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FROM GEOLOGY TO ART HISTORY: CERAMIST ALEXANDRE BRONGNIART’S OVERLOOKED CONTRIBUTION TO THE DEVELOPING SCIENCE OF ART HISTORY IN THE EARLY NINETEENTH CENTURY

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THESIS

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Arts in the College of Fine Arts at the University of Kentucky

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ABSTRACT OF THESIS

FROM GEOLOGY TO ART HISTORY: CERAMIST ALEXANDRE BRONGNIART’S OVERLOOKED CONTRIBUTION TO THE DEVELOPING SCIENCE OF ART HISTORY IN THE EARLY NINETEENTH CENTURY

Alexandre Brongniart was known for his work as an important geologist and as an administrator at the Sèvres Porcelain Manufactory, but his roles as art historian and museologist are overlooked. Brongniart created a holistic methodology taken directly from science and applied it to ceramic art of all cultures and eras. He had a uniquely modern perspective on time, world culture, and archeology. Brongniart wrote about the art of Asia and the Americas on an equal status with that of the Classical West at least fifty years before it became a mainstream idea. Brongniart integrated scientific principle and practice into the structure of the Sèvres Museum and a comprehensive set of books which includes Traité de Mineralogie avec des Applications aux Arts, Traité des Arts Ceramiques, and Description Methodique du Musée Ceramique de la Manufacture Royale de Porcelain de Sèvres. Numerous historians were influenced by Brongniart’s work, including Samuel Birch and Albert Jacquemart. Notably, the art historian Gottfried Semper refocused his ideas for Style in the Technical and Tectonic Arts after seeing the completed works of Brongniart. Although contemporary historians credit Semper with the development of a scientific approach to art history, Semper himself frequently acknowledged the importance of Brongniart’s work.

Julia Anne Carr-Trebelhorn
8 MAY 2014
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Section One: Introduction

Alexandre Brongniart (10 February 1770 – 7 October 1847) is well known as a geologist and a scientist, and his contributions to these fields are indispensable. Additionally, his forty-seven years as the Director of the Sèvres Manufactory during the early nineteenth century are well regarded among specialists in ceramics and the decorative arts. However, his role in the development of art history, and particularly in applying scientific principles to art historical and archaeological objects, has been minimized or overlooked. Although he founded the first research center and museum for ceramics and wrote an encyclopedic seven-volume set of books on ceramics and related materials, his work has not received the critical study it deserves. In looking at the writings of Brongniart and the scientific methodology he applies to the ceramic objects from around the world collected for the museum, I hope to shed light on the true impact of his contribution to the study of art history.

Alexandre Brongniart’s research and writings constitute a substantial contribution to art history, in which Brongniart created a synthesis of world knowledge in ceramics and established an underlying logic for treating all ceramic materials and ceramic art. His comprehensive approach paralleled similar research styles prevalent among the work of his colleagues in the French scientific academy for fields such as geology, biology, and other nascent sciences of the early nineteenth century. Brongniart’s work signaled a new approach to art history. By working as a scientist, and using elemental and mineralogical characteristics as a starting point, Brongniart demonstrated a clear shift away from thinking that implicitly relied on the dominance of Western art, instead utilizing a taxonomy in which development in ceramics is viewed globally. In this context, I will examine Brongniart’s
encyclopedic writings on ceramics, in particular Description Méthodique du Musée Céramique de la Manufacture Royale de Porcelaine de Sèvres, the catalog raisonné he created for the Sevres museum, Traité des Arts Céramiques, ou des Poteries, Considérées dans leur Histoire, leur Pratique, et leur Théorie, plus the accompanying third volume, the Atlas, as well as the comprehensive two-volume Traité Élémentaire de Minéralogie avec des Applications aux Arts, written in 1807 as a textbook for the French national lycées. These books were the definitive texts on nineteenth century ceramics at the time of their publication and provided comprehensive, open information, including the most recent research and technology in contemporary factories.¹,²,³

The museum at Sèvres and Brongniart’s series of books on ceramics were the first of their kind in many ways. The museum brought together artifacts from discoveries around the world, and classed them by their material natures, down to their newly identifiable elemental characteristics, rather than by their stylistic commonalities or their geographical origins. This diverse collection enabled comparative study of ceramics for its global technical and stylistic development in a method directly analogous to those established by scientists, including naturalist and zoologist Georges Cuvier.⁴ Brongniart was the first author


³ For a deeper discussion of Brongniart’s fieldwork in geology and archaeology, see Martin J.S. Rudwick, Worlds Before Adam: Reconstruction of Geohistory in the Age of Reform. (Chicago: The University of Chicago Press, 2010).
to consider the science behind ceramics in order to establish a chemical and mineral basis for the artifacts in the museum collection, as well as to provide technical information for use in the manufacture of pottery and art objects. By creating a scientifically based taxonomy, Brongniart was able to make novel connections among world ceramics, which gave him a unique global perspective on the development of the arts.

There are diverse approaches to Brongniart’s *Arts Cèramiques*. It can be read for its practical scientific and industrial information, and was intended as a resource for smaller independent potteries and large-scale manufacturers alike. It was also intended as a historical record, and this aspect can be appreciated not only by ceramics makers but also by archaeologists, anthropologists, historians, and artists, among others. Additionally, the museum catalog and the *Atlas* to the *Traité* contain diverse images that were intended to entertain and amuse, as well as to educate, an interested or a polite public. Only two partial translations were made of the seven-volume series of books published at Sèvres. A small book, *Coloring and Decoration of Ceramic Ware* was adapted from Book III of the *Traité des Arts Cèramiques* and translated into both English and German.5 This book clearly catered to an audience of artists and amateurs alike who could benefit from the instructional nature of this smaller text without the expense or complexity of the larger series of books.

There is a short list of modern texts that examine the work of Brongniart. Only relatively recently, in 1997, the first major exhibition based on Brongniart’s prodigious, forty-

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seven year career at Sèvres was organized at the Bard Graduate Center in New York. The catalog for the exhibition, *The Sèvres Porcelain Manufactory: Alexandre Brongniart and the Triumph of Industry, 1800-1847*, acknowledges that his work has long been overlooked and also points to the necessity for a greater understanding of Brongniart’s contributions to the arts.\(^6\) This collection of essays pulls together entries from diverse scholars who contribute to a picture of both Brongniart and Sèvres in the nineteenth century, but none approach his writings on ceramics with a view to their place in the development of art history. The seventeen years that have lapsed since that exhibition have not seen a great expansion in the study of his writings on ceramics or his career as a museologist. Martin J.S. Rudwick’s *Worlds Before Adam* traces Brongniart’s important geological discoveries and archaeological work, particularly emphasizing the research he did jointly with Cuvier. Importantly, this work later included Brongniart’s son, the noted paleobotanist Adolphe Brongniart.\(^7\) This insight into his geologic research gives a deeper understanding of Brongniart’s related work in ceramic history. Brongniart sought material evidence that related to the understanding of geology and time; as such, ceramics could not only be discussed for their artistic merits, but also for their ability to connect the present with a historical past.

Nineteenth and early twentieth century writers were much more cognizant of, challenged by, and indebted to Brongniart’s encyclopedic writings on ceramics. Albert Jacquemart’s well-received *Histoire de la Céramique* in 1873 was based heavily on the work and

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\(^6\) Préaud, *Sèvres Porcelain Manufactory*.

collections of Brongniart. Additionally, several English writers on ceramics cited Brongniart in their own research, including Samuel Birch in his 1858 *History of Ancient Pottery*, Joseph Marryat in his 1857 *History of Pottery and Porcelain: Mediaeval and Modern*, and C. Drury E. Fortnum’s 1873 publication *A Descriptive Catalogue of the Maiolica: Hispano Moresco, Persiam, Damascus, and Rhodian Wares.* Perhaps most telling is the entry for *Arts Cérami ques* found in L.M.E. Solon’s nearly 650-page 1910 bibliography *Ceramic Literature*, written over 60 years after Brongniart’s first publication:

If one single book had to be selected to represent ceramic literature in a miscellaneous library, if a student of pottery manufacture had to part with all of his technical works save one, we have no hesitation in saying that the choice should fall upon Brongniart’s *Traité des Arts Céramiques*. Before Brongniart gave to the learned world a treatise which was to raise the potter’s art to the level of a science, nothing but desultory attempts had been made to gain that end.

Notably, the German architect and historian Georges Semper, considered one of the first writers to apply a scientific approach to the study of the history of art, repeatedly cites Brongniart’s historical writing on ceramics in his influential 1860 text, *Style in the Technical and Tectonic Arts, Or, Practical Aesthetics*.

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12 Louis Marc Emmanuel Solon. *Ceramic Literature: an Analytical Index to the Works Published in All Languages on the History and the Technology of the Ceramic Art; Also to the Catalogues of Public Museums, Private Collections, and of Auction Sales in Which the Description of Ceramic Objects Occupy an Important Place; and to the Most Important Price Lists of the Ancient and Modern Manufactories of Pottery and Porcelain.* (London: Charles Griffin, 1910), 58.

historian, later influencing Alois Reigl and Heinrich Wölfflin, but it is evident that
Brongniart’s work is an indispensable first step in the creation of a scientific approach to art
history. Semper had a number of personal reasons to be familiar with Brongniart’s work. In
1849 he lived in Sèvres and was able to frequent the museum collections Brongniart
established there. However, biographer and Semper scholar Harry Francis Mallgrave has
not fully acknowledged or explored this relationship, and credits Semper’s “scientific” style
to Semper’s early visits to Cuvier’s laboratories in the late 1820s, more than twenty years
before Semper would revise and publish his 1852 book Wissenschaft, Industrie und Kunst
(Science, Industry, and Art). It is a substantial omission considering the thematic links
between Semper’s thesis and the complete works of Brongniart, as well as the distance in
time from Semper’s early visits to Cuvier’s laboratories.

