number: "CS5"

title: Case Study 5

subtitle: One Commission, Two Sculptors, How Many Founders? A Technical Study of Three Renaissance Statues from the Monument of the Heart of Duke Anne de Montmorency

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bio: Manon Castelle is a conservation scientist specializing in copper alloys in ancient and historical metallurgy. She received a PhD from the Université de Versailles Saint-Quentin-en-Yvelines in 2016 for her work on French bronze statuary techniques, 1540 to 1660. She then worked on bronze artifacts excavated from the Celtic prince of Lavau tomb (fifth century BCE, France) and, as part of a postdoctoral project (UVSQ), on copper-based seal matrices from the French Archives Nationales and the Musée des beaux-arts de Lyon. In 2018 she obtained the two-year Migelien Gerritzen Fellowship at the Rijksmuseum and continued her research on European bronze objects from the fifteenth to the eighteenth centuries.

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bio: David Bourgarit (Archaeometallurgist, Centre de Recherche et de Restauration des Musées de France [C2RMF], Paris, and Laboratory TEMPS-CNRS-Nanterre University) has a background in physics, with a PhD on the physical metallurgy of a specific titanium alloy. Since 1996 he has been a researcher at the C2RMF, where he has been investigating metallic artifacts from almost all periods and regions. His primary research interests are in the technological approach to copper metallurgy, with a focus on the provenance of copper and fabrication techniques. He coedited *French Bronze Sculpture: Materials and Techniques 16th–18th Century* (2014).

abstract: Commissioned in 1571, theMonument of the Heart of Duke Anne de Montmorency (French, 1493–1567), Constable of France, includes three life-size bronze statues. These were made by two sculptors, Barthélémy Prieur and Martin Lefort. In the archives, only one founder, Nicolas Péron, is associated with the casting of two of the statues. A technical investigation of the statues, including metal and core analysis and visual and radiographic examinations, was undertaken to discern whether Péron might have cast all three and to shed light on the relationship between the sculptors and the founder(s), which was crucial in this period of Renaissance bronze statuary.

short\_title: Case Study 5

## Slide 1: Introduction

Commissioned in 1571, theMonument of the Heart of Duke Anne de Montmorency (French, 1493–1567), Constable of France, includes three life-size %%bronze%% statues. These were made by two sculptors, Barthélémy Prieur (French, 1536–1611) and Martin Lefort (French, active 1562–82). In the archives, only one %%founder%%, Nicolas Péron, is associated with the casting of two of the statues. A technical investigation of the statues, including metal and %%core%% analysis and visual and radiographic examinations, was undertaken to discern whether Péron might have %%cast%% all three and to shed light on the relationship between the sculptors and the founder(s), which was crucial in this period of Renaissance bronze statuary.

**Fig. 523**

## Slide 2: The commission

In 1571, Madeleine of Savoy, Anne de Montmorency’s wife, commissioned the architect Jean Bullant (French, 1515–1578) to produce a funerary monument for the heart of her husband. The monument, now in the Louvre, is composed of a sculpted stone column that would originally have been topped by an urn containing the heart. Bronze allegorical personifications of Abundance, Peace, and Justice were situated around the base of the column as witnesses to the character of the deceased. Bullant charged two sculptors to produce the statues. Prieur was responsible for Abundance and Peace, andLe Fort made Justice. Péron was commissioned to cast the statues by Prieur. There is no record of who cast Le Fort’s.

**Fig. 523**

## Slide 3: Main questions

Considering the number of people who collaborated in the production of such sculptures (and there were no doubt more unnamed hands involved as well), can the physical evidence help clarify who was ultimately in charge of the production? In other words, do the technical choices suggest that the same founder or different ones worked with the two sculptors to cast the three sculptures? Can comparison of the casting processes used for each of the statues help answer these questions? And what can the characterization and comparison of the materials used tell us with regard to these questions?

**Figs. 34, 97, 524**

## Slide 4: Visual evidence of lost-wax casting

Clear traces of %%lost-wax casting%% include the modeling of details such as the vine leaf and grapes held by Abundance. It is also clear from an examination of the undersides of all three sculptures, which are hollow %%casts%% with relatively thick, uneven metal walls, still partially filled with the baked, sandy clay cores that were built around a system of iron %%armature%% rods, as seen here in the interior of Peace.

**Figs. 8, 51, 70**

## Slide 5: Internal evidence of unique chaplets

The location of %%core supports%% is nearly invisible on the radiographs. Endoscopic examination of the interior metal walls of Justice and Peace where the core had been removed revealed a rather unique feature in both: the raised outline of what looks like a rectangular bronze %%patch%% with an integral faceted tapering point extending out from its center. That these features are idiosyncratic to these two casts is a strong indication of their production in the same foundry. No such %%chaplets%% could be observed in the radiographs of Abundance due to the possible masking of the internal surface by the core.

**Fig. 38**

## Slide 6: A direct lost-wax cast?

Radiography of the statues showed the relatively thick metal walls and the shape of the preserved vestiges of the original armatures. Few wax-to-wax joints are visible, and the internal surfaces do not conform to external contours. The latter features suggest that the sculptures were directly cast.

