# What is Stone in Ms. Fr. 640?

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# *Abstract*

This essay addresses the ontology of stone in BnF Ms. Fr. 640. What is stone to the author-practitioner, both in the manuscript as a repository of knowledge and the workshop as a site of production? What constitutes a stone and what distinguishes it from other natural resources and usable objects? How does the author-practitioner demonstrate and produce knowledge about stone as a material by exploiting its material properties, and to what end? Analysis suggests five categories to classify the author-practitioner's understanding and use of stone: tools and supports, materials, matrices, gemstones, and reference materials. Stone is revealed to be a varied and versatile material for transformation and use.

**Abstract**

This essay addresses the ontology of stone in BnF Ms. Fr. 640. What is stone to the author-practitioner, both in the manuscript as a repository of knowledge and the workshop as a site of production? What constitutes a stone and what distinguishes it from other natural resources and usable objects? How does the author-practitioner demonstrate and produce knowledge about stone as a material by exploiting its material properties, and to what end? Analysis suggests five categories to classify the author-practitioner's understanding and use of stone: tools and supports, materials, matrices, gemstones, and reference materials. Stone is revealed to be a varied and versatile material for transformation and use.

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## Introduction

In Ms. Fr. 640, references to materials may straightforwardly denote ingredients, function metaphorically, or express certain judgments and inferences. Materials, in other words, are multivalent entities, and stone is no exception. An analysis of the appearances of “stone” (*pierre*) and its derivatives in the manuscript reveals this material used variously and in several physical states: it can be polished, engraved, and pulverized; hollowed and used for a mold; used as a common tool; and invoked as a point of reference in the description of other materials. This variety is nevertheless coupled with a consistent notion of its defining attributes and material properties,

knowledge of which enables its exploitation. The functional and material contexts in which "stone" appears *in*, *on*, *with*, *as*, and *like* other materials and processes indicate its function in signalling or mediating other materials as well as its ubiquity in the workshop.

## The Ontology of Stone in Historical Perspective

The ways in which stone is invoked or used in Ms. Fr. 640 are consistent with a period system of knowledge that classified stones as distinct from other forms of raw natural materials and further subdivided stones into discrete categories. In the early modern period, knowledge of stone's origin within the earth and its attendant material properties were constructed around the Aristotelian polar oppositions of hot, dry, wet, and cold.1 According to this Aristotelian worldview, rocks and metals—the larger categories of solid matter—were formed by hot vapors that congealed in the cold of the earth. Stone was a kind of rock and was understood primarily as composite yet densely consolidated matter that could not be melted.2 Theophrastus, Dioscorides, Galen, Avicenna, and Albertus Magnus later built upon and revised the Aristotelian division. Avicenna, for

example, proposed four categories (*lapides, sulphura, sales,* and *metalla*), while Albertus Magnus added a third (*media mineralia*) to Aristotle's rocks and metals.3

Although textual authorities continued to inform various ontologies of stone in the sixteenth century, their works proved increasingly insufficient to those invested in understanding the genesis and properties of various stones.4 Georgius Agricola (1494–1555), a physician and mine shareholder, revised and expanded Aristotle's classification in his *De natura fossilium* (*About the Nature of Things Dug up*), published in 1546.5 In addition to drawing upon ancient philosophical foundations, Agricola's classification incorporated experimentation and observation of mines and artisanal workshops.6 Agricola's system thus reflects a conception of stone's ontology derived from the intersection of natural philosophy and practical knowledge. In this system, stone occupied its own discrete category separate from earths, congealed juices, mixed substances, and composite minerals, and it was further subdivided into four genera of common stones, gems, marble, and rocks. Ms. Fr. 640 reproduces categories consistent with the changing period conceptions of stone, albeit implicitly through

uses and applications of the material, instead of explicitly as a system of knowledge.