In this paper I will look at the plates Brongniart has assembled in both the Atlas to
Traité des Arts Céramiques and in the museum catalog to establish the underlying scheme that
unifies the collections. I will examine the textual evidence Brongniart provides, particularly
the authorities he cites and the goals he expresses in the text. Additionally, because science
is integral to his work as a ceramist, I will look at the texts he published in geology and
mineralogy for the commonalities between his art historical writing and his scientific writing.
With these methods, I hope to place Brongniart into a context that is clearly
interdisciplinary, and that demonstrates his connection to not only science and archaeology,

14 Harry Francis Mallgrave. *Gottfried Semper: Architect of the Nineteenth Century.* (New Haven: Yale University
Press, 1996). Semper’s year at Sèvres commenced in mid-1849, almost two years after Brongniart’s death. At
this point in my research, I have not found a source that illuminates the extent of Semper’s personal
connections to Brongniart and his circle of intellectuals and scientists, but it is clear from his work and
biography that Semper shared a similar spirit of intellectual discovery. Among those whom Semper cites as
influential in an 1853 lecture include Cuvier and Alexander von Humboldt, both of whom were intimately
connected with Alexandre Brongniart and his son, Adolphe Brongniart. *(Semper 157).*

but to the development of the field of art history. Additionally, I hope to demonstrate that
he did not fall immediately into line with mainstream thought, and kept an open mind in
view of textual, archaeological, and visual evidence. For example, he openly discussed the
importance of advanced Chinese and Japanese ceramics in the development of Western art
nearly a century before it would become a widespread discussion in the arts.¹⁶

Few writers have examined these themes in Brongniart’s work, while contemporary
scholarship highlights Brongniart’s importance in his role as a scientist, geologist, and
administrator. However, I hope to show that his work was innovative in its approach to art
history, and that he had a wide global perspective that opened the door to new possibilities
in viewing developments across the entire spectrum of the arts. Brongniart relied on
scientific inquiry, and looked to the lessons of the Enlightenment while seeking out experts
from all disciplines and working toward an open exchange of information. He placed an
emphasis on seeking understanding for the benefit of society, undertook a systematic pursuit
of science, and sought to examine the artwork of world cultures with an objective and
ordered viewpoint. Brongniart’s work helped to shape modern scientific and artistic theory
beginning with the establishment of a sound and consistent basis for understanding matter
and materials, including arguing for modern systems of classification based on then newly-
identifiable elemental compositions. In ceramic science, he discovered and established an
important rheological formula that bears his name and is still in use in manufacturing today,
and also made a vast number of other advancements and discoveries, including creating new
ceramic colors and kiln technology. Finally, his diverse intellectual and practical resources

¹⁶ Alexandre Brongniart. *Arts Céramiques.* In particular, see Brongniart’s discussions on Asian porcelain and the
history of porcelain, Book 2, 423-443, 473 - 496.
provided him the ability to create a comprehensive study museum of world ceramics that was the largest and most comprehensive of its kind.
Section Two: Early Education & Experience of Alexandre Brongniart

In 1770, Alexandre Brongniart was born into a family whose accomplishments and aspirations mirrored the best of all that the Enlightenment embodied. The son of noted Parisian architect Alexandre-Theodore Brongniart and nephew of the important chemist Antoine-François Fourcroy, Alexandre Brongniart was exposed to the newest ideas in science and the arts throughout his childhood, and had access to the highest levels of educated French society both before and after the revolution. The portrait of Alexandre’s sister Louise by Elizabeth Vigee-Lebrun that now hangs at London’s National Gallery, as well as the childhood portrait busts of Alexandre and his sister by Houdon at the Louvre, serve as visual reminders of the closeness of the Brongniart family to pre-Revolution Versailles. Jacques-Louis David was employed by the Brongniart family as a private painting instructor for Louise, and both the statesman Thomas Jefferson and the chemist Antoine Lavoisier were guests in the family’s home.¹⁷ This was a rich environment to draw from, and it fostered the intellectual development of Alexandre Brongniart. Later, his appointment by Napoleon as the director of the Sèvres manufactory attests to the importance placed on the accomplishments and abilities of the still young Alexandre Brongniart. The aesthetic, social, and intellectual benefits of being nurtured by this environment are incalculable but served as a basis for all of the work Brongniart needed to accomplish at Sèvres, where he worked not only directly with Napoleon, later rulers of France, and other European heads of state, but also with a diverse group of scientists, geologists, diplomats, ship captains, artists, and technicians.

¹⁷ Préaud, Sèvres Porcelain Manufactory, 25-41.
Section Three: Brongniart at the Royal Manufactory at Sèvres

Brongniart’s first work in ceramic manufacturing began at age 30, with the task of converting the factory at Sèvres from what had been a royal endeavor engaged in the creation of luxury objects for elite consumption into a publicly-owned concern.\(^{18}\) By the end of the 1700s the Royal Manufactory at Sèvres held perhaps the highest distinction for its refined wares among all the European porcelain factories, but the revolution had suspended its work and nearly forced the institution to close permanently. With its re-establishment, the manufactory’s interests had to become more diversified and of lasting value to a broad population. As its first post-Revolution leader, Brongniart rebuilt the manufactory, and added new pursuits intended to strengthen the state-sponsored Manufactory’s new role. Meanwhile, Brongniart was given the directive to maintain only the highest standards of elegance and quality. For Napoleon and the leaders who followed, the work at Sèvres needed to be continually exemplary for both innovation and perfection.\(^{19}\) However, the creation of refined luxury wares alone was too difficult a position to maintain and justify while being heavily subsidized by the young republic. Brongniart’s diverse interests and far-reaching goals helped to provide a solid financial basis for the factory works and to create lasting works in the public interest.

At Sèvres, Brongniart was able to synthesize his ideas on ceramics and geology, and to lay the groundwork for modern ceramic science and engineering. Brongniart diversified the interests of the Manufactory without increasing its financial dependence on the government. He worked independently and with world scholars to further scientific and

\(^{18}\) Préaud, Sèvres Porcelain Manufactory, 53-63.

\(^{19}\) Préaud, Sèvres Porcelain Manufactory, 32.
industrial understanding, as well as to create an unrivalled collection of historical and
contemporary ceramics for the purpose of research. Both of these pursuits helped to carve a
prominent and well-justified position for the Manufactory. Sèvres became a global resource
for ceramic information and maintained its high standards for technology while remaining in
demand for the creation of important state gifts.

Brongniart’s own research would justify and fulfill the goals established by Napoleon
in 1800. To that end, the encyclopedic collections Description Méthodique du Musée Céramique de
la Manufacture Royale de Porcelaine de Sèvres, and Traité des Arts Céramiques, ou des Poteries,
Considérées dans leur Histoire, leur Pratique, et leur Théorie (three volumes, including the Atlas)
became the comprehensive guide to knowledge related to world ceramics. Brongniart’s
extensive research and collected writings firmly established the French concern at Sèvres as a
prominent leader in every aspect of the ceramic arts, including design, production,
engineering, classification, archaeology, history, and education.
Section Four: Early Writings of Alexandre Brongniart at Sèvres

Brongniart’s scientific work merged seamlessly with his work at Sèvres. He was an active researcher in geology and archaeology throughout his lifetime, and also was an important teacher of geology and chemistry. In the course of his work at Sèvres, he remained in dialogue with scientists and experts in diverse fields. The value of his geological research to his ceramics practice cannot be overstated. Brongniart’s writing and research provided a basis for understanding global historical developments on a geologic scale. Brongniart’s expressly modern perspective emerged from his own contributions to developing science, which were themselves decades in advance of mainstream understanding. In Brongniart’s work, ceramics have a dual role of being presented as artistic objects for modern production, as well as objects for study, as they provide evidence in historical and geological questions of archaeology. The history of the earth and civilization can be traced not only by the mineral remains of flora and fauna, but also by the remnants of material culture, of which ceramics and metals are among the most enduring.

In the early 1800s, with Georges Cuvier, Brongniart wrote an important paper, *Essais sur la géographie minéralogique des environs de Paris, avec une carte géognostique et des coupes de terrain*, that incorporated an extensive biological study. Shortly after the Paris Basin study was published, Brongniart wrote the comprehensive two-volume *Traité Élémentaire de Minéralogie avec des Applications aux Arts* as a textbook for teaching in the French national lycées. As consciously interdisciplinary as his research was with Cuvier, so, too, was this educational

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21 Georges Cuvier and Alexandre Brongniart. *Essai sur la Geographie Mineralogique des Environs de Paris*. Paris, 1811. This once-controversial treatise ultimately brought about a better understanding of then-emerging historical and scientific theories, including extinction and the nature of time itself. It was a foundational work in establishing a link between geology, biology, and the history of the earth.
text. The *Traité Elémentaire de Mineralogie* is structured as an elementary text for mineralogy. Brongniart followed the theories developed by Antoine-Laurent de Lavoisier and René-Just Haüy. Lavoisier and Haüy, exact contemporaries, were groundbreaking theorists in chemistry and mineralogy, respectively. Both advocated for the idea that there was an underlying and inviolate structure that was consistent across nature. Lavoisier classified and named a series of elements for the first time in his 1789 textbook, *Traité Élémentaire de Chimie*, known now as the very first textbook on chemistry. Haüy, too, made important discoveries in science, having taken his own empirical observations on symmetry in nature and reasoned for a similar ordered structure among minerals. By taking the singularity of chemical elements as fact, he began to unlock the basic geometries underlying crystal structures. Along with other early theorists, such as Jean-Baptiste Louis Romé de l'Isle, Haüy’s work established the basis for the field of crystallography. In 1784, Haüy wrote a groundbreaking treatise, *Essai d'une théorie sur la structure des cristaux* and, in 1801, an important five-volume text on mineralogy, *Traité de Mineralogie*, among other articles and texts in both fields. Both Lavoisier and Haüy worked on classifications for minerals and elements and searched for commonalities that would group certain elements together. At the time, the work of these two men was still considered experimental or theoretical, and not necessarily widely accepted or known beyond *l'Académie des sciences* in Paris or among similar groups.

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25 Brongniart had been in a perfect position to learn from these men at a young age. Brongniart had known Lavoisier since his earliest youth, and Haüy had joined the Academy of Sciences in 1783, where he became associated with the leading scientists of his day, including Lavoisier. Brongniart would eventually serve in a teaching post as Assistant Director of Mineralogy at the *Muséum d'Histoire Naturelle* under Haüy, who in turn took an honorary post as Director.
Brongniart adopted Lavoisier’s theories on the elements, and embraced Haüy’s work on crystalline structure. Using them as a foundation, Brongniart outlined a scheme for the classification of minerals from around the globe. Although the Periodic Table itself had not yet been invented (and would only be created as early as 1869 by Dmitri Mendeleev), Brongniart establishes that, while there are regional differences among mined materials, there are also material commonalities that linked, for example, jade from China, India, and the Americas. Brongniart was among the first to utilize chemically definable elemental characteristics to express the commonalities of (and to differentiate between) similar materials.

