtained a PhD in 2008. Since 2006 C. Piepenbring-Thomas has been scientific assistent in the manuscript department of the Gottfried Wilhelm Leibniz Library in Hannover. Her academic interests are Urban Administration and Legal History of the 16th Century, history of books and palaeography, cultural and scientific history. Publications and Presentations include: *Leibniz as a librarian, the collection of the libri botanici Martin Fogel* (2009); *The law in the city of Hanover. Documented Enforcement of rules* (2010); *The card index system of Martin Fogel* (2010). Current scholarly work involves the processing of libraries of scholars of the 17th Century in connection with the virtual reconstruction of the working library of Gottfried Wilhelm Leibniz (DFG project GWLB) and the publication about *Epistemological methods of the organisation of knowledge in the 17th Century: The library and the card index system of the Hamburg physician Martin Fogel* (2010-2012).

Denis Ribouillaut

Measuring Time in the Gardens of Papal Rome

Many gardens in early modern Europe featured sundials or *meridiane* along with ancient statues and elaborate fountains. The presence of these devices for measuring time and space is an eloquent illustration of the idea that the early modern garden was an area for the demonstration of sciences, as gnomonics was itself a branch of mathematics. Most mathematical treatises in the sixteenth century have a chapter on gnomonics: Apian, Münster, Oronce Fine, Clavius, Salomon de Caus, etc. The *gnomon* was also instrumental in practical geometry, for surveying, building geographical and chorographical maps, laying out streets and the main boundaries of territories. In short, it was a pivotal instrument of local, yet cosmic measurement of time and space, both an instrument and symbol of power.

The interest for such instruments during the Renaissance is closely linked with ancient Roman science. Vitruvius dedicates an entire chapter to gnomons and sundials in his treatise on architecture, which also contains instructions for making hydraulic machines. Both these devices are present in the Renaissance garden. They were meant to advance the knowledge of the world and to provoke wonder, whilst celebrating the owner of the garden for having created such marvelous artifices. Especially important from a historical point of view is the link of these instruments with the practice of astrology on one side and with the reform of the Julian calendar on the other. From an etymological and philosophical point of view, the sundial or *gnomon* designates that which understand, decide, judge, distinguish (Michel Serres). It is fundamentally linked with a theory of knowledge. Plato's allegory of the cave and his metaphor of the sun are linked with the way astronomers interpreted and measured the universe by means of the cast of a shadow.

Despite the vast literature in gnomonics, the form, function and meaning of these scientific instruments and the reasons why they were displayed in gardens have never been fully addressed. In this paper, I will present new research which seeks to investigate the importance of these devices in the symbolic and scientific economy of the early modern garden, focusing on the gardens of papal Rome.

The first part of the paper will be dedicated to the presentation of an archaeological discovery made in January 2010 whilst I was a fellow at the French Academy in Rome: a large polyhedral sundial with the names of the winds which originally topped a high pyramid set in the Vigna Poggio, one of the *vigne* making up the huge park of Pope Julius III (1550-1555) outside Porta del Popolo, the Vigna Giulia. The pyramid, with its *sphaericum horologium*, formed an extraordinary "Tower of the Winds". It served as a belvedere, affording splendid views on Rome, as an observatory for the practice of astronomy and astrology, and as a monumental ideogram of the Pope's name, Del Monte, meaning hill or

mountain in Italian. The rediscovery of this monument shed new light on the whole design and significance of the papal garden, but also on Renaissance art and culture during the brief pontificate of Julius III.

The Tower of the Winds at the villa Giulia raises interesting questions regarding the practice of measuring time and space within the world of the garden. In the remainder of my presentation, I plan to compare this monument with other similar constructions for measuring time in earlier and later gardens. The *pyramide vastissima* described by Francesco Colonna in the *Hypnerotomachia Poliphili* is especially interesting since it was "dedicated to the sun" and is described as a very elaborate sundial. It was topped by a wind-vane in the shape of a statue of a nymph, identifiable with an allegory of Fortuna, the Italian goddess of destiny. The Tower of the Winds at the Vatican built for Pope Gregory XIII (1572-1585) in the 1580's is the best known construction of the kind in Rome. The connection with the landscape of Rome, which is a crucial aspect of the Villa Giulia monument, has been noted by scholars, yet the importance of its setting in the very midst of the Vatican gardens has not been sufficiently questioned. The same is true regarding another Tower of the Winds also built for Pope Boncompagni on top of the Quirinal palace and overlooking its extensive formal gardens. The clock that once adorned this tower is still extent. Today, it decorates the façade of the church of Sant'Atanasio dei Greci. Shaped like a dragon or *ouroboros*, the heraldic animal of Pope Gregory XIII, it served a practical and heraldic function and boost, like at the villa Giulia, an interesting discourse on the mastery over time in Papal Rome. During the pontificate of Urban VIII (1623-1644), an elaborate *meridiana* was installed within those same gardens, just below the tower, this time making use of the sun and the bees of the Barberini arms. A floral *meridiana* also existed in the gardens of the Aldobrandini villa at Frascati, visible in Matthias Greuter's engraving of 1620. The villa Borghese possessed at least two such time-measuring devices. A pavilion with a *meridiana* was built in 1688, near the main Casino. The following century, in 1790, an obelisk – *meridiana* was installed in the *giardino del lago* by Giuseppe Calandrelli, famous mathematician and astronomer, who was the first to develop an interest for Gregory XIII's then old Tower of the Wind at the Vatican.

In presenting briefly these examples, I will insist on the important relationship existing between *gnomon* and *nomen*, i.e. between the mechanical and symbolic function of those sundials and the way they are shaped as heraldic devices. I will propose that such conflation of the *gnomon* and the *nomen* in the sundials of Papal Rome essentially derives from Augustan imagery, in particular the famous *horologium Augusti* set in the green surroundings of the Campus Martius.

CV

Denis Ribouillault is professor of history of early modern art at the University of Montréal, Canada, specializing in cultural landscape and garden studies and cartography. He gained his Ph.D. at the Sorbonne with Philippe Morel in 2006. He was assistant professor at the Sorbonne (2003-5), lecturer at the Courtauld Institute of Art (2006-8), fellow at Villa I Tatti (2008-9), 'pensionnaire' at the Académie de France à Rome (2009-11). In 2003, he was summer fellow at Dumbarton Oaks and was offered the full fellowship in 2008 (declined).

His book, *Paysage et pouvoir. Parcs, jardins et décors topographiques à Rome au XVIe siècle* (Paris, Institut national d'histoire de l'art) will appear later this year. He co-edited, with Michel Weemans, *Paysage sacré. Le paysage comme exégèse dans l'Europe de la première modernité / Sacred Landscape. Landscape as Exegesis in Early Modern Europe, Florence, Olschki* (giardino e paesaggio, n. 29), 2011. His main recent publications on Early modern gardens include: „La Villa Montalto et l'idéal rustique de Sixte-Quint", *Revue de l'art*, 173, septembre 2011 – 3, p. 33-42; „Toward an Archaeology of the Gaze: the Perception and Function of Garden Views in Italian Renaissance Villas", in: *Clio in the Italian Garden: Twenty-First-Century Studies in Historical Methods and Theoretical Perspectives*, M. Benes, M. G. Lee (eds.), Dumbarton Oaks Colloquium on the History of Landscape Architecture XXXII, Washington D.C., Harvard University Press, 2011, p. 203-232; „Le ville dipinte del cardinale Ippolito d'Este a Tivoli: l'architettura di fronte all'antico, la tradizione ferrarese, e un nuovo documento su Belriguardo", in: *Delizie estensi. Architetture di villa nel Rinascimento italiano ed europeo*, acts of the international symposium (Ferrara, Castello Sforzesco, 2006), F. Ceccarelli, M. Folin (eds.), Florence, Olschki, 2009, p. 341-371; „'Paesaggio dipinto, Paesaggio reale': notes sur une fenêtre de la Villa d'Este à Tivoli", in: *Delizie in villa. Il giardino rinascimentale e i suoi committenti*, G. Venturi, F. Ceccarelli (eds.), Florence, Olschki, 2008, p. 269-287; „Le Salone de la Villa d'Este à Tivoli: un théâtre des jardins et du territoire", in: *Studiolo: Revue d'histoire de l'art de l'Académie de France à Rome*, 3, 2005, p. 65-94.
For more see, http://www.histart.umontreal.ca/personnel/DenisRibouillault.htm.

Ana Duarte Rodrigues

Gardening Knowledge: The Circulation of Agriculture Treatises in Portugal between the 16th and the 18th Centuries

The study of the circulation of Gardening knowledge in Portugal between the 15th and 18th centuries is giving its first steps in our historiography. Aurora Carapinha (1995) was the first one to call our attention to the role such books as Alonso Herrera's *Agricultura Geral* (1513) or Gregorio de los Rios's *Agricultura de Jardines* (1595) had in the conception of Portuguese gardens. Since 2008 we are enrolled in a research project on Art Treatises in Portugal, with funding from the Ministry of Science, being our field of research books interesting for the Art of Gardens.

The *corpus* of books in Portugal is specific and absolutely necessary to define. Until now a considerable *corpus* of treatises and books interesting for the art of gardens circulating in Portugal during the Early Modern period with the information could be found in the following libraries: Biblioteca Nacional de Portugal, Biblioteca do Palácio Nacional da Ajuda, Biblioteca do Palácio Nacional de Mafra, Biblioteca Pública de Évora and Biblioteca da Academia de Ciências de Lisboa. This corpus is being gathered in a database of the research project Art Treatises in Portugal, with the funding of the Foundation of Science and Technology/Ministry of Science.

We have concluded so far that Gardening knowledge was spread in Portugal through much different kind of books during the Early Modern Art – from a predominance of Agriculture

treatises in the 16th century to botanic books in the 18th century. Treatises on the art of gardens were extremely rare books in Portugal (Rodrigues, 2011). The aim of this paper is to divulge to the international community the results obtained so far within this research project, revealing all the agriculture treatises with information on gardening that circulated in Portugal, which authors were more popular and which editions had more success. Furthermore, we seek to compare the circulation of agriculture treatises with treatises on the art of gardens and with botanic books. The comprehension of Portuguese gardens can be regarded from another perspective through the circulation of gardening knowledge, which was substantially different from country to country.

Among the more than hundred books on agriculture interesting for the art of gardens found until now, we point out the texts by Gabriel Alonso de Herrera's *Agricultura Geral*, Miguel Agustin's *Libro de los secretos de agricultura, casa de campo, y pastoril*, Louis Liger's *La Nouvelle Maison Rustique* and João Garrido's *Agricultor Instruído* as the books with more circulation, so more reception, in Portugal. Although Gregorio de los Rios's *Agricultura de Jardine*s was known in Portugal, we cannot compare it with the success achieved by Alonso Herrrera's book that was popular in Portugal from the 16th until the 19th century. Also understood as a legacy of the text written by the muslim Ibn Al-Awwam which had also a great influence in the Portuguese garden with its particular water technology.

In the 16th century, besides the books in Spanish, the most successful were modern editions of antique authors written in Latin, such as Cato, and Varro's and Columella's *De Re*

Rustica. The success of these authors was prolonged until the 19th century when a French translation was still in circulation in Portugal.

Besides Spanish and Latin books, that clearly had a higher expression among us, French and Italian authors such as Charles Estienne's *Maison Rustique*, Luigi Alamani's *La Coltivazione*, or Giuseppe Falcone Piacentino's *La nuova, vaga, e dilettevole villa. Opera d'agricoltura* have also circulated among us.