## Stone in Ms. Fr. 640

The early modern artisan had intimate knowledge of stone, ranging from the means of sourcing raw minerals for pigments to working with stone mortars and marble slabs. This practical knowledge was contingent on an awareness of the identity of a variety of stones, from the common pebble to the prized diamond, that enabled the manipulation of material properties. Forms of stone appear in at least 133 entries in Ms. Fr. 640. This number includes independent appearances of “a stone,” “stone,” and “stones;” compound words signifying specific varieties (“touchstone,” “pumice stone”); gemstones, including counterfeits; and named varieties of stone (alabaster, flint, marble, porphyry, sandstone, shale, slate, and tufa).7 In order to better understand this multifaceted material category, stone can be subdivided into five broad categories based on its identity and function across the entire manuscript: materials, tools and supports, matrices, gemstones, and references.

## Materials: Powders and Pebbles

The word “stone” appears most frequently to refer to materials for pulverizing or calcining. This is consistent with Aristotle’s belief that most “*fossiles*,” the underground bodies formed from the earth’s vapors, are colored dust or formed from a similar powdered composition.8 It is notable that many, though not all, pulverized raw materials used for pigments and plaster are still referred to as “stone” rather than “powder” (*pouldre*) or “sand” (*sable*)—the latter forming a rather broad category of material the author-practitioner uses for mold making. The persistence of “stone” to describe different formats of the same material runs counter to the author-practitioner’s understanding elsewhere of stone as a material defined by its consolidation, as discussed below in the concluding section on “Stone Transformed.”

Stone also appears in the form of pebbles and rocks. Their availability is emphasized, as is their naturalness. The author-practitioner instructs to “take white pebbles that are found by the rivers & among the sand banks, & paths” (fol. 100v (http://edition640.makingandknowing.org/#/folios/100v/f/100v/tl)). Nature provides “white pebbles,” but the artisan, by virtue of artistry, has the ability to transform humble pebbles into gemstones.

# Stone (*pierre*) and associated terms as materials in Ms. Fr. 640

Transcriptions and translations from 2017 version of Ms. Fr. 640.