Traité de Mineralogie avec des Applications aux Arts

In the introductory section of Mineralogie, Brongniart establishes the basis for his logic within his study. Various topics are covered in a series of more than 130 distinct points. Brongniart explains all relevant contemporary theories concerning each topic, including those on the characterization of materials and the classification of elements. These points are divided among a series of “Articles” related to various material properties such as physical characteristics, nomenclature, classification, chemical characteristics, and structure. In this series of ideas, the core of Brongniart’s beliefs and research becomes clear: commonalities in material character define the larger characteristics of a group and the basic microscopic structure (crystalline and/or elemental) determines the potential of the larger, macroscopic whole. This type of classification system enabled new discoveries or new samples of materials to fall into existing categories without a reversal of the system. It was the simplest and, simultaneously, the most comprehensive system possible. This concrete belief in the practical truths of Lavoisier and Haüy provides the foundation for all of
Brongniart’s work, but in particular, here, it informs the second and largest section of the *Traité de Mineralogie*: a comprehensive listing of materials and their various qualities, including chemical formulae, physical characteristics, mining information, and information on their use. These are divided into larger categories, such as non-metallic salts, inorganic combustibles, and metals. These larger subgroups provide the basis for the later classifications of the periodic table. The third section is a supplement to the text, with additional material notes. Additionally, there is a set of sixteen plates depicting various subjects, including Haüy’s crystalline structures, new machinery used in mining and processing materials, and cross sections of the earth depicting the locations of various materials and strata. It is clearly intended to educate and inform interested parties and to standardize available information.

Brongniart’s earlier works help illustrate the twin driving forces of intellectual inquiry and synthesis of ideas in his approach. Where fields overlap, Brongniart seeks to draw connections that might otherwise be overlooked, and his diverse background provided a tremendous advantage in approaching the inherently interdisciplinary subject of ceramics. Brongniart’s important early publications shed light on the later five volumes that represent the culmination of his research. The geology textbook serves as a preliminary and complementary text for the major works of Brongniart at the Sèvres Manufactory and Museum.

*Traité des Arts Céramiques*

Brongniart’s final series of five books, which together form the focus of my study, begins with *Traité des Arts Céramiques, ou des Poteries, Considérées dans leur Histoire, Leur Pratique,*
et Leur Théorie, published in 1844. *Arts Céramiques* contains two volumes of text in approximately 1400 pages and a third volume (the *Atlas*), which includes charts and descriptions along with 86 plates. The plates depict all facets of ceramic production, archaeology, and use, including ceramics from foreign or historical cultures alongside those of the contemporary, global porcelain industry. In 1845, a catalogue raisonné, *Description Méthodique du Musée Céramique de la Manufacture Royal de Porcelaine de Sèvres*, was published as a complement to *Arts Céramiques*. The catalogue, co-authored by the museum’s conservator, Denis-Désiré Riocreux, includes two volumes. The first includes descriptions of objects in the museum’s collection and the second is comprised of hand colored lithographic plates depicting each item in exacting detail.26

Brongniart’s publications are not only stylistically and thematically liked, they are deeply integrated and intended to work in tandem with one another. The text of *Arts Céramiques* refers consistently to the museum collection and the plates in the *Description Méthodique*. Although the volumes on mineralogy were intended for use in the Paris public schools, the information they contain readily contributes to subjects discussed within all of the other books and is not generally repeated elsewhere. Much of the research, both historical and scientific, was based on the objects in the collections Brongniart had built for the museum during his tenure at Sèvres. Throughout each of the texts, Brongniart follows a carefully considered organizational scheme informed by his understanding of the arts, and, in character, identical to his ideas about scientific methodology.

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26 It was also published as a large, single volume.
In the ceramics texts, topics such as science, art history, archaeology, geology, and contemporary practice are addressed equally, while the plates have a broad appeal to a wide audience. The carefully rendered and richly colored drawings illustrate all aspects of the ceramic process, including mining, anthropology and archaeology, manufacturing and production processes, historical objects held in the museum, and luxury objects made at the Manufactory. It is a fascinating compendium of every aspect of the ceramic arts that could be gathered at the time, often from distant countries and cultures. Frequently, one illustration or topic has multiple levels of appeal. For example, plate XIX, (see Figure 1), depicting a large wheel-turned burial jar from Brazil, contains anthropological significance and gives insight into the materials and skills of the Brazilian potters. In addition, it has an interest for a general reader, as it is a beautifully rendered drawing that demonstrates a kind of life that is foreign and unknown.

The structure of Arts Céramiques provides technical information, historical information, and production information. The cumulative information thus provides a comprehensive manual for understanding world ceramics, with emphasis on a global perspective. The first two volumes are divided into three books: First: Historic Introduction & General Considerations, Second: Classifications of Pottery, and Third: Coloration and Decoration. Lastly, the Atlas contains a further set of tables of collected data; serves to illustrate the concepts established within the text; provides examples regarding archaeology; and shows technical information. Although the individual sections may be read out of sequence, generally the first book serves as a foundation for the second book, and reading the book in sequence would benefit readers unfamiliar with the complex nature of ceramics. The Atlas has three sections. First, data concerning research in world pottery, including
archaeology, clay mineralogy, and testing done on various potteries, has been arranged into charts. Next, the second section provides in-depth explanations for each descriptive illustration in the final section, which contains the seventy-four engraved plates.

The first book looks at the history of making ceramics, and also at the steps in processing and creating ceramics. It is, essentially, a stand-alone manual for learning about ceramic production. Each topic, from clay and glaze composition to making and firing objects, is discussed with respect to both historical and contemporary practice. In all, the first book is divided into six chapters:

I. *Introduction to the History and General Considerations:* discussions herein include etymology, historical origins of ceramic techniques, geology, and the nature of pottery

II. *Formation of Clay Bodies:* an in-depth discussion of ceramic materials, their classifications and their functions in a clay body; also included are techniques for identifying and preparing raw materials for use

III. *Making of Objects:* offers analysis of various types of construction with detailed information on the making of objects; includes hand-building techniques, wheel-throwing, moulding, and other techniques ranging from historical methods to the sophisticated and refined production techniques used at fine porcelain manufactories, including Sévres

IV. *Glazes and Vitreous Coatings:* provides generalities of glazes and production; definitions of glaze types, methods of application

V. *Firing of Clay Bodies:* outlines types of kilns and their use and construction; the loading and effective stacking of kilns, and the use of saggars; types of combustible materials to use as fuel; and ways to observe and measure firing temperatures

VI. *Properties of Clays and Glazes:* examines material properties that are preferential based on clay type and desired product; discusses chemical and mechanical changes and the effect on objects before, during, and after firing, including shrinkage and color changes; analyzes post-firing qualities, such as density, durability, and strength

The first book provides a basis for understanding ceramics production or for enriching an existing practice with new techniques. It provides an overview of diverse ceramics processes, while defining the use and the development of long-standing techniques in the

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27 Brongniart, *Arts Céramiques.*
medium. Additionally, Brongniart illuminates material qualities and technical factors that are variable, which can be manipulated with understanding in order to achieve desired results, or which can be the cause of unexpected problems. These variables can also help contribute to an understanding of archaeological materials. Throughout the text, Brongniart looks both at the past and at contemporary practice, demonstrating a cohesive approach that anticipates the diverse audience for the texts. Following the sections on raw materials and clay bodies is an extensive discussion of refining, treating, and forming the clay, often with illustrations. Brongniart has collected every type of forming method and gives extensive instructions for each process. He does likewise with firing techniques and firing equipment. He openly shares information from the factory at Sèvres, including methods and formulae that would have previously been considered proprietary secrets.

With the first book providing a technical background, the second book serves as a history and an exploration of the styles and work of various cultures and civilizations. Contemporary archaeological practice often plays a role in Brongniart’s extensive survey of global ceramic styles. Although the second book can be read without a deep technical background, an understanding of ceramic materials benefits many concepts. Brongniart frequently uses technical data such as clay formulas derived from laboratory testing as a tool in understanding the origins, production techniques, and historical styles of historical objects.

The second book traces the history of ceramics by each civilization and its technology. Style and artistic considerations are acknowledged as being defined by material character, technology, and the skill of the maker. In historic pottery examples, these factors
are demonstrated to have frequently exerted more influence on style than the surrounding cultural background. For example, porcelain requires both pure white kaolin and high firing temperatures. Styles that are borne out of imitating the whiteness or durability of porcelain, such as Delftware or white stoneware, ultimately differ both technically and aesthetically so significantly from the original that they became new styles of their own. As such, Brongniart begins with a table defining the characteristics of distinct pottery types, ranging from the most simple and common to the most complex and refined. This table (See Figure 2) further sub-classifies the types into methods of construction or of chemical nature. This comprehensive list of styles provides both an overview of the potential of ceramic production and a hierarchical list ordered by technical refinement. By the time of Brongniart’s writing, these basic types of pottery were generally understood, but his list represents the first concise outline and development of fixed categories. At the bottom, and the least rare, is unfired or low-fired earthenware without glaze, followed by glazed earthenware. The categories move progressively upwards through the types of stoneware into types of porcelain and whiteware. The hierarchy works equally for technological complexity, firing temperature, and material purity. This gives weight to the importance of understanding the science behind the objects and, in part, privileges the complex understanding, refined materials, and expensive technology needed to create refined objects such as porcelains. Once this underlying scheme is established, each “Order” is explored by culture or geographic region in detail. However, Brongniart establishes that it is not a particular geographic boundary that typifies a pottery style, but also cultural ties and aesthetic considerations. Thus, a Germanic pottery might be found in a region in France.

28 Jacquemart, “Technologie”
29 Brongniart, Arts Céramiques, V.1, XVII-XVIII.
Brongniart’s hierarchy echoes the developments taking place in biological science at the time.\(^{30}\) In the introduction to *Arts Céramiques*, Brongniart acknowledges his appreciation for the classification methodology of the botanist Carl Linnaeus, and the subsequent refinements made by Antoine Laurent Jussieu and Augustin Pyramus de Candolle.\(^{31}\) However, his understanding of the subject goes beyond the superficial. Early in his career, Brongniart worked and published as a naturalist. In an 1805 article “Essai d’une classification naturelle des reptiles”, he created 4 distinct new orders of reptile in a revision of the work of Linnaeus.\(^{32}\) Brongniart noted fundamental distinctions between the species in Linnaeus’ “Reptilia” and created further divisions: Batrachia (now Amphibia), Chelonia, Ophidia, and Sauria. Thus, Brongniart draws directly from contemporary approaches to naturalism in forming his classifications for “l’art industriel” of ceramics. His view is clearly progressive and modern, but maintains that artistic and industrial productions change too often to rely heavily on a strict system such as varieties, species, and genres. Brongniart’s classifications of ceramics are adopted with an acknowledgement of progressive change in the products of mankind. Brongniart writes “‘(o)n trouvera bien à former quelques groupes, mais quand on voudra y introduire toutes les productions, non-seulement les anciennes, mais encore les récentes, on rencontrera bien plus des obstacles que dans la classifications des productions naturelles.’”\(^{33}\) In working to accommodate both modern and ancient wares simultaneously, his system begins by considering the scientific and common factors of the

\(^{30}\) Although major theories of evolution had not yet been fully realized, they were under development during the early to mid 1800s and many of Brongniart’s circle were actively engaged in the development of biological classification systems, including his son, Adolphe Brongniart; the naturalist Jean-Baptiste Lamarck; and explorer and naturalist Alexander von Humboldt, among others.  
\(^{31}\) Brongniart, *Arts Céramiques*, V.1, XVII.  
\(^{32}\) Alexandre Brongniart, Essai d’une classification naturelle des reptiles, 1805, Paris.  
\(^{33}\) Brongniart, *Arts Céramiques*, V.1, XVI, “One can easily find how to form some groups, but when you want to introduce all of the productions, not only the ancient ones, but also the recent ones, one encounters many more obstacles than in the classifications of natural productions.”
pottery. The first factor considered is the clay body composition, and then the glaze, rather than more ambiguous and changeable aesthetic or stylistic considerations.

