1. Jacques Jonghelinck, tomb of Charles the Bold, 1558–62, gilt bronze. Church of Our Lady, Bruges
(photo: the authors)

Jacques Jonghelinck (1530-1606), bronze sculptor of the Low Countries in the 16th century

Arie Pappot and Lisa Wiersma

Abstract

Today, the sculptural oeuvre of Jacques Jonghelinck (1530-1606) is scattered over the world, and has not received much technical attention. A comparison between his works and that of Leone and Pompeo Leoni (1509-1590 and 1533-1608) tells us more about the impact of Italian bronze sculpture on the techniques of Netherlandish workshops, and helps determine the characteristics of Jonghelinck's bronzes. In both workshop practice and his use of materials, Jonghelinck clearly followed his Milanese employer. Alas, not that many monumental sculptures left the artist's workshop, but the pieces that did demonstrate his artistic resourcefulness. In this paper, particular attention is paid to the *Planet Series* to support this statement. Additionally, we argue that the artist might have been trained by an Augsburg master, as a result of which he would have become the perfect Renaissance bronze sculptor with an outstanding background in goldsmithing.

Introduction

Jacques Jonghelinck was one of many Netherlandish artists of his generation who spent time in Italy.[1] He was born and raised in Antwerp, worked in the Leoni workshop in Milan around 1552, and settled in Brussels and later in Antwerp as a court sculptor, medallist and mint master. Few examples of monumental metal sculpture are known from the Low Countries in the first half of the 16th century, the period preceding Jonghelinck's career. The flourishing production of sculptures in brass - including, for instance, the late gothic *Mary of Burgundy* in Bruges – declined. Jonghelinck's rise coincided with the equally sudden appearance of his compatriots working abroad: at the hands of Giambologna (1529-1609), Willem van Tetrode (c. 1525-1588), Hubert Gerhard († 1620) and Adriaen de Vries († 1626) bronze sculpture blossomed in Florence, Prague, Nuremberg, Augsburg and Munich. Jonghelinck was the only bronze sculptor to return permanently to the Low Countries, where the Reformation and waves of iconoclasm had a severely negative impact on the practice of sculpture.

In recent years, Luc Smolderen has rescued Jacques Jonghelinck from oblivion. From the 1960s onwards he researched and published archival material, culminating in his comprehensive monographic study of 1996.[2] A significant contribution to the corpus of Jonghelinck's oeuvre of monumental sculptures was made in 1979 by Bert Meijer, who studied the seven life-size planetary deities and *Bacchus*, which were rediscovered in the Spanish royal collections.[3] Subsequently, the iconography of this series was discussed in relation to the collection of the commissioner, Jacques Jonghelinck's brother Niclaes (1517-1570) by Iain Buchanan, who also reconstructed the history of the transfer of the bronzes to Spain.[4] Following the identification of these monumental sculptures, further attributions to the artist were made by Rosario Coppel.[5]

Despite the available scholarly material, Jonghelinck remains relatively unknown to art historians. As Smolderen stated in 2010, Jonghelinck lacked the good fortune to be known through his work: his creations are largely anonymous and dispersed.[6] Moreover, his sculptures are not that numerous.[7] However, Jonghelinck's career and oeuvre are of undeniable significance in the art of the Low Countries.

Fashionable sculptures

Jonghelinck's known output of sculptures consists of the lost epitaph for Reinhard of Hanau (between 1554 and 1557), the bust of Philip II (c. 1557, attributed), the design and wax model - never cast in bronze - for a monumental wall tomb for Philipp III of Hanau-Münzenberg (c. 1560), the effigy of Charles the Bold (1558-1562) (fig. 1), the *Planet Series* and *Bacchus* (1566-1574), the destroyed *Alba* (1571), the Alba bust (1571) and a lost fountain for the Brussels royal gardens (1565, and restored 1597).[8] The taste for sculpture in metal faded in the Low Countries with the decline of the monumental brass tradition in the early 16th century, which coincided with the start of the Habsburg rule and, later, the aforementioned iconoclasm.[9] Given these circumstances, Jonghelinck's eminent and rewarding position at the Antwerp mint from 1572 must have made him reluctant to work as a sculptor. He might even have turned down opportunities of contributing to major sculptural projects. When Gaspar del Castillo, administrator of the Escorial building project, went searching for sculptors in Antwerp in November 1584 to enlist them to work alongside Pompeo Leoni on the Escorial high altarpiece, he returned empty-handed.[10] Either Jonghelinck was not asked, or, more plausibly, he would not give up his position at the mint and did not have protégés to send.