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Materials | pierre | stone | Le plastre / Plaster | 106v |
| Materials | pierre | stone | Pouldre d'horloges de sable / Powder for sand glasses | 10r |
| Materials | pierres, eau de roche, mabre, pierres mineralles | stones, rock water, marble, mineral stones | Paindre à huille d'esmail d'azur / For painting esmail d'azur in oil | 11r |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Materials | pierre | stone | Pour murailles de terre et bastiment rustique | 14r |
| Materials | monceaulx de pierres | stone mounds | Pour mener le canon en pays | 24v |
| Materials | pierre | stone | Pintiers | 28v |
| Materials | en pierre, tuf | in stone, stuf | Sable / Sand | 68v |
| Materials | pierres, gros gravier | stone | Tuiles/ Tiles | 106v |
| Materials | Le spat est une pierre blanchastre | Spalt is a whitish stone | Pour prendre lezards et serpents / For catching lizards and snakes | 107v |
| Materials | | | Pour grottes / For grottoes | 118r |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| | pierres faictes d'eau appellées stuf | stones made from water called stuf | | |
| Materials | pierres | stones | Praeparation du sable pour chassis | 161r |
| Materials | pierres toutes faictes | ready-made stones | Pour la boutique / For the workshop | 166r |
| Materials | cailloux, esbranles plusieurs pierres | flint stones, shake loose stones | Pour mener le canon en pays | 5r |
| Materials (calcined, pulverized), Tool | mabre, plastre, albastre calciné, porphire, tripoly | marble, plaster, calcined alabaster, porphyry, tripoli | Sable / Sand | 41r |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Materials (calcined) | alabastre, mabre | alabaster, marble | Sable de gect / Sand for casting | 42v |
| Materials (calcined) | Albastre calciné | calcined alabaster | Sable excellent / Excellent sand | 83r |
| Materials (melted, pulverized) | caillou, caillou blanc calciné | pebbles, white calcined pebbles | Le salpestre vitrifié / Vitrified saltpeter | 100r |
| Materials (pulverized) | pierre | stone | Pour donner couleur de toute sorte de metaulx au boys & aultre chose / For giving the color of all | 7v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| | | | kinds of metals to wood & other things | |
| Materials (pulverized) | pierre ponce | pumice stone | Aultre / Other | 49r |
| Materials (pulverized) | charbon de pierre | charbon de pierre | Velours et noirs / Velvets and blacks | 63v |
| Materials (pulverized) | stuc | stucco | Stuc blanc fort dur / White stucco very tough | 80r |
| Materials (pulverized) | pierre | stone | Aultre pour le plomb / Another for lead | 83r |
| Materials (pulverized) | chaulx, pierre vive | quicklime, flint | Sable / Sand | 93r |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Materials (pulverized), Tools and Supports | pierre la meule pour la faire trancher, pierre de foule, esmeril, croye | grindstone, thunderstone, emery, chalk | Fourbisseur / Furbisher | 95r |
| Materials (pulverized) | en pierre | from stone | Plastre / Plaster | 106v |
| Materials (pulverized) | plastre recuit en pierre | stone plaster | Plastre seul / Plaster alone | 159v |
| Materials (pulverized), Gemstone, Stucco | pierre, croye blanche, pierre blanche | stone, white chalk, whitestone | Stuc / Stucco | 44v |
| Materials (pulverized), Gemstone, Stucco | pierre ponce | pumice stone | Gect/ Cast | 47v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Materials (pulverized), Reference | pierre ponce, co{mm}e caillou à foeu | pumice stone, like fire stone | Topasse / Topaz | 101v |
| Materials (pulverized), Reference | albastre, plastre | alabaster, plaster | Plastre pour gect de cire / Plaster for casting in wax | 125v |
| Materials (pulverized), Rocks | rochers | rocks | Ocre / Ocher | 62r |
| Materials (pulverized), Tools and Supports | arcenic, mabre | agate diamond alabaster | Carnation d'arsenic / Carnation from arsenic | 13r |
| Materials (pulverized), Tools and Supports | le cristallin, pierre de touche | cristallin, touchstone | Dorer ta moleures de tableaux sans or / Gilding | 99v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| | | | your molding for panels without gold | |
| Materials (pulverized), Tools and Supports, Reference | arcenic, mabre, agathe | arsenic, marble, agate | Pour blanchir enlilanroc / For whitening enilanroc | 12v |
| Materials (pulverized), Tools and Supports, Reference | sel armoniac, mabre, albastre, co{mm}e pierre | sal ammoniac, marble, alabaster | Sel armoniac et albastre / Sal ammoniac and alabaster | 89v |
| Materials (pulverized); Tools and Supports | ocre, goume, mortier de pierre | ocher, alum, stone mortar | Pour faire bronze en couleur d'or / For making bronze in gold color | 78v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Materials, Reference | spalt, comme plastre, monceaulx & pierres, la pierrerie | spalt, like plaster, mounds & stones, from the quarry, sal ammoniac | Spalt / Spalt | 108r |