In all, there are three classes, nine orders, and numerous suborders, as follows:

**Class I. Poteries à Pâte tendre**
- **Order I. Terre Cuites**
  - a. La Plastique
  - b. Les Utensiles
  - c. Poteries tendres mattes
- **Order II. Poteries tendres lustrées**
- **Order III. Poteries tendres vernissées (poterie commune, grosse poterie)**
- **Order IV. Poteries émaillées**

**Class II. Poteries à Pâte dure**
- **Order V. Faience Fine**
- **Order VI. Grès-Céramé**

**Class III. Poteries à Pâte dure, translucide**
- **Order VII. Porcelaine Dure**
- **Order VIII. Porcelaine Tendre Naturelle**
- **Order IX. Porcelaine Tendre Artificielle**

There are geographic discussions within each order, with a noticeable geographic and chronological shift following the transitions in each culture’s technology. Thus, the most developed and well-understood earthenwares of Greece and Rome appear naturally near the commencement of the discussion, but are not present at all during the discussion of later types that required a different kind of understanding and technology, such as porcelain, in which later European and Chinese ceramics are dominant. The recognizable styles and their groupings proceed naturally from a definition based on chemical composition and technology, (See Figure 2). Brongniart demonstrates links between seemingly distant cultures. In a compelling juxtaposition, Plate XIX (See Figure 1) shows a cut-away view of a massive pot that serves as the burial for a Brazilian native. Another frame of the same plate has an engraving showing Diogenes in his renowned pottery domicile. The image of
Diogenes is distinctly similar to an illustration of the same subject in Johann Joachim Winckelmann’s *History of Ancient Art*, (See Figure 3 and Figure 4), thus connecting the Greek style, at least tangentially, to the New World.\(^{34}\)

Book Three, on the art of painting and decorating ceramics, works as an instructional manual and provides thorough information for all aspects of pottery decoration, beginning with a description of the materials used as colorants, and their preparation, then discussions of the application of colors, their use, and firing methods. Finally, a discussion of the variability in results based on the use of different vehicles, chemical interactions, or firing issues follows. It is straightforward, descriptive, and openly shares technical information. It could easily be used to develop or enhance a practice in ceramic art.\(^{35}\) When it was published in English in 1898, the publisher’s preface included the following summation:

> Brongniart, a profound chemist, rejected all that was superfluous, reduced his recipes to their simplest form and brought them, practically, to the present day methods of making the formulas agree,\(^{36}\) as nearly as possible, with the combining of the weights of the materials used.

> While this work is of especial interest to decorators of ceramic ware, potters and glazed and enamelled brick makers, we believe that every worker in clay, in whatever line, will find in it information and suggestions of real worth.\(^{37}\)

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\(^{34}\) Interestingly, Semper’s *Style* also features an engraving of Diogenes nearly identical to that of the *Atlas to Arts Ceramiques*, (See Figure 6). Subtly, the illustration of Diogenes on Plate XIX also links the work of Brongniart to the pioneering art historical efforts of Winkelmann. However, Brongniart cites his source as the contemporary archaeologist of Roman and Gallic artifacts, Grivaud de la Vincenne. Grivaud de la Vincenne uses a near direct copy of the Winckelmann image, with a citation included in the engraving. Thus, Brongniart’s use of the image places his work alongside contemporary archaeology and simultaneously in a succession following Winckelmann.

\(^{35}\) In the second (1854) and third (1877) editions of *Arts Céramiques*,\(^{35}\) published after the death of Brongniart, and edited by Alphonse Salvetat, both the first and second volumes end with an additional section of “Notes & Additions”, which contain smaller articles on various topics not categorized into the themes or structure of the three primary books.

\(^{36}\) Modern methods use the unity formula, a method of working with a balanced, molecular formula.

The third volume of *Traité des Arts Céramiques* is an atlas of large, engraved illustrations depicting scenes of anthropological and archaeological interest, or describing technology and production methods, (See Figure 1). Additionally, there are nine large charts related to archaeological discoveries, global clay types, and chemical analysis by element of various geologic materials used for ceramics. A series of similar, smaller tables follows and descriptions of the various illustration contained in the 81 engraved plates are given. The text and images both contain the same attention to detail and meticulous clarity established across the scope of these five volumes. The *Atlas* material supplements the discussions of the first two books, but also works as a technical and visual reference. Among the plates are both historical and contemporary technologies, such as kilns, and descriptions of the pottery making techniques in diverse cultures, such as Europe, the Americas, China, and the Middle East. This book supports concepts and topics found in the first two volumes. The drawings are explicit in detail and carefully rendered to give accurate information, with little extraneous stylization.

**The Catalog Raisonné**

The *Description Méthodique* is a further two-volume set consisting of one volume of plates and another of tables and text descriptions of the illustrations. The plates depict nearly all of the collection in the Musée Céramiques de Sèvres. This includes not only elegant, refined types of pottery, but also bricks, tiles, and pottery fragments. Functional objects and common pottery wares are shown alongside religious objects or artistic ones, mirroring the categories defined in *Arts Céramiques*. According to the scheme of *Arts Céramiques*, geography is less important than material nature, and all world regions are treated equally, such that a single plate may represent pottery objects from around the world, (See
Figure 5). Contemporary ceramics from potteries around France are shown, and a single plate is devoted to the workshop of Jules Ziegler, (See Figure 6). Additionally, carefully selected examples of the modern production at Sèvres are included. All of the illustrations are carefully rendered to provide an accurate, non-stylized depiction of the objects. The text provides supporting material and information on the provenance of the objects in the collection. The two books of the catalog raisonné can function as an independent work, but they also are fully integrated into the 3-volume set of *Arts Céramiques*, thereby demonstrating the unified approach of Brongniart and his staff.
Figure 1: Atlas, Plate XIX, Funerary Jars of Brazil
## Tableau de la Classification des Poteries

<table>
<thead>
<tr>
<th>Classes</th>
<th>Noms et Caractères</th>
<th>Ordres</th>
<th>Noms et Caractères</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1er Ordre</td>
<td>Térrasses Cuites:</td>
</tr>
<tr>
<td>I.</td>
<td>Poterie à Pâte Tendre,</td>
<td></td>
<td>Pâte argile-sableuse.</td>
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<tr>
<td></td>
<td>c. d. rayable par le fer,</td>
<td></td>
<td>Surfase mate.</td>
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<tr>
<td></td>
<td>argilo-sableuse, calcaire,</td>
<td></td>
<td>Sans aucune glaçure.</td>
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<tr>
<td></td>
<td>la plupart fusible au feu</td>
<td></td>
<td>(Sous-ordre)</td>
</tr>
<tr>
<td></td>
<td>de porcelaine.</td>
<td></td>
<td>A. La plastique. (modèle)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B. Les ustensiles.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Briques, fours, etc. (modèle)</td>
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<td></td>
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<td></td>
<td>C. Les Poteries matisses.</td>
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<td></td>
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<td></td>
<td>Sarrees, Urnes. (couleur)</td>
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<td>2er Ordre</td>
<td>Poteries Lustrées.</td>
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<tr>
<td></td>
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<td></td>
<td>Glaçure miroir, silice-alcaline.</td>
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<td></td>
<td>3er Ordre</td>
<td>Poteries Vernissées.</td>
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<td></td>
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<td></td>
<td>Glaçure plombifère.</td>
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<td></td>
<td></td>
<td>4er Ordre</td>
<td>Poteries Émaillées.</td>
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<td></td>
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<td>(Fattine commune)</td>
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<td></td>
<td>Glaçure stannifère.</td>
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<td></td>
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<td></td>
<td>(Appendice): Carreaux, briques, etc., à glaçure vitrifiée.</td>
</tr>
<tr>
<td>II.</td>
<td>Poterie à Pâte Dure,</td>
<td>5er Ordre</td>
<td>Faïence Fine.</td>
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<tr>
<td></td>
<td>c. d. non rayable par l'acier,</td>
<td></td>
<td>Pâte lente.</td>
</tr>
<tr>
<td></td>
<td>opaque,</td>
<td></td>
<td>Glaçure vitr-plombifère.</td>
</tr>
<tr>
<td></td>
<td>argilo-siliceuse,</td>
<td></td>
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<tr>
<td></td>
<td>infusible.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Notes: Du XVIᵉ au XVIIIᵉ siècle.</td>
<td></td>
<td></td>
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<tr>
<td>III.</td>
<td>Poterie à Pâte Dure,</td>
<td>6er Ordre</td>
<td>Grès-Céramique.</td>
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<tr>
<td></td>
<td>translucide,</td>
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<td>Pâte colorée.</td>
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<tr>
<td></td>
<td>argilo-siliceuse, alcaline,</td>
<td></td>
<td>Sans glaçure ou glaçure silice-alcaline.</td>
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<td></td>
<td>ramollissable.</td>
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<tr>
<td></td>
<td>Notes: Du XVIIᵉ au XIXᵉ siècle.</td>
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<td>7er Ordre</td>
<td>Porcelaine Dure.</td>
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<td></td>
<td></td>
<td></td>
<td>Pâte de kaolin.</td>
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<td></td>
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<td></td>
<td>Glaçure stéatitique.</td>
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<td>8er Ordre</td>
<td>Porcelaine Tenue Naturelle.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Pâte argilo-siliceuse, phlogistique, kaolinitique.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Glaçure vitr-plombifère, borosilicate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9er Ordre</td>
<td>Porcelaine Tenue Artificielle.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pâte marno-siliceuse, stéatite.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Glaçure vitr-plombifère.</td>
</tr>
</tbody>
</table>
Figure 3
Diogenes - Illustrations from Winkelmann, History of Ancient Art (L) and Brongniart, Atlas, (R)

Figure 4
Diogenes - Illustrations from Winkelmann, History of Ancient Art (L) and Brongniart, Atlas, (R)
Figure 5
Illustration from *Description Méthodique* depicting glazed earthenware pottery from around the world.
Figure 6
Illustration from *Description Méthodique* depicting contemporary pottery from the workshop of Jules Zeigler
Section Five: Brongniart’s Scientific Method