The monumental projects Jonghelinck did undertake were technically complex, of high quality and artistically fashionable. The parallels with the works of his contemporaries, the Leonis and Giambologna, are evident and the planetary deities and *Bacchus* series especially demonstrate his resourcefulness.[11] This allegorical group could have been prompted by his exposure to similar themes in Italy, and fits a wider culture of cosmology in art.[12] But a precedent for the specific subject matter of planetary deities had been present much closer to home. Juan Cristobal Calvete de Estrella, who accompanied Charles V and Philip II on their visit to Mary of Hungary's castle at Binche in 1549, described the planetary gods in their chariots, 'beautifully painted' on the walls of the 'enchanted chamber'.[13] If Jonghelinck was involved in preparing the festivities at Binche as a goldsmith (see below), and caught a glimpse of this room, the chamber would no doubt have made quite an impression on the young artist. But he must have encountered further images depicting the planets: German astrological prints of planetary gods were produced from the late Gothic period and reached their most extensive circulation during the first half of the 16th century, and in the 1560s, elaborate prints depicting the planetary gods were made after Maarten van Heemskerck.[14]

Sculptural examples are scarce, especially on a monumental scale. A small fountain with the planet deities from the 1530s was made by Hans Peisser.[15] And - again relatively small - reliefs in stone of planetary gods can be found in Burg Trausnitz, the residence of Ludwig X of Bavaria in Landshut, made in 1541 by Thomas Hering, who used the theme for the mantelpiece of the fireplace in the Italian Hall, to support the wider decorative scheme in the room of cosmic versus earthly order.[16] In the same period that Jonghelinck made his series, several sets of cosmically themed statuettes were cast not only by German and Italian artists, but also sculptors and goldsmiths originating from the Low Countries.[17] A planet series for the sepulchral monument for Edo Wiemken in Northern Germany is closest in scale to Jonghelinck’s work. The sculptures were presumably made by a Netherlandish artist, perhaps a follower of Cornelis Floris, in the early 1560s.[18] An intriguing example of a sculpted planet series appears on a painting from the 1590s attributed to the French

artist François Bunel (fig. 2).[19] The poses differ slightly from the Jonghelinck Planets, but it is conceivable these sculptures were derived from Jonghelinck's figures.[20]

2. François Bunel the Younger (attrib.), *The Confiscation of the Contents of a Painter's Studio*, c. 1590?, oil on panel, 28.1 × 47 cm. Mauritshuis, The Hague (photo: © Mauritshuis, The Hague)

Clearly, there was some momentum for the theme of planets in sculpture in the 1560s and 1570s. Most of the aforementioned gods on prints were depicted with a range of symbolic objects that distinguished them, and often seated in chariots.[21] The changing iconography seen in statuary coincides with the immense popularity of astrology in the wake of new developments in astronomical knowledge and a vogue for allegorical statuettes.[22] Nevertheless, to create deities representing a series of the planets was exceptional, and the freestanding, life-size depiction of the planets, with a mannerist emphasis on the beauty of the human form, was unprecedented.[23]

The size and rarity of the mythological and cosmic planet theme in sculpture might have been the reason for the strict embargo laid on copying the *Bacchus* or Planets, unless significantly altered, that was written into the contract between Jonghelinck and Aert Vleminck, who took possession of the sculptures after the death of Niclaes Jonghelinck in 1570.[24] Such a restriction would not have applied to the Duke of Alba (1507-1582). He might very well have commissioned imitations of the works of Jonghelinck when he erected a fountain in his garden in Spain adorned with the seven

planets.[25] He could not have known the prints that Philip Galle (1537-1612) made of each sculpture, for these were not published until 1586, but he must have seen the Planets in Brussels, when Jonghelinck was also working on the Duke's portraits.[26]

Development

In his working practice, Jonghelinck was not a typical artist within the tradition of Low Countries sculpture. He was not trained as a *geelgieter* (latten founder), stone or wood sculptor, but developed his skills in the Antwerp mint, was trained as a goldsmith, and became a sculptor under the tutelage of Leone Leoni in Milan in the 1550s. We know of Jonghelinck's sojourn in Leoni's workshop in Milan from a document dated 23 May 1552, but the duration or purpose of his stay is unknown.[27] Antoine Perrenot de Granvelle (1517-1586), at that time Bishop of Arras and advisor to the Habsburg throne, not only arranged for foreign artists such as Leoni to work at the court in Brussels, but also encouraged Netherlandish artists to study abroad.

An undated letter from Granvelle to Leoni seems to usher in Jonghelinck's stay in Milan. In the letter Granvelle speaks highly of a goldsmith who taught his men the art of life-casting: real, fragile flowers were cast in silver or another metal, which combined to form a 'substantial meadow'.[28] It has been suggested that this letter was sent from Flanders, and that the unnamed goldsmith could be the young Jonghelinck.[29] But it is more likely Granvelle wrote from Augsburg, and was referring to a local master. In the same letter he mentioned Leoni's wax model of the *bella Felipina*, of which a fine medal was cast by the same goldsmith.[30] This must have been the portrait medal of Philippine Welser, almost certainly modelled and cast in Augsburg, home town to the rich merchant's daughter.[31] Leoni visited the city in December 1549 and early 1551 and could have portrayed

Welser on both occasions.[32] Granvelle, who was present when the medal was cast, often resided in Augsburg during the Imperial Diets of 1548-49 and 1550-51 in the service of Charles V.