However, these Spanish, French and Italian books on agriculture would not have repercussions on the art of gardens after the 17th century as they had before, because in the absence of French and Italian treatises on the art of gardens, such as Boyceau's, they would be their substitutes to patrons, architects and gardeners in Portugal. We have not found until now any copy of Olivier de Serres's *Théâtre d'agriculture et mesnage des champs*, although it was owned by the marquis of Fronteira in the 17th century, who created with it one of the most exquisite gardens by then in the surroundings of Lisbon. We have also not found any copy of the Italian Augustino Gallo's *Le diece giornate della vera agricoltura e piaceri della villa* (1564), or Agostino del Riccio's *Agricultura Teorica*, or Bartolomeo Taegio's *La Villa* (1559). English was not an accessible language in Portugal, so it is not a surprise that we have not found any copy of Thomas Hill's *A Most Brief and Pleasant Treatyse* (1563), or William Lawson's *The Country House-Wife's Garden* (1618).

The first book on this issue in Portuguese language appears only in the 18th century and it is a translation: Fr. Theobaldo de Jesu Maria's *Agricultor Instruído* (1730) translated by João António Garrido. Then, also in Portuguese, Afonso Toar da Silveira's *A nobreza dos lavradores e a vida de S. Izidro* (Lisboa, 1741) made the defense of farmers and gardeners.

So, after defining the *corpus* of books available to commissioners, architects and gardeners, we seek to determine which among these books were recommended to, or owned and possibly read, by these same artists and commissioners (through archive research), finally, to prompt an accurate picture on the spread of ideas and theories that promoted gardening as an art in Portugal and the diffusion of techniques important in itself but also to seek how the content of treatises and books on agriculture fed the identity of Portuguese gardens.

CV

Ana Duarte Rodrigues is a lecturer at the Faculty of Human and Social Sciences of the New University of Lisbon and Associated Researcher of the Art History Institute/FCSH and CHAM (Centro de Estudos Além-Mar)/FCSH and CHAIA (Centro de História da Arte e Estudos Artísticos)/University of Évora.

She got her PhD from the Universidade Nova de Lisboa, Faculty of Social and Human Sciences, 2004-2009. Scientific area: History of Early Modern Art; Dissertation: *A Escultura de Jardim das Quintas e Palácios dos Séculos XVII e XVIII em Portugal* (text vol. 515 pp.; docs vol. 296 pp.; 3rd vol. 821 images).

MSc - Universidade Nova de Lisboa, Faculty of Social and Human Sciences, 2004. Scientific area: History of Early Modern Art. Dissertation: *A escultura de vulto figurativo do Laboratorio de Joaquim Machado de Castro (1771-1822): produção, morfologia, iconografia, fontes e significado* (text vol. 294 pp.; II vol. 400 pp).

BA - Universidade Nova de Lisboa, Faculty of Social and Human Sciences, 2002. Degree in Art History.

Positions held:
2011 to present – Lecturer – Post-graduate Studies on Gardens and Landscape, Universidade Nova de Lisboa, Faculty of Social and Human Sciences; 2009 to 2011 – Lecturer – Department of Art History, Universidade Nova de Lisboa, Faculty of Social and Human Sciences; 2008 to the present – Lecturer – Council of International Exchange, Universidade Nova de Lisboa, Faculty of Social and Human Sciences; 2006 to the present – Lecturer – Summer School, Universidade Nova de Lisboa, Faculty of Social and Human Sciences.

Current research interests: Gardens and Landscape Studies; Treatises and artistic literature; Iconography; Renaissance and Baroque art.

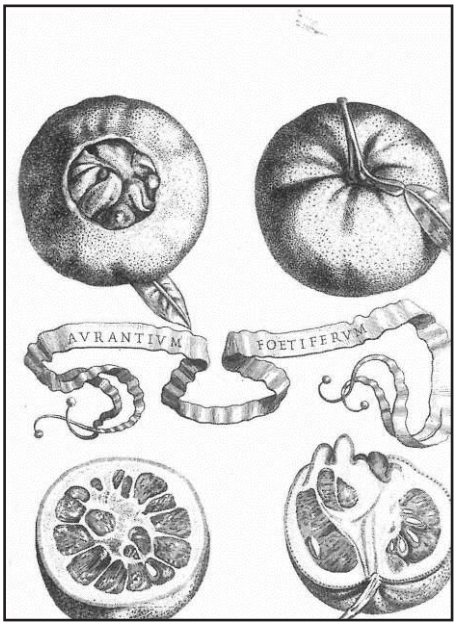
She published several books and many articles and book chapters.
Books (author): *A Escultura de Jardim das Quintas e Palácios dos Séculos XVII e XVIII em Portugal*, Textos Universitários das Ciências Sociais, Lisbon, Fundação Calouste Gulbenkian/ Fundação para a Ciência e Tecnologia, 2011 (edition of the PhD thesis through a contest); Lisboa, Rainha dos Oceanos /Lisbon, Queen of the Oceans, Lisbon, Scribe, 2011 [bilingual]; *Mulheres do Século XVIII. O Belo Ideal,* Lisboa, Ela por Ela, 2006.
Book (co-editor): With Rafael Moreira, *Tratados de Arte em Portugal/Art Treatises in Portugal*, Lisbon: Scribe, 2011.

Irina Schmiedel

Between Knowledge and Representation –
Growing, Painting, Collecting, Classifying Citrus Fruit

The Jesuit philologist and gardener Giovan Battista Ferrari's *Hesperides, sive de Malorum aureorum cultura et usu* (Rome 1646) explicitly testifies to early modern interests in the cultivation and classification of citrus fruit. Collections of diverse and sometimes extraordinary varieties were a great fashion among the noble and wealthy. The much sought-after objects existed not only *in natura* to adorn gardens, courtyards and tables, but also in various degrees of abstraction as works of art, bundling aspects of delight, utility and (not infrequently) political representation.

Frontispiece – Giovan Battista Ferrari: *Hesperides*..., Rome 1646



Aurantium Foetiferum – Giovan Battista Ferrari: *Hesperides*..., Rome 1646)

The correspondence between the erudite collector Cassiano dal Pozzo (1588-1657), who was closely involved in the compilation of Ferrari's *Hesperides*, and the Medicean court physician Franceso Nardi vividly illuminates the curiosity for both diversity and anomaly within the group of citruses. As just one example among many their letters reveal that it was a great concern to document and exchange information on names, looks, uses and the provenance of cultivars. Being part of the seventeenth century Medici court Nardi must have been familiar with existing traditions and strategies of political representation that could also incorporate citrus fruit.

As early as the fifteenth century citruses were cultivated in the gardens of the Careggi and Fiesole villas and it is telling that it was one of the family's art agents who procured "melaghrani, melaranci, limonciegli" (pomegranates, oranges and lemons) for Fiesole. Around 100 years later a panegyric poem to Cosimo I de' Medici (1519-1574) praises the Herculean rape of the Hesperidean apples, their transfer into the Medicean gardens and as palle even onto their coat of arms. Most fittingly the dynasty's first grand duke was also the founder of two of the first botanical gardens in Europe: the *giardini dei semplici* in Pisa and Florence.

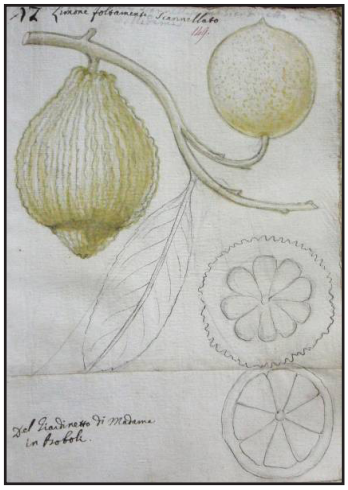
Giorgio Vasari: *Hercules slaying Ladon, the dragon of the Hesperides*, 1556/57, Florence, Palazzo Vecchio, Sala di Ercole

This sketch gives an idea of horticulture in general and citriculture in particular between knowledge and representation. In my paper I will focus on the late Medici grand duchy around 1700, particularly on the horticultural passions of Cosimo III (1642-1723) who, speaking with Francesco Redi, not unlike Hercules transplanting the citruses form Africa to Greece, provided the gardens of Florence and Pisa with every foreign plant; not just for a vain and curious delight, but for the sole benefit of those who investigate and describe the diverse characters and properties of the plants.[1] I will consider Bartolomeo Bimbi's (1648-1730) botanical still lifes for one of the grand duke's favourite retreats, the Casino della Topaia close to the famous Castello villa. The artist's biographer states that the place was full of all kinds of fruit, citruses, grapes and flowers. Cosimo wanted Bimbi to paint them

1 Redi, Franceso: *Esperienze intorno a diverse cose naturali e particolarmente a quelle che ci son portate dall'Indie, scritte in una lettera al padre Atanasio Chircher della Compagnia di Gesù*, Florence 1671, in: Opere di Francesco Redi, vol. 4, Milan 1811, p. 59.

after life to document their forms, their colours and their names.[2] This painted catalogue of Tuscan floral and pomological abundance corresponds to the extensive lists, descriptions and drawings compiled by the grand ducal botanist Pier Antonio Micheli (1679-1737). A closer look at Micheli's work and social environment will provide an idea of engaging with the plant world between traditional patterns of princely representation as well as pre-Linnean tendencies of scientific specialisation and amateurish popularisation.[3]

Bartolomeo Bimbi: *Varieties of Citrus Fruit*, 1715, Poggio a Caiano, Museo della Natura Morta



Limone foltamente scannellato – Pier Antonio Micheli: Enumeratio... (ms. 48), ca. 1733-35, Florence, Biblioteca botanica dell'Università, manoscritti micheliani

Citrus fruit continued to be part of the contemporary botanical and horticultural discourse as demonstrated by Bimbi's and Micheli's works or by a lecture on the Storia degli Agrumi, given by Giovanni Domenico Civinini, a member of the Società Botanica Fiorentina, in 1734.[4] The ornamental and botanical delight in oranges, citrons and lemons went well beyond Tuscany's or Italy's borders. For instance considering the fortune a publication like Ferrari's Hesperides had in Germany and the Netherlands, along with the construction of orangeries all over Europe, the ongoing passion for the "golden apples" becomes more than evident. Such observations taken together create a complex image of early eighteenth century botany, horticulture and pomology that seemed to diverge and mingle at the same time, sticking to existing traditions and also exploring new spaces of production and perception.

2 Baldinucci, Francesco Saverio: *Vite di artisti dei secoli XVII-XVIII (1725-30),* BNCF, Fondo Palatino, ms. 565, edited by Anna Matteoli, Rome 1975, p. 247.

3 Vast information on Pier Antonio Micheli is provided by Targioni Tozzetti, Giovanni: *Notizie della vita e delle opere di Pier Antonio Micheli botanico fiorentino*, edited by Adolfo Targioni Tozzetti, Florence 1858.

4 Civinini, Giovanni Domenico: *Della storia degli agrumi all'illustriss., e clariss. sig. sen. Presidente Pier Francesco de' Ricci. Lezione accademica*, Florence 1734.

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CV

Irina Schmiedel earned her M.A. degree in Art History and Romance Philology from the Johannes Gutenberg Universität Mainz (2003-2009). As a fellow at Collegio Ghislieri (2006) and Collegio Nuovo (2008) she also studied at the Università degli Studi di Pavia.

In her Ph.D. project she focuses on botanical knowledge in the late Medici grand duchy in Florence considering the relationship between arts and sciences, as well as questioning tendencies towards both popularisation and specialisation of knowledge in the course of the 18th century and the role of traditional patterns such as strategies of princely representation.

After a DAAD fellowship at the Kunsthistorisches Institut in Florence (2009/10) she has worked as a research assistant in Science Studies at Aarhus University (2010/11), in Art History at the Johannes Gutenberg-Universität Mainz (2011) and since October 2011 in History of Science and Technology at the Bergische Universität Wuppertal.