Brongniart seamlessly integrates art and science in a way that is clearly influenced by his own tendency to think holistically, as in this excerpt from *Traité Elémentaire de Mineralogie avec des Applications dans les Arts*, in which the topic is the use of various cut and polished rocks, semi-precious stones, and minerals to create works of art:

Les artisans, et principalement ceux de Florence, ayant remarqué qu’on trouvoit dans les pierres toutes les nuances de couleurs qui composent la palette d’un pientre, ont osé faire des tableaux dans lesquels ils n’ont employé que des pierres rapportées; ils ont su les assortir avec un tel art, que les couleurs des objects et leur degradation, la lumière, les demi-tientes et les ombres, ont été ménagées, au point de donner de la saillie au devant du tableau, de faire tourner les corps ronds, et de placer les ombres portées et les reflets avec un mastic composé de cire et de poix blanche et on les polit tous ensemble. Ce travaille est très-lent, et les tableaux qui en résultent sont d’un prix excessif. On peut voir au Musée Napoléon, dans la galerie d’Apollon, des tableaux fait a Florence suivant ce procédé. Ils representent des fruits et des vases, et sont montés en tables.38

This passage brings together a number of concepts central to the career of Brongniart. The minute details of interior decoration are critically important to his work at Sèvres and a table made with cut stones bears more than a superficial material resemblance to porcelain. These are the same stones, or families of minerals, that are blended together into a clay body and glazes to make the lavish creations at Sèvres, albeit with perhaps more intervention (both chemical and mechanical) on the part of the maker. Certainly, a geologist who seeks to utilize mined materials for an artistic application needs to understand the factors that determine desirable qualities for aesthetic and utilitarian applications in the same way that an artist does. Both the tables of which Brongniart writes and the Sèvres porcelains whose

38 Brongniart, *Traité Elémentaire de Mineralogie*, 266. “Artisans, especially those of Florence, having noticed that, among the stones are found all shades of colors that make up the painter’s palette, have dared to make pictures using nothing but stones added, they knew how to match them with such art, that the colors of objects and their gradations, light, half tints and shadows, were formed to the point of giving the impression of being at the front of a picture, to make the shapes seem to go around, and to place the shadows and reflections with a putty made of wax and white pitch and to polish them all together. This work is very slow, and the resulting tables are very expensive. You can see at the Musée Napoléon, in the Apollo Gallery, paintings made in Florence by this method. They represent the fruits and vases, and are mounted in tables.”
production he supervised were destined for the same sorts of elite interiors. Brongniart’s sensitivity to the perfection of the artwork, the exactness of the detail, and the expense of the finished product is informed not only by science, but also by his upbringing, his family relationships, and his own study of the arts. Lastly, Brongniart consciously addresses the importance in developing State-sponsored arts; the reference to the Musée Napoléon is not incidental, but integral, as his own career was so deeply invested in the cultural institutions developed following the revolution.

Like the *Traité de Mineralogie*, science underlies the structure of the *Traité des Arts Céramiques* and Brongniart’s material understanding shapes the character of his organizational scheme. Integrating it with historical notes on ancient pottery usage, Brongniart begins with the most basic technical information and relates it back to objects. Use, material, and method are intertwined and the use is often defined by what the raw materials make possible. Brongniart draws out the links between geology and ceramics, such as mining, local material availability, and the composition and processing of clays, thus working to define and classify the materials and their origins.

In both science and mineralogy, Brongniart created systems by which all things could be measured equally, and he established that this came from the underlying science and crystal structure. In the introduction to the *Traité de Minéralogie*, Brongniart writes:

> La plupart des espèces minerals sont isolées et on ne possède encore que deux moyens de reconnaître les rapports importants qui peuvent exister entre elles: ces moyens sont l’analyse chimique et l’observation des formes primitives. Ils ont contribué à élever au rang des véritables sciences la mineralogie, qui n’était qu’une réunion de connaissances empiriques, (Brongniart, vi).  

[39] Brongniart, *Arts Céramiques*, V.1, vi. “Most species minerals are isolated and there are as yet only two ways to identify the important possible relationships between them: these methods are chemical analysis and the
Crystal structure defines and controls the structure of ceramics in much the same way that it underlies mineralogy. In effect, the ceramic maker combines the same geologic materials under intense heat, mimicking a natural process and consciously recombining them to create new forms. It is the interaction of the diverse crystal structures that makes this possible, and geology and ceramic science rely upon a rich understanding of these complex systems. The fact that, at the time of his writing, geology was still a nascent science emerging from a history of empirical observation is felt in both *Mineralogie* and *Arts Céramiques*. Long descriptions accompany each entry of a material or a mineral. Although chemical composition is a part of each discussion, there is no dominance of a chemical shorthand notation as in modern science – each entry is viewed in a family of materials, but the compounds are all known by their empirical characteristics as well as their chemical ones.

Geography is a highly determinant factor in style of historical ceramics and can be used to define the pottery of a region or a people. For example, a porcelain body can only be made from the most refined clays that are found only in select deposits around the world, but iron-bearing clays that produce earthenware and stoneware may be found almost anywhere on the globe. As a forerunner to the field of archaeometry, Brongniart consciously uses the geological differences in materials to further his understanding of archaeology. Many pottery objects are analyzed for their chemical composition, thereby recreating a formula or a clay body recipe that can be used to differentiate between pottery types, even those of apparently similar or identical styles. This type of testing was highly specialized and at the forefront of the sciences at the time. When illustrative, Brongniart observation of primitive shapes. They helped elevate mineralogy to a real science, which was once nothing but a combination of empirical associations.”
includes this information in his discussion, (See Figure 7), and there are several large tables provided in the *Atlas* with more comprehensive information.\(^{40}\)

In Brongniart’s works, material and technical differences are placed ahead of chronology and geography in the construction of a classification system for world ceramics. The differences in ceramics style are directly based on definable characteristics in material and technology. Thus, Brongniart assembles a set of images in a single plate in the *Catalog Raisonné* that shows an ancient Egyptian object, a Roman object, a South American one, all alongside architectural elements from European Renaissance buildings - these objects are chronologically and geographically out of sequence, but materially and technically are all closely similar (See Figure 8). They show a common state of applied technology. This embodies one of the premises of Brongniart’s research: that ceramics and art are a progression based on materials and technology and can be compared side by side on this basis. At the same time, he demonstrates that the art of ceramics has been developed and is utilized in stages that are not chronologically or technically identical across the globe.

Recent kiln designs, along with other developing technology, are treated as fully as long-held knowledge, and when information is offered from other ceramics makers or scientists, Brongniart cites the expert who has shared the technology. Although pottery and porcelain making was a competitive industry, Brongniart’s intent was to create an open scientific and technical exchange that would be a permanent and valuable resource. His sense of open knowledge sharing is evident throughout the text, and schematic drawings are provided as supporting documentation to the descriptions and analysis of the text, (See

\(^{40}\) Brongniart, *Arts Céramiques*, V.1, 467.
It was not until the search for porcelain in Europe in the seventeenth century that scientific material understanding truly developed and complex clay body recipes were formed. Initially, porcelain techniques were developed in secret as competition was fierce and large industries were at stake. In all Western ceramics practice up through the end of the race for European porcelain, ceramic recipes and clay sources were understood through empirical methodologies and were tightly guarded workshop, or even family, secrets. At this point in the development of porcelain, many concerns were royal, including those in France and Germany, and even the locations of large clay mines were hidden from public knowledge. Following the development of porcelain, a large body of information had been developed with a new scientific basis, but much of this knowledge was still concealed at the start of the nineteenth century. It may now seem entirely intuitive and obvious to classify matter by its primary constituents, but Brongniart was among the very first scientists to have the comprehensive technical understanding and the laboratory access to establish the elemental character of common minerals and materials. Brongniart’s writing addresses the vast global knowledge of ceramics that had been accumulated, both historical and contemporary, and simultaneously illustrates a comprehensive view of the modern industry of which the manufactory at Sèvres was not only a part, but was one of the highest achievers.

It is very unlikely then, as now, that the readership of this oeuvre came to the works with equal expectations or understanding, but it was, at the same time, intended to be open
and accessible to everyone who read or made use of the works. No complete translation was ever made of these publications. For a scientific or intellectual reader, the prevailing language for discourse was in French, and a translation would be unnecessary. A general reader or a specialized reader might make use of only one small part of the works, as the separate translations into German and English of only the brief chapters related to china painting and decoration of wares suggest. These limited translations were meant to appeal to a specific audience, and were intended to have a fairly wide distribution among professionals and hobbyists interested in applied skills. The practical section on decoration had a broad commercial appeal and was easy to separate faithfully from the main body of text and plates. Meanwhile, creating a small book out of the larger book demonstrates that a specialized audience needed to have access to only a small part of the whole offering, and would perhaps not have desired or to have been able to make use of much of the other information related to industrial manufacturing concerns, or archaeology.

No text on the making of ceramics had ever consolidated so much technical information and provided it so openly as *Arts Cèramiques*. Prior to Brongniart’s work, only a few topical studies of ceramics concerning regional styles or workshop practices were written, such as Piccolpasso’s groundbreaking handbook of maiolica written around 1548.⁴¹ Unlike Brongniart, Piccolpasso was not an expert or an artist in his own right, and he relied heavily on the often-unreliable testimony of others. Piccolpasso admits that there are limits to his understanding, and possibly inaccuracies in his writings owing to the protections and seccrecies of the sources he consulted as he wrote his book. By contrast, Brongniart provides

all of the technical data and material research on clays and clay minerals that he has gathered, including elemental analysis of the materials that are mined throughout and beyond Europe, defining their utility and roles as ingredients as well as their potential faults. Chapter II in Book One is a discussion of the formation of clay bodies that openly considers body recipes on the basis of chemical composition. The meticulous survey of all of the known materials as they are mined throughout Europe, including notes on their performance under ordinary use, is schematically similar to the textbook *Traité Elémentaire de Mineralogie* and Brongniart’s rich understanding of geology is brought together with his mastery of ceramics. In the geology treatise, a material or compound is discussed by its primary classification and then its sub-classification or type, with notations on the crystalline structure, chemical composition, geographic origin, and predominant uses. A similar but simplified entry is given for all relevant ceramic materials in *Arts Céramiques*. Although the two sets of writings are not directly intended to work together, they are at times so closely linked that the geology text could have served as a useful complement to the set of ceramics books. The deliberate openness of the geology textbook is matched in kind within the ceramics texts, signifying a departure from the secrecy and specialization of the past. Brongniart clearly expresses his own philosophical stance in his criticism of Bernard Pallissy. Pallissy’s lack of willingness to share the results of his own research, and especially his willingness to publish incomplete or even inaccurate statements, prompted the following from Brongniart:

*Bernard Pallissy est donc un homme très-remarquable par de hautes qualités toutes personnelles, par ses connaissances étendues, sa persévérance, son noble et courageux caractère. C’est, comme j’ai dit au commencement de cet article, un héro parmi les Potiers; mais l’héroïsme est une qualité individuelle, qui, comme*
toutes celles de ce genre, sont peu utiles à l'humanité, parce qu’elles ne transmettent pas."