| Materials, Tools and Supports | alum de plume, en pierre, mabre | feather alum, of stone, marble | [continued entry] | 107v |
| Materials | ardoise calcinée | calcined slate | Sable / Sand | 90r |
| Materials (pulverized) | stuc | stucco | Stuc blanc fort dur / White stucco very tough | 80r |
| Materials (pulverized) | pierre | stone | Pour donner couleur de toute sorte de metaulx au | 7v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| | | | boys & aultre chose / For giving the color of all kinds of metals to wood & other things | |
| Materials (pulverized), Gemstone, Stucco | pierre, croye blanche, pierre blanche | stone, white chalk, whitestone | Stuc / Stucco | 44v |
| Materials (pulverized); Tools and Supports | ocre, goume, mortier de pierre | ocher, alum, stone mortar | Pour faire bronze en couleur d'or / For making bronze in gold color | 78v |
| | | | Sable / Sand | 69r |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Tools and Supports, Materials (pulverized) | mabre, en pierre, tuf | marble, in stone, stuf | | |
| Tools and Supports, Materials | porphire, mabre, ardoise pilée | porphyry, marble, crushed slate | Sable / Sand | 68v |
| Tools and Supports, Materials | mabre | marble | Stuc pour mouler / Stucco for molding | 29r |
| Tools and Supports, Materials | mabre | marble | Stuc pour mouler / Stucco for molding | 29r |
| Materials | cailloux, esbranles plusieurs pierres | flint stones, shake loose stones | Pour mener le canon en pays / For bringing a | 25r |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| | | | cannon over land | |
| Materials | monceaulx de pierres | stone mounds | Pour mener le canon en pays / For bringing a cannon over land | 24v |
| Materials | pierres toutes faictes | ready-made stones | Pour la boutique / For the workshop | 166r |
| Materials | pierres | stones | Preparation du sable pour chassis / Preparation of sand for frames | 161r |
| Materials (pulverized) | plastre recuit en pierre | stone plaster | Plastre seul / Plaster alone | 159v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Materials | pierre | stone | Pour murailles de terre et bastiment rustique / For walls of earth and rustic construction | 14r |
| Materials | ardoise calcinée | calcined slate | Mouleurs de Foix / Molders from Foix | 143r |
| Materials | plastre blanc pulverisé, ardoise chaulde | white plaster, hot slate | Gect en cire pour representer l'animal qu'on n'a point / Cast of wax to represent an | 140r |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| | | | animal one has not got | |
| Materials (pulverized), Tools and Supports | arcenic, mabre | agate diamond alabaster | Carnation d'arsenic / Carnation from arsenic | 13r |
| Materials (pulverized), Tools and Supports, Reference | arcenic, mabre, agathe | arsenic, marble, agate | Pour blanchir enlilanroc / For whitening enilanroc | 12v |
| Materials (pulverized), Reference | albastre, plastre | alabaster, plaster | Plastre pour gect de cire / Plaster for casting in wax | 125v |
| Materials | pierres, eau de roche, mabre, | stones, rock water, marble, | Paindre à huille d'esmail | 11r |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| | | | d'azur / For painting esmail d'azur in oil | |
| | pierres mineralles | mineral stones | | |
| Materials | pierres faictes d'eau appellées stuf | stones made from water called stuf | Pour grottes / For grottoes | 118r |
| Materials | pierre | stone | Pouldre d'horloges de sable / Powder for sand glasses | 10r |
| Materials, Reference | spalt, comme plastre, monceaulx & pierres, la pierrerie | spalt, like plaster, mounds & stones, from the quarry, sal ammoniac | Spalt / Spalt | 108r |
| Materials | | | | 107v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| | Le spat est une pierre blanchastre | Spalt is a whitish stone | Pour prendre lezards et serpents / For catching lizards and snakes | |
| Materials, Tools and Supports | alum de plume, en pierre, mabre | feather alum, of stone, marble | [continued entry] | 107v |
| Materials | pierre | stone | Le plastre / Plaster | 106v |
| Materials | pierres, gros gravier | stone | Tuiles/ Tiles | 106v |
| Materials (pulverized) | en pierre | from stone | Plastre / Plaster | 106v |
| Materials (pulverized), Reference | pierre ponce, co{mm}e caillou à foeu | pumice stone, like fire stone | Topasse / Topaz | 101v |
| | | | | 100v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Gemstones, Materials (calcined) | rubis, esmerauldes, caillou blanc calciné, caillous | rubies, emeralds, white calcined pebbles, pebbles | Pierrerie / Gemstones; Pour ruby prens de l'or en fœille / For ruby take some gold leaf | |
| Materials (melted, pulverized) | caillou, caillou blanc calciné | pebbles, white calcined pebbles | Le salpestre vitrifié / Vitrified saltpeter | 100r |