Irina Schmiedel is a member of the IZWT (Interdisziplinäres Zentrum für Wissenschafts- und Technikforschung) at the Bergische Universität Wuppertal and an associate of the project "Writing Art History after Vasari – Bellori's 'modern painters, sculptors and architects', a German translation and new commentary" at the Johannes Gutenberg Universität Mainz.

Verena Schneider

The Creation of Knowledge: Reconstructing Garden History in the Early Modern Period

Focusing on the creation of historical knowledge within the German empire this contribution is positioned between scientification and the increasing professionalism in garden art in the Early Modern Period. Scholarly approaches in the reconstruction of garden history are detectible from the 16th century onwards. In comparison to today's scientific standards, however, these mainly generate knowledge of a more narrative character. Considering historiography over a period of approximately five hundred years, from the 16th until the 20th century, several paradigm shifts distinguish phases of which the first one, contemplated in this paper, extends to around 1770. Within this chronology, the works of Johann Georg Sulzer and Christian Cay Lorenz Hirschfeld mark a change towards a more critical enquiry with the topic as expressed in the narrative structure of their books and their underlying notion of scientificity.


Siben Bücher
Von dem Feld
bau / vnd vollkomener
bestellung eynes ordenlichen May-
erhofs oder Landguts.
Etwan von Carolo Stephano vnd Jo-
hanne Liebhalto/ der Artzenei Doctorn/
Frantzösisch beschrieben.
Nun aber seines hohen nutzes halben/
gemeynem Vatterland zu lieb/ von dem Hoch-
gelehrten Herren Melchiore Sebizio Silesio, der
Artzenei Doctore, im Teutsch gebracht.
Fernern Innhalt/ was für sonderliche
sachen vnd frembde Materien/ durch das gan-
tze Buch tractiert werden/ wird der gönstige Leser
hiernach gleich auff der anderen seit dises platts
summarisch zuvernemen haben.
Getruckt zu Straßburg bei B. Jobin 1579.
Mit Röm. Kay. May. Freyheit.

Melchior Sebitz, *Siben Bücher Von dem Feldbau/ und vollkomener bestellung eynes ordenlichen Mayerhofs oder Landguts*, Strassburg 1579, frontispiece

Except for only a few studies on English historiography focusing mainly on the 18th century, most of which are published in the series 'Dumbarton Oaks Colloquium on the History of Landscape Architecture'[1], the history of annal-writing of garden art lacks further research. Because history was first systematized consistently far after 1700, this applies all the more to the Early Modern Period. Taking into account German-speaking sources of the Early Modern Period Clemens Alexander Wimmer published an essay about historiographical writing between 1570 and 1913, which is the only, however, cursory overview of that topic.[2] In my doctoral thesis I intend to examine this desideratum referring especially to the "long" 19th century, which for the significant changes occuring in the writing in garden art in that time can be considered as the most important era of garden historiography.[3]

To encounter the complexity of my topic adequately, I would like to discuss several topic areas regarding a diachronic as well as a synchronic reflection:

1. Which type of historic literature does include retrospections about garden art? Which genres do capture them? What kind of authors are interested in history? There is, for instance, a very heterogenic field of literature that involves genres such as agricultural and horticultural treatises, theories of architecture and household literature. However, a distinct historiographical genre is only established in the 19th century.[4] Accordingly, many different authors have presented their different views on garden history, and yet a certain canon of narrative content has been synthesised during this period.

2. What kind of functions is historiography attributed to? How is it legitimized and how do authors argue? In which way does natural science matter? Since the 16th century it became common to write introductions which consider the historical dimension of the book's topic in order to place work, topic and author itself into an ideally long tradition tracing back to antiquity. History in this regard was used as a rhetorical figure and awarded legitimation and credentials.

1 For example see the contributions of John Dixon Hunt (pp. 77-90) and Michael Leslie (pp. 91-106) in: Michel Conan (Ed.): *Perspectives on Garden Histories (Dumbarton Oaks Colloquium on the History of Landscape Architecture* 21), Washington D.C. 1999. See also Joseph M. Levine: John Evelyn: Between the Ancients and the Moderns, in: Therese O'Malley/Joachim Wolschke-Bulmahn (eds.)*: John Evelyn's "Elysium Britannicum" and European Gardening* (Dumbarton Oaks Colloquium on the History of Landscape Architecture 17), Washington D.C. 1998, pp. 57-78.

2 Clemens Alexander Wimmer: Frühe Perioden der Gartengeschichte. Ein Überblick über die gartengeschichtliche Literatur 1570-1913, in: *Zandera*, 24.1 (2009), pp. 11-45.

3 The dissertation is written at the Institut für Kunstgeschichte of the Heinrich-Heine-Universität Düsseldorf and entitles: *Historiographiegeschichte der Gartenkunst in Deutschland. Wissensgenerierung im transnationalen und interdisziplinären Kontext (1770-1914).*

4 See chapter „E – Frühe Gartenkunsthistoriograhien" in: *Gärten wie sie im Buche stehen. Gartenkunsthistorische Publikationen des 16. bis 20. Jahrhunderts aus dem Bestand der Universitäts- und Landesbibliothek Düsseldorf*, Ausst.kat. hg. v. Irmgard Siebert/Carola Spies/Stefan Schweizer, Düsseldorf 2011, pp. 132-159.

3. What is (not) narrated in historiographical literature? What are the methods and central figures of annal-writing?

4. Considering the creation of knowledge: What kind of foundations do historic narration require? On which basis do authors draw when generating knowledge?


Allgemeiner
Gärtner/
Von Setz- und Pflan-
zung allerhandt fruchtbarer Bäume/
schöner Kräuter und Blumen/ in allerley
Gärten und Ländern/
Zu deß Menschen grosser Ergötzlichkeit;
Eingerichtet nach der Kunst-lehrenden
Regeln/ wie man die Erde recht erkennen/
verbessern/ und der Sonnen Höhe über
jeglichem Clima beobach-
ten solle;
Verfertiget durch
Hn. Peter Gabr
ihrer Fürstl. Durchleuche. zu Würtemberg
bestellten Garten-Inspectorem.
aus dem Frantzösischen ins
übersetzt von
M. J. G. Scharffenstein.
In Verlegung Johann-Georg
Buchhändlers:
Zum Dritten mahl gedruckt
In Esslingen/
Durch Simon Dannenbergern/ 1673.

Peter Gabriel, *Allgemeiner Gärtner/ Von Setz- und Pflanzung allerhandt fruchtbarer Bäume/ schöner Kräuter und Blumen/ in allerley Gärten und Ländern*, Aus dem Frantzösischen ins Teutsche übersetzt von M. J. G. Scharffenstein, Zum Dritten mahl gedruckt, Esslingen 1673, title page

CV

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Martina Sitt

Paths of Knowledge – The Bergpark Wilhelmshöhe at Kassel as a Centre of Scientific and Aesthetic Networking in Early 18th-Century Europe

My aim is to report on a research project which has been initiated by an interdisciplinary seminar on the *Bergpark Wilhelmshöhe* at Kassel (mountain park) in 2011. During this work on the subject a huge amount of new approaches to the whole complex of regarding this kind of park were discovered. As a consequence the ongoing project considers the period from the founding of the *Bergpark Wilhelmshöhe* in 1696 until 1765.

The area of the park is 2.4 square kilometers (590 acres) and makes it to be the largest hillside park in Europe. In designing and constructing this unique area not only aspects of garden design but geology, mineralogy, botany etc. had to be taken into account and even more aspects of economic and political requirements of the Landgraf (his "Wissens- und Wirtschaftslandschaft") which in former times had to be respected. This created a multi-faceted horizon of mediation in all directions of cultural fields which finally was the basis for the aesthetic staging at the *Bergpark Wilhelmshöhe*.

By now a huge amount and wide range of literature is known and enlisted which already picks out the *Bergpark Wilhelmshöhe* as a main subject. But the authors mostly looked on one aspect and ignored the networking question. Taking this into consideration my contribution will now also focus on the transfer of knowledge into (landscape) images which took place against this background of the topic of scientific networking. This subject has not been sufficiently considered. It is not the process of taking ideas and not the inspiration but the results of their importations I will concentrate on.

As until now a lot of unnoticed literary sources and original documents came up the research project "WissensWege" was initiated. These sources will help to illuminate the way natural scientists and engineers who worked at the *Collegium Carolinum* at Kassel from 1709 onwards were expected to consider also aesthetic concepts in case their research results should be integrated in the concept of this *Bergpark Wilhelmshöhe*. The walks through the park turn out to be corridors which call attention to visible results of scientific research.

Taking few outstanding personalities of the early period of the *Bergpark Wilhelmshöhe* into consideration, the two perspectives – the perspective of the history of science, which is to be discovered in this project, and the contemporaneous perspective of aesthetic concepts – will be better illustrated on European background. The aim of the Landgraf and its protégés was to create a higher harmonic unity and an extensively harmonised ensemble. This happened at the *Bergpark Wilhelmshöhe* in a unique way.

CV

Prof. Dr Martina Sitt teaches Art History at the University of Kassel since April 2010. After her studies of Art History, European History, Comparative Literature and Philosophy in Bonn, Vienna and Freiburg she did her doctoral thesis in 1990 on Jacob Burckhardt's writings on aesthetics and art criticism (Kriterien der Kunstkritik, Wien 1992). Employments in projects at the Residenzgalerie Salzburg, the Kunsthistorisches Museum in Vienna and the Technical University, Institute of Art History in Vienna, were followed by the position of the Chief Curator of Old Master Paintings at the Kunstmuseum Düsseldorf (1992-1999).

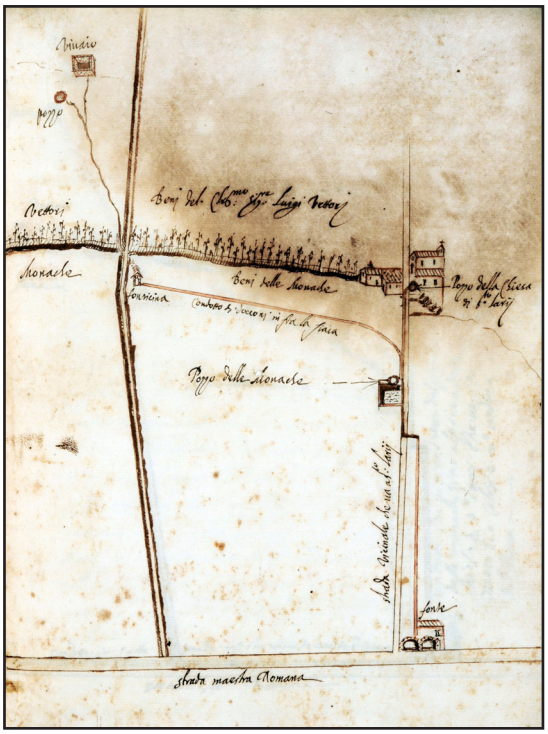
Starting in 2000 she was deputy director and chief curator of the Old Master paintings at the Hamburger Kunsthalle. Teaching at Universities since 1993 at Düsseldorf University and guest lecturering continued parallel to the museum work. She qualified as a professor in 2001 and taught as associate professor at the University at Düsseldorf and from 2006 onwards at Hamburg (University and Bucerius Law School). Her guest professorships include positions held at Budapest, Uni Roma III, Vienna and Smith College (MA), and she worked at guest curator in Museums at Trento, Rome, Luxembourg and New York. Her fellowships include the PhD Grant (1988-1990) of the Konrad-Adenauer-Foundation, 1992-1993 of the Volkswagen-Foundation (Habilitation), 2002 at the Bibliotheca Hertziana and the Getty Curatorial Grant. Her work on Netherlandish Art has involved exhibitions and books on Pieter Lastman, Jacob van Ruisdael and still life paintings, as well as the role of light in Dutch and Flemish painting. In 2008 she published a detailed inventory catalogue of the Old Master collection of the Hamburger Kunsthalle. She is currently working at a publication on the so called Master Francke, especially his Altar with scenes of the legend of Thomas Becket, and on a new research project called WissensWege.

