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
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
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 kinds of metals to wood & other things	7v
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
Materials (pulverized),	pierre la meule pour la faire trancher, pierre de foule, esmeril, croye	grindstone, thunderstone, emery, chalk	Fourbisseur / Furbisher	95r

Category	Terms Used (French)	Terms Used (English)	Title	Folio
Tools and Supports				
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
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 your molding for panels without gold	99v
Materials (pulverized), Tools and Supports, Reference	arcenic, mabre, agathe	arsenic, marble, agate	Pour blanchir enlilanroc / For whitening enilanroc	12v
Materials (pulverized), Tools and	sel armoniac, mabre, albastre, co{mm}e pierre	sal ammoniac, marble, alabaster	Sel armoniac et albastre / Sal ammoniac and alabaster	89v

Category	Terms Used (French)	Terms Used (English)	Title	Folio
Supports, Reference				
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
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 boys & aultre chose / For giving the color of all kinds of metals to wood & other things	7v
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
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

Category	Terms Used (French)	Terms Used (English)	Title	Folio
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 cannon over land	25r
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
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 animal one has not got	140r
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

Category	Terms Used (French)	Terms Used (English)	Title	Folio
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
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	Le spat est une pierre blanchastre	Spalt is a whitish stone	Pour prendre lezards et serpents / For catching lizards and snakes	107v
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
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	100v
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 for panels without gold	99v
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 bronze in gold color	78v
	mabre, en pierre, tuf	marble, in stone, stuf	Sable / Sand	69r

Category	Terms Used (French)	Terms Used (English)	Title	Folio
Tools and Supports, Materials (pulverized)				
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), 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, 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 Used (French)	Terms Used (English)	Title	Folio
Matrix	pierre	stone	Mirouers d'acier / Steel Mirrors	5r

Category	Terms Used (French)	Terms Used (English)	Title	Folio
Matrix	pierre porte morte	pierre porte morte	Pintiers / Pewterers	28v
Matrix	pierre	stone	Plomb, estaim / Lead, tin	48v
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
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

Category	Terms Used (French)	Terms Used (English)	Title	Folio
Gemstones	pierres, jaspe, cornalines	stones	Jaspe contrefaict / Counterfeit jasper	10r
Gemstones	pierre	stone	Pour poinctes de diamants à graver / For diamond points for engraving	11v
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
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	Croix des commandeurs de Malte / Cross of the commanders of Malta	40v
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	Pour ruby prens de l’or en fœille / For ruby take some gold leaf p1	100v
				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		
Gemstones	ruby	ruby	Pour ruby prens de l'or en fœille / For ruby take some gold leaf p2	101r
Gemstones	pierreries, caillous, esmeraulde, topase, ruby, ambre, pierre à feu, pierre ponce	gemstones, pebbles, emerald, topaz, ruby, amber, firestone, pumice	Topasse / Topaz	101r
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

Category	Terms Used (French)	Terms Used (English)	Title	Folio
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 of damascene steel on knives	11v
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
Tools and Supports, Reference	agathe, diamant, alabastre	arsenic, marble, agate, diamond	Pour blanchir enlilanroc / For whitening enilanroc	12v
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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1. Pamela H. Smith, "The Codification of Vernacular Theories of Metallic Generation in Sixteenth-Century European Mining," in *The Structures of Practical Knowledge*, ed. Matteo Valleriani (Switzerland: Springer International Publishing, 2017), 386. See also Pamela H. Smith, "The Matter of Ideas in the Working of Metals," *The Matter of Art: Materials, Practices, Cultural Logistics, c. 1250-1750*, edited by Christy Anderson, Anne Dunlop and Pamela H. Smith (Manchester: Manchester University Press, 2015), 42-67.↩

2. Aristotle, *Meteorologica*, 6:5, trans. H. D. P. Lee (Harvard University Press: Loeb Classical Library), 287. See also D. H. Eichholz, "Aristotle's Theory of the Formation of Metals and Minerals," *The Classical Quarterly* 43.3 (1949): 144.↩

3. Nicoletta Morello, "Agricola and the Birth of Mineralogical Sciences in Italy in the Sixteenth Century," *Geological Society of America* 411 (2006): 26.↩

4. Knowledge of stones, minerals, and metals were important to the financial interests of mine shareholders and miners. See Smith, "Codification of Vernacular Theories of Metallic Generation," 374-77.↩