## Tools and Supports

Another common use of stone in Ms. Fr. 640 is as a tool or support. By tool, I refer to instruments that aid the performance of actions on another material; by support, I refer to surfaces or objects used to hold materials used in a technique or procedure. The author-practitioner refers most frequently within this

category to using “the marble,” understood to be a marble slab. Calling these supports “the marble” or “a marble” instead of “marble slab” or simply “slab” is a shorthand (“marble slab” shortened to “the marble”) that calls attention to marble’s ubiquity as a surface against which materials can be worked.9 “The marble” appears in entries across the manuscript, with uses ranging from the cutting of printing plates to the grinding of sand.

Other stones functioned similarly to marble. The author-practitioner also mentions porphyry and slate in several entries that require slab supports. In “Sand from pulverised rock salt and sand from the mine finely ground on marble” (fol. 88v (http://edition640.makingandknowing.org/#/folios/88v/f/88v/tl)), instructions for first “grinding” on marble and then “reworking” on porphyry suggest an implied hierarchy and complementarity of hard, polished surfaces used in conjunction with one other.10 Such surfaces, used to grind, mix, and form oils and pigments, were indispensable in the workshop and had inherent properties, especially the (in)ability to hold heat. For instance, marble is a cool, hard surface that can hold a high polish and efficiently dissipate heat. This makes it suitable for grinding and polishing,

processes that generate heat through friction. Slate, in contrast, is exploited for the opposite property—its ability to retain heat (fol. 140r (http://edition640.makingandknowing.org/#/folios/140r/f/140r/tl)).

In addition to stone slab tools and supports, several mentions of specific tools appear sporadically, such as a single instance of a "magnet" and a "sharpening stone," as well as several mentions of a "mortar" with its composition unspecified.

## Stone and associated terms as tools and supports in Ms. Fr. 640

Transcriptions and translations from 2017 version of Ms. Fr. 640.

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Materials (pulverized), Tools and Supports | le cristallin, pierre de touche | cristallin, touchstone | Dorer ta moleures de tableaux sans or / Gilding your molding | 99v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| | | | for panels without gold | |
| Materials (pulverized), Tools and Supports | pierre la meule pour la faire trancher, pierre de foule, esmeril, croye | grindstone, thunderstone, emery, chalk | Fourbisseur / Furbisher | 95r |
| Materials (pulverized), Tools and Supports, Reference | sel armoniac, mabre, albastre, co{mm}e pierre | sal ammoniac, marble, alabaster | Sel armoniac et albastre / Sal ammoniac and alabaster | 89v |
| Materials (pulverized); Tools and Supports | ocre, goume, mortier de pierre | ocher, alum, stone mortar | Pour faire bronze en couleur d'or / For making | 78v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| | | | bronze in gold color | |
| Tools and Supports, Materials (pulverized) | mabre, en pierre, tuf | marble, in stone, stuf | Sable / Sand | 69r |
| Tools and Supports, Materials | porphire, mabre, ardoise pilée | porphyry, marble, crushed slate | Sable / Sand | 68v |
| Tools and Supports, Materials | mabre | marble | Stuc pour mouler / Stucco for molding | 29r |
| Tools and Supports, Materials | mabre | marble | Stuc pour mouler / Stucco for molding | 29r |
| Materials (pulverized), | arcenic, mabre | | Carnation d'arsenic / | 13r |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Tools and Supports | | agate<br>diamond<br>alabaster | Carnation from arsenic | |
| Materials (pulverized), Tools and Supports, Reference | arcenic, mabre, agathe | arsenic, marble, agate | Pour blanchir enlilanroc / For whitening enilanroc | 12v |
| Materials, Tools and Supports | alum de plume, en pierre, mabre | feather alum, of stone, marble | [continued entry] | 107v |

## Stone as a Matrix: Impressions and Molds

Stone is used as an intermediary material in processes that involve impressing or transferring an image (fol. 11v (http://edition640.makingandknowing.org/#/folios/11v/f/11v/tl)), copying patterns (fol. 51r (http://edition640.makingandknowing.org/#/folios/51r/f/51r/tl)), or the use of stone as a mold (fol. 49r (http://edition640.makingandknowing.org/#/folios/49r/f/49r/tl)). In each of these

capacities it acts as a matrix. The term “matrix” is most often associated with printmaking, in which context it refers to the metal plate into which a design is etched or engraved. A matrix however can be conceived as any type of mold that holds impressions to be cast, shaped, or printed.11 Stone serves as a matrix in all such capacities in the manuscript. Like wax, paper, plaster, stucco, oyster shells, cuttlefish bone, and bread, it is recognized as capable of holding impressions.