Anatole Tchikine

Ancient Knowledge, New Aesthetics: Italian Renaissance Garden Waterworks between Theory and Practice

The principles of water supply and management in Renaissance Italy showed close dependence on those of antiquity (known both through classical texts and archaeological remains). Yet, when it came to the display of water, these traditional methods usually resulted in the creation of decidedly new types of ornaments (such as the so-called "candelabrum" fountains, water-chains, monumental cascades, and fishponds with artificial islands), which offered a response to a different set of aesthetic demands. Importantly, in the Renaissance, even such utilitarian features as irrigation channels were often given artistic articulation. The purpose of this paper is to explain the relationship between ancient technology and theory and their adaptation in the context of sixteenth-century Italian gardens, by focusing on three specific areas: (1) water supply, (2) fountain design, and (3) the nature of kinetic automata, which were common in garden grottoes.

Renaissance discourse on water heavily relied on ancient texts. Different types of water were distinguished with respect to its origin and properties (such as rivers, mountain springs, and wells, as well as rain and snow). The purest water was colourless, odourless, and tasteless, with its quality generally impaired through contact with earth and other mineral substances. Topography and different types of terrain were also supposed to have a direct bearing on its nature and composition.



Scheme of water counduits supplying a fountain in Via Senese (Florence), 1627 (Florence, Archivio di Stato, Capitani di Parte Guelfa, numeri neri, 797, supplica 292)

Sixteenth-century gardeners were supposed to utilize the best available water, since this is what humans ultimately consumed in the form of vegetables and fruit. Following the decline of the Roman system of aqueducts, however, water supply in Italian gardens had to draw on a combined range of sources, such as cisterns, wells, and open or underground conduits. Along with the most common types of water-lifting machinery, these technological solutions derived from antiquity. A crucial task, however, was to make sure that running water retained its

properties without becoming putrid. This was achieved by keeping it in circulation, usually through the use of special reservoirs, but also by making water pass through the whole system of garden waterworks (which included such features as fountains, fishponds, and grottoes). For this reason, in sixteenth-century gardens the practical functions of retaining and conserving water could never be separated from its display and aesthetic enjoyment.

The relative scarcity of fresh running water during the Middle Ages and the Renaissance heightened the general sensitivity to its appearance and sound, encouraging the creative exploitation of its visual, acoustic, kinetic, or tactile properties. Featuring water, however, was not merely an attractive sight. It purified and cooled the air, becoming a matter of hygiene and health as much as a source of pleasure. Areas around garden fountains were preferred spots for gatherings and meals, with water serving to cool drinking glasses or chill wine flasks. By employing different types of basins and nozzles, Renaissance engineers learned to create an astonishing variety of water effects, which ranged from natural-style trickling, bubbling, and rain-like display to more complex forms imitating umbrellas, mushrooms, and even fireworks.

Romolo del Tadda, Fontana dei Mostaccini, 1619-21, Florence, Boboli Gardens (detail showing an irigation channel to the left of the water-chain)

Renaissance fountains are generally seen as recreations of those of antiquity. This is true only in part, with regard to specific elements and forms (such as reclining river-gods and sarcophagus-shaped basins). In other important respects, however, Renaissance fountains resembled those of the Middle Ages (as demonstrated, for example, by their high receiving basins and meaning-rich decorative programs). Yet the sheer variety of fountain types that emerged between the late 13th and the late 17th centuries makes it impossible to reduce their design to a few basic schemes. In fact, this variety suggests that the fountain, as a structure, had to be "reinvented" during the Renaissance by adapting other, already established, artistic models (such as pulpits, candelabra, portals, triumphal arches, glass and silverware, statues on pedestals, and obelisks). Some of these solutions were ultimately rejected, while others – notably the "candelabrum" fountain with multiple tiered basins (which kept water in circulation by making it overflow from one

receptacle to another) – enjoyed enduring popularity. Enhanced by the visual and representational potential of water, this ability to absorb other artistic forms allowed fountains to become a distinctive type of Renaissance monuments.

The design of sixteenth-century kinetic automata, powered by the movement of water, was more dependent on ancient models. The operation of "singing" birds, hydraulic organs, and wooden or terracotta figures that raised their arms, rotated on their axis, "played" musical instruments, or enacted various scenes, was based on the pneumatic principles described in the book of "moving machines" by the first-century mathematician Hero of Alexandria. Particularly popular was the conceit of "chirping" birds, "silenced" by a rotating owl. Rather than becoming a restrictive factor, however, this faithful adaptation of ancient conceits stimulated Renaissance imagination. A clear indication of this was the fact that, by the end of the 16th century, classical subjects gradually gave way to contemporary scenes (such as water-spouting warships and castles, mining camps, and miniature towns with moving figures, ringing church bells, rotating windmills, and running streams). Although operated by the same principles, the appearance and meaning of these devices signalled a distinctly different cultural and artistic era.

The separation of practical and utilitarian aspects of Renaissance garden waterworks is therefore a purely modern distinction, which did not exist at the time. Although sixteenth-centuries engineers widely used ancient technological and theoretical blueprints, they adapted them to achieve new aesthetic goals. In this way, in Renaissance gardens, functional solutions usually paved way for artistic discoveries.

CV

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Alessandro Tosi

Botanical Art and the Idea of the Garden between Imagination and Science

As is well known the visual image, and the contribution of the artist to shaping the forms and models of a means of communication that was not only verbal, constituted fundamental nodal points in early modern European culture. And in the opening years of the sixteenth century, the rise of the scientific illustration accompanied and characterized the "rebirth" of the disciplines connected with the sciences of nature and of man, providing a new and more modern way of seeing, portraying, cataloguing, and in the end understanding the natural world.

This phenomenon, which was born out of the long process of the rediscovery and revision of the classical authorities achieved by humanist culture and by the formidable insights of Leonardo, may be assigned a precise date and specific context. In 1530 the printer Johann Schott began the publication in Strasbourg of Otto Brunfels' *Herbarum vivae eicones ad naturae imitationem, summa cum diligentia et artificio effigiatae*, which presented the first visual portrayal of the plant world ad vivum. In his images the artist Hans Weiditz sought to adhere to the rigorous principle of *ad naturae imitationem, in imitation of nature*, as declared by the author when he laid out his programme for a new method of investigating, describing and defining natural data.

At the same time, the rigorous objectivity of Weiditz's portrayals of individual specimens seems to be in marked contrast with the title page, where the scenes of the mythical gardens of Adonis and of the Hesperides return to a symbolic and allegorical tradition in which echoes of the Renaissance imagination of Dürer were interwoven.

A literary and erudite dimension, evocative and essentially anti-naturalistic, which may also be admired in the title page of *De natura stirpium* by the French naturalist Jean Ruelle (Paris, 1536), a splendid tapestry *aux millesfleurs* and book of hours in which the elegant veduta of the garden echoes the humanist dream of Polifilo.

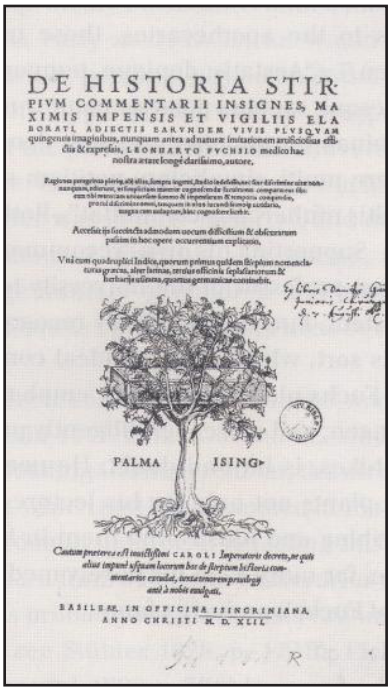
The physical space of the book and the page, the *mise en page* of the plates and the complex architectonic composition of the frontispiece therefore reflected the "dual spirit" of the illustration, between *imitation* and *imagination*: on the one hand, the spirit linked to the emergence of a new form of scientific thought and that, in its close adherence to reality, imposed new rules of visual commu-

nication; and on the other hand the spirit inextricably linked to an artistic, literary and philosophical culture which continued and would continue to favour the metaphorical dimension of myth and allegory.

The place of the flower is clear, but what of the place of the garden? What idea of the garden came to be promulgated by early modern visual culture? And above all, what was the nature of the relationship that was created between art and science in the definition and representation of the garden as a space and a repository for knowledge, with its certainties, its naturalistic data, but also the tantalizingly indeterminate nature of its evocative and emotional power?

In this context, the contribution will present some reflections on the idea and the image of the garden during the course of the sixteenth century. It will begin with the crucial chapters penned by the fathers of modern botany, which reveal and affirm the role of the scientific illustration in this new method and new approach to knowledge. In *De historia stirpium* (1542) Leonhart Fuchs presented a conception that reflects the immediately recognizable typology of the botanical garden.

His garden (*in vivo iocundissimo viridario*) is a veritable encyclopaedia and space dedicated to knowledge – like the coeval natural history collection: it embodied metaphor and reality, a living and most pleasant garden composed of beautiful images on paper, and *a living and most pleasant garden* made up of plants and flowers, in both of which the aesthetic and emotional pleasures of contemplation sprang from knowledge. And in this period, the creation of the first gardens of simples associated with academic institutions – in Pisa in 1544, then in Padua and Florence, and subsequently in every part of Europe – confirmed the garden's role as a place of knowledge and science, but also as a center for the production of images.

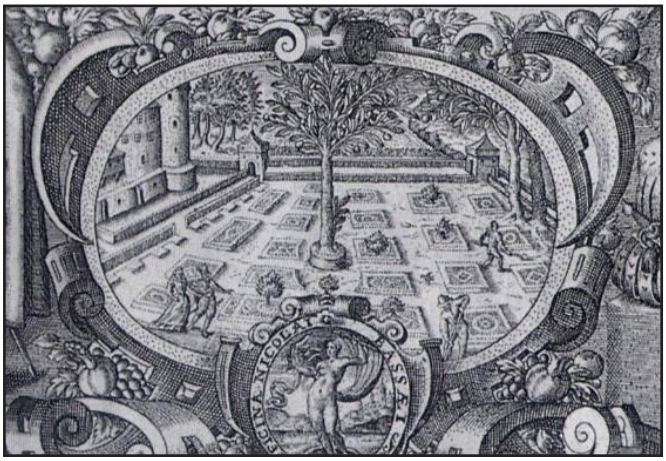


The metaphor conceived by Fuchs was taken up by Pietro Andrea Mattioli in the edition of his work *I Discorsi* magnificently illustrated by Giorgio Liberale

(1555). Mattioli's "painted garden", like that of Fuchs, was linked to a modern conception of scientific knowledge and a new strategy for visual communication.

On the one hand therefore, an idea of the garden born of and wedded to the purposes of science, in which the image played a central role in the sharing and dissemination of knowledge. On the other hand a vision of the garden transmitted by artists and by the flourishing production of engraved images during the decades from the 1570s to the 1590s, a conception that underlined its evocative, decorative and architectonic dimensions.

In this connection between art and science, between the dual souls of illustration and visual culture in early modern Europe, at the end of the sixteenth century the garden found its own definition and forms of representation, and the ground was prepared for further development during the baroque age.