Granvelle could have brought 'his men', artists from the Brussels court, to accompany him, allowing them to work with the South German goldsmiths famous for their refined skill. If Jonghelinck was among them, this implies a secondary training in South Germany, en route to Milan.[33] But the instructions Granvelle's men received from a South German goldsmith might also have taken place in the Netherlands, some time before the letter was written. During the last evening of Mary of Hungary's spectacular festivities to celebrate the visit of Charles V and Philip II to Binche in August 1549, the different courses of dessert were served to the royal guests and their entourage in the aforementioned ‘enchanted salon'. The courtiers Calvete and Hieronymo de Cabanillas described the guests drinking wines that streamed from a rock formation against the wall, adorned with branches of coral and several plants and animals: flowers, herbs, lizards, turtles, snakes and 'other creatures that live in rocky hills'.[34] When Lodovico Guicciardini mentioned the demolition of the castle by Henri II in 1554, he mourns the loss of its many treasures, among which were, 'made by Germans, herbs or little plants and flowers of silver, cast in the foundry, made artistically, that were set in motion by the wind.'[35] One of these goldsmiths could have cast the Felipina medal later that same year in Augsburg.

Either way, Jonghelinck could have been one of the men instructed by the German artist. In the capacity of an extraordinarily skilled goldsmith, Jonghelinck must have been an interesting assistant for Leone Leoni. Perhaps he travelled south on his own or in the retinue of Granvelle, arriving by May 1552 at the latest, or he could have joined Leoni on his way home in 1549, after Binche.

Jonghelinck must have returned to the Low Countries sometime before November 1553, when he designed the model of a new silver Carolus guilder.[36] From this point, it appears inevitable that

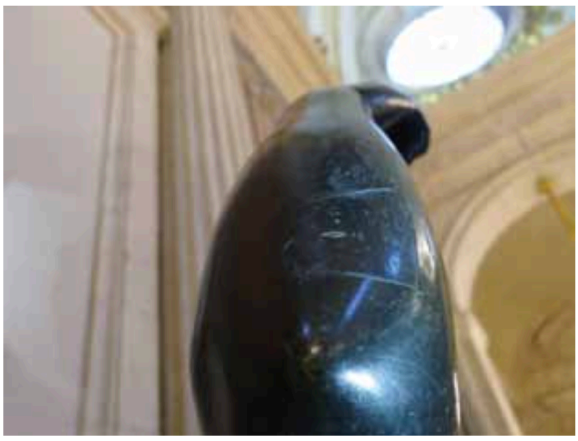
Jacques Jonghelinck became the main, and moreover royal, bronze sculptor in the Low Countries. Not only was he a fully trained goldsmith, medallist and bronze sculptor, but he had no obvious local rivals: his peers Willem van Tetrode and Giambologna travelled southwards in the same period he did, but, like the next generation of bronze sculptors, including Hubert Gerhard and Adriaen de Vries, they rarely returned.[37]

Workshop practice

Because of the richness of the fifteenth-century brass sculpture tradition, it is not surprising that some art historians set Jonghelinck's apprenticeship in the workshop of a brass founder, Hans or Jan Symons, by whom a number of similar medals are known.[38] But Jonghelinck clearly organised his workshop in the manner of his Italian teacher, Leone Leoni. He was the main contractor for his first important assignment back in the Netherlands, the tomb of Charles the Bold, albeit under the auspices of Cornelis Floris De Vriendt (1513-1575).[39] In the fifteenth century, different tasks were divided according to guild regulations: a painter would provide the design, and a sculptor or wood carver the models, which were then cast in a brass foundry and finished or gilded by goldsmiths. Most of these casts appear to be made indirectly, as sculptors often carved their models in wood and did not supply fully prepared wax models.[40] As we shall see, Jonghelinck's casting techniques differed greatly from traditional Netherlandish brass founding.