## Stone as matrix in Ms. Fr. 640

Transcriptions and translations from 2017 version of Ms. Fr. 640.

| Category | Terms (French) | Used | Terms (English) | Used | Title | Folio |
|---|---|---|---|---|---|---|
| Matrix | pierre | | stone | | Mirouers d'acier / Steel Mirrors | 5r |
| Matrix | pierre morte | porte | pierre morte | porte | Pintiers / Pewterers | 28v |
| Matrix | pierre | | stone | | Plomb, estaim / Lead, tin | 48v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Matrix | en pierre | in stone | Gect de plomb / Casting of lead | 49r |
| Matrix | en pierre | in stone | Pintiers / Pewterers | 49r |
| Matrix | en pierre d’Istre | in stone from Istre | Mouler fort tanvre co{mm}e font les bimbalotiers / Molding very thin like bimbalotiers do | 169v |
| Matrix | en pierre | in stone | Sur pierre l{ett}re noire / On Stone Black Letters | 46v |

## Gemstones

Gemstones occupy a separate category in period ontologies of stone due to their properties of color, hardness, and clarity.

Agricola describes four genera of stones in De natura fossilium: common stone, gems, marble—which have the brilliance of gems and are defined by their place of origin—and rocks, which differ from stones.12 Gemstones appear in Ms. Fr. 640 in entries with instructions to augment their brilliance through polishing, or to counterfeit them from glass and more common stones. In both cases, the author-practitioner demonstrates a desire to exploit or imitate the optical qualities of gemstones as well as to share his practical knowledge of the lapidary arts. The working of gemstones is predicated on thorough knowledge of stone characteristics: lapidaries leverage the intrinsic hardness of grits and stones to cut, shape, and polish natural materials into objets d'art. Some of this knowledge is discernible in Ms. Fr. 640.13

## Gemstones in Ms. Fr. 640

Transcriptions and translations from 2017 version of Ms. Fr. 640.

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Gemstones | saphir | sapphire | Saphir / Sapphire | 2v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Gemstones | esmeraldes, minium, {christ}al, marbre | emeralds, minium, crystal, marble | Esmeraldes de Brissac / Emeralds of Brissac | 2v |
| Gemstones | doublets | doublets | Doublets / Doublets | 7r |
| Gemstones | ruby | ruby | Polissement du ruby balay / Polishing of the balas ruby | 8v |
| Gemstones | pierres | stones | Polissement de pierres / Polishing of stones | 8v |
| Gemstones | pierres, jaspe, cornalines | stones | Jaspe contrefaict / Counterfeit jasper | 10r |
| Gemstones | pierre | stone | | 11v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| | | | Pour poinctes de diamants à graver / For diamond points for engraving | |
| Gemstones | pierre | stone | Roue de cuivre à polir / Polishing wheel of copper | 11v |
| Gemstones | | | | 12v |
| Gemstones | | | | 13r |
| Gemstones | pierres | stones | Polisseme{n}t de pierres / Polishing of stones | 13r |
| Tools and Supports | escaille | shale | Paindre d'aprest / Painting on glass | 31v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Gemstones | pierreries | gemstones | Foeilles pour les pierreries / Leaves for the gemstones | 37r |
| Gemstones | pierreries | gemstones | Saphir / Sapphire | 38r |
| Gemstones | | | Saphir / Sapphire | 38r |
| Gemstones | | | Ambre / Amber | 38r |
| Gemstones, Reference | pierre, saphir, esmery, eaulx marines | stone, sapphire, emery, aquamarine | Saphir / Sapphire | 38r |
| Gemstones, Reference | ambre, semble pierre de mabre | amber, resembles marble stone | Ambre / Amber | 38r |
| Gemstones | pierrerie | gemstone | | 40v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| | | | Croix des commandeurs de Malte / Cross of the commanders of Malta | |
| Gemstones | 43v | | | 43v |
| Gemstones | ambre | amber | Ambre / Amber | 71r |
| Reference | couleur d'ardoise obscure, retire à l'ardoise | color of dark slate, resemble slate | Fondeurs de menus ouvrages d’estaim / Founders of small tin works | 80v |
| Gemstones | pierreries | gemstones | Pierreries / Gemstones | 100r |
| Gemstones | caillous blancs, esmeraulde | white pebbles, emerald | Pierrerie / Gemstone | 100v |
| Gemstones | ruby | ruby | | 100v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| | | | Pour ruby prens de l’or en fœille / For ruby take some gold leaf p1 | |
| Gemstones, Materials (calcined) | rubis, esmerauldes, caillou blanc calciné, caillous | rubies, emeralds, white calcined pebbles, pebbles | | 100v |
| Gemstones | ruby | ruby | Pour ruby prens de l’or en fœille / For ruby take some gold leaf p2 | 101r |
| Gemstones | pierreries, caillous, esmeraulde, | gemstones, pebbles, emerald, | Topasse / Topaz | 101r |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Gemstones | topase, ruby, ambre, pierre à feu, pierre ponce | topaz, ruby, amber, firestone, pumice | | |
| Gemstones | jacinthe, ruby | jacinth, ruby | Jacinthe / Jacinth | 101v |
| Gemstones | lames de foeilles de pierrerie | sheets from gemstones | Medailles destampe par la cire / Medals stamped from the wax | 120r |
| Gemstones | pierrerie | gemstone | Animaulx gectés en cuivre / Animals cast in copper | 129v |