42 Brongniart, *Arts Céramiques*, V.2, 65. “Bernard Pallissy is a very remarkable man known for his high personal qualities, his extensive knowledge, his perseverance, his noble and courageous character. He is, as I said at the beginning of this article, a hero among the Potters; but heroism is an individual quality which, like all of this type, is of little use to humanity, because it is not handed down.”
Figure 7
Chart depicting various historic European clay body analyses, adjusted for a Unity Formula (i.e. based on 100 percent)

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<tr>
<td>Germaines grises.</td>
<td>64</td>
<td>13</td>
<td>10</td>
<td>1</td>
<td>0,5</td>
<td>10</td>
<td>1</td>
<td>0,5</td>
<td>Salv.</td>
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<tr>
<td>Gauloises noires.</td>
<td>63</td>
<td>19</td>
<td>6</td>
<td>7</td>
<td>3</td>
<td>E.ded.</td>
<td>5</td>
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<td>Buis.</td>
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<tr>
<td>G. d’Abbeville grises.</td>
<td>60</td>
<td>15</td>
<td>4</td>
<td>20</td>
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<td>4</td>
<td>tr.</td>
<td>0,3</td>
<td>Salv.</td>
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<tr>
<td>G. idem. noires.</td>
<td>63</td>
<td>19</td>
<td>6</td>
<td>7</td>
<td>3</td>
<td>E.ded.</td>
<td>5</td>
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<td>Buis.</td>
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<tr>
<td>Scandinaves grises.</td>
<td>64</td>
<td>11</td>
<td>11</td>
<td>2,5</td>
<td>0</td>
<td>10</td>
<td>1</td>
<td>0,5</td>
<td>Salv.</td>
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<tr>
<td>Sc. du Jutland. noires.</td>
<td>70</td>
<td>14</td>
<td>10</td>
<td>1,5</td>
<td>1</td>
<td>0,3</td>
<td>1,5</td>
<td>1</td>
<td>Salv.</td>
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Salv. – Alphonse Salvetat, chemist at Sèvres; Buis. – Buisson, chemist at Sèvres

Figure 8
Plate from Description Méthodique depicting diverse earthenware (terra cotta) objects from around the world
Figure 9
Illustration of modern kiln designs and related technology from the *Atlas*
Section Six: Impact and Scholarly Reception

Throughout the literature on ceramics that followed the publications at Sèvres, Brongniart receives acknowledgement for his rich understanding and thorough scholarship. The depth and breadth of his work impacted authors in art history, archaeology, and the sciences. Noted art historians such as Samuel Birch, Albert Jacquemart, Gottfried Semper, Joseph Marryat, Alphonse Salvetat, and Charles Drury Edward Fortnum all demonstrated their sometimes considerable debt to Brongniart’s collections and publications. By the end of the nineteenth century, many histories and writings on ceramics incorporated the early groundwork established by Brongniart.

However, not all authors responded to the work equally, or accepted all of the changes Brongniart’s research brought to light. English historian Samuel Birch writes:

The subject (ceramics) resolves itself into two great divisions, which have engaged the attention of two distinct classes of inquirers; namely, the technical or scientific part, comprising all the details of material, manipulation, and processes; and, secondly, the historical portion, which embraces not only the history of the art itself, and the application of ancient literature to its elucidation, but also an account of the light thrown by monuments in clay on the history of mankind(.)

thus expressing a will toward a clear delineation between the fields of science and art history that Brongniart had so deftly and tacitly handled in combination. With this statement, Birch pushes back suggestions that Brongniart’s work as a ceramic scientist includes aspects of art history. Birch clearly prefers to maintain a reliance on well-known ancient texts and Biblical testimony. Conversely, Birch readily provides Brongniart’s scientifically determined material and clay body formulae for his readers and is willing, sometimes grudgingly, to

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43 Samuel Birch History of Ancient Pottery. London: John Murray, 1858, V.1, 1.
recognize Brongniart’s contribution.\textsuperscript{44} As Brongniart’s work was published only in French, and Birch wrote for a primarily English-speaking audience, this challenge to Brongniart’s innovative, holistic methodology likely went unnoticed by general readers of Birch’s histories.

Conservative in his approach, Birch adheres steadfastly to a timeline that commences with Egyptian history, stating boldly “Egypt, Assyria, and Babylonia, the triple cradle of the human race, have alone transmitted to posterity the sun-dried products which represent the first efforts of the art (of ceramics)”.\textsuperscript{45} The explicit reliance upon Biblical texts is shown in the statement, “. . .the bricks of Egypt not only afford testimony to the truth of Scripture by their composition of straw and clay, but also by the hieroglyphs impressed upon them. . . .”\textsuperscript{46} Birch places the creation of pottery in Egypt, before the historical period, “at least coeval with the formation of a written language”, giving the dates as 3000–2000 B.C.E.\textsuperscript{47}

Birch’s argument ignores a prominent aspect of Brongniart’s archaeological, textual, and geological research, all of which open this question to the potential of a Chinese practice occurring in an earlier, or at least simultaneous, period. In Brongniart’s discussion of the history of porcelain at the end of the second book, Brongniart provides a timeline on the development of porcelain (See Figure 10). At the earliest date, 2600 B.C.E., is the notation

\textsuperscript{44} For example, see Birch, \textit{Ancient Pottery}, V.1, 44: “Although M. Brongniart denies to the Egyptians a type of fabric distinct from that of other people, a practised eye will undoubtedly at once detect their vases by their simpler forms, by their want of high mechanical finish, by the prevalence of pointed bases, and by the extreme smallness of the neck and orifices . . . The Egyptian potters had not, it is true, that highly refined sense of the beautiful which the Greeks possessed, but they were by no means entirely destitute of it.”
\textsuperscript{45} Birch, \textit{Ancient Pottery}, V.1, 2.
\textsuperscript{46} Birch, \textit{Ancient Pottery}, V.1, 3.
\textsuperscript{47} Birch, \textit{Ancient Pottery}, V.1, 10.
“Chun et Honang-ti. Il y avait un intendant de la poterie. Houen, inventeur de la poterie,”

in reference to the “Yellow Emperor”, Huangdi (2698-2598 B.C.E.), who employed an
official administrator to supervise the development of ceramics. The next listing, for 2357
B.C.E., states simply “Yao (Ces dates sont tres apocryphes).” These early Chinese rulers,
now considered mythological or legendary, were, at the time of Brongniart’s writing, still
thought of as Chinese historical figures, and their inclusion here suggests Brongniart was
collecting evidence that would expand common perceptions of both time and history, or at
least open the question more. Following the early Chinese dates on the timeline is the first
mention of Egypt, of which neither statement favors the idea of placing an absolute origin of
pottery in Egypt. Under the year 1006 B.C.E. are the telling entries: “Egypt (ce n’est pas de
la porcelaine).” and “Porcelain Chinoise trouvée en Égypte.”

This latter was a reference to
a number of small Chinese vases found in the tombs at Thébes (See Figure 11), which
Brongniart had the opportunity to examine and discusses at length in the second book of
Arts Céramiques. The Thébes vases were a sensational discovery that left open a possibility of
the existence of advanced Chinese wares predating those made elsewhere in the world. The
importance Brongniart placed on the discussion of these small objects is underscored by the
placement of one of the vases as the final figure of the second book, at the end of the
discussion of the global history of porcelain. It is given an unmistakable and prominent
position, clearly acknowledging the unanswered questions dependent on thorough research
and advanced understanding, as well as drawing attention to the interrelated nature of global

48 “Chun-ti and Honang. There was an intendant of pottery. Hun, inventor of pottery.”
49 “Yao (These dates are very apocryphal).” Yao was a Chinese emperor considered to have ruled from 2333 –
2234 B.C.E. Although later scholarship determined that these early rulers were largely mythological in
character, mixed occasionally with historical fact, during Brongniart’s lifetime this had not yet been resolved.
Brongniart’s use of these Chinese dates as a reference parallels the use of other ancient texts, such as the Bible
or Greek and Roman literature.
50 “Egypt (This is not porcelain).”; “Chinese Porcelain found in Egypt.”
51 Brongniart, Arts Céramiques, 480-483; 504.
history. However, in contrast to Brongniart’s interest in the rich tradition of Chinese ceramics, Birch pays China (and the Americas) little attention in his history of “ancient pottery”, even as his stated pursuit is a history of “all nations”. Rather, Birch explains that his book, History of Ancient Pottery:

... comprises the principal features in the history of the art, from the most ancient period till the decadence of the Roman Empire. In the Oriental division it embraces the pottery of Egypt and Assyria – the two great centres of primaeval civilisation. In classical antiquity it treats on the pottery of Greece and Rome; it ends by a concise account of that of the Celtic and Teutonic nations.52

Birch’s 1858 publication reveals a scholarly willingness to accept the adaptations forced by the overwhelming technical content available within Arts Céramiques. However, even almost fifteen years after Arts Céramiques’ first publication, and four years after its popular second edition, Birch does not expand his world view to reflect the new and diverse historical and cultural understanding that finds a prominent place in Brongniart’s research.

Brongniart’s work challenged commonly held beliefs in Egyptology. As a further question regarding the absolute prominence traditionally given to Egyptian pottery in the early nineteenth century is Brongniart’s well-researched and definitive answer to the question of whether Egyptian porcelain truly existed. For centuries after its initial production in China and its discovery by Europeans, porcelain has been regarded as an unrivalled and perfected material. The ability to make refined porcelain thus establishes a culture as technologically and artistically superior. Brongniart takes a careful approach and refers to his sustainable and explicit scientific definition of porcelain for both hard-paste and soft-paste clay bodies. Either soft paste porcelains, such as those high-firing bodies developed in Europe in the seventeenth century, with qualities of purity, translucence, and whiteness, or

52 Birch, Ancient Pottery, V.1, v.
the true hard-paste bodies, such as those found originally in China, made with kaolin and a feldspar, were together established as a defining group. For most purposes in the decorative arts, this definition of porcelain is still in place today. Under Brongniart’s testing and analysis, no true porcelain was discovered among the Egyptian artifacts. Rather, the objects called porcelain were closer in character to a glazed earthenware or stoneware. Birch acknowledges the question of the misuse of the term porcelain, but considers it unresolved, while placing the blame for error on archaeologists. Thus, he continues to use the misnomer “porcelain” to describe countless Egyptian wares, rather than seeking an appropriate adjustment to the name that reflects a change in understanding as described by Brongniart. Citing discrepancies that leave no exact, singular clay body and glaze analysis of Egyptian pottery, Birch clumsily offers a technical explanation of his own, ultimately resolving “(n)o very recent analysis has been made; and it is to be regretted that we are compelled to acquiesce in the conjectures of archaeologists, rather than to adopt the tests of chemists.”