The Leoni workshop was bustling with activity in the period of Jonghelinck's stay, as the statues of Charles V, Phillip II, Isabella and Mary of Hungary, now in the Prado museum, were all made between 1551 and 1555.[41] A study carried out in 2012 by Elena Arias, sculpture conservator at the Prado, reveals their technical characteristics.[42] Leoni finished the wax models to a high degree of detail and used direct casting techniques, except for the bust of Charles V. Most of the core material

and armatures were removed, but in some spots, the sandy clay core and heavy rectangular bars are still present. Although the casts of *Charles V and the Fury* and *Phillip II* were almost flawless, as Leoni reported in his letters to Granvelle, the surface of the Mary of Hungary and Isabella are covered with patches, which were made by cold forging slabs of bronze in tapered recesses.[43] According to Arias, Leoni did not apply the commonly used iron pins to secure the core in the mould, but instead left rectangular gaps of ±4.5 x 2 cm in the wax layer, through which the clay of the outer mould was joined with the core.[44] Nonetheless, round core pins can be observed in the knee of the *Mars*, and claw of the eagle which form the base of the Charles V bust at the Prado. Another explanation for the lack of core pins and the rectangular patches on the larger bronzes might be the use of armature bars which protrude from the core, through the wax layer, into the outer mould, similar to the drawings of the casting of the equestrian statue in Diderot's encyclopaedia. The bronzes were finished under supervision of Pompeo in Madrid between 1556 and 1564, and some repairs could date from this period. With regard to the choice of alloy, the metal analyses of the Philip II, Mary of Hungary and Charles V bust reported by Arias indicate that Leoni consistently used a binary copper-tin alloy with 9-11% of tin and some lead.[45]



3. Jacques Jonghelinck, *Luna*, 1563–70, bronze, 187 cm, detail of rectangular patch in the right elbow. Palacio Real, Madrid (photo: the authors)

4. Jacques Jonghelinck, *Venus*, 1563–70, bronze, 176 cm, detail of polygonal, cast-in repair in the base. Palacio Real, Madrid (photo: the authors)

The difference with the conventional metal sculpture techniques of the Low Countries could not have been greater, and studying Jonghelinck's work is a fundamental step in understanding which skills Netherlandish sculptors acquired when staying in Italy. For this essay Jonghelinck's two major works, the *Tomb of Charles the Bold* in the Church of Our Lady in Bruges and the seven Planets at the Palacio Real in Madrid, were visually examined and subjected to XRF analysis to determine the metal composition. XRF results were quantified using opensource PyMCA software and the CHARM set of reference standards.[46] Similar data on the bust of Alba at the Frick collection has kindly been made available by Julia Day of the Frick conservation department. With the use of large, rectangular patches (fig. 3), and the absence of iron core pins, Jonghelinck appears to have followed his Milanese tutor, although the tomb effigy could have been finished differently for the purpose of gilding. However, most of the patches comprise cast-in sections of bronze, rather than cold forged plates (fig. 4 & 8). This may be a complex technique Jonghelinck developed independently of the Leoni workshop, but this is not necessarily the case: it is possible Leoni initially combined cast-in patches with cold forged inserts, which were lost during transit and replaced by Pompeo in Madrid, as mentioned above.[47] Some of Jonghelinck's cast-in patches clearly have fallen out or were replaced later, as can be seen,for example, from a small rectangular patch on the wrist section of the right hand glove of the tomb of Charles te Bold, which was cast in a brass alloy similar in composition to several other later repairs; and a patch at the left collarbone of the Alba bust which was reattached by means of a modern adhesive (fig. 5). It appears this technique relied on interlocking edges instead of a more durable, fused join, which is achieved through flow-welding.[48]

5. Jacques Jonghelinck, bust of Alba, 1571, bronze, 116.5 cm, interior view of a cast-in patch. The Frick Collection, New York (photo: © the Frick Collection)

6. Jacques Jonghelinck, *Venus*, 1563–70, bronze, 176 cm, detail of the hair showing as-cast surface and coarse chiselling marks. Palacio Real, Madrid (photo: © KIK-IRPA, Brussels)

As a trained goldsmith, Jonghelinck was certainly familiar with modelling in wax, and his use of this material for sculpture is documented in the case of the Hanau tomb.[49] During the time he worked on the Charles the Bold tomb, he provided the brass founder Andries van Voesdonck with models of angels, carved in stone, and their moulds, *patrons et molures de pierre d'anaines*, designed to crown brass pillars, now lost.[50] The sculptures of the Planet series show clear signs of wax modelling, the hair of *Luna* for example, which, besides some rough chiselling, received little further tooling or cold work (fig. 6). Jonghelinck made the wax models of these figures in two parts: the sculpted sections according to the direct method, the sharp-angled bases indirectly. The direct method is suitable for complex and large sculptures such as the Planets, but bases with straight planes and edges are more easily achieved by using negative moulds, in which wax is applied by brushing. The drip marks and brush wipes (fig. 7) are tell-tale signs of this process. Openings were cut out of the top of the wax bases to connect to the core of the sculpted part and the two sections were joined before casting (fig. 8 & 9). Photographs of *Luna*, *Venus* and *Sol*, made in Brussels during an exhibition in 1985, also show the interior view of the numerous cast-in patches

Jonghelinck had to apply. The detailed surface and complex undercuts of the effigy of Charles the Bold are strong indications of direct casting, but the repeated architectural elements that frame the tomb's corner figures, and the small variations between the angels on both sides of the heroic panels, suggest multiple casts were made from the same model. The embargo on copying the *Bacchus* or the Planets in the contract between Jonghelinck and Vleminck mentioned above suggests that multiples or surmoulage was common practice.[51]