CV

Alessandro Tosi (Pisa, 1959) teaches and conducts research at the Department of Art History, Faculty of Letters, University of Pisa, as Associate Professor of Modern Art. Teaching courses on research methodologies for the study of art history and the history of the graphic arts, since 2007 is Scientific Director of the Museo della Grafica, Palazzo Lanfranchi, Pisa. Member of the editorial board of „Nuncius. Journal of the Material and Visual History of Science". Since 1984 he has participated in numerous research projects with the Department of Art History, University of Pisa, focusing in particular on the history of visual arts and the relationship between art and science from the early modern age to the present, and the history of the graphic arts. He has produced many scholarly articles, books and multi-media presentations on a wide variety of topics in these fields. He coedited the international Symposia „Linnaeus in Italy: the Spread of a Revolution in Science" (2006); „La conquista del visibile: Galileo e le arti" (2006); „Tennis and the Scientific Revolution" (2012).

Matteo Valleriani

The Organ of the Garden of Tivoli

The Renaissance garden of Tivoli was built near Rome between 1561 and 1611 as a setting for the residence of the cardinals of the Este family. The work was initiated by Cardinal Ippolito II, who died in 1572, then further supported by Cardinal Luigi d'Este until 1586 and, finally, by Cardinal Alessandro. Concerning the conception of the garden and the villa, the periods of Ippolito II and Alessandro are particularly relevant. The inauguration of the villa took place in September 1572, about three months before the death of Cardinal Ippolito II.

The garden was realized under the supervision of the architect Pirro Ligorio in association with a French engineer and his pupil. Sources written in Italian identify these as Luca Clerico and Claudio Venardo. Luca Clerico died in 1565 so the work was completed by Claudio Venardo.

These two figures were specialized hydraulic and pneumatic engineers. The need for such expertise is justified by the fact that the garden of Tivoli represents one of the most impressive early modern achievements in the field of external water technology. A myriad of fountains and water devices and, of course, the water supply system for the villa itself were installed in this garden by a considerable number of artisans and their laborers. For the functioning and supply of these installations, an elaborate aqueduct was obviously needed as well. Built on the subterranean level, this aqueduct brought water from the River Aniene to the garden by means of pipes positioned at a natural waterfall. Without entering into the subject of the iconographic and iconological meaning of the garden, it is sufficient to mention here that the role of water in such gardens was not purely decorative, but should be framed in the Renaissance conception of 'garden' as the place where nature is imitated and (by means of technology) forced to replicate an iconological, but rational, plan. Water is therefore a natural element which can, for instance in the frame of practical pneumatics, easily be used for a rational plan that intends to integrate natural and artificial elements.

The Italian Renaissance was a period when technology and pneumatics, together with architecture and metallurgy, flourished. They comprised some of the most cultivated practical activities of the period.

The presence of a hydraulic organ in the garden of Tivoli (Fig. 1) will be discussed within the conceptual and historical frame of Italian Renaissance gardens, which can be applied more or less directly to other specific gardens of the Renaissance period. The organ was built by the same French engineers, who supervised the entire water supply system and all the achievements in the frame of water technology. According to the tradition already es-

Fig. 1: Fontana dell'Organo at Tivoli's garden

power what is nowadays called a typical Heronian device, which caused a number of artificial birds to sing in harmony. Finally, the position of the organ was peculiar too, for it was situated outside and, originally, its apparatus was not covered (Fig. 2). It is often said, erroneously, that this is the only hydraulic organ conceived to diffuse sound in the open and, after this experience, all other hydraulic organs were built in closed spaces to better appreciate the music performance. This, however, is not true. In the garden of Pratolino, for instance, which was built at almost the exact same time, two hydraulic organs were built. One was built inside underneath the villa, the other was outside at Mount Parnassus. The latter device was also able to diffuse sound outside (Fig. 3). The difference between Tivoli's hydraulic organ and similar successive devices is rather due to the fact that the tablished during the late Middle Ages, this hydraulic organ had no need of a player, but was able to produce a musical piece entirely mechanically.

The peculiarities of this organ are three: its dimensions, its position and the multiple functionality of the technology that activated it. According to the archeological findings and the ensuing studies, the apparatus of the organ, situated beyond the wall of the Fontana dell'Organo, appears to be considerably larger than any other Renaissance hydraulic organ known. This could be related to its multiple functionality. The water and the mechanisms served not only to make the organ play, but also to activate a set of trumpets and to simultaneously

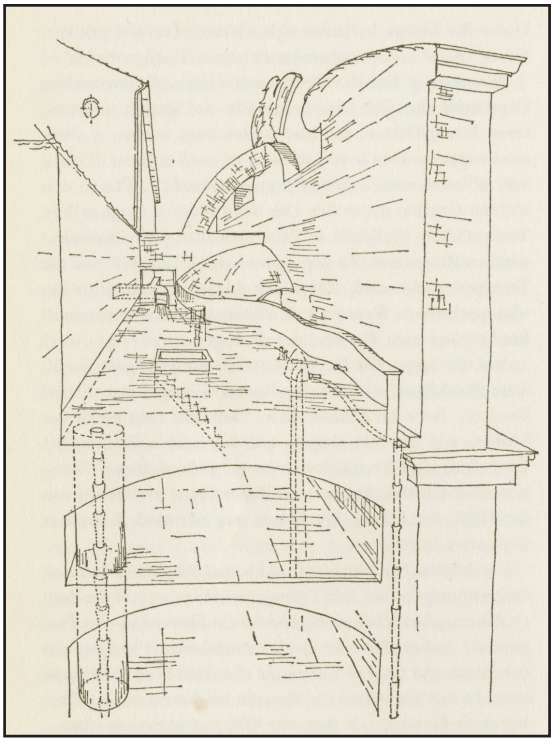


Fig. 2: Sketch of the pneumatic apparatus of the hydraulic organ of the garden of Tivoli. Carl Lamb, 1966

mechanical and pneumatical apparatus of the former was not covered or hidden. But this was soon recognized as a deficiency since it led to serious maintenance problems. At the end of the XVI century, Cardinal Alessandro d'Este finally ordered the construction of an architectural element to cover the working part of the apparatus. This decision led to the construction of Bernini's extraordinary Edicola at the base of the Fontana dell'Organo. The very first version of the organ must have been completed and functioning before September 1572, as we know that when the villa and the garden were inaugurated in that month, Pope Gregory XIII attended a musical performance of the instrument and, impressed, asked to see the mechanical apparatus beyond the wall.

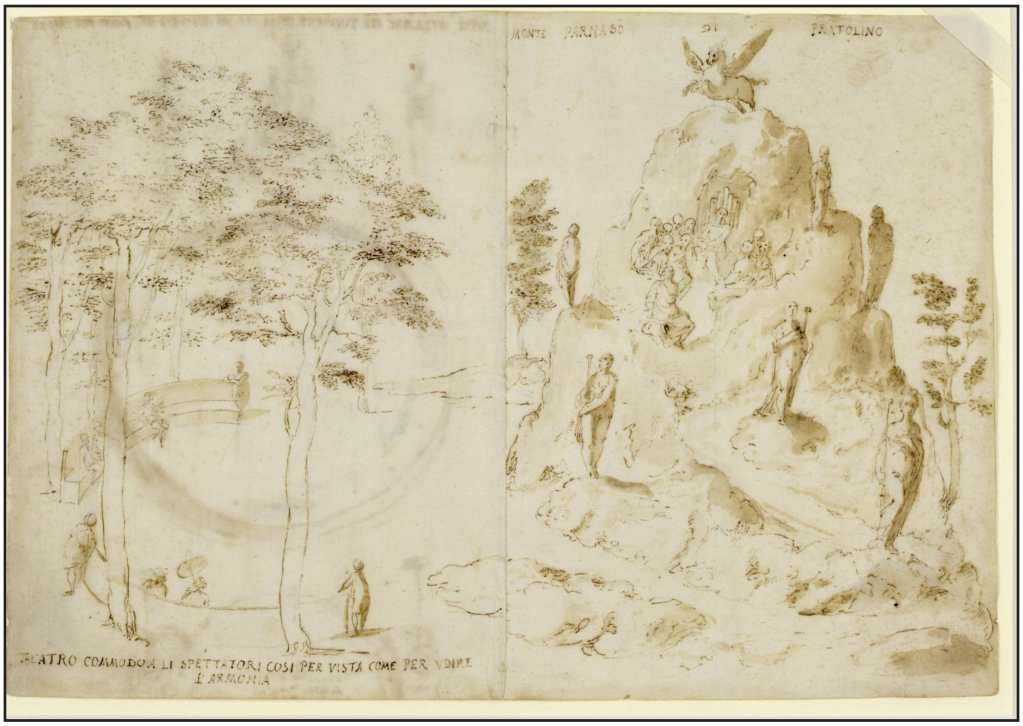
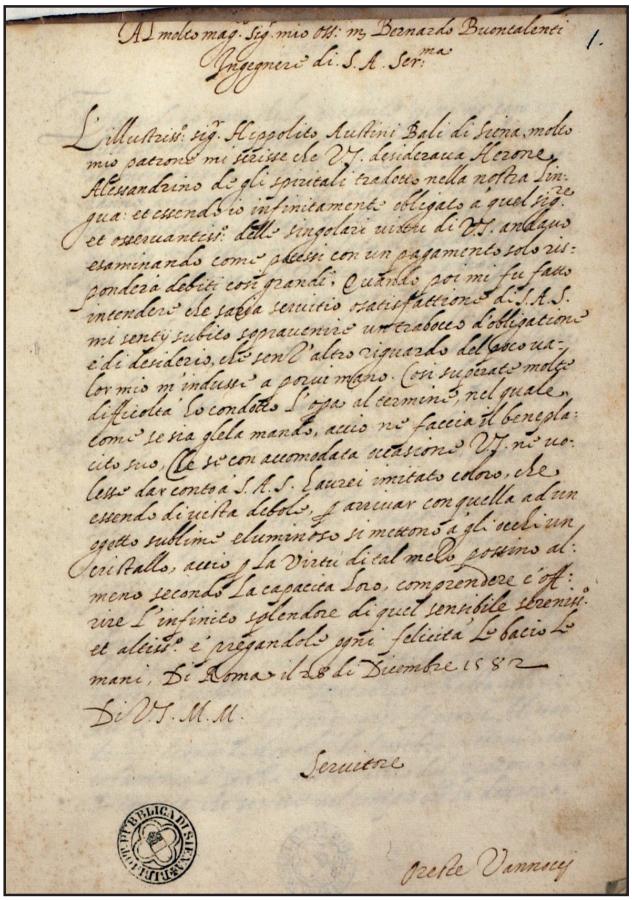


Fig. 3: Il Monte Parnaso. Giovanni Guerra, 1598

Three years after this event, Federico Commandino's Latin translation of Hero's *Pneumatics* was published posthumously. This edition, which had not received any final text editing before publication, was nevertheless enriched by a series of new engravings that greatly improved its comprehensibility. This most likely led the chief engineer of the Medici family in Florence, Bernardo Buontalenti, to commission an Italian translation of Hero's Pneumatics while supervising the construction of all pneumatic devices, including the two abovementioned hydraulic organs installed at the garden of Pratolino. The translation, made by Oreste Vannoccio Biringuccio, nephew of the famous Vannoccio Biringuccio who published De la pirotechnia in 1540, was eventually finished in 1582 (Fig. 4).



Al molto mag.° Sig.° mio oss.° m.° Bernardo Buontalenti
Ingegnero di S. A. Ser.ma

1.