It is important to note that this particular timeline refers only to porcelain, not to all pottery. However, porcelain is ranked by Brongniart (among many others) as one of the highest developments in ceramics. As such, he frequently and comfortably places the early accomplishments of the Chinese in this regard ahead of other cultures. It is clear that Brongniart and Birch’s respective interests diverge as to what constitutes an appropriate beginning for their histories. Brongniart seeks absolute origins, as an extension of his

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53 This style is now commonly referred to (if also misleadingly) as “Faience” or “Egyptian Faience” for its resemblance to the style of pottery created in Europe during the Middle Ages.
54 Birch, *Ancient Pottery*, V.1, 66.
55 Birch, *Ancient Pottery*, V.1, 68; Birch’s incomplete technical discussion offers little convincing argument, but it does seem to demonstrate a resistance to the masterful challenge presented by Brongniart, particularly as relates to Egyptian wares.
archaeological, ethnological, zoological/botanical, and geological research. Birch dismisses the origins of pottery making in favor of “the art” of pottery, which is nebulously defined. Birch writes, “the inquiry must commence with Egypt, since the earliest specimens of the art belong to that country, and are of a period when Central Asia offered no material proofs of civilisation.”56 Yet Birch previously stated, “clay is a material so generally diffused, and its plastic nature so easily discovered, that the art of working it does not exceed the intelligence of the rudest savage.”57 Thus, Birch writes only of pottery making within a select group represented by the common written histories of the Classical and Judaeo-Christian worlds, not of the history of the peoples and civilizations that may have preceded them or coexisted in other less-explored continents. Thus, it is not surprising that Birch made his way clear to write a book about the history of world ceramics without the inclusion of Chinese ceramics, in spite of Brongniart’s strong evidence regarding its early sophistication and importance.

Albert Jacquemart, a Frenchman whose book, *Histoire de la Céramique*58, was translated into English in 1877 following its initial appearance in French59, was more readily disposed to support Brongniart’s research. Writing in 1873, Jacquemart credits much of his effort to the groundwork laid by Brongniart nearly thirty years prior. He adopts and outlines all of the technical classifications created by Brongniart as now-fixed categories:

> Ce langage existe depuis longtemps pour la céramique; il a été créé avec un incontestable talent et une véritable autorité par Alexandre Brongiart dans son beau livre publié pour la première fois en 1844. C’est donc la nomenclature du savant

56 Birch, *Ancient Pottery*, V.1, 1.
57 Birch, *Ancient Pottery*, V.1, 2.
Thus, the work that Brongniart compiled and the technology he shared openly ultimately established a common system for the field of ceramics not only in industry, but also in art history.\textsuperscript{61}

Additionally, Jacquemart recognizes the crucial contribution to world ceramics from China. The recently, if forcibly, opened China following the British Opium Wars of the 1840s offered the potential of new information and new understanding. Jacquemart writes that there were still barriers to information exchange from China at the time of his writing, and he thus relies largely on known texts rather than new research.\textsuperscript{62} Still, Jacquemart builds a large discussion on Chinese history, religion, and art. Much of Jacquemart’s Chinese history retains a sense of distance, and a perspective that the Chinese are “primitive” in their religion,\textsuperscript{63} yet, like Brongniart, he searches for balance and understanding that reflects a push toward fairer, more equilateral view, acknowledging that the Chinese have their own resistance to Europeans:

Ce pays, si fier de sa vieille civilisation, s’est vu forcé d’abaisser ses barrières devant nos canons; mais il n’en mettra que plus de soin `a éviter tout contact moral avec les

\textsuperscript{60}Jacquemart, \textit{Histoire de la Céramique}, 4. Translation, Fanny Bury Palliser, Jaquemart, \textit{History of Ceramics}, 1877: “This language, which has long existed in ceramic art, was created by the talented Alexander Brongniart, as first set forth in his valuable book, published in 1844. We propose, therefore, adopting the nomenclature of the learned director of Sèvres, giving as briefly as possible the different orders of pottery and the varieties of decoration, as referred to in these pages.”

\textsuperscript{61}In Jennie L. Young’s \textit{The Ceramic Art: A Compendium of The History and Manufacture of Pottery and Porcelain}. New York: Harper and Brothers, 1878, Young echoes Jacquemart’s sentiments, accepting and acknowledging the significant groundwork laid by Brongniart. Thus, it is clear that Brongniart’s system was broadly used and applied.

\textsuperscript{62}Thus, Jacquemart is using information that had been available or in use to Asia scholars for the better part of the early nineteenth century, at least.

\textsuperscript{63}Jacquemart, \textit{Histoire de la Céramique}, 25.
Importantly, however, Jacquemart recognizes that not much mid-nineteenth century research had of yet been valuable, and yet he depicts a rich and lengthy history of Chinese ceramics by building on European collections, including those at Sèvres. Echoing Brongniart, Jacquemart advances dates that coincide directly with, or slightly pre-date, the first dates considered important in Egypt. Unlike Birch, Jacquemart’s inclusion of Chinese, Japanese, and Korean ceramics in his complete history continues the path established by Brongniart. Like Brongniart, Jacquemart attempts to balance our understanding of the East, combining it with that of the Western world. This expanded view suggests a continuing shift toward increased globalism in mainstream scholarship.

Clearly following the discussion that was established in book two of *Arts Ceramiques*, Jacquemart returns to the question of the Chinese porcelains found at Thébes. After a review of all of the evidence available, he resolves the question based on newly established scholarship in Chinese literature and poetry. It is, thus, dispelled as impossible that these bottles were in the tombs at Thébes at the time of their original construction, but rather that there was likely some element of faulty archaeology at play. Brongniart had raised these

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64 Jacquemart, *Histoire de la Céramique*, 24. Translation, Fanny Bury Palliser, Jaquemart, *History of Ceramics*, 1877, p.22: “This country, so proud of its civilisation, has found herself forced to lower her barriers before our cannon; but she will not take the less precautions to avoid moral contact with the barbarians she fears. She will conceal from us her manners, hide her laws, and confine her relations to what the treaty exacts, and nothing more.”

65 Jacquemart, *Histoire de la Céramique*, 24. However, at the same time that Chinese literature effectively disproved one set of potential evidence, it provided other thought-provoking questions which Jacquemart probes, even as he discards as outlandish the ones that rely on an expansive, non-Biblical, but rather a geological timescale. Jacquemart expresses his distrust in the potential truth of some Chinese creation stories, the longest ranging of which has the “Chinese Adam” living ninety-six million years before Christ (Jacquemart 24). Considering Brongniart’s extensive geological research, wherein he was a groundbreaking theorist in the nature of time and the age of the earth, this is a telling statement. It is a testament to the innovative and expansive vision of Brongniart, as even in the late nineteenth century, historians have not yet shifted their view.
same problems with the findings, but was unable to use material evidence and scientific testing to eliminate the possibility of an early date. His inclusion of the debate in *Arts Céramiques* suggests that he believed in both the potential of such an object and in the value of archaeological and scholarly discussion, rather than in the age and credibility of these particular objects.

Interestingly, the architect and historian Gottfried Semper draws both directly and abstractly from Brongniart’s research and logic. Semper is commonly considered to be the first art historian to elevate the effort to a science by adopting scientific forms and language. An avid and able mathematician, Semper served as his own engineer in the construction of his buildings, and also studied acoustics in depth, thereby working to create some of the best spaces for musical performance ever built. Semper came across Brongniart’s texts, archives, and museum while in his first year of political exile at Sèvres in 1848-1849, the year following Brongniart’s death. As Semper’s once-stable architecture career dissolved, Semper sought new activities, including developing his critical essays on architectural history. Brongniart’s writings and the collection at Sèvres were to have a beneficial and demonstrable effect on Semper’s work. Upon moving to England in 1850, after serving fifteen years as the director of the Dresden School of Architecture, somewhat surprisingly, the displaced Semper hoped to teach the ceramics at the newly developing school for the “technical arts”, the “Department of Practical Art” in London. He managed a convincing preliminary

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of time or religion from a profound reliance on biblical sources. Jacquemart has benefitted from the work of Brongniart, to be sure, but at the same time, he has followed Brongniart within certain limits. In the early nineteenth century, Brongniart’s vision on the nature of time was already open to a much more vast scale. However, this is to be found in his connection to, among others, the naturalist Georges Cuvier, and in his shared research with his son, the paleobotanist Adolphe Brongniart, rather than in his books on ceramics. This complex subject is too large to be considered within the context of this paper, but merits further discussion, as Brongniart’s advanced, if unspoken, scientific views on the nature of time provided him with a fundamentally different perspective in all aspects of his career.

assessment of his ceramics understanding, but his practical skills were found necessarily lacking when sent to work with Herbert Minton at Minton’s Stoke-on-Trent pottery.\textsuperscript{67}

Outside of Semper’s long-term residence at Dresden, near Meissen, the German center for porcelain, and his time spent at Sèvres, Mallgrave records no instance when Semper spent time actively pursuing ceramics. Mallgrave notes Semper’s interest in both Jules Ziegler’s 1850 \textit{Études Céramiques} and Brongniart’s \textit{Arts Céramiques}, which he used as source material for three lectures on ceramics in 1853.\textsuperscript{68} In the end, at the request of Henry Cole, in stipulation for a teaching position, Semper researched and wrote a paper on metals and enamelling\textsuperscript{69} (much as Brongniart had done in his early career), and served for a brief period as a metals instructor, where, undoubtedly, his rich understanding of building ornament was of much benefit.

Interestingly, Mallgrave credits Semper’s scientific approach to art history that he developed in \textit{Style} to Semper’s youthful visits to the Paris laboratory of the naturalist Georges Cuvier in the late 1820s.\textsuperscript{70} Mallgrave only indirectly and briefly explores Semper’s 1849-1850 residence at Sèvres. In his first year of exile, Semper resided first at the home of

\textsuperscript{67} Mallgrave, \textit{Semper}, 210.
\textsuperscript{68} Mallgrave, \textit{Semper}, 217. Additionally, Zeigler’s \textit{Etudes Ceramiques} directly raised a question about Greek projectiles that Semper drew upon in creating his now famous essay on the topic.