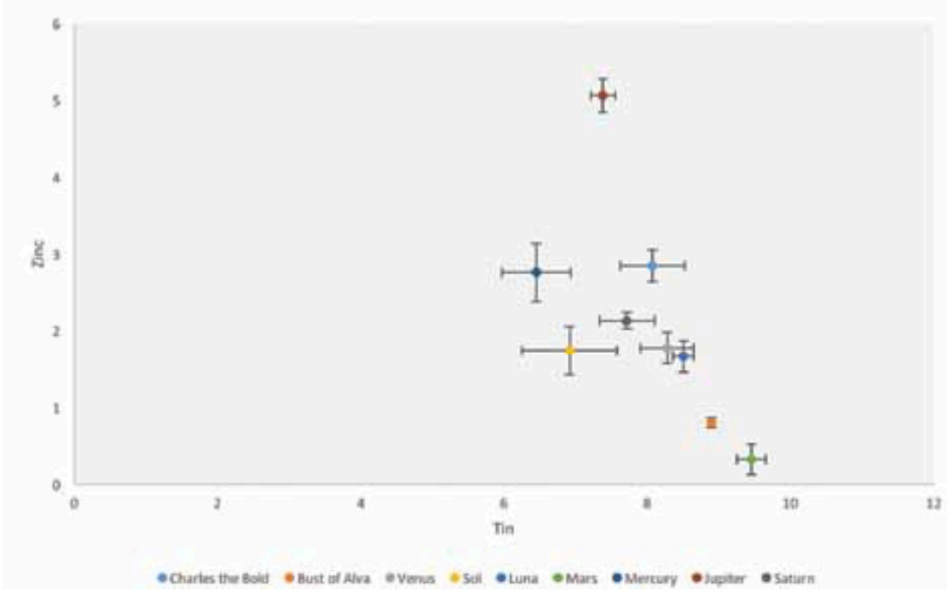
7. Jacques Jonghelinck, *Venus*, 1563–70, bronze, 176 cm, detail of interior of the base showing drip mark and brush wipes. Palacio Real, Madrid
(photo: © KIK-IRPA, Brussels)

8. Jacques Jonghelinck, *Venus*, 1563–70, bronze, 176 cm, detail of interior of the base showing cast-in repair; cf. fig. 4. Palacio Real, Madrid
(photo: © KIK-IRPA, Brussels)

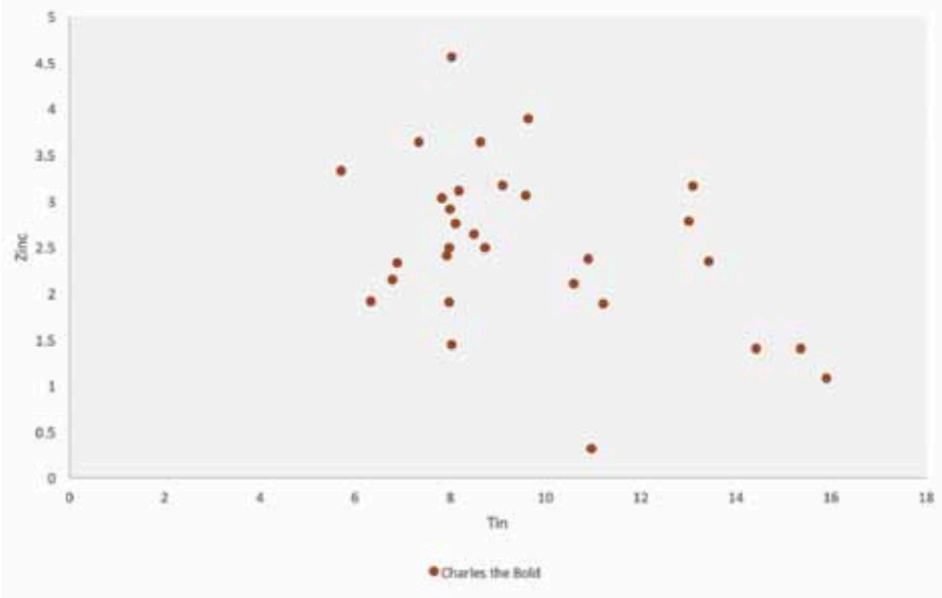
9. Jacques Jonghelinck, *Apollo* or *Sol*, 1563–70, bronze, 176 cm, detail of interior of the base showing recess, cut out in the wax. Palacio Real, Madrid
(photo: © KIK-IRPA, Brussels)

As we have seen, Jonghelinck returned from Milan to a region with a rich tradition of brass sculpture, and collaborated with brass founders such as Van Voesdonck. Yet he operated his own workshop at Granvelle's palace, installed during Leone Leoni's time, and later in his own house in Brussels, both equipped with a foundry.[52] The alloy he used for most of the Planets and virtually all parts of the tomb, consists of copper, 5.5-12% of tin, 1-4% of lead and 1.5-5.5% of zinc. (graph. 1) The Planets all show lead surface enrichment, which could be caused by the application of lead-based paint, or, more likely, by lead sweating. Lead does not form an alloy with copper but concentrates in a separate globules. Above 327.5 ˚C the lead starts to melt and sweat out of the bronze matrix.[53] The Planets were installed at the Alcázar palace, which burned down in 1734 and although the room where the bronzes were displayed was relatively unaffected, the metal could have been exposed to considerable heat.

