——— Finishing. Vitruvius on an architecture of Time ———

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"*Partes ipsius architecturae sunt tres, aedificatio, gnomonice, machinatio.*"[1]

The parts of architecture, Vitruvius proclaims in first book of his treatise *De architectura*, are three: *aedificatio*, *gnomonice*, and *machinatio*. What are these parts? *Aedificatio* might be described as the process of bringing materials into positions of rest in order to create buildings, streets, and cities, an endeavor that English translations have often called the "art of building."[2] *Gnomonice* relates the geometric projection of shadows cast by the sun to the measurement of time and the definition of orientation: "shadow-trackers," spatial assemblies, convert movements in the heavens to tabulated predictions on the ground.[3] *Machinatio* has been translated as the "construction of machinery."[4] It might concern the movement of materials using mechanical inventions, or the behavior of objects cast into flight by catapults, or indeed the alluvial behavior of rivers and hydraulic systems.[5]

The first section of *De architectura*, from Book 1 to Book VI, provides an account of architecture that overlaps rather precisely the notion of *aedificatio*. The emphasis is on the fixed nature of buildings; on architecture's duty to predict permanent position for building elements; on its potential to predicate arrangement and proportion according to static rules, pinning down the fluidity and temporal nature of the free-flowing world, giving it order and enduring pattern. But although this first section of Vitruvius's treatise is a hymn to stasis, it also predicts the necessity of *gnomonice* and *machinatio* to its structure. The model city that the architect lays out in book I must contain at its center a level platform and, at the center of that platform, a gnomon, or shadow-tracker that can define orientation.[6] City walls must resist battering rams, the stones set "like teeth in a saw". If a city is mis-sited, it must be physically translated to a better location. In these senses *gnomonice* and *machinatio* guarantee the success of static architecture. And their equality with *aedificatio* is reflected in the shape of Vitruvius treatise as a whole, which balances a description of architecture as that which gives enduring position (described via formulae for the composition of temples, public works and houses in books II to VI), against a description of architecture as dealing with movement in books VIII to X. Definitions of the proper measures and proportions of building types are followed by of disquisitions on water; on the stars, sun, and planets; on projectiles, catapults and cranes.

These two sides of Vitruvius – an obsessive concern with permanence, propriety and placement *contra* a focus on movement, fickleness and change – might be seen to embrace two mutually exclusive notions of an architecture of time. The first speaks of architecture as that which endures and speaks of time through this endurance; the second evokes time through investigating systems in change, highlighting a contrast between how things were, how things are, and how they are about to be. A question, therefore: are these two contrasting visions of a temporal architecture to be reconciled in Vitruvius text? And what implications for thinking an architecture of time might that reconciliation hold?

Book VII of *De architectura* sits between Virtuivuus's consideration of the fixed and his ruminations on the fluid, sandwiched between the discussion of projected form, permanency, and propriety contained in books II to VI and the account of movement, temporality, and translation contained in books VIII to X. It concerns the "finishing" (*de expolitionibus*) that architectural works require. This completion is clearly central to architecture: it endows buildings with "beauty and durability" (*venustatem et firmitatem*).[7] Like the layers of painting, wet sanding, waxing, and polishing that produce the final surface on a perfect automobile, finishing in some sense creates the object, turning a building from a technical assemblage into an emotive whole. Finishing concerns primarily, although not exclusively, the internal surfaces of buildings, articulating the meeting between the body and eyes of an occupant and the interior environment that a building produces.[8]

Vitruvius is very detailed about the material processes that take place during finishing. Typically they involve conglomerates that change their state with time. Concrete floors convert individual bricks or tiles into a jointless amalgam as they harden. Plaster, blended from lime, sand, and marble dust in various proportions and applied in repeated layers to walls, creates continuous, uninterrupted surfaces; vaulting work erects an armature in light construction—reeds and timber—and clads ceilings with a seamless casing of stucco. All these applications, in their material nature, occupy a problematic category that includes the fluid and fixed together. They require working methods that navigate a strange temporal and motivational caesura between a state of potential flow—these are materials that slump, drip, splatter—and a singular, pristine, fixed form.

Having explained with great precision the creation of these systems of continuous material support, Vitruvius describes in the final paragraphs of book VII the extraction and manufacture of the pigments and compounds that can be introduced into this process of smoothing and finishing to enliven surface with color and design. These are divided between

natural pigments (ochres, chalks, orpiment) and manufactured compounds (black, blue, white lead, brown ochre, sandarac, verdigris, and purple). And in between these categories, finally, Vitruvius focuses on cinnabar and quicksilver in relation to the production of vermillion.