\textsuperscript{70} Harry Francis Mallgrave, Introduction to \textit{Style}, 4, 12. While certainly Semper’s interest in science is lifelong, even these early visits to Cuvier’s laboratory took place after the collaboration between Cuvier and Brongniart. It is intangible how much Brongniart influenced Semper at this stage, but his work as a scientist would have been well known in Cuvier’s laboratories. Certainly, Alexandre Brongniart’s connection to his famous architect father Alexandre-Theodore Brongniart would also have been at least an interesting anecdote to a young architect studying in Paris. In the early 1820s, A-T Brongniart’s last major building, the Paris Bourse (Palais Brongniart), was completed. Lastly, Alexandre’s son, the paleobotanist Adolphe Brongniart had, by the late 1820s, spent several years in collaboration with both Cuvier and his father. Adolphe Brongniart had published numerous studies, as well as founding \textit{Annales des sciences naturelles}. In 1828, the first installments of his important work \textit{Histoire des végétaux fossiles} (1828-1837) were published. Adolphe Brongniart used extensive field research (sometimes with his father, Alexandre) and extended Cuvier’s careful system of class comparisons to fossil plants. Like his father, Adolphe Brongniart was an early theorist on the extended geological history of the Earth. (For a deeper discussion, see Martin J.S. Rudwick \textit{Worlds Before Adam and Bursting the Limits of Time})
the decorative painter Edouard Desplechin, who created set designs for the Paris Opera, and then with the set designer and important porcelain painter as well as art director at Sèvres, Jules Diéterle. Although Brongniart was deceased by the time of Semper’s year-long visit to Sèvres, it is clear that Semper was acquainted with the museum, the manufactory, and its staff, including Denis Riocreux, curator at Sèvres. Mallgrave notes that Semper was deeply familiar with Brongniart’s texts on ceramics. Semper visited the museum collections frequently, and also was able to see a collection of Assyrian bas-reliefs that had yet to be installed at the Louvre. In the year 1850, Semper acknowledged to his publisher a radical rethinking of his works. Mallgrave writes, “. . .the depressed and highly agitated Semper complained that the most recent discoveries of Assyrian, Persian, Babylonian, and Indian artifacts had greatly expanded the range of subject matter and rendered his earlier observations obsolete.”

In common with Brongniart’s inherently modern focus on the most simple commonalities and forms, and his reliance upon explicit elemental and material character, Semper organized Style around the principle of basic elements in design, seeking to find the origins of art forms. However, Semper remains rooted in a Western perspective that is heavily influenced by mainstream, non-scientific thought. Semper’s recognition that Chinese civilization is the only civilization to have a written history prior to the “Great Flood” is both forward-looking and rooted in long-held belief. First, he recognizes that Chinese civilization had early and significant understanding, but he also suggests that the Chinese have failed to progress. Anachronistically recalling Winkelmann, he writes that

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71 Mallgrave, *Semper*, 279.
72 Mallgrave, “Introduction to Style”, 12.
(a)n early decline gave rise to antiquarian political party that ruled China, with the exception of a few short intervals, for forty-five centuries up to the present day. This party sought to fix the golden age of Xia forever but only deprived the people of its power of spiritual growth and expression. Thus the features of eunuchs, staring through their wrinkles with haunting youth, remained an inherited trait of Chinese physiognomy. 73

It is a puzzling contradiction when viewed alongside the truly modern work of Brongniart and his associates of l’Académie des sciences. However, Semper demonstrates his openness to new ideas when he at once recognizes the value of the Assyrian finds as a shift in understanding. He acknowledges their role as having displaced Egyptian art from “apparently the oldest” to second oldest, following Assyria. 74 Elsewhere, Semper uses Brongniart’s classifications (with occasional modifications) when discussing ceramics, but he simultaneously opens the category of “ceramics” to non-clay materials such as metal, wood, and stone, thus departing from using the material nature of the objects as a basis, but rather the function and style. 75 Throughout Style, Semper attempts to create a progressive, modern work, but is at the same time retroactively applying this change in understanding to his earlier ideas. Although Semper sought to create a unifying system, his work lacks the careful scientific rigor and clarity for which Brongniart is known.

In contrast to Semper’s free acknowledgement of Brongniart’s importance in shaping his ideas, Mallgrave downplays Brongniart’s influence. 76 Overlooking Brongniart, Mallgrave instead cites as influential, “such thinkers as Isaac Newton, Pierre-Simon de LaPlace, Cuvier, and Alexander von Humboldt.” Certainly, all of these thinkers would have been influential,

73 Semper, Style, 256.
74 Semper, Style, 106.
75 Semper, Style, 467.
76 Mallgrave, “Introduction to Style”, 9.
particularly the dramatically all-encompassing theories of von Humboldt’s *Kosmos.*

However, it is clear in Semper’s texts, particularly *Style,* that Semper has paid close attention to the work of Brongniart. The index to Mallgrave’s translation of *Style* includes sixteen references by Semper to Brongniart and his work. Only Herodotus, Pliny the Elder, Vitruvius, and Semper’s close friend and collaborator Richard Wagner are mentioned more frequently. By contrast, Cuvier does not appear. *Style,* which includes a substantial discussion of ceramics, continued to be refined over the course of the early years of Semper’s exile from Dresden and unwilling departure from his architecture career.

Elsewhere, noting the clear importance Semper placed on the work of Brongniart, Mallgrave argues that Brongniart’s intent as a historian was pedagogical, and that the museum and texts were meant “not so much for the casual visitor as for the artist and ceramic manufacturer.” Mallgrave further writes that Brongniart’s simple but unifying and comprehensive ceramic art classification was, for Semper, “only a starting point, as the architect’s desired mark far exceeded the framework of these earlier schemes.” Here, Mallgrave has missed the inherent truth of Brongniart’s publications and collections. Brongniart established the first complete system for applying a scientific basis for looking at an artistic discipline across its entire spectrum. Brongniart’s principles could be applied consistently to new evidence without falter, and could, if desired, be used for other disciplines, such as textiles or metals, with little adjustment. Meanwhile, Semper’s lofty goals were often awkwardly realized, sometimes contradictory, and ultimately incomplete. While Semper’s writing has had an

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78 *Der Stil in der technischen und tektonischen Künsten (Style in the Technical or Tectonic Arts; Or, Practical Aesthetics),* 1860-1862. Hereafter referred to as *Style.*
79 The composer and Semper were longstanding friends, having both a personal and a professional relationship. Mallgrave treats this relationship at length in *Semper.*
80 Mallgrave, *Semper,* 279.
influence of the work of others, such as Riegl and Wölfflin, Brongniart’s work, if less acknowledged, has largely maintained its original importance and continues to serve as a basis for understanding ceramic art and material culture. Based on Brongniart’s initial collections, the museum at Sèvres remains one of the most important global collections of ceramics, fulfilling an Enlightenment ideal, and providing legacy that continues to draw in visitors of all types.
Figure 10
Timeline of Porcelain History from Book 2 of *Arts Céramiques*
Figure 11
Illustration from Book 2 of *Arts Céramiques* of a Chinese porcelain vase believed to have been found in the tombs at Thébes.

*Petit vase chinois.*
(Voir p. 481.)

*Trouvé dans les tombes de Thébes.*
Section Seven: Conclusion

Alexandre Brongniart’s long, prolific career influenced the development of a number of disciplines, including geology, mineralogy, naturalism, industrial ceramics, archeology, and art history. His holistic approach provided an integrated and carefully constructed basis for the field of ceramics. As his work touched upon the growing field of art history, it shaped the discussion by providing a common vocabulary and a shared understanding of a field of work that is at once technical and artistic. Additionally, his global outlook toward collections created a scientifically based, balanced resource for understanding not only ceramic history, but the history and development of world civilizations. By building the museum at Sèvres into a research center for ceramic art, he echoed the development of major post-Revolution cultural institutions in France, such as the creation of the Jardin des Plantes and other branches of the Muséum national d'histoire naturelle, and the Louvre.

When confronted with the question as to why Brongniart’s importance in the development of art history is overlooked, there are many possible factors. One of the largest is simply the difficulty in resolving the complexity of Brongniart’s diverse and erudite background. His influence was felt strongly across a number of fields, and his important theories in naturalism and geology may now overshadow his active work in the ceramic arts. Although his career was a synthesis of disciplines based in a common core of understanding, Brongniart is often viewed through the limited lenses of individual disciplines. The difficult task of bringing technical and scientific comprehension into the realm of aesthetics often limits access to the true importance of Brongniart’s work. Viewed from either a solely aesthetic or scientific perspective, details that point to subtle, or sometimes dramatic, shifts in meaning may be lost. Scholars such as Birch rejected the synthesis Brongniart
represented, perhaps because of the gulf in understanding Brongniart’s work signified.

Another possible reason that Brongniart’s contribution to a scientific approach to art history is that the connection to Semper was downplayed or missed by the scholars that took up where Semper left off, such as Riegl and Wölfflin. Yet, it is certain that Semper understood and was indebted to Brongniart’s scientific methodology.

If current scholarship has yet to fully acknowledge the connection between Brongniart and modern art history, his contemporaries and the generation that followed him recognized and were shaped by his achievements. His work established a scheme for understanding ceramics, but more than that, it established a basis for looking objectively and methodically at art forms. Even those to whom his work presented a challenge, such as Samuel Birch, simultaneously recognized its inherent value as a new kind of contribution to the history of art. Brongniart’s work established a bridge from Winkelmann’s early, often-speculative art history, Diderot’s encyclopedia, and the work of antiquaries and geologists of the eighteenth century to a systematized, scientific art history and museology.

Brongniart’s unique perspective as an early and prominent geological theorist provided him with unusual insight as a museologist and historian. Where Brongniart was open to the idea of a culture that preceded Egypt, Birch was resistant to consider Chinese civilization as parallel in importance to the West. Later, Semper was taken by surprise that the mid-nineteenth century Abyssinian archaeological finds demonstrated a larger world view than he had previously considered. Brongniart may not have had access to reliable evidence during his lifetime, but it is clear from the questions he considered, such as the Thébes vases, that he was alert to the potential of a discovery of an earlier civilization and
ready to acknowledge sophisticated thought and well-developed art outside of Classical tradition.

Among the first historians to view Asian and American art forms without a Eurocentric bias, Brongniart opened a path for others to follow. Frenchman Albert Jacquemart echoed Brongniart’s broadened view almost immediately, and soon after American author Jennie L. Young followed suit. By the end of the nineteenth century, Western cultural understanding was moving toward a global view that departed from a strict reliance on a classical tradition and began to explore relationships between European, Asian, and American art.

Brongniart, by having a dual interest in the sciences and the arts, possessed a rare understanding and a singular insight. With his position at Sèvres, he was able to create a new approach to the collection and analysis of artifacts and material culture. At the same time, he remained active in moving the industry and the art of ceramics forward. If Brongniart’s colleague Alexander von Humboldt had the ambition of creating an underlying theory of everything, Brongniart used his extensive resources to do so for the art of ceramics. In view of his diverse contributions and pioneering perspective, Brongniart is long overdue for recognition for his role in the creation of a modern approach to art history.
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