Graph 1. Tin and zinc values of bronze sculptures by Jonghelinck as determined by XRF.



Jonghelinck deliberately and consistently added brass to the alloy, resulting in substantial amounts of zinc, except in the case of the *Mars* and the bust of Alba (graph 1). The systematic application of this alloy is clearly demonstrated by its occurrence in all the separately cast parts of the tomb (graph 2). The destroyed statue of Alba, erected at the Citadel in Antwerp, was cast from bronze cannon looted by the Spanish troops after the battle of Jemmingen in 1568.[54] As the bust was made at the same time as the statue, it is possible that Jonghelinck used the same looted cannon bronze, which would explain the deviation from the leaded copper-tin-zinc alloy he appears to have preferred. From this perspective, it is tempting to assume that the *Mars*, because of the military connotation of this deity, was cast from copper-tin cannon bronze too.



Graph 2. Tin and zinc values of separately cast parts of the Charles the Bold Tomb by Jonghelinck as determined by XRF.

Unfortunately, documents related to the manufacture of the *Planets* are scarce, and their exact date is uncertain. A document dated 22 May 1570, shortly after Niclaes' death, mentions eight statues (the seven Planets and *Bacchus*), six of which were finished, while two others, namely *Saturn* and *Jupiter*, were still in the sculptor's workshop in Brussels. Smolderen argues that these two figures were made later because of the complexity of the poses, and might not have been finished before April 1574, when Jonghelinck moved out of his house in Brussels. Work on the first six statues could have started as early as 1563, after the completion of the tomb of Charles the Bold.[55]

Could the addition of brass to the alloy, resulting in an elevated zinc content, be characteristic to Jonghelinck and originate from a hybrid of Northern brass, and Italian bronze founding traditions? Probably not: although Ghiberti specifically required additional brass for the casting of the Baptistery doors, most major Italian sculptures were cast in copper-tin alloys during the early 16th century.[56] This particular alloying practice may have been a reinvention that spread through Italy during the 1550s, and while Vasari mentioned two parts of copper and one of brass as a typical Italian recipe for statuary metal in his technical introduction to *Vite*, the actual application of this alloy is only known from a limited number of 16th century sources.[57] For the casting of the equestrian statue of Henri II in Rome, Daniele da Volterra used an alloy of 15 parts of copper, 3 of

tin and 7 of brass, which contributed to the beauty of the colour and softness of the material. The metals were obtained in Antwerp in 1561.[58] Leone Leoni did not add brass to the alloy in the case of the *Philip II*, *Mary of Hungary* and Charles V bust at the Prado, but he did list brass among the ingredients he gathered in preparation for the casting of the statue of Ferrante Gonzaga, to be erected in the centre of Guastalla, in a letter to Cesare Gonzaga dated November 1562. He managed to acquire several old pieces of ordnance but requested more money to buy tin and brass, in order to achieve a finer alloy and colour.[59] His son Pompeo evidently continued to use this specific alloy, as he charged for additional expenditure in 1579 for his work on the Escorial altarpiece, since so much more copper, fine brass and tin was needed for the sculptures and frames.[60]

Apart from the High German brass producers, who exported to the Italian market, Tyrolean smelters in Pflach near Reutte and Achenrain near Rattenberg on the Inn marketed their product in Bolzano.[61] From their plant in Fuggerau, the Fugger company supplied brass to Venice, where manufacturing flourished during the first half of the 16th century.[62] Although both Ghiberti and da Volterra obtained their brass in Flanders, Milan, according to Biringuccio, was famous for its own brassware and zinc ore was found locally in a mine close to Como.[63] In the Netherlands, sculpture or ornamental work in general were cast in a brass alloy, often with significant amounts of lead of 10% or even more. Copper-tin alloys were reserved for bells and cannon.[64]

Metal composition

Apart from the cannon used for the Alba statue, we do not know where Jonghelinck obtained his metals, and of what quality they were. The market in Antwerp was partly supplied with copper from the region of Mansfeld near the Harz by the Leutenberg trade company from 1527 through factors in Lüneburg and Hamburg. Although they met competition from Hungarian copper from Neusohl and, incidentally, some Swedish copper, they were able to take advantage of the crisis the Fuggers