L'illustriss.° sig.° Hippolito Rustini Bali di Siena, molto
mio patrone mi scrisse che V.S. desiderava Herone
Alessandrino de gli spiritali tradotto nella nostra lin-
gua: et essendo io infinitamente obligato a quel sig.re
et essecuantissimo delli singolari uisceri di V.S. andai a
esaminando come potessi con un pagamento solo ri-
pondere a debiti così grandi. Quando poi mi fu fatto
intendere che sarei seruito e satisfattone di S.A.S.
mi sentii subito sopraauenire un'estraordinario d'obligatione
e di desiderio, che senz'altro riguardo del caso ma-
lor mio m'indusse a porui mano. Con superare molte
difficoltà lo condotto l'opra al termine, nel quale
come se sia gielo mando, acio ne faccia il beneplac-
ito suo. Che se con accomodata occasione V.S. ne ue-
lesse dar conto a S.A.S. Lauerei imitato coloro, che
essendo di uista debole, per auuicinar con quella ad un
oggetto sublime e luminoso si mettono a gli occhi un
Cristallo, acio per la virtù di tal mezo possino al-
meno secondo la capacità loro, comprendere e ri-
uire l'infinito splendore di quel sensibile serenis.
et altiss.° e pregandolo ogni felicità le bacio le
mani. Di Roma il 28 di Dicembre 1582

Di V.S. M.M.

Seruitore

Oreste Vannoccij

Fig. 4: Dedication letter of Oreste Vannoccio Biringuccio to Bernardo Buontalenti, December 28, 1582

Although this translation does not seem to be linked to the garden of Tivoli, it turns out that it is concerned with Tivoli's hydraulic organ and its construction in two ways.

As is well known, Hero's *Pneumatics* ends with the description of the construction and functioning of the aeolian and hydraulic organs. Although this has been overlooked in modern times, engineers of the 16th century had already noticed that Hero's description of the hydraulic organ was incorrect and attributed this problem to the corruption that the text most certainly underwent. This caused Oreste Vannoccio Biringuccio to add to the original text a description of the technical apparatus and the functioning of the hydraulic organ built in the garden of Tivoli. The addition was meant to improve on the description of the devices as they appeared at that time in Hero's text. This exceptional document, together with the entire translation, was ready for publication but then remained in manuscript form because of the premature death of Vannoccio Biringuccio. Unfortunately, the drawings for which empty spaces are left in the manuscript have never been found (Fig. 5).

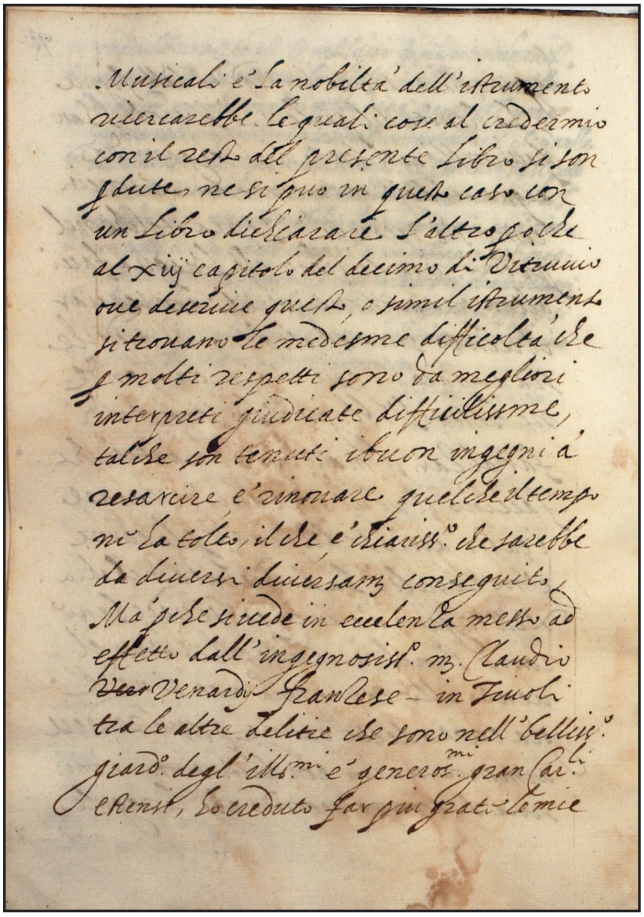


Fig. 5: On this folio (70v) of Biringuccio's text, he quotes the name of the engineer Claudio Vernardo

The information that can be found in this source, together with the analysis of the archeological fundings, offer a unique chance to complete the description of the functioning of the first version of the organ of Tivoli. A few months before Biringuccio had finished preparing the last handwritten version of his text, the organ as well as the trumpet system linked to it were illicitly destroyed. Thus, Biringuccio's description concerns a technical realization from the Renaissance, which existed, however, only for about ten years.

The second link between Biringuccio's text and the hydraulic organ of Pratolino is related to a specific technical aspect of the pneumatic device at the basis of the functioning of the instrument.

In contrast to the textual tradition related to pneumatics, the practical activities of pneumatic engineers show an impressive continuity throughout the Middle Ages, which is particularly well documented in reference to the Latin West starting from the 11th century on. Since the translation of Biringuccio deeply influenced the construction plans of the garden of Pratolino, and since Hero's description of the hydraulic organ is corrupted, a

comparison has been made between the sources at disposal concerning the hydraulic organ built at Mount Parnassus in the garden of Pratolino and Hero's organ (Fig. 6). The result of this comparison shows that hydraulic engineers of the 16th century were experienced enough to be able to build such devices with much more advanced pneumatic apparatuses than, for instance, those suggested by Hero or those described by Vitruvius. In particular, the pneumatic cylinders of the hydraulic organs of the 16th century were built with technical solutions that allowed the pressure of the air exiting towards the organ pipes to be kept stable. In this way, disturbing variations in the sound could be avoided. However, the comparison between the organ of Pratolino and Hero's description can only offer a local character to the validity of such historical result. Thus, on the basis of the analysis of the construction and functioning of the organ in Tivoli, the validity of this research result can be extended. The pneumatic cylinder of the organ of Tivoli in fact also displays technical solutions that were applied to obtain the same effect. Although such technical solutions differ in the two known cases, they were nevertheless clearly based on the same sort of abstract considerations and practical experience.

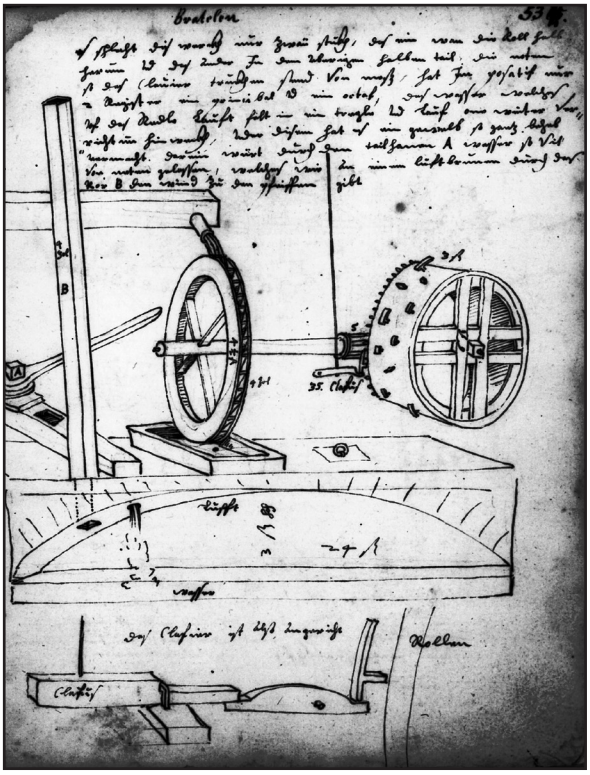


Fig. 6: Mechanical apparatus of the hydraulic organ built in the Mount Parnassus at the garden of Pratolino. Heinrich Schickardt. 1600

On the basis of this analysis, finally, the hypothesis can be formulated that when Hero's *Pneumatics* reappeared in printed form in the second half of the 16th century, the technical devices described in that text were either already obsolete or had become part of the stock of knowledge of Renaissance hydraulic engineers.

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CV

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Present Projects

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Professional Knowledge of the Practitioners in the early modern period (MPIWG)
- The Structure of Practical Knowledge

Globalization of Knowledge
- The Aristotelianism in the World

Elizabeth Westling

Through the Looking Glass: Optics, Geometry, and Art in Renaissance and Baroque Gardens

This paper does not challenge but builds on the voluminous and highly developed literature of landscape design and the sciences – gardening and knowledge – in the Early Modern period. Using several carefully chosen examples, I will explore the symbiotic relationships between such mathematical tools as geometry, topology, and optics and the aesthetic dimensions of Renaissance and Baroque garden design.

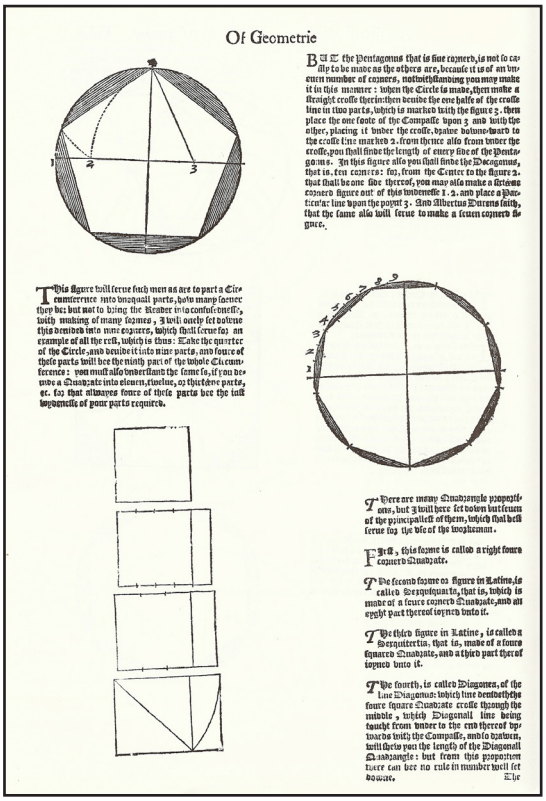
Gardens have always been the fragile and ephemeral creation of man and his constant companion. Throughout humankind's existence, a vital trust developed between man and nature – not just for what either could give to the other but for what the two could exchange in a nearly seamless embrace. The garden emerged from the timeless serenity of nature to partner with the human need for sustenance, for metaphorical imagination, and for bringing the counter-intuitive into the world as living, visible form.

This paper will highlight some of the most important tools – both physical and conceptual – that formed the garden designer's habit of mind.

1. Centuriation

Most Renaissance designers found Euclid and other Classical authors through the work of the Italian mathematician, Leonardo Fibonnacci. Italy, in particular, was home to the old Roman surveyor's technique of *centuriation*: dividing the land into squares and rectangles. In this square-based geometry, the square served as the parent shape from which all others are born by the application of certain fixed ratios and proportions. The square was perceived as 2-dimensional perfection and that perfection would follow the square into three dimensions – the cube. These designers truly believed, given the right numbers and proportions – worked out in paint, wood, stone, or plant material – that beauty and perfection would emerge as a living, breathing spirit.

From David Hockney, *Secret Knowledge: rediscovering the lost techniques of the old masters,* Viking Studio, 2001, p. 52. Detail of Raphael's portrait of Pope Leo X (1518-19)


Of Geometrie

BUT the Pentagonus that is five cornerd, is not so easily to be made as the others are, because it is of an vneuen number of corners, notwithstanding you may make it in this manner: when the Circle is made, then make a straight crosse therinthen deuide the one halfe of the crosse line in two parts, which is marked with the figure 2. then place the one foote of the Compasse vpon 3 and with the other, placing it vnder the crosse, draw downe-ward to the crosse line marked 2. from thence also from vnder the crosse, you shall finde the length of euery side of the Pentagonus. In this figure also you shall finde the Decagonus, that is, ten corners: for, from the Center to the figure 2. that shall be one side thereof, you may also make a Sexiens cornerd figure out of this vnderneth 1. 2. and place a Pacticular line vpon the poynt 3. And Albertus Durens saith, that the same also will serue to make a seuen cornerd figure.

THIS figure will serue such men as are to part a Circumference into vnequall parts, how many corners they but wat to bring the Reader in a confusednesse, with making of many figures, I will onely set downe this deuided into nine corners, which shall serue for an example of all the rest, which is thus: Make the quarter of the Circle, and deuide it into nine parts, and foure of those parts will bee the ninth part of the whole Circumference: you must also vnderstand the same so, if you deuide a Quadrate into eleuen, twelue, or thirteene parts, etc. so that alwayes foure of those parts bee the tuill longnesse of your parts requiere.

THere are many Quadrangle proportions, but I will here set down but seuen of the principallest of them, which shall best serue for the vse of the workemann.

FIRST, this forme is called a right foure cornerd Quadrate.

THe second forme or figure in Latine, is called Sesquiquartus, that is, which is made of a foure cornerd Quadrate, and an eyght part thereof joyned vnto it.

THe third figure in Latine, is called a Sesquitertius, that is, made of a foure squared Quadrate, and a third part thereof joyned vnto it.

THe fourth, is called Diagonus, of the Line Diagonus: which line deuideth the foure square Quadrate crosse through the middle, which Diagonall line being taught from vnder to the end thereof vpwards with the Compasse, and so drawen, will shew you the length of the Diagonall Quadrangle: but from this proportion there can bee no rule in number well set downe.

The

From the *The First Book of Architecture*, made by Sebastian Serly (Serlio), entreating of Geometerie. Translated out of Italian into Dutch, and out of Dutch into English, London, Printed for Robert Peake, and are to be sold at his shop neere Holborne conduit, next to the Sunne Tauerne, Anno Dom 1611

2. Mensuration

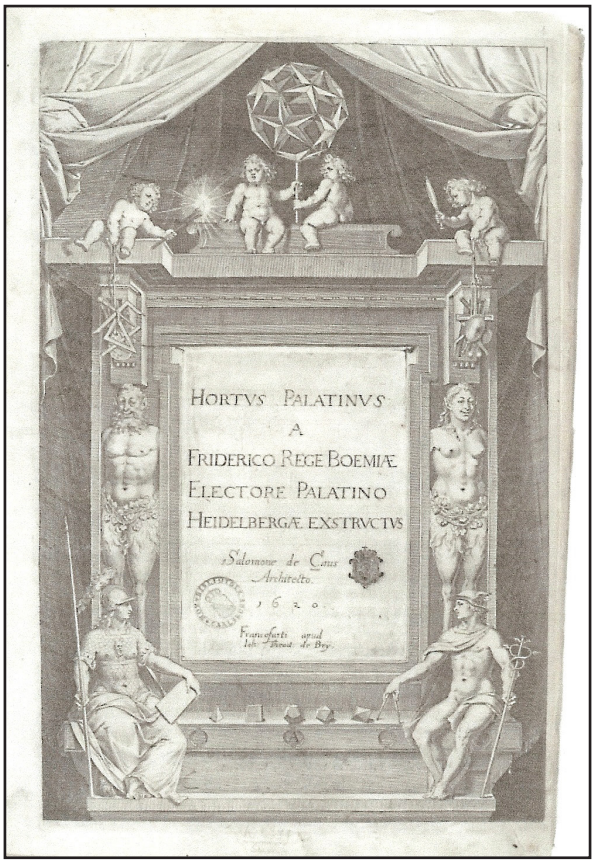
Applying Euclidian geometry to the computation of areas and volumes from specified dimensions and angles – that is, employing what they called *mensuration* – Renaissance and Baroque designers followed the Classical tradition of using the alidade, the back of the astrolabe, for measuring angles. Always motivated by the Platonic belief that vision is caused by discrete rays that emanate from the eye, optical instruments were used to connect, through the human eye, the physical shapes in this world with the spiritual world of nature.

3. Linear Perspective and the Relationship Between Time and Scale

When Filippo Brunelleschi conducted his now famous experiment in *linear perspective* at the Bapistry of San Giovanni in 1413, he employed "an almost magical optical trick, a *trompe l'oeil* painting that, in its clever confusion of life and art," quickly led painters to adopt the new technology because it had the unintended consequences of allowing them to work far more rapidly, saving valuable time while enriching the subjects of their paintings with a previously unattainable level of detail. My paper further ventures the theory that Brunelleschi's work made possible another leap forward: applying the new painter's techniques to resolving the builder's perennial spatial problems of scale and the challenge of time, in an almost uncanny anticipation of Einstein's much later discovery of the inseparability of time and space.

4. Knot Topology and the Platonic Solids

The 17th century garden of the Elector Frederick V at Heidelberg was designed by Salomon DeCaus. On the front cover of the *Hortus Palatinus*, along with the more typical iconographic symbols for garden design – Athena and Mercury – DeCaus mysteriously arrayed the

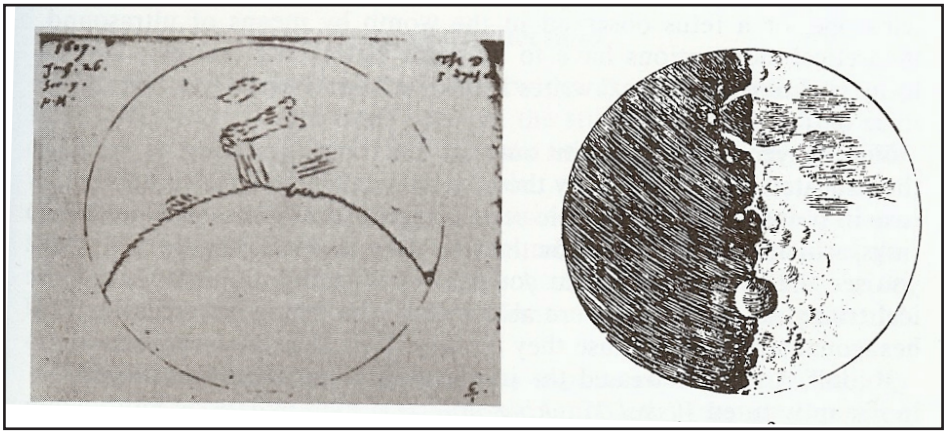


Caus, Salomon de, *Hortus Palatinus*, Frankfurt, 1620. Title page

five Platonic solids: the tetrahedron, the cube, the dodecahedron, the icosahedron and the octahedron, a most untypical set of symbols for the garden. DeCaus was an excellent mathematician and geometer and evidently saw deeply into a relationship that modern mathematics has only recently illuminated through the tools of algebraic geometry, algebraic topology, and algebraic number theory – namely, the relationship between the topology of knot designs and the geometry of such forms as the Platonic solids. Indeed, this paper argues that, in the great Heidelberg garden, the knot designs that others have identified as underlying the parterres are elegantly derived from 2-dimensional projections of the cube – the perfect Renaissance tool – laid out on a lattice grid that, when viewed from a special vantage point, provided a "perspective that was the only part of mathematics capable of providing pleasure to the sight."

5. Chiaroscuro and the Bosco

All Renaissance and Baroque designers were trained in Chiaroscuro – an artistic technique that manipulates light and shadow to create realistic 3-dimensional effects. This paper theorizes an alternative to the traditional view of the role of the *bosco* – the densely



From *On the Shoulders of Giants: New Approaches to Numeracy*, Lynn Arthur Steen, Editor, National Research Council, National Academy Press, Washington, D.C. 1990, p. 169. Drawings of both Heriot and Galileo on the surface of the moon

wooded area of the garden. In the *bosco*, shade is created and light is captured and then refracted in a multitude of ways. In the bosco, which remarkably provides for the perceptive observer something like what the shadows of the moon's craters at one time provided for Galileo, nature herself serves as the ultimate manipulator of light. In the *bosco*, my paper argues, nature revealed to her most observant students the secrets of designing with this most elusive of tools, *Chiaroscuro*.

6. Trompe l'oeil and the Role of Optics

If *Chiaroscuro* was used by the Renaissance and Baroque designers to enhance the 3-dimensional in the garden, *trompe l'oeil* was the optical device that gave the deepest expression to the invisible. As a tool, *trompe l'oeil* intertwined art and symbol, metaphor and illusion. "This was the substance of Brunelleschi's magical optical trick, his trompe l'oeil, his clever confusion of life and art."

In both the Renaissance and the Baroque garden, beauty and truth alike are indeed in the eye of the beholder – not as conventional usage would have it, but *literally* connected to the beholder through the aperture of his eyes. It is in this sense that the science of optics worked physically to create or conjure Truth and Beauty, which in turn served to bind man in this temporal beatitude.

From Alain LeToquin, *The Most Beautiful Gardens in the World*, Introduction by Michel Baridon, Text by Jacques Bosser, Harry N. Abrams, Inc. Publishers, Printed in France. Fountain of the Birds. Originally belonging to the chateau of Malgrange, near Nancy, this fountain was purchased by Carl-Thedor during the estate sale of Stanislas Leszczynski, Duke of Lorraine. At the back is a trompe l'oeil entitled *The End of the World.*

CV

Elizabeth A. Westling, Landscape Designer and Landscape Historian, was born in Zurich, Switzerland and grew up in Los Angeles, California. After graduating from Scripps College in Claremont with a Bachelor of Arts in History and Humanities, she earned a Master of Arts degree in history and is all but dissertation in Reformation history from UCLA. After coming to Boston, Westling matriculated in Landscape Design at the Landscape Institute, Harvard University, graduating in 2007 with the Valedictorian Awards for both landscape design and landscape history. During the 2008 and 2009 academic years, she was a reader at Dumbarton Oaks Library, Washington, D.C., working as an independent scholar on the 17th Century Garden of the Palatinate in Heidelberg. In June 2011, Westling was selected as a Poster Presenter for the International Federation of Landscape Architects World Congress in Zurich, Switzerland. She is a practicing landscape designer and continues to write on projects of interest in landscape history.

Clemens Alexander Wimmer

The Arrangements of Plants in Renaissance Parterres between Science and Art

The arrangement of plants was a new task during the Renaissance. Both, botanists and artists were challenged to find principles of order to be generally accepted in science and in the garden. The function of the garden was primarily a place of collection of plants for science, pleasure and health. Some famous gardens were connected with cabinets of curiosities. The artistic value of the garden layout was of minor significance. But the artists were also interested to incorporate garden design into their business. The main plot where such different considerations became evident was the parterre.

Scientific garden and pleasure garden generally were not distincted. The aim to order and design the vegetable kingdom was all the same. But we should not forget that collecting plants and designing gardens were still seen in a greater theological context. Both were regarded not as occupations for its own sake but as a part of a doing agreeable to God. So the garden was not only a collection of plants and a work of art, but also a paradise regained. Ordering the world was a human duty, assigned by God. Art was not an effect of human genius, but a perfection of nature according the divine principles. Thus regarded, the garden of paradise must been a geometrical one.

Flower painting shows the high value of the individual flower species and the disregard of colour choice and harmony. But the garden was an instrument not only to collect, but also to order and to classify the plants. We can detect the following principles of ordering plants:

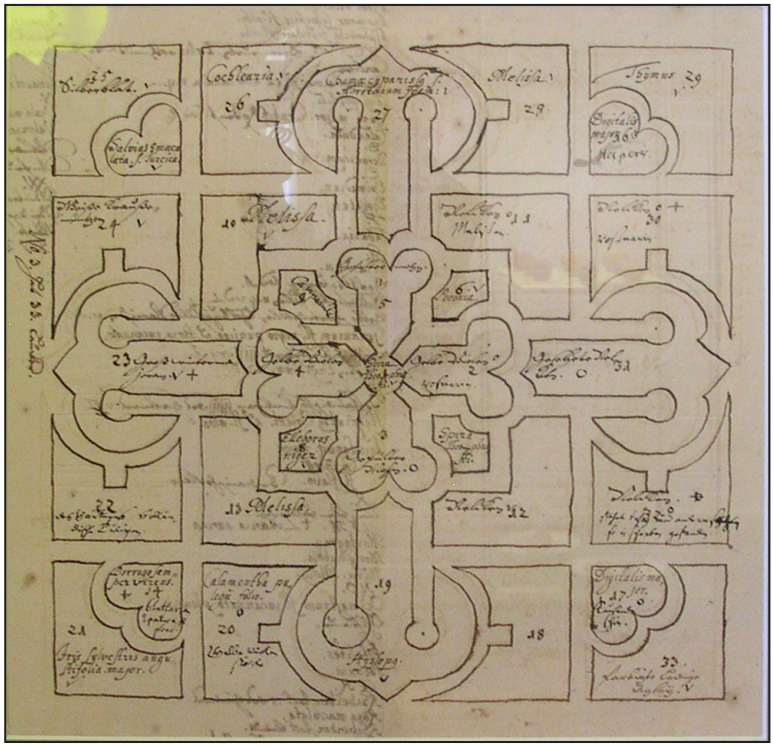
1) by use
2) by soil condition
3) by zodiac sign
4) by geographic direction
5) by temperature
6) by moisture
7) by color
8) by size
9) by flowering time
10) by physiognomic class.

Renaissance science generally agreed that there was not a single system of order but a complex system. The doctrine of signatures tried to unit the several aspects of possible relations.

The role of aesthetic development in garden design is not so clearly documented by texts, we must refer mainly to illustrations. The most important part to be considered here is the parterre, in its older form the coffer (cassettoni) parterre and in its younger form, the knot parterre.

Only few examples of planting details for Renaissance parterres are detected up to now. They show a certain disposition to symmetry, but it seems generally that principles of planting were not strictly fixed before mid 17th century.

Finally, the invention of the purely ornamental parterre, e.g. the parterre of arms, of monograms or of embroidery around 1600 marks the division of botany and art. These more modern forms were not designed to contain and display certain plants, but for emblematical or decorative purposes only. Banished from the proper beds of the parterre, flowers were restricted to borders, and their order in the borders followed exclusively aspects of form and colour. In specialised flower gardens, garden enthusiasts restricted themselves to collect a special choice of florist flowers like tulips or carnations instead of a broader botanical collection. From late 17th century onwards flowers were arranged in grids and modules without any scientific aspect. From this point of view, the parterre is a very fine example for the division of science and art in the early modern period.



Planting design for the Ducal Gardens at Gotha 1655, from: *Im Reich der Göttin Freiheit: Gothas fürstliche Gärten in 5 Jahrhunderten*, Weimar 2007

CV

Wimmer was born in 1959 at Berlin, studied garden and landscape design at Berlin Technical University, thesis at Hanover University in 1984, postdoctoral lecture qualification in 2001. He wrote various publications on garden history. One of his main subjects is the history of garden plants and practical gardening, but he never neglects design and social history, too.

The Organizing Institutions

The Centre of Garden Art and Landscape Architecture (CGL) Leibniz University of Hannover

The Senate of the University of Hannover[1] decided on 19 June 2002 at the request of the Department of Architecture and the Department of Landscape Architecture and Environmental Development[2] to establish the Centre of Garden Art and Landscape Architecture (CGL) as one of its research centres. A qualified forum with a research profile was achieved, marked by openness, interdisciplinarity and internationality. Today the CGL is one of five officially acknowledged research centres of the Leibniz University of Hannover. The other centres are the Laboratory of Nano and Quantum Engineering (LNQE), the Hannover Centre for Mechatronics (MZH), the Centre for Biomolecular Drug Research (BMWZ), and the Centre for Solid State Chemistry and New Materials (ZFM).

The endeavours to establish a research centre for garden history and landscape architecture date back to the 1990s. The symposium „The Artificial Paradise. Garden Art in the Tension between Nature and Society" in September 1996, supported by the Lower Saxony Foundation, marked the official starting point for developments in Hannover, which eventually led to the establishment of the CGL. Continuing this development, an international experts' workshop for conceptualising the research centre, supported by the Volkswagen-Foundation, took place in March 2001.

The charter of the CGL lists as its main objectives:

- Interdisciplinary research and the promotion of research in the field of garden history, garden preservation and modern landscape architecture and at intersections between architecture, city planning and the arts
- Information and exchange of experience and knowledge on an international level
- Connection of research activities and teaching
- Connection of theory and praxis; further education also outside of the university
- To impart knowledge and results of research to a scholarly as well as to a broader public (to achieve this objective the CGL has established the series CGL-Studies)
- To promote young scholars.

Belonging to the regular undertakings of the CGL are lectures, research colloquia, the organization of specialist conferences and workshops among other things on questions of the history of garden culture and design, on the history of this profession as well as on modern landscape architecture. The broad spectrum between garden history and landscape architecture of today and the openness of the research profile have proven to be successful and unique.

1 Today Leibniz University of Hannover.

2 Both departments are today united as the Faculty of Architecture and Landscape

The CGL is located close to the well-known Herrenhausen Gardens, a unique ensemble comprised of the Großer Garten, the Georgengarten, the Welfengarten and the Berggarten, an environment which makes the research in the fields of garden history and modern landscape architecture the more pleasant.

The Interdisciplinary Centre for Science and Technology Studies (IZWT) Wuppertal University

The Interdisciplinary Centre for Science and Technology Studies (IZWT, http://www.izwt.uni-wuppertal.de/) at Wuppertal University has been founded in 2004. It fosters close collaboration between history and philosophy of science as well as science studies. The main goal is to open up new avenues for interdisciplinary research with a focus on the development and structure of science and technology. The IZWT encourages interdisciplinary activities between the humanities, the social sciences, the sciences, mathematics and technology. By organising joint colloquia, lecture series and international workshops the IZWT promotes the dialogue between different cultures of knowledge and disciplines.

Among the current research projects are:

- Knowledge and gardening in the early modern period
- Botany at the late Medici court
- The Jesuits and early modern science
- Popularisation of mathematics in the 19th century
- Mathematics in the Nazi period
- The epistemology of the LHC (Large Hadron Collider, CERN)
- history of the historiography of science and philosophy

Program of the Workshop

Monday, September 17, 2012
Location: Leibnizhaus, Holzmarkt 4-6, Hannover

16.00-16.15 Welcome

Session 1: Acquisition and Organisation of Knowledge in Early Modern Gardening
Chair: Joachim Wolschke-Bulmahn (CGL, Leibniz Universität Hannover)

16.15-16.45 Clemens Alexander Wimmer (Bücherei des Deutschen Gartenbaues e. V., Berlin)
„The Arrangements of Plants in Renaissance Parterres between Science and Art"

16.45-17.00 Discussion

17.00-17.30 Iris Lauterbach (Zentralinstitut für Kunstgeschichte, München)
„Commerce and Erudition: Bourgeois Self Representation by Botany and Garden Culture in Germany, 16th to 18th Centuries"

17.30-17.45 Discussion

18.15-19.30 Evening Lecture
Michael Leslie (Rhodes College, Memphis, USA)
„The Uneasy Paradise: Why Couldn't John Evelyn Complete the Elysium Britannicum?"

Tuesday, September 18, 2012
Location: Leibniz Universität Hannover, Herrenhäuser Str. 2a, Room 009 and Room 020

Resuming Session 1: Acquisition and Organisation of Knowledge in Early Modern Gardening
Chair: Volker Remmert (IZWT, Bergische Universität Wuppertal)

09.00-09.20 Carola Piepenbring-Thomas (Gottfried Wilhelm Leibniz Bibliothek, Hannover)
„Garden Visits, Observation, Reading and Excerpt –
Martin Fogel (1634-1675) of Knowledge Acquisition Techniques"

09.20-09.30 Discussion

09.30-09.50 Verena Schneider (Universität Düsseldorf)
„The Creation of Knowledge: Reconstructing Garden History in the Early Modern Period"

09.50-10.00 Discussion

10.00-10.30 Coffee Break

Session 2: Science and Gardening in the Early Modern Period
Chair: Volker Remmert (IZWT, Bergische Universität Wuppertal)

10.30-11.00 Chandra Mukerij (University of California, San Diego)
„The Potager du Roi and the Garden of the Sun King"

11.00-11.15 Discussion

11.15-11.45 Alette Fleischer (University of Twente)
„Gardening Nature, Gardening Knowledge: Early Modern Gardens and the Rise of Natural Knowledge"

11.45-12.00 Discussion

12.00-14.00 Lunch Break

Resuming Session 2: Science and Gardening in the Early Modern Period
Chair: Michael Leslie (Rhodes College, Memphis, USA)

14.00-14.20 Anthony Gerbino (University of Manchester)
„The Topographical Survey and the Formal Garden: Cartography and Landscape in 17th-century France"

14.20-14.30 Discussion

14.30-14.50 Denis Ribouillault (Université de Montréal, Canada)
„Measuring Time in the Gardens of Papal Rome"

14.50-15.00 Discussion

15.00-15.20 Martina Sitt (Universität Kassel)
„Paths of Knowledge - The Bergpark Wilhelmshöhe at Kassel as a Centre of Scientific and Aesthetic Networking in Early 18th-Century Europe"

15.20-15.30 Discussion

15.30-16.00 Coffee Break

16.00-16.20 Elizabeth A. Westling (Cambridge/MA)
„Through the Looking Glass: Optics, Geometry, and Art in Renaissance and Baroque Gardens"

16.20-16.30 Discussion

16.30-16.50 Ana Duarte Rodrigues (New University of Lisbon)
„Gardening Knowledge: The Circulation of Agriculture Treatises in Portugal between the 16th and the 18th Centuries "

16.50-17.00 Discussion

Wednesday, September 19, 2012
Location: Leibniz Universität Hannover, Herrenhäuser Str. 2a, Room 009 and Room 020

Session 3: Botanical Knowledge
Chair: N.N.

09.00-09.30 Alessandro Tosi (Università di Pisa)
„Botanical Art and the Idea of the Garden between Imagination and Science"

09.30-09.45 Discussion

09.45-10.05 Katharina Peters (Leibniz Universität Hannover)
„From Seeing to Science or Learning by Doing – The Acquisition of Botanical Knowledge (Looking at the Court Gardeners Wendland of Hannover)"

10.05-10.15 Discussion

10.15-10.35 Irina Schmiedel (Bergische Universität Wuppertal)
„Between Knowledge and Representation –
Growing, Painting, Collecting, Classifying Citrus Fruit"

10.35-10.45 Discussion

10.45-11.15 Coffee Break

11.15-11.35 Gregory Grämiger (ETH Zürich)
„Reconstructing Order: Architecture, Layout and Plants of the Botanical Garden in Leiden During its First Hundred Years"

11.35-11.45 Discussion

Session 4: Waterworks
Chair: Sigrid Thielking (CGL, Leibniz Universität Hannover)

11.45-12.15 Anatole Tchikine (Trinity College Dublin)
„Ancient Knowledge, New Aesthetics: Italian Renaissance Garden Waterworks between Theory and Practice"

12.15-12.30 Discussion

12.30-13.30 Lunch Break

13.30-13.50 Matteo Valleriani (Max-Planck-Institut für Wissenschaftsgeschichte, Berlin)
„The Organ of the Garden of Tivoli"

13.50-14.00 Discussion

14.00-14.20 Alexander Ditsche
„Water-powered Musical Automata in Prestigious European Gardens of the 16th to 18th Century"

14.20-14.30 Discussion

14.30-15.00 Final Discussion

15.30-17.00 Guided tour „Großer Garten Herrenhausen"

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