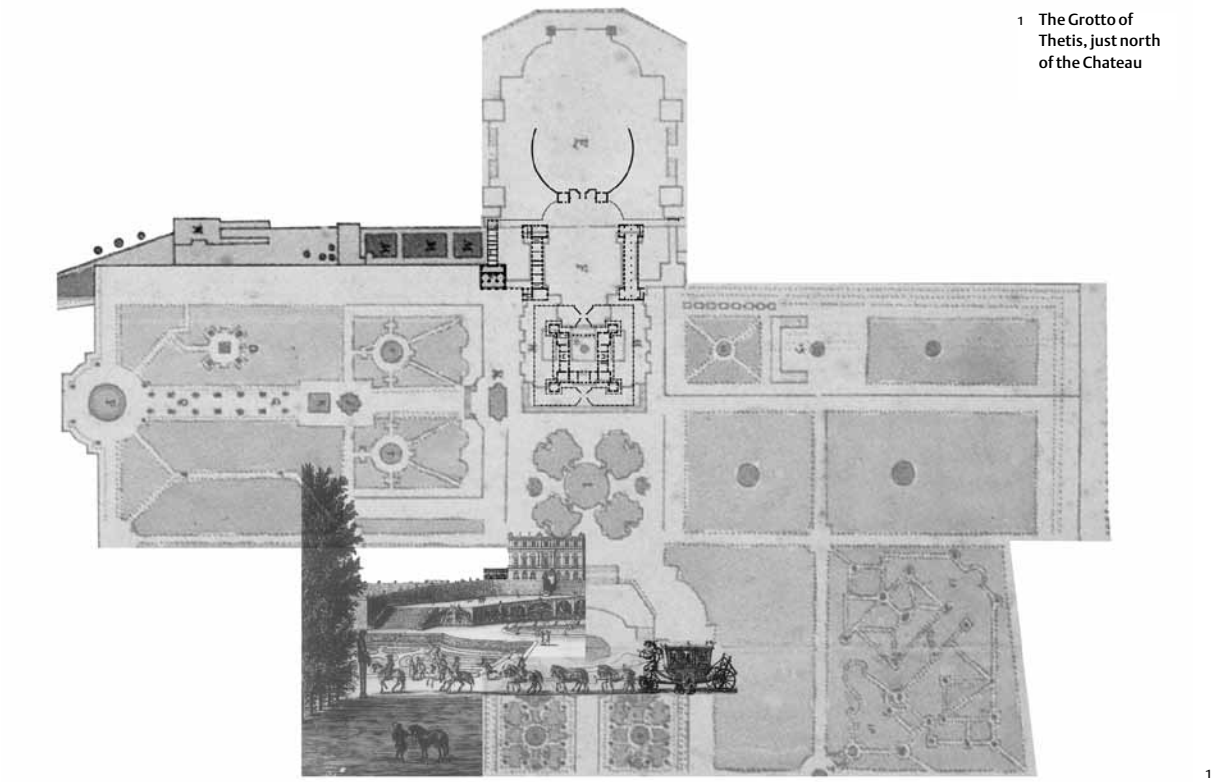
Why was the *action* of the fountains critical to the gardens at Versailles? The Grotto of Tethys is examined as metaphoric ground, a generative *place* animating the hydrological cycle.

Charging the waters: the Grotte de Téthys as Versailles's initial metaphoric ground

Nina Hofer

Recent scholarly work has shifted our attention to the ways in which gardens negotiated the particularities of their ecological situation. New studies look at the archaeology of gardens, a fundamentally architectural shift which excavates issues of resource use. Materially specific research which sets gardens back into their hydraulic and topographic context has illuminated new dimensions of their inventive praxis. Many gardens turn out, in fact, to have been very carefully constructed in relation to a sensitive reading of local hydrological conditions. What is more, the facts of these sources seem also to be integrally enmeshed with their spatial and poetic aspects, providing salutary examples as our attention returns to what we are now calling sustainability.

The dramatic narrative of the successive sources of the water used for the fountains at Versailles has been one of the best known. Louis XIV is often described as indulging in an insatiable search for water in order to power the movement of the fountains, exhausting both human and territorial resources as he transformed a relatively humble and inauspicious site into the palace garden we all know. These are generally regarded as anything but the kind of sensitive negotiation between architecture and the environment we might hope to achieve in contemporary work – a warning, and not an example. As always, there is more to this story. Infamous projects ranging from the diversion of the River Eure to the construction of the Marly Machine and the massive Aqueduct at Maintenon engaged the expertise of the new Académie Royale des Sciences and the muscle of the furloughed 'Army'. Chandra Mukerji proposes that such ludic geo-territorial projects were part of a spectrum of playful invention



1 The Grotto of Thetis, just north of the Chateau

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which ultimately led to technological advances – for example, new military protocols and the implementation of urban water systems.[1]

Why were dynamic water effects so important? Contemporary garden treatises from Boyceau de la Baraudière to Dezallier d'Argenville emphasise the variety of the action of the fountains much more than they do alignments or axial views. This paper focuses on the dynamic action of water, in the earliest phases of the gardens at Versailles. A poetic praxis can be demonstrated in the construction and reception of a metaphorically loaded reservoir which served to power the expressive action of the first fountain cycle in the *Petit Parc du Nord*.

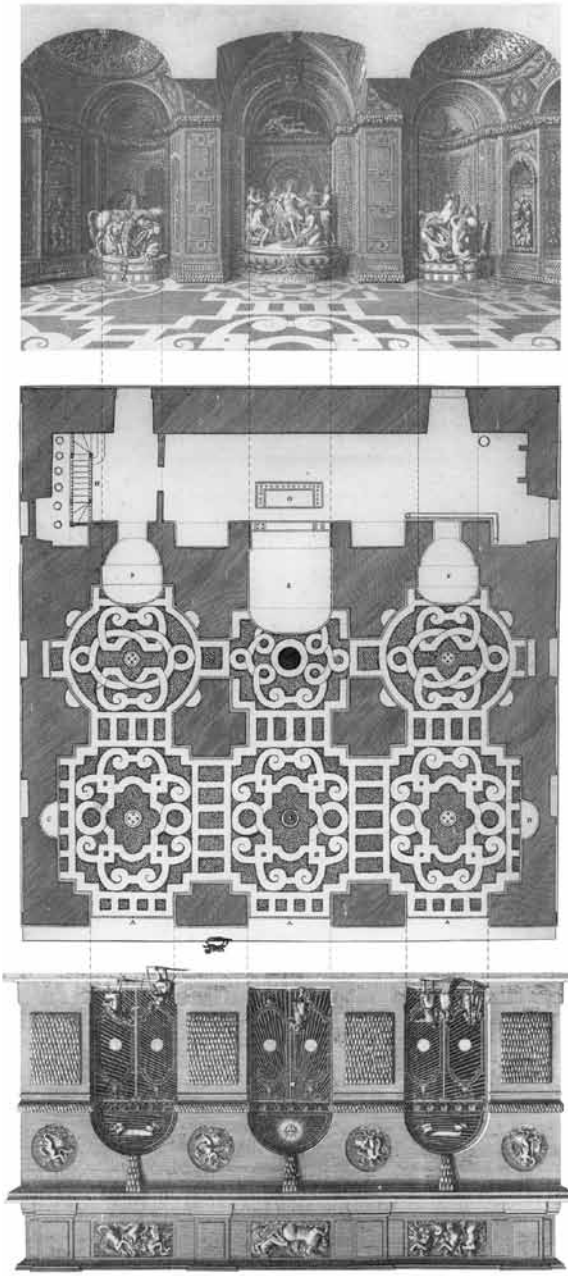
Nine years before the more famous Apollo Fountain, a richly detailed reservoir and pleasure pavilion provided the initial metaphoric ground for Versailles, focusing on the gardens (and the earth) as the place from which the King drew his *puissance*. From 1664 to 1689 the *Grotte de Téthys* raised 540 cubic gallons of water high alongside the original Chateau, vivifying the fountains in the *Petit Parc du Nord* for several hours at a time. In this 'hinge moment' between 1654 and 1674, a Renaissance cosmological spatial logic which *disposes* water relative to Fire, Earth and Air in the overall complex briefly collaborates with a Baroque passion for the *gestural* 'action' of the movement of water. Detailed analysis of aspects of this story support and qualify the metaphor of the Grotto of Thetys as the generative *place* which animates the hydrological cycle and thus life itself.