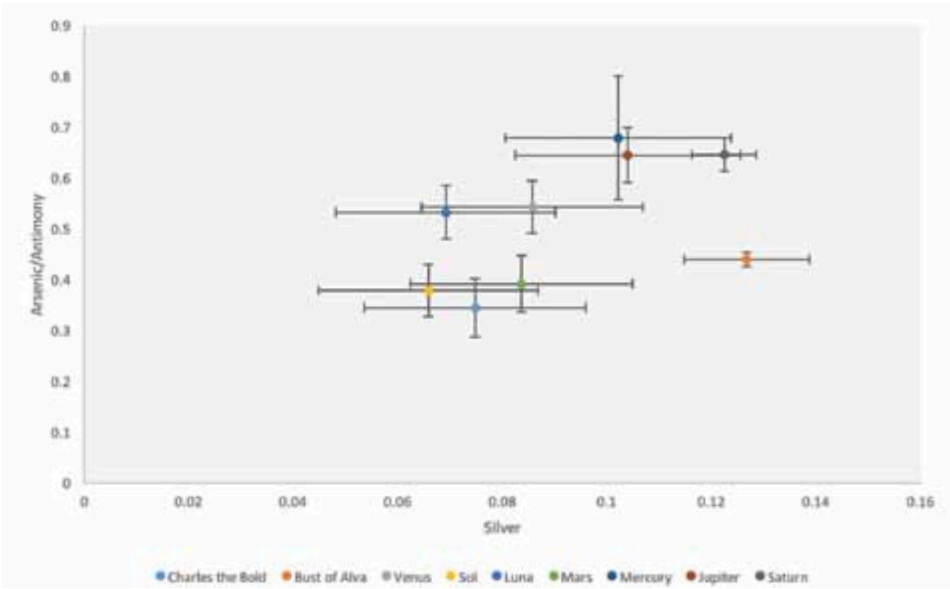
experienced in their Hungarian trade after 1525. From the late 1520s an increasing amount of cheap copper from Schwaz in Tyrol was exported northwards to Nuremberg, Frankfurt and Antwerp by the Manlich firm. Especially in Nuremberg the copper from Mansfeld was pushed out of the market and as a result, exports to Frankfurt and Antwerp increased instead.[65] In 1536 the five largest companies trading in copper from Mansfeld united in a syndicate, to compete more aggressively with their rivals. The market was divided and the Leutenberg company was granted exclusive access to the Antwerp market.[66] This company went bankrupt in 1546, and by the late 1540s Mansfeld copper was traded directly through Frankfurt with the brass makers of Aachen, who traditionally were the main consumers of this type of copper.[67] At the same time the position of Hungarian copper in Antwerp improved, when in 1548 the Manlich firm, now operating the Neusohl mine, and the Fuggers, who had increased their interests in the Tyrolean production, agreed to divide the European markets, granting Antwerp to the Manlichs.[68]

Between the start of the Dutch revolt (1566), the sack (1576) and siege of Antwerp (1584-1585), the trade in Antwerp rapidly deteriorated. The uncertain times and unsafe seas particularly affected the production and trade of copper from Neusohl, which was strongly dependent on Antwerp's financial network. Increasing Ottoman threats in the area around the mines caused unrest among the miners.[69] Although not documented, it is possible that copper from either Tyrol or Mansfeld re-established its former positions in the Low Countries.

These events coincided with the disappearance of one of the principal types of copper used for coinage in the Low Countries and the increased use of another between the 1550s and 1570s.[70] Both types are chemically similar, with minor elements such as antimony above 0.2% and arsenic, silver and nickel around 0.1%. These impurities are commonly found in copper smelted from tetrahedrite/tennantite type ores and can vary depending on the provenance and composition of the ore and the refining procedure.[71] The type that becomes more dominant in its use for coinage after

1550 has a lower average amount of silver (0.06% vs. 0.10%) and nickel (0.10% vs. 0.13%), and a lower ratio between arsenic and antimony (0.23 vs. 0.50). (graph 3) This might seem a marginal difference, but these values match well with data published on ingot material from Neusohl.[72] Whether the other distinct type is indeed related to Tyrolean, Mansfelder or other copper, as one might expect from the trade history, remains to be seen. The amounts of antimony and arsenic point towards a type of grey ore, or *Fahlerz*, unlike the copper slate ores used in Mansfeld, which produced copper that was relatively pure but rich in nickel.[73] Mansfelder copper is identified in the work of the Vischer workshop during the 1520s and 1530s.[74] Apart from Tyrolean copper, grey ore mines in the Harz or Erzgebirge should be considered as well.[75]

Graph 3. Arsenic vs. antimony ratio and silver content of bronze sculptures by Jonghelinck as determined by XRF.