If book VII in its overall dimensions deals with those components of architecture that sit most naturally between the durable and the protean, between the static and the slippery, the account about cinnabar and quicksilver seems to complete this ontological circle. Where all the other material systems described in book VII predict a final condition of stasis out of an initial existence of wayward possibility, cinnabar upsets this order and reminds the reader that the relation between fluidity and repose can be bivalent. Concrete, stucco, and plaster set; surface layers of paint harden; but cinnabar and quicksilver are caught in an endless exchange between the solid and the liquid. "I shall now proceed to explain the nature of cinnabar," Vitruvius writes. It is an ore "like iron, but rather of a reddish color and covered with red dust. During the digging it sheds, under the blows of the tools, tear after tear of quicksilver, which is at once gathered up by the diggers."[9] Here, then, is a rock that weeps when struck. Under its working, solidity produces fluidity. This constant trading between the solid and the volatile continues in Vitruvius's description of quicksilver, which runs on to a furnace floor or melts into air; which evaporates and recondenses as a liquid; which can catch gold out of ashes thrown into water but gives up its prize as it drains through a mesh.[10] This effervescent dimension characterizes as well the color pigment that the working of cinnabar produces. Burn cinnabar, extract its quicksilver, and you have vermillion, the best of reds. It is a color fit for the apartments of nobles, as Vitruvius notes, and was much used in fresco work with raw.[11] But its color is hard to keep. Sun and moon drain its virtue; used externally in peristyles or exedra, it must be shielded with a layer of wax, lest it turn "mottled and ugly."[12]

All this to-ing and fro-ing between the solid and the liquid, between the durable and the decadent, is sandwiched between chapters on the permanent and the fixed on one side and on the fluid and transient on the other. The discussion about vermillion, about cinnabar and quicksilver, marks this watershed in the text. Before it, every subject is destined for a final set form: propriety, order, repose, fixity. After it, subjects slide, move on, escape, resonate, revolve. With the treatment of vermillion that which has been solid in the text melts into air; the color of this change is red.

This transition from the fixed to the fluid through the consideration of a building's finishing points to an irresistible logic in the treatment if time in Vitruvius. On one side, book VII shows that there is finally no absolute boundary to be found between two ways of thinking about how buildings gain the effect: although the absolutely permanent and the

absolutely transient might appear opposed, they are in fact shown to be contiguous conditions in Vitruvius's account of architecture. And this contiguity concerns exactly that which gives buildings beauty and durability: what is at stake, in the instant where the static and the motive meet, is an emotive quality as well as a practical one. Questions about architectural emotive effect, then, are intimately bound up in this watershed case with the temporal characteristics of process.

An architecture of time, surely, is an architecture in which time connects with emotive effect. In Vitruvius's terms, not only does the duration of buildings through time wake such emotions, but so too do the experienced conditions of change that surround the formal becoming of built objects. Architecture, suddenly, is discovered not only in the judgment of fixed formal compositions but in the swirl of activity and the experience of material change that accompanies building though time.

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[1]1 Harley, f.8v.

2 Vitruvius, *De architectura* I, III:1, 16 (Morgan). Rowland and Noble Howe replace "the art of building" with "construction," removing the edifying aspect of *aedificatio*.

3 Vitruvius, *De architectura* I, III:1, 16. The "making of timepieces" is Morgan's translation. Rowland and Noble Howe use "the making of sundials" and provide descriptor titles for the various books based on this terminology (for example, book VIII becomes "Sundials and Clocks").

4 Vitruvius, *De architectura* I, III:1, 16. Rowland and Noble Howe use "mechanics."

5 On the compositional structure of Vitruvius see, among others, Ingrid D. Roland, "Vitruvius in Print and in Vernacular Translation: Fra Giocondo, Bramante, Raphael and Cesare Cesariano," in *Paper Palaces: The Rise of the Renaissance Architectural Treatise*, ed. Vaughan Hart and Peter Hicks (New Haven, CT: Yale University Press, 1998), 105–121. For a discussion of *machinatio* see Bernard Cache, "Vitruvius: Machinator Terminator." in Bernard Cache, *Projectiles* (London: AA Publications, 2011), 119–137, esp. 121. For a thorough investigation of the state of antique treatises on engineering and mechanics see Philippe Fleury, "Le *De architectura* et les traités de mécanique ancienne," in *Le projet de Vitruve. Objet, destinataires et réception du* De architectura. *Actes du colloque de Rome (26–27 mars 1993)* (Rome: École Française de Rome, 1994), 187–212.

6 Harley, f.13v–f.17r.

7 Vitruvius, *De architectura*, book VII, Introduction, 201 (Morgan). Rowland and Noble Howe maintain this translation.

8 Vitruvius, *De architectura* VII, V: 2, 211.

9 Vitruvius, *De architectura*, VII, VIII: 1–4, 215.

10 Vitruvius, *De architectura*, VII, VIII: 4, 216.

11 Vitruvius, *De architectura*, VII, V, 1–3, 210–211.

12 Vitruvius, *De architectura*, VII, V, 4, 211.