The narrative of Thetys provided a *complete poetic image* marrying diverse forms of knowledge. Seventeenth-century France inherits the Aristotelian belief that sea water was purified in a continuous cycle, moving up through caverns deep in the earth to emerge as spring water. Charles and Claude Perrault adopt the metaphor of Thetis, working together as architects and supervisors in the construction of the Grotto and its associated fountain cycle. The life story of the building parallels cultural developments which ultimately invert both the poetic and the scientific construction of the global circulation of water. We will see that many of these play out within the Perrault family.

The Grotto as metaphor: Tethys and Thetis

The Grotto of Thetys was assembled in stages between 1664 and 1672, but survived only until February of 1685. It thus belongs entirely to the period after Louis XIV's assumption of solitary kingship but before the seat of government is moved to Versailles *[1]*.

We know about the Grotto through maps, prints and paintings, through records of payments to supervisors and craftsmen, and through a constellation of descriptive and responsive texts. Charles Perrault claims in his *Mémoires* to have conceived it.[2] He definitely oversaw its construction, as *Premier Commis* under Colbert and member of the Petite Académie, the committee designated to oversee all works which represented the 'Gloire' of the King. Charles Perrault states that his brother Claude designed the Grotto, and that it was built



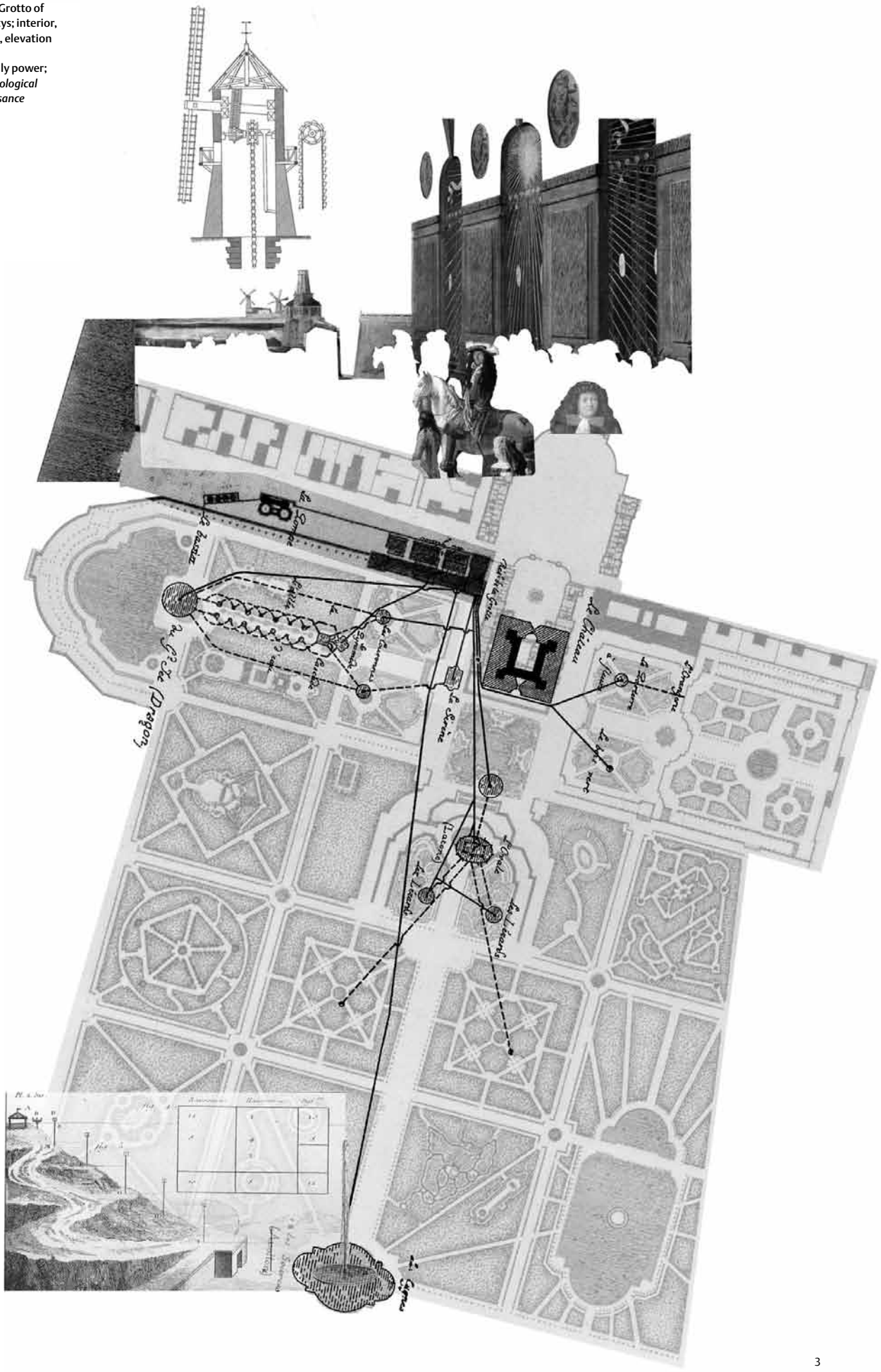
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precisely to his drawings. Nicolas-François Blondel confirms this in his *Architecture Françoise*, claiming to have seen the drawings as late as 1750 in an unpublished Perrault manuscript which was subsequently destroyed in a fire in 1871.[3] The Grotto of Thetis is one of only three buildings traditionally ascribed to Claude Perrault, but it actually involves three of the Perrault brothers, and in particular Charles, *Premier Commis* to Colbert as the superintendent of the Bâtiments du Roi, author of the *Parallèle des Anciens et des Modernes* and also of the fairy tales. André Félibien writes *La Description de la Grotte de Versailles,*[4] which includes a long experientially based description, and twenty engravings of its plan, its elevation and its interiors *[2]*. A wide net of reference and cross reference develops almost immediately around it: for a small building, it casts a large shadow. One can study its reception through Molière's ballet *Psyché* or Lully's eclogue *La Grotte de Versailles*, both written for the Grotto. Contemporary descriptions include