One mine could produce different grades of copper, some more suitable for coinage, others for casting cannon or sculpture, and the chemical composition of those grades are not necessarily exactly the same. Nevertheless, it is remarkable that the same change of silver content and arsenic versus antimony ratio observed in Netherlandish coins from the early 1570s, can also be seen in *Mercury*, *Saturn* and *Jupiter*, the last two of which were evidently cast after May 1570 (graph 3). It is possible that Jonghelinck used a new batch of copper for these later casts, whose chemical composition reflect the state of the metal trade at that time. If so, the involvement of Aert Vleminck

and Gaspar Schetz in the settlement of Niclaes' assets and their claim to the eight bronze deities becomes interesting.[76] Both men were active in the copper and brass trade network that connected Antwerp, Aachen, Frankfurt and Mansfeld.[77] Their commitment to the completion of the group of sculptures might have stretched beyond the stringent contracts they signed with Jonghelinck.

Conclusion

The novelty of the bronze sculpture practice of Jacques Jonghelinck in the Low Countries is reflected in the title the artist was awarded with while working on the tomb of Charles the Bold: *sculpteur, fondeur de métal et graveur ordinaire des sceaux du Roi*.[78] In Dutch, Jonghelinck is not named a *sculpteur du Roi*, but a *geelgieter* or *geltgieter* (latten founder), which he never was, but this fitted existing guild regulations.[79]

The Habsburg court seems to have actively affected the production of metal sculpture in the Low Countries through its patronage, by engaging Leone Leoni and nurturing Jonghelinck's development. Given Jonghelinck's relatively short stay in Milan, and the great technical similarity between his work and that of the Leoni workshop, Jonghelinck's study abroad must have been deliberately aimed at obtaining the right skills for making bronze sculpture. Back in Brussels, he ran his workshop more or less independently, his sculptures showing no sign of reliance on any traditional founding expertise. The apparently abrupt collapse of metal sculpture production around 1500, which deserves more attention, could be the remote cause for this example of migration and knowledge exchange. The Habsburg involvement led not only to newly established technological expertise, but also provided familiarity with Renaissance art and artists. In realizing his sculptures, Jonghelinck combined the best of Italian practices with Northern Renaissance taste.

Acknowledgements

We would like to thank Titia de Haseth Möller, Julia Day, Joe Gotla, Robert van Langh, Maria Jesús Herrero Sanz, Frits Scholten, Stephan Schröder, Elena Arias Riera and the staff of Erfgoedcel Brugge for their support and contributions.

---

[1] The phenomenon of Netherlandish sculptors' success abroad has been addressed recently: A. de Koomen, '"Una Cosa Non Meno Maravigliosa Che Honorata" The Expansion of Netherlandish Sculptors in Sixteenth-Century Europe', in *Art and Migration: Netherlandish Artists on the Move, 1400-1750*, (eds.) F. Scholten, J. Woodall and D. Meijers, *Netherlands Yearbook for History of Art*, 63, Leiden: Brill, 2013, pp. 82–109.

[2] L. Smolderen, *Jacques Jonghelinck: Sculpteur, Médailleur et Graveur de Sceaux (1530-1606)*, Louvain-la-Neuve: Dép. d'archéologie et d'histoire de l'art Séminaire de numismatique Marcel Hoc, 1996; followed by 'Projets de monuments funéraires dressés par Jacques Jonghelinck pour les comtes de Hanau (1558 et 1562)', *Revue belge d'archéologie et d'histoire de l'art*, 74, 2005, pp. 51-62, and the supplementary L. Smolderen, 'Du Nouveau Sur Jacques Jonghelinck', *Revue Belge de Numismatique et de Sigillographie*, 156, 2010, pp. 129–74.

[3] B. Meijer, 'The Re-Emergence of a Sculptor: Eight Lifesize Bronzes by Jacques Jonghelinck', *Oud Holland*, 93.2, 1979, pp. 116–35.

[4] I. Buchanan, 'The Collection of Niclaes Jongelinck: I. "Bacchus and the Planets" by Jacques Jongelinck', *The Burlington Magazine*, 132.1043, 1990, pp. 102–13; I. Buchanan, 'The Collection of Niclaes Jongelinck: II The 'Months' by Pieter Bruegel the Elder', *The Burlington Magazine*, 132.1049, 1990, pp. 541–50.

[5] A bust of Philip II in the Museo del Prado, formerly attributed to the Leoni, and a bagpipe player in the Mansfeld Collection. See Rosario Coppel, 'La Colección de Escultura en Bronce bajo el Reinado de los Austrias' and cat.nr. 11, in *Brillos en bronce: colecciones de reyes: noviembre de 2009 a enero de 2010*, (ed.) I. Morán Suárez, Madrid: Patrimonio Nacional, 2009, pp. 26, 124–125.

[6] Smolderen, 2010 as at note 2, p. 130.

[7] As Jeffrey Chipps Smith stated in his review of Smolderen's book on Jonghelinck: if