## Stone as Reference

The ubiquity of stone, as well as the familiarity with its varieties and the language used to describe it, enables its use as a

reference. The author-practitioner uses stone-related terms and analogies to refer to visual properties (“slate-colored”) and physical properties (“hard as stone”). In this regard, he uses this broadly conceived material to mediate between familiar and unknown or less familiar processes and ingredients. Stone shares this function as mediating material with bread and textiles.14 Touchstone, for example, is not referred to in relation to its conventional use in testing alloyed metals, but instead in pulverized form or as a point of reference. Touchstone was a familiar tool to the author-practitioner and, presumably, to his readers. In the entry “Color of Damascus steel on knives,” fol. 11v (http://edition640.makingandknowing.org/#/folios/11v/f/11v/tl), the author-practitioner relates that gold and silver “will touch as on a touchstone” on the prepared surface of a knife. A potentially unfamiliar process (possibly “false damascening”) is bridged with common artisanal knowledge (the function of a touchstone) in order to communicate the effect of a specific step in this process.

## Stone as reference in Ms. Fr. 640

Transcriptions and translations from 2017 version of Ms. Fr. 640.

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Gemstones, Reference | pierre, saphir, esmery, eaulx marines | stone, sapphire, emery, aquamarine | Saphir / Sapphire | 38r |
| Gemstones, Reference | ambre, semble pierre de mabre | amber, resembles marble stone | Ambre / Amber | 38r |
| Materials, Reference | spalt, comme plastre, monceaulx & pierres, la pierrerie | spalt, like plaster, mounds & stones, from the quarry, sal ammoniac | Spalt / Spalt | 108r |
| Reference | pierre de touche | touchstone | Couleur dacier de damas sur costeaulx / Color | 11v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| | | | of damascene steel on knives | |
| Reference | imitier l'albastre | imitate alabaster | Papier / Paper | 12r |
| Reference | dur comme mabre | hard as marble | Masque in promptu / Impromptu mask | 84v |
| Reference | mabre, co{mm}e albastre | marble, like alabaster | Sel à fayre fondre / Sand for Melting | 101v |
| Reference | ferme co{mm}e une pierre | firm as stone | Faire courre l'or pour gect / Making gold run for casting | 106r |
| Reference, Tools and Supports | pierre, roche, forme en pierre | quarry, rock, in the form of rock, porphyry | Sable mineral / Mineral sand | 88v |
| | | | | 12v |

| Category | Terms Used (French) | Terms Used (English) | Title | Folio |
|---|---|---|---|---|
| Tools and Supports, Reference | agathe, diamant, alabastre | arsenic, marble, agate, diamond | Pour blanchir enlilanroc / For whitening enilanroc | |
| Tools and Supports, Reference | pierres de filieres, couleur d'ardoise. | pierres de filieres, slate-colored | Sable / Sand | 71v |
| Tools and Supports, Reference | sur des pierres de quoy, pierre, couleur d'ardoise obscure | sharpening stone, stone, color of dark slate | Fondeurs de menus ouvrages d’estaim / Founders of small works of tin | 80v |