**Figs. 34, 97, 524**

## Slide 7: Armature system

The armature systems were mapped out based on the radiographs for each sculpture, to the extent possible. The gauge of iron rods seems similar in all three. Both of Prieur’s figures show that the core of the protruding arms was bound with wires. The Le Fort figure does not have these, probably because the core was almost entirely removed.

**Figs. 34, 97, 524**

## Slide 8: The archives point to an indirect process—lasagna

The surviving contract between Prieur and Peron, however, mentions that the founder would produce the wax %%model%% from a plaster %%piece mold%% that the sculptor had made of his original model. All of the evidence now points to some version of the lasagna technique described by Benvenuto Cellini (Italian, 1500–1571; see [GI§2.3.2](#GI§2.3.2)).

**Fig. 23**

## Slides 9, 10, 11: A characteristic core composition?

Some core could be sampled from underneath each statue. A new methodology based on the precise measurement of the size of the quartz inclusions in the clay core of bronze statues has shown that the cores of the three allegories were not only the same, but very specific with respect to sixteenth- and seventeenth-century Parisian bronzes analyzed to date. Indeed, whereas the petrographic images do not show many differences, the distribution of sizes of quartz inclusions show slight but clear differences. Whereas in most sixteenth- and seventeenth-century Parisian bronzes, two sizes of inclusions coexist (very small inclusions of around 5 µm in diameter and much larger ones, up to 150 µm in diameter), in the allegories only the large inclusions are present (100–200 µm).

[Slide 10] **Fig. 431**

[Slide 11] **Figs. 427, 428, 525**

[Slide 12] **Figs. 34, 274, 405, 406, 524, 526, 527**

## Slide 12: The alloys

Inductively coupled plasma with atomic emission spectroscopy (ICP-AES; see [II.5§1.6.1](#II.5§1.6.1)) analysis of a sample drilled from each statue revealed that Prieur’s Abundance and Peace are made of tin-bronze, whereas Le Fort’s Justice is made of %%brass%%. Moreover, the very different impurity patterns suggest disparate copper ore sources. If Péron cast all three sculptures, he would have been responsible for preparing and %pouring% the metal. How then to explain the variation in the alloy types?

**Fig. 528**

## Slide 13: Summary of findings: A unique founder?

The three figures were cast by a similar method using idiosyncratic chaplets and a similar core composition, which strongly suggests that they were cast by the same founder. The variation in metal composition would suggest, however, that a different founder was involved. All of Prieur’s large bronzes that we were cast in France are made of tin-bronze. It is possible that he imposed his choice of alloy on the founder. Conversely, Le Fort was of less renown, with no documented previous experience in casting, and so he might have left it up to Péron to work with his preferred alloy, which we assume was brass (this of course is only a hypothesis; we unfortunately have no record of other productions by Péron).

In the end, the sculptors’ different backgrounds and status lead us to rationalize that the alloy used for Prieur’s two figures was due to the artist’s deliberate Italianate choice, and that the founder Péron was willing and able to successfully execute the casts for the monument in both alloys.

**Fig. 523**

## Slide 14: Synopsis of technical parameters

The study was carried out at the C2RMF as a public service to French museums and the procedures undertaken by staff unless indicated. Its total duration was more than one hundred person-days, as part of Manon Castelle’s PhD research. The study consisted of:

• visual examination: Manon Castelle & D Bourgarit, and Francesca G. Bewer (Harvard Art Museums). This was one of the most time-consuming steps in the study.

• daylight photography: Dominique Bagault. Of the circa 100 photos taken per statue, about half were selected.

• X-radiography: Thierry Borel, Jean Marsac and Elsa Lambert. The particularly large thickness of the metal wall and the core filling created a very dense barrier that pushed the X-ray facilities of the C2RMF to their limit.

• endoscopy: Manon Castelle. Alas, the image resolution of the files produced was insufficient for publication.

• bulk metal analyses by atomic emission spectrometry (ICP-AES): Nathalie Gandolfo, Jessica Legendre, Benoit Mille, and David Bourgarit

• core analysis: Manon Castelle and Yvan Coquinot. In the framework of Castelle’s PhD work, this study offered the opportunity to develop a new protocol detailed in [II.7](#II.7).

For more on the operating conditions see {Castelle 2016}; {Castelle, Bourgarit, and Bewer 2018}; {Seelig-Teuwen, Bourgarit, and Bewer 2014}. For more on the techniques see volume II.

## Slide 15: Further questions

• What was the original %%patina%% of the statues? Was it the same for all three?

• What was Péron’s training and production prior to the casting of the allegories? Such information might provide insight into his alloy preference and approach to casting sculpture.

## Slide 16: Further resources

{Bewer, Bourgarit, and Bassett 2009}

{Bresc-Bautier and Scherf 2008}

{Castelle 2016}

{Castelle, Bourgarit, and Bewer 2018}

{Castelle, Coquinot, and Bourgarit 2016}

{Castelle et al. 2021}

{Grodecki 1986}, 134, 135

{Seelig-Teuwen, Bourgarit, and Bewer 2014}