5. Smith, "Codification of Vernacular Theories of Metallic Generation," 374. For a translation, see Georgius Agricola, *De natura fossilium*, translated from the First Latin Edition of 1546 by M. C. Bandy and J. A. Bandy (Geological Society of America, 1955).↩

6. Pamela O. Long, *Openness, Secrecy, Authorship: Technical Arts and the Culture of Knowledge from Antiquity to the Renaissance* (Baltimore: Johns Hopkins University Press, 2001), 184.↩

7. I searched in English and French for alabaster, basalt, flint, granite, limestone, marble, porphyry, breccia, carrara, onyx, sandstone, shale, slate, travertine, and tufa.↩

8. Aristotle, *Meteorologica*, 6:5, trans. Lee, 287.↩

9. This shorthand is also used in English, though first documented in 1670. See *OED Online*, s.v. "marble," www.oed.com (http://www.oed.com), definition 7a: "slab of marble on which something can be worked; esp. one on which paints are ground, or on which blown glass is shaped."↩

10. "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) continues, "The one and the other, once very finely ground on marble, after having thoroughly pestled them dry & beaten in the mortar, I mixed as much of one

as the other, and having reworked them together on porphyry, & passed them through a double sieve or through the sleeve of a shirt to mix them even better."↩

11. Print technology and the engraving of seals in stone share the same basic principle of engraving an image in relief and transferring that image onto another medium. On the long history of printing, broadly conceived, see Ad Stijnman, *A History of Engraving and Etching Techniques: Developments of Manual Intaglio Printmaking Processes, 1400–2000* (London: Archetype Publications, 2012).↩

12. Georgius Agricola, *De natura fossilium*, Book VI, *De natura fossilium*, trans. from the First Latin Edition of 1546 by M. C. Bandy and J. A. Bandy (Geological Society of America, 1955), 83.↩

13. On polishing and engraving gemstones, see Angel Jiang, "Polishing and Engraving Stones," in *Secrets of Craft and Nature in Renaissance France. A Digital Critical Edition and English Translation of BnF Ms. Fr. 640*, ed. Making and Knowing Project, et al. (New York: Making and Knowing Project, 2020), https://edition640.makingandknowing.org/#/essays/ann_074_fa_18 (https://edition640.makingandknowing.org/#/essays/ann_074_fa_18).↩

14. See Emma Le Pouésard, "Bread as Mediating Material: Tactile Memory and Touch," in *Secrets of Craft and Nature in Renaissance France. A Digital Critical Edition and English Translation of BnF Ms. Fr. 640*, ed. Making and Knowing Project, et al. (New York: Making and Knowing Project, 2020), https://edition640.makingandknowing.org/#/essays/ann_050_fa_16 (https://edition640.makingandknowing.org/#/essays/ann_050_fa_16), and Sophie Pitman, "Black Color for Dyeing, and the Place of Textiles in Ms. Fr. 640," in *Secrets of Craft and Nature in Renaissance France. A Digital Critical Edition and English Translation of BnF Ms. Fr. 640*, ed. Making and Knowing Project, et al. (New York: Making and Knowing Project, 2020), https://edition640.makingandknowing.org/#/essays/ann_036_sp_16 (https://edition640.makingandknowing.org/#/essays/ann_036_sp_16).↩

15. Smith, "Codification of Vernacular Theories of Metallic Generation," 376.↩

16. See Ana Estrades, "Jasper Imitation on Horn," in *Secrets of Craft and Nature in Renaissance France. A Digital Critical Edition and English Translation of BnF Ms. Fr. 640*, ed. Making and Knowing Project, et al. (New York: Making and Knowing Project, 2020), https://edition640.makingandknowing.org/#/essays/ann_028_fa_15 (https://edition640.makingandknowing.org/#/essays/ann_028_fa_15), and Isabella Lores-Chavez, "Imitating Raw Nature," in *Secrets of Craft and Nature in Renaissance France. A Digital Critical Edition and English Translation of BnF Ms. Fr. 640*, ed. Making and Knowing Project, et al. (New York: Making and Knowing Project, 2020), https://edition640.makingandknowing.org/#/essays/ann_045_fa_16 (https://edition640.makingandknowing.org/#/essays/ann_045_fa_16). See also Pamela H. Smith and Isabella Lores-Chavez, "Counterfeiting Materials, Imitating Nature," in Marjolijn Bol and Emma Spary, eds., *The Matter of Mimesis* (Leiden: Brill, 2023).↩

17. Smith, "Codification of Vernacular Theories of Metallic Generation," 380.↩

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