## Stone Transformed: Learning from Nature

Stone can undergo transformations that challenge the notion of its status as a single or static entity. To understand what this means, we must first look to the nature of stone: the

identification of stone can depend on properties unfamiliar to modern readers. Agricola, his learned contemporaries, and artisans identified stones by color, brilliance, smell, taste, and touch as well as qualities such as “fatty” and “lean.”15 This shared epistemology is exemplified in the author-practitioner’s instructions on counterfeit stones, for instance, counterfeit jasper, which is understood as jasper on the basis of its ability to imitate the nature and visual properties of this stone, such as “luster & fatty polish” (fol. 10r (http://edition640.makingandknowing.org/#/folios/10r/f/10r/tl)).16 Tests used on, and qualities associated with, stone are shared by other materials. The human body and analogies to its nutriment are recurring points of reference. The author-practitioner writes that the “goodness” of pastel woad (fol. 39r (http://edition640.makingandknowing.org/#/folios/39r/f/39r/tl)) “is known when, put in the mouth, it gives a taste as of vinegar, or when crumbling & breaking it, it has some mold-like veins which are as if golden or silver.” Stone, like woad, was described to have “veins;” its vascular network was formed by “juice of the earth” flowing as blood in the body. Like a living body, the earth and its materials were thought to be dynamic and capable of growth.17

Features of stone also point to a fundamental compaction that occurs during a material's formation in the earth. The author-practitioner considers "rock" (*rocher*) descriptive of a formal as opposed to an intrinsic property, consistent with the Aristotelian view of stone as consolidated matter. He recommends, for example, that "mineral sand" be taken in one piece, "as if from a quarry [*quarre*] or rock [*rocher*] formation" (fol. 88v (http://edition640.makingandknowing.org/#/folios/88v/f/88v/tl)). The "signs of its goodness" are seen in its form as a mass, "that when removing in the form of rock, it comes out in lumps and pieces which demonstrates its bond, & that it is not too lean" (fol. 88v). The "Sand from a mine in Thoulouse" (fol. 84r (http://edition640.makingandknowing.org/#/folios/84r/f/84r/tl)) found in the depths of the earth is valuable because it comes out in compacted lumps. And, even lean soil can give forth valuable masses that come "off in large lumps like stones of *tuf*" (fol. 69r (http://edition640.makingandknowing.org/#/folios/69r/f/69r/tl)). On fol. 69r, the author-practitioner makes a comment that shows his conceptualization of the genesis of stone; he sees stone as generated from the consolidation of sand: "since it [sand] comes out in large lumps one would say it starts to take shape as a stone" (fol. 69r). It thus follows that the hardest and therefore best plaster is "as firm as stone" (fol. 106r (http://

edition640.makingandknowing.org/#/folios/106r/f/106r/tl)). The author-practitioner seems to be posing the setting of plaster as an imitation of the generation of stone out of sand. This is consonant with his view that plaster is a sand (*sable*), just like other sands for making molds. These passages reveal a key feature in the author-practitioner's ontology of stone.

Ms. Fr. 640 reveals a conception of stone formed through practice and experience—both in the workshop and in nature. Stone is understood to be determined by its formation in the earth, which yields certain physical and visual qualities. Beyond this ontological conception, Ms. Fr. 640 also reveals that stone possesses diverse properties and qualities in the workshop according to its use as a material, a tool, and a matrix. As a reference material, stone helps bridge familiar and unfamiliar artisanal knowledge and practices. The various uses of stone contained in Ms. Fr. 640 collectively demonstrate the author-practitioner's knowledge of the material properties of stone; a knowledge that underlies the rich potential of stone to be manipulated by the hand of the artisan.

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