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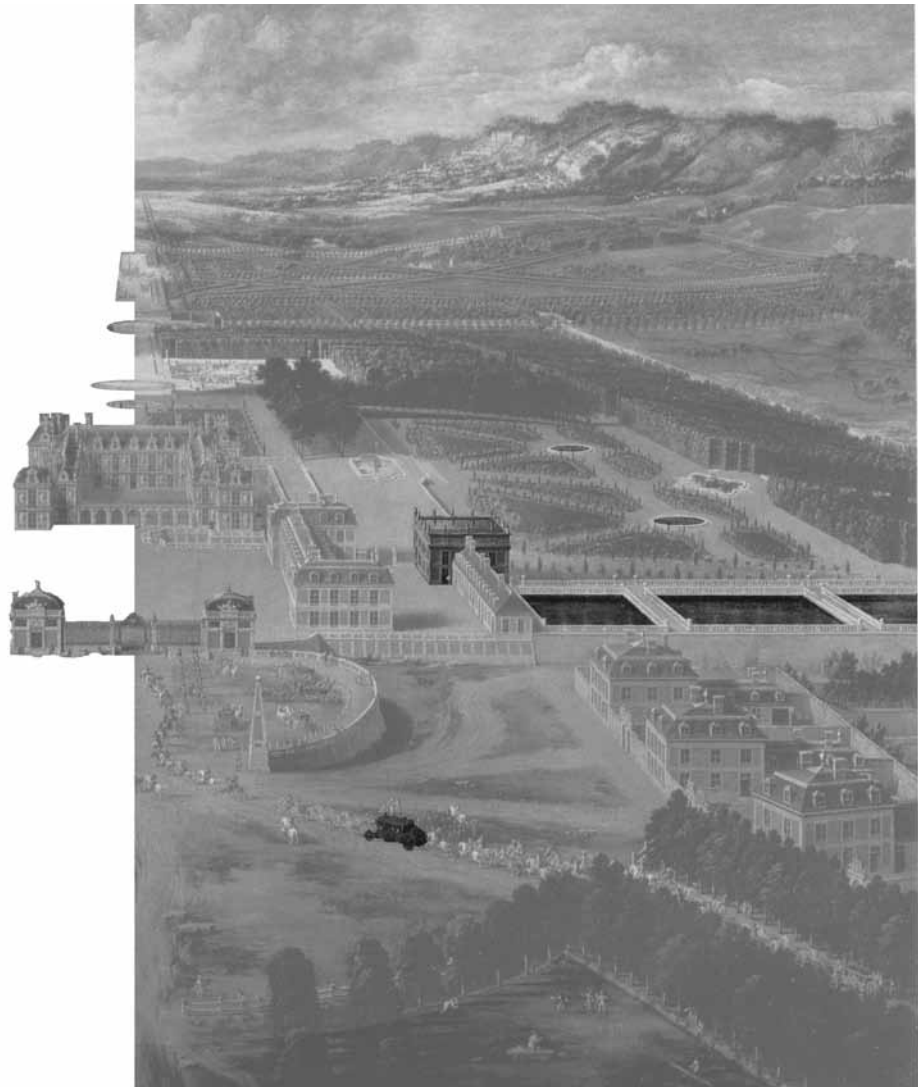
2 The Grotto of Thetys; interior, plan, elevation

3 Kingly power; *hydrological puissance*



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4 The Grotto: a celestial eye, a metaphoric *delay* (Pierre Patel)

Madeleine de Scudéry, La Fontaine and John Locke. The beauty of the story is the Grotto's ability to hold the intentions of multiple authors and its immersion in the cultural horizons of the period; it comes to belong to everyone and no one.

The Grotto was called *une métaphore ingénieuse*; an 'ingenious architectural metaphor' – a poetic invention. Charles Perrault tells us proudly that it was he who first cast the Grotto as the underwater cavern of Thetys; here Apollo spends his nights resting and refreshing himself before emerging from the ocean to drive the Chariot of the Sun across the sky each day. The building is at the heart of the earliest constructions of the King as the *Roi Soleil*; his ludic nights of leisure were inscribed at the heart of a spatial and temporal field in the gardens several years before the more familiar east-west axial line came to do the same for his illuminating days of work.

The Grotto was also admired as *une machine ingénieuse*, an 'ingenious architectural machine' – a hydraulic invention. The roof was a raised reservoir which fed the fountains in the *Petit Parc du Nord*, creating the latent energetic force to run the powerful jets and gestural water effects which contemporary garden texts tell us were so critical to the Renaissance and Baroque Garden. It didn't *supply* the waters, it *charged* them. In 1648 Blaise Pascal had clarified the relationship between height and water pressure; this principle had been used in terraced gardens as early as the Romans, but wasn't illustrated as a principle until Antoine-Joseph Dezallier d'Argenville's *La Théorie et la Pratique du Jardinage* of 1709. 'Power', 'Pressure', 'Puissance'; it is all the same word in French. But what kind of power was it *[3]*?

The Grotto was not necessary to run the fountains. The water was already filtered and raised to the appropriate level by the *Tour d'Eau*, and held there by the reservoirs along the eastern wall. The water for Versailles came first from the open *étang* at Clagny, where since 1639 a horse-driven pump by the pond had supplied the single jet and two basins of the first garden of Louis XIII. This was replaced in 1664 by Le Vau's first *Tour d'Eau*, which held a new pump at ground level, designed by Denis Jolly, and a lead-lined reservoir at the first level constructed by the Francine brothers. Subsequently, the first pump was augmented by several windmills, allowing for a faster transfer of water, and a second, larger raised reservoir was built close to the Chateau. In 1666, the Grotto of Thetis was installed underneath that open reservoir.[5] From the beginning, then, the celestial eye of the Grotto, located just below the bedroom of the King, doubled the functional solution. We might call this a 'metaphoric delay' in the transmission of

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water. It worked, and it worked to *perform* its workings *[4]*.

In Greek mythology, Tethys was one of the Titans, the fundamental primordial forces prior to the Olympians. Called both 'Nurse' and 'Source', she is wife to Oceanus (the fresh water Ocean at the rim of the world) and mother of rivers, they emerge from her caverns. In adopting her as the programmatic client, the Grotto marries current technological and scientific expertise with mythical figuration. Well into the seventeenth century, France perpetuates the ancient commonplace that all the waters of the earth are physically continuous, from the oceans to the smallest streams. Sea water was understood to be purified in a continuous cycle, pushed by the winds into and through underground caverns, moving up from deep in the earth to emerge as spring water from the mountains. In 1663, this was common currency; even Descartes espoused the continuous caverns theory. While this inverts our current understanding of the global water wheel, it is dynamically consistent with the actual workings of the Grotto. For Charles Perrault, the leader of the Moderns, Tethys may have been a reference from classical mythology; but as cavernous mother of 3000 freshwater nymphs and innumerable rivers she was also concretely figurative as the crucial joint in the system, and a potent source for water. We know, from his writings, of his delight in these kinds of ingenuous overlays in which 'one sees in the blink of the eye a reciprocal resemblance'.[6] He frequently claims a talent for the construction of *Devises;* these demand 'the flower of imagination, the joy of their finding, and the force of their seizing'.

In his *Mémoires*, Charles Perrault claims to have invented the Apollonian metaphor, adopting Ovid's description of the realm of Thetis as a place for Louis to retire and recharge his solar puissance. The conflation of Tethys and Thetis in the metaphor is hardly an error. Socrates, in *Cratylus*, points out the confluence of the name Tethys with flow and time, with metamorphic motility over the stasis of form. The name itself, a true name he says, 'tells of a spring somewhat disguised; for it is composed of that which is strained and filtered'. Tethys, as the source, thus brings us to the power of motility itself. Tethys has two daughters: Metis and Thetis, shapeshifters, devisers of ways, and both prophesied to bring forth a son more powerful than Zeus. The figures are convertible. We know Thetis best as the mother of Achilles, for whom she makes her most famous intervention, procuring the armour/daidolon which allows his return to battle. She also works to achieve his immortality – and almost succeeds. Thetis appears frequently in seventeenth-century France, and long before the beginning of Louis XIV's reign, but always in the context of her marriage to Peleus, as a (reluctant) helper to gods and men. The symbolic usefulness of a son greater than the father is obvious as the young Sun King prepares to take on the weakened and disputed throne of Louis XIII. The Petite Académie invokes powerful sources of assistance, and ones which rely on motility and metamorphosis.

The Grotto as an element in the spatial inscription of a cosmology

Already in the first half of the seventeenth century imagery, primarily from Ovid's *Metamorphoses*, informed a ubiquitous cosmography arraying the four elements. The figure of Apollo and the image of the sun were used as part of this elemental field by the Valois and Bourbon courts, linked with the element of Fire, the most powerful and transformative element. At first, the young Louis was just as likely to appear as Ceres, the goddess of Harvest (*Ballet des Saisons*, 1661) or as a Fury (*Les Noces des Pélée et de Thétis,* 1654). This ancient, but still active cosmological field of meaning, is powerfully apparent in the earliest stages of the garden. Before there is a 'Specular' or an 'Extended' Versailles, there is a Versailles grounded in a propitiatory balancing and ordering of the elemental world. In the first Chateau, twin sets of planetary suites for Louis and his new Queen establish a careful symmetrical balance between the realms of the north and south. This unusual disposition may have been intended to substantiate Maria-Theresa's controversial status as heir to Spain. Such a gendered elemental structure also makes sense at a moment focused on the critical importance of Louis' reordering of the chaos of the kingdom, through the new balance implied by his marriage and his reproduction. His marriage is effected in 1660; the very first two constructs of the Garden, the Grotto and the Orangerie embody the realms of water and earth. Elemental themes subsequently play out recursively in the disposition of special topoi in the gardens, in the festivals which enact their meaning in real time and space, and in every detail of the sculptural iconography which comes to elaborate these places. Louis le Vau builds his *Enveloppe* between 1668 and 1672, which extends and re-presents the ancient Chateau. Both the building programme and the highly developed surface articulation support the elemental themes, and Félibien's *Description Sommaire* articulates the rich spatial and symbolic mediation evolving between Chateau and the garden.

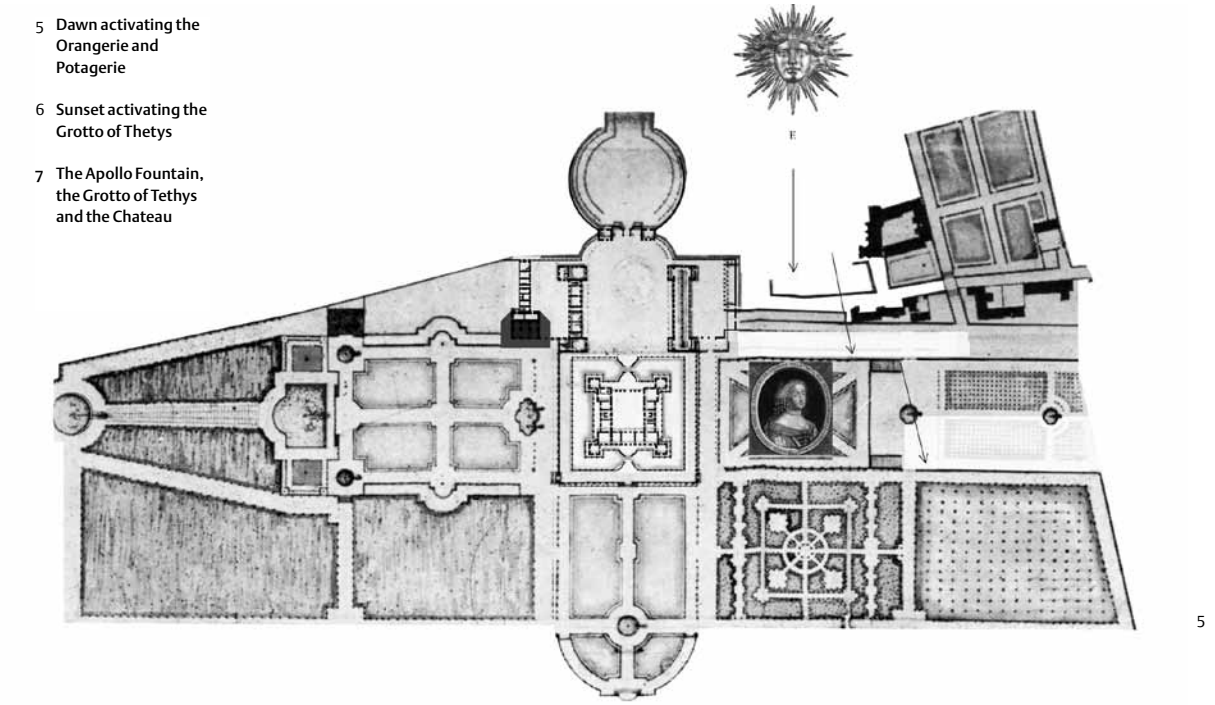
This field is activated symbolically, made present in *associations*; in the Orangerie and the Potagerie to the south, water combines with earth and the sun's warmth, channelling these forces to nutrify, husband and fructify. In the north, water combines with air and the sun's *puissance*, channelling these forces to animate and express in the Grotto and the ludic topoi which develop in the *Petit Parc du Nord*. These constructs are also literally activated in space and time, made present in *experiences*. Morning sun is a necessity which any kitchen gardener will recognise: sunrise, coming from the east, hits the Potagerie, and warms its east-facing masonry wall *[5]*. The court might feel this warmth emanating as they follow the King on his daily promenades. The evening sun penetrates directly through the western facade and into the depths of the Grotto, illuminating the figures of Apollo and his horses only at sundown, the precise moment when the poetic metaphor of his nightly destination can leap to life *[6]*.

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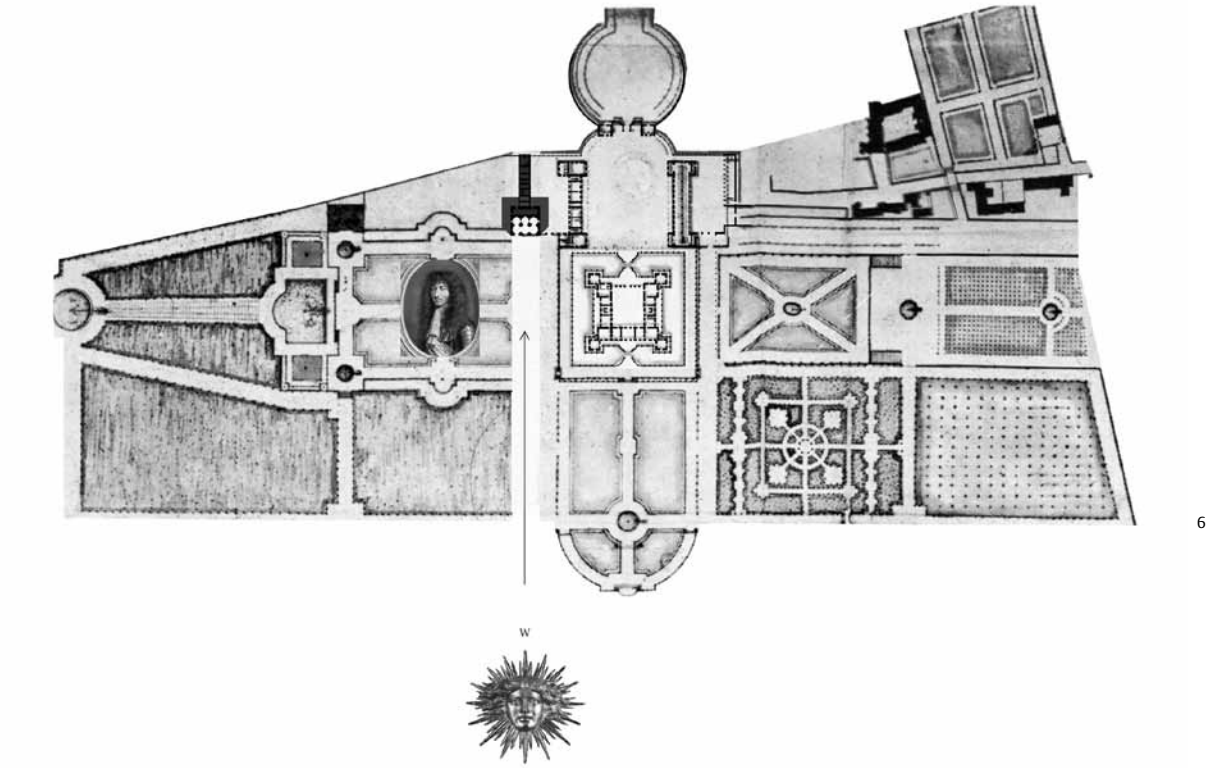
5 Dawn activating the Orangerie and Potagerie

6 Sunset activating the Grotto of Thetys

7 The Apollo Fountain, the Grotto of Tethys and the Chateau



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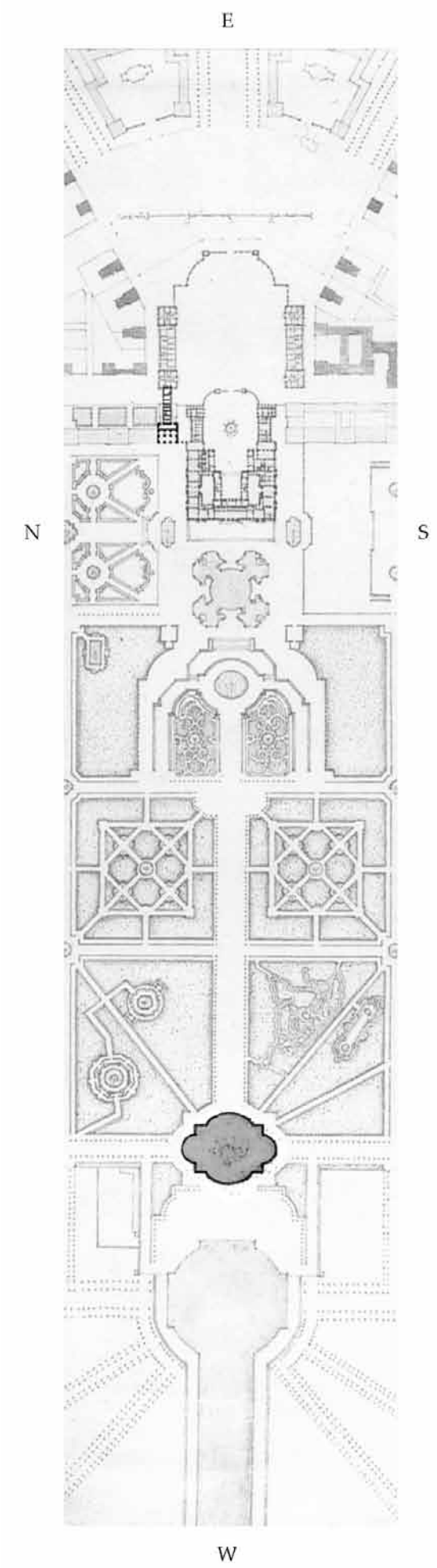


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The use of the sun as a device for Louis XIV is at first more a sign of continuity than difference. What becomes new at Versailles is its virtually exclusive use, the consistency of its implementation, its embodiment in dance and ritual, and its spatial inscription. As architects we are naturally most interested in this latter aspect. The spatial metaphor has usually been associated with the later Apollo fountain and the east-west axis of the Grand Canal. We all know the story; the sun's movement across the sky from east to west aligns with the King's bedroom, and with the Apollo fountain which shows his chariot, rising from the waters to commence its daily trip across the skies. But there has always been an awkwardness about this as a spatial narrative. The King's bedroom is located centrally on the east side of the Chateau. His '*Lever*' *is* illuminated by the rays of the rising sun in the east; but the sculptural depiction of dawn and the rising of Apollo from the sea is built in the west end of the garden. Meanwhile the Grotto of Tethys, the destination of the sun setting in the west, is actually located far east of the Apollo Fountain *[7]*.

The spatial metaphor works better in considering the earliest state of the gardens and the 'actions' of the Grotto. Between 1661 and 1674, the King's

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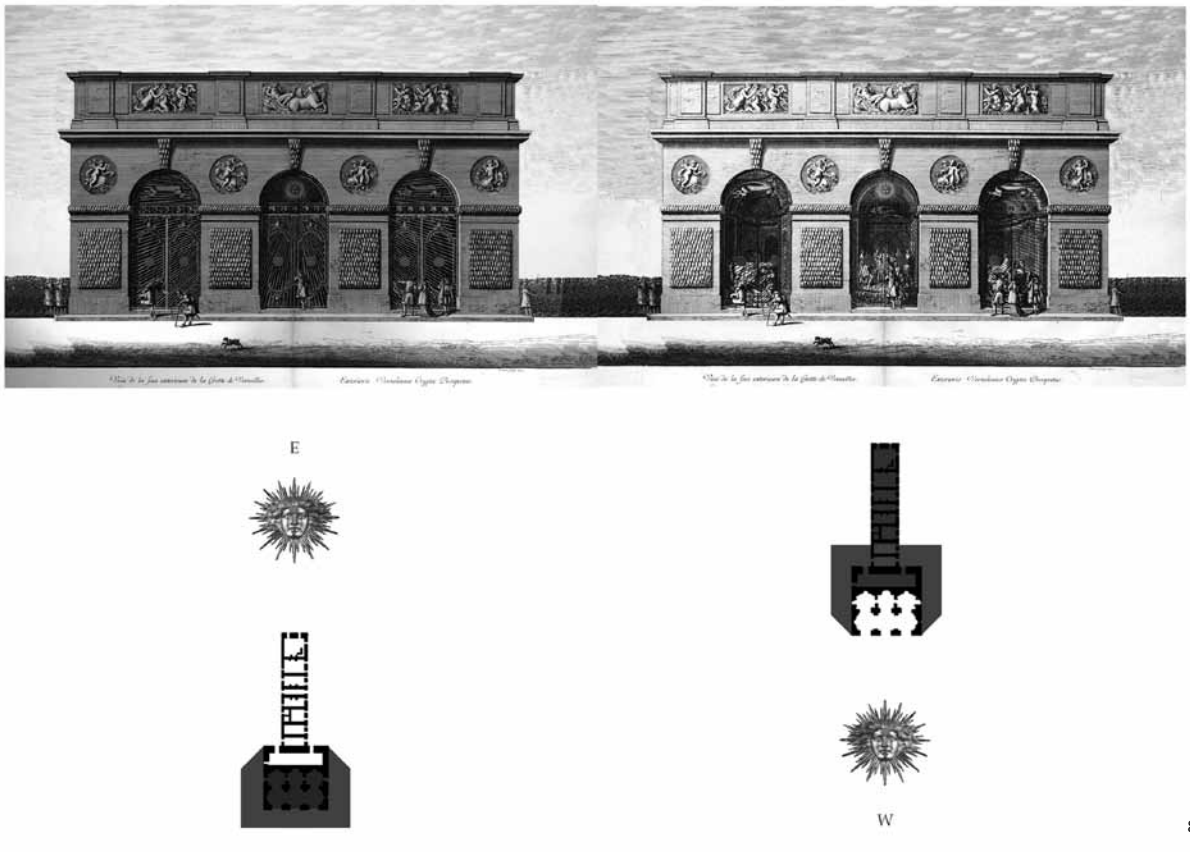
bedroom is actually on the north side of the Chateau, disposed within the elemental field I have begun to describe. He looks out onto the raised surface of the reservoir, a bright mirror for the sky as depicted in Pierre Patel's painting of 1672 *[4]*. This lights up at the '*Lever*', as Louis rises at dawn, activated by rather than representing a 'solar eye'. Throughout the morning, the Grotto is dark, shaded by the mass of the Chateau and silhouetted against a bright morning sky *[8]*. In early afternoon, the rays of the sun rake across the bars of the famous solar grille at the entrance, illuminating its surface but leaving the interior dark behind. As the afternoon progresses, the sun's rays gradually creep across the first and then the second bays of the Grotto until precisely at sundown the sun, now low in the west, shines through the grille, now barely visible against the lit interior, all the way in to light up the statue groups at its heart. Apollo and his horses arrived in the Grotto through the action of the sun.

Félibien's descriptions as a process of spatial programming

André Félibien writes a series of descriptions of the works of the King between 1664 and 1676, working in conjunction with the Petite Académie. The most famous describe the three great Fêtes of 1664, 1668 and 1674, offering precious details of the *Divertissements du Roi*. But there are also descriptions of the Grotto, of the Tapestries of the Seasons and Elements,[7] and of the newly extended state of the Palace of Versailles.[8] Close study of these undervalued texts in conjunction with a careful analysis of the sequence in which each of these works are imagined and fabricated suggests a fascinating process of spatial programming, a 'full-scale, real-time' process of design in which elements and relationships are conceived and tested in the ephemeral constructs of elaborate public festivals, and then selectively rebuilt in permanent form. We know that the process of construction was of interest at the time; several literary works of the period are written as strolling conversations or *Entretiens* and suggest at some point in the text that they 'go see what is new at Versailles'.[9]

Metaphoric form-making and descriptive language alternate in a reiterative cycle of spatial programming. The members of the Petite Académie were involved at every step from maquette to redesign. Imagery cycled from embodiment in dance and ritual, to material and spatial inscription on the grounds, to textual ekphrasis. Read as a process of programming, this cycle of texts and constructs sheds light on an important process of seventeenth-century architectural intentionality. We can also look at the reception of the gardens. Both the Fêtes and Félibien's descriptive texts were intended, through ekphrasis, to create recognition and recollection by *personnes d'esprit,* experiences and conversations at and beyond the events and locales described. Taken all together, these processes imbued the physical structures of the gardens with embodied memories which precipitated in a remarkably consistent and powerful set of poetic and artistic works left in their wake. My larger project

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looks at this poetic programming process through the lens of the Grotto and its associated works.

My argument is that between 1661 and 1676, a consistent spatial rhetoric, which enacts the metamorphic relations between the elements, is developed and inscribed into the compound of gardens and Chateau at Versailles, and that the physical and metaphorical lineaments of this are clearly expressed in André Félibien's descriptions of the Works of the King. The *Description of the Tapestries of the Elements and the Seasons* lays out the rhetorical ground in great specificity and gives us a very particular set of emblems which create hinges to the larger field of signification. The descriptions of the festivals play out this field of significance in temporal as well as spatial relationships, and strengthen and expand on the sensual aspects and effects of this elemental field. The *Description of the Palace at Versailles* narrates the implementation of this field at two scales in the relationship between the Chateau and the gardens; once in the entry court, and again in the relationship between the new *Enveloppe* of Le Vau and the *Petit Parc* around it. The Grand Canal is barely mentioned in this work, written in 1674. The text takes us in two spiralling itineraries which circulate through the Baroque elements of the unfinished Chateau. It culminates in a description of the *Parterre d'Eau* of Le Brun, which would have completed a third circulational spiral, emblematic in the ancient sense of the word, of the larger field of meaning. This fountain was intended to gather and dispose the *Grande Commande*, an ambitious sculptural cycle consisting of twenty-four quaternaries. The supplanting of the *Parterre d'Eau* is part of a spatial shift which eventually includes the relocation of the bedroom of the King. No longer situated *within* the circulating elemental field in the important realm of Fire, the King, finally, stills as he comes to represent himself.

The Grotto text: how elements acquire meaning

André Félibien's *La Grotte de Versailles* is his only description which addresses a particular architectural garden element; this suggests the importance of the Grotto in the first iteration of the garden. Perhaps we can gather insight as to *how* each locus in the field was intended to *mean* by reading the development of the plan of the garden against the rhetorical field laid out in the explanations for the scheme of the Tapestries of the Seasons and Elements. It is clear from both its location in the *Parc du Nord* and the ways in which it was used, that the Grotto belongs to the significant realms of water and of winter, and therefore to the activity of spectacle associated with those tapestries. Not only is Thetis herself pictured as the presiding goddess in the Tapestry of Water, but the borders are composed of the same shells – literally – as those encrusting every inch of the surface of the Grotto *[9]*.

The action of the King associated with the winter is the *Ballet à Machines*. The *Devises* written to accompany the images at the corners of the Tapestry tell us that what is important about this activity can be understood through close attention to the *actions* of the machine: 'a Machine, by its movements, surprises and charms the spectators, and surpasses the ordinary effects of nature'.[10] The Grotto will soon be described in precisely the same language. The devices in the corners, invented by Charles Perrault, present the machine as a particular kind of *techné*,

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8 The Grotto, 'closed' by the sun at dawn and 'opened' by the sun at dusk

9 The twin shell encrusted borders of the Tapestries of Water and Winter

10 Analogous devices: machine, rose, falcon



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but not a tool. Occupying the same syntactical location in the tapestries as the rose for the carousel, or the falcon for the *chasse [10]*, the machine is figured as a moment of productive cooperation between natural forces and the actions of man. In such company, the machine is hardly artificial. It belongs to and extends nature.

It is important not to read the use of the term 'machine' retroactively here. In texts on ballet, on spectacle and on fireworks in this decade, the machine is more wondrous than mechanical. We are still closer to the divine science of Salomon de Caus's musico-hydraulic automata, or the *Grotte Rustique* of Bernard Palissy than we are to Bernard Forest de Bélidor's more instrumental *Architecture hydraulique ou l'art de conduire, d'élever et de ménager les eaux pour les différens besoins de la vie*. The Grotto reads well as a wonder machine, better, in many ways than as a work of architecture, although ultimately, it is both. Its metaphoric associations conjoin Thetis with Apollo, the element of water with that of fire – explicitly linked with the activity of *bâtiments* (or architecture) in the Tapestry cycle. Thus Claude Perrault's more famous building, the Louvre, forms the emblazoned shield at the centre of that tapestry (Summer). Half spectacle, half building, the Grotto of Thetis, like the Louvre, should be considered as a portrait of the King. The Tapestry text quoted above goes on to establish such a metaphoric overlay directly: 'In this way, his majesty, by his virtues and his heroic actions, astonishes and ravishes all those who are witness, and surpasses natural forces and the usual deportment of Men'.[11] The Grotto text similarly states that the metamorphic mixing of the elements, the balancing, purifying and perfecting accomplished by the Grotto have *'un rapport particulier au grand Prince pour qui on les entreprend'*. We will see that the nature of these actions is circulatory; the Grotto is hymned, as a heart.

Félibien's text on the Grotto is remarkable; written a hundred years before Le Camus de Mézières' *Le Génie de l'architecture; ou, l'analogie de cet art avec nos sensations,* it is completely focused on rendering the synaesthetic experience of a linked sequence of built spaces. Félibien tells us how to approach the building: 'One must consider the Actions'. The text follows the passage of the visitor, describing the play of light, vision and material over the elevation and interior surfaces and through the bays of the Grotto to the sculptural group at its heart. He then follows the path of the water from its source in the urn of Oceanus above Apollo and the Muses, back out to the garden. Water overflows the basins below the sculpture groups. It dematerialises every massive pier, it sprays into the vaults and drips off their ribs; it runs across the pavement of the floor in channels. At the same time it powers the hydraulic organ hidden in the back of the Grotto; ceramic fish swim, and live birds combine with the organ's songs and the acoustical echo which was a special property of the space. The experiential synthesis ecstatically rejoins the re-ordered elements:

> *It seems that we see a perfect image of the concert of all the elements, having found the art to make heard in this place that Universal Harmony rendered by the poets in the lyre of Apollo, like that which rules the seasons and tempers the elements.*[12]

All of this spatial exuberance culminates in a fountain which atomises water into light in a final explosive gesture at the entry, as the water re-emerges into the garden:

> *These different showers are so conjoined and confounded that it is impossible to discern from which side they arrive. What one notices amongst the confounded mass of drops and atoms of water, is an almost infinite number of tiny crystal globes that seem to move in this place like the atoms of light one discovers in the rays of the sun.*[13]

The ecstatic tone of this final apotheosis of water and light will be repeated in identical language at the end of every one of Félibien's descriptive works as *historiographe du Roi*. In the texts for the festivals it is always the firework displays which occupy this key position, similarly celebrated as a powerful and wondrous mixing of the elements.

Circulations

Water is given its place. Its natural gravitational movement combines with its opposite gesture, the forceful upward thrust of the jet at the portal, accomplished through the comingled forces of art and science. The union of opposites effects a metamorphosis through the architectural spatial effects of the Grotto, transforming Water, Air and Fire into a fifth element. This process is explicitly tied to the astonishing fecundity of the gardens, and by its association with the Tapestry of Winter, to the King's analagous reordering of the elements throughout the kingdom. Over and over during his early reign, his propitious marriage to Maria Theresa of Spain is hymned as a happy union of opposites, a disposition and perfecting which orders the destitute political chaos of recent history. From the *Tapestry of Winter*:

> *The king, in the body of the state, is like the heart in the body of the man, where by a continual circulation he sends to composite members the blood necessary to give them life. He keeps for himself only the* puissance *to distribute it well. He acts always to conserve its heat and in purifying it by his actions he gives its proper nourishing qualities* [...].[14]

Here he is praised for his ability to create an abundance and put back into circulation the blood of the state, previously hoarded by some 'members' at the expense of others – a clear reference to Fouquet's economic transgressions and Colbert's new policies of 'Economic Circulation'.

The circulational metaphor is not particularly a new one; however it has a new cast following the publication of Harvey's discoveries of the circulation of blood (*De Motu Cordis*, 1628). Prior to this, the king's microcosmic ability to circulate *'les biens de l'état'* is associated with the macroscosmic metamorphic cycle of the elements rather than with images of Blood or even Chyle.[15] Now the superimposition of biological and metamorphic explanations again creates more a kind of 'wonder machine' than a merely mechanical explanation.

A close look at Claude Perrault's text on the

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Circulation de la Sève perfectly illustrates this synthesis, in the direct cultural context of the Grotto of Thetis. This Perrault brother, doctor and architect, apparently worked on the drawings and construction of the Grotto of Thetis with Charles between 1664 and 1667. At precisely the same time we find him suggesting, in the initial meeting of the Académie des Sciences, that the first topic for discussion and presentation be the 'Movement of Sap'. What is the function of this vitalising fluid? Is it a closed system? Is sap made by the body of the plant? How does it flow? What is its composition? Most importantly, does the plant have a heart? Where is it located? Does that heart merely move the juice?, or does it perfect it?

Claude proposes that circulation is the same in the bodies of animals and plants and indeed in the body of the earth:

> *The sublimation (evaporation) of the vapours of the earth, and their descent as rain is not, then a simple mechanical circulation of the juices of the earth, such as that of a pump; but a* circulation physique*, made to perfect that which is circulated; it has a particular rapport with the circulation of juices underlying the life of all living things* [...].[16]

He proposes that the plant has a heart, which is located at the joint between the roots and the trunk. This heart creates a physical circulation of sap, which is powered by two airy processes; the movement of the plant by the wind, and differential air pressure in its parts. The heart perfects the sap to create 'an altered juice, cooked and prepared by parts destined by Nature to this common office'. A crucial aspect of his work is the idea of a *retour*, through which the depleted substance is renewed and reinvigorated and sent out again.

The parallels are striking. In the first place, the implementation of a raised datum at the Grotto is created by two airy processes – the windmills and the action of air pressure on the lifted water. These create a reservoir of *puissance* – latent energy – more than a supply of water itself. In this way, the water is perfected by the Grotto – given force and action as well as literally aerated and cooked – filtered, and healthfully exposed to the air and the sun. In addition, one of the primary hydraulic inventions associated with the Grotto is the system of *retour* which brings the water from the fountain of the dragons at the lowest point of the north gardens cycling back to the *Tour d'Eau*, greatly increasing the efficiency of the hydraulics and creating, in fact, a closed circulatory system.[17]

Claude Perrault delivers his first lecture explicitly linking circulation in plants, in animals and in the earth on 7 July 1668. The great *Divertissement of Versailles*, held to recharge the King after his labours of war, occurs ten days later. It begins and ends at the Grotto, circulating through the (unfinished) complex according to the same spiralling itinerary later used by Félibien in his description of the palace and gardens. The path, marked on a map made for the festival, starts at the Grotto at sundown, when the *maquettes* of Apollo and his horses would have been fully illuminated. It passes by the reservoirs and the *Tour d'Eau* to the Dragon Fountain, and then on to a night of ephemeral ludic constructs, including collations, ballets and opera. Such pastimes are described as never distracting the king, but recharging him, allowing him to return full of *joie* and *puissance* to his incessant work. The all-night festival ends with a firework display just before dawn behind the *Tour d'Eau* which draws the guests to the Grotto just in time to watch the king drive off in his chariot towards the east and Paris. He disappears into the rays of the rising sun, where he will resume his work, spreading abundance and increasing the realm. The Grotto inscribes the ludic nights of Apollo into the garden several years before the axis does the same for his distributive days.

The Kitchen Garden of the king sheds one last ray of light on the marvellous abundance hymned in these descriptions of the early reign of Louis XIV. Jean-Baptiste de la Quintinye, the noble *potager* of Versailles publishes a treatise on agriculture: *Instruction pour les jardins fruitiers et potagers, avec un traité des orangers, suivy de quelques réflexions sur l'agriculture*.[18] Charles Perrault's 1688 *Idylle*, his poem of introduction, tells of his transportation in a dream to the Palace of Nature, where he is initiated into the secrets of mineral and vegetative circulation and metamorphosis. Perrault describes Quintinye's new understanding of the circulation of sap through the plant and the subsequent innovations in pruning, grafting and transplantation. These rigours were discovered to promote new growth and productivity, invigorating the plant, and producing a miraculous yield. Quintinye explicitly compares the vessels of the plant to those of a fountain; Charles Perrault even inserts his brother's hypothesis on the location of the heart as the source of the vegetative soul: *'Dans l'endroit où le tronc se joint à la racine, L'ame fait sa démeure, & prend son origine'. (In the place where the stem joins the root, the soul makes its place and takes its origin.)*[19]

These agricultural inventions took place in the same allegorically charged realm as the Grotto's hydraulic inventions. The King participates almost daily in the work on pruning, grafting and binding the body of the plant. The ensuing vegetal vigour, like the vigorous puissance of the water of the reservoir, is performed at the court as a 'surpassing of nature'. Louis XIV transplants fully grown trees to create thick *bosquets* overnight and serves strawberries in midwinter. Orange trees flower year round. Perrault, in the tapestry texts, hymns the King's ability to channel, after his rest in the winter: 'that mysterious warm and humid substance which plants receive in the spring giving them the *puissance* to push upwards out of the earth'. Louis is a vitalising fluid that warms and seeds in the spring – a Kingly Sap? Both the message and the discoveries themselves were important as Louis put national and international policies in place to help France recover from the famines of the Thirty Years War. Louis is both *'ordonnateur* and *animateur* of Versailles';[20] the well known image of the fountains programmed to burst into effulgence as the King passed by may have been more than an aquatic compromise based on

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inadequate supply. The King's presence had the erotic *puissance* to make the garden fecund in every way. The material demonstration of this *puissance* programmes the Grotto symbolically and literally; it is ultimately a place for the nightly pleasures of love.

Ironically, it was Pierre Perrault, the youngest brother of Charles, who cut this metaphorical knot. Convinced that rainfall was sufficient to explain the flow of major waterways, he studied the movement of water in the River Seine outside Dijon. His *De l'origine des fontaines*[21] was first published in 1674; we find here the true mechanistic Cartesian of the family. Pierre was the first to establish the hydrological cycle as we know it, accounting for the disposition of waters through rainfall, evaporation, transpiration, groundwater recharge and run off. This reversed the direction and transformed the gesture of current conceptions of water movement. Ground water is now understood to fall from the sky and collect in and on the surface of the earth. Once Edme Mariotte accepts this work in the Académie des Sciences, the strategies for water collection transform at Versailles, making the Grotto functionally and metaphorically obsolete. Is it merely a coincidence that a new closed reservoir is constructed located underground, which collects water from a vast watershed area surrounding Versailles? That the Festival of 1674 focuses on the *stillness*, rather than the *action* of water? Or that the metaphorically charged Grotto is ultimately replaced by the mechanical Marly Machine? The spatial significance of the cavernous Palace as *source* is finally supplanted by still pools which celebrate the ground as a surface, gathering and reflecting the sky.

Notes

1. Chandra Mukerji, *Territorial Ambitions and the Gardens of Versailles* (Cambridge: Cambridge University Press, 1997).
2. Charles Perrault, *Mémoires de ma vie: Précédé d'un essai d'Antoine Picon* (Paris: Macula, Art et Histoire, 2000).
3. Robert W. Berger, *The Palace of the Sun: the Louvre of Louis XIV* (University Park, PA: Pennsylvania State University Press, 1993), p. 98.
4. André Félibien, *Description de la Grotte de Versailles* (Paris: Imprimerie Royale, 1676).
5. Pascal Lobgeois, *Versailles: Les Grandes Eaux* (Les Loges-en-Josas: JDG Publications, 2008).
6. In addition to Perrault's work on inscriptions and devices for the Petite Académie in the realm of medals, tapestries etc., Laurence Grove has recently established his authorship of a manuscript, Arsenal ms 3328, entitled *Discours sur l'art des devises*. My dissertation delves into this more deeply, exploring the Grotto of Thetis as an Architectural Device.
7. André Félibien, *Tapisseries du roy, ou sont representez les quatre elemens et les quatre saisons: avec les devises qui les accompagnent et leur explications* (Paris: Sebastien Mabre-Cramoisy, 1679).
8. André Félibien, *Description sommaire du chasteau de Versailles* (Paris: Desprez, 1674).
9. Madeleine de Scudéry, *La promenade de Versailles* (1669); Jean de la Fontaine, *Les amours de Psyché et de Cupidon* (1669); André Félibien, *Entretiens sur les vies et sur les ouvrages des plus excellents peintres anciens et modernes* (1666).
10. André Félibien, *Tapisseries du roy*. From the devices for winter.
11. Ibid. While Perrault is speaking of *la machine* here, throughout the tapestry text it is made clear that every one of these devices is an enigmatic portrait of an aspect of the King.
12. André Félibien, *Description de la Grotte de Versailles*.
13. Ibid.
14. André Félibien, *Tapisseries du roy.* From the devices for winter.
15. Alice Stroup, *A Company of Scientists: Botany, Patronage, and Community at the Seventeenth-Century Parisian Royal Academy of Science* (Berkeley: University of California Press, 1990).
16. Claude and Pierre Perrault, *Oeuvres diverses de physique et de méchanique* (Leiden: Pierre vander Aa, 1721). From 'La Circulation de la Sève'.
17. Madeleine de Scudéry brings attention to this *retour* in *La Promenade de Versailles.*
18. Jean-Baptiste de la Quintinye, *Instruction pour les jardins fruitiers et potagers, avec un traité des orangers, suivy de quelques réflexions sur l'agriculture* (Paris: Claude Barbin, 1690) includes: *L'Idylle à Monsieur de la Quintinie* by Charles Perrault.
19. Ibid., *L'Idylle*.
20. For the best articulation of this vegetal cosmogony, see Dominique Garrigues, Joël Cornette, *Jardins et jardiniers de Versailles au Grand Siècle* (Seyssel: Editions Champ Vallon, 2001).
21. Claude and Pierre Perrault, *Oeuvres diverses de physique et de méchanique* (Leiden: Pierre vander Aa, 1721). From *De l'origine des fontaines.*

Illustration credits

All analytical images were constructed by the author from diverse maps, diagrams and etchings which are published widely in the literature on Versailles, my thanks to the archives which have made these available for interpretation and adaptive reuse.

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Biography

Nina (Adeline) Hofer has taught architectural design and theory for twenty years. She is the Director of the Architectural Pedagogy programme at the University of Florida, and works as a curricular consultant nationally. She received her professional degree from Cooper Union and is currently working on her Ph.D. at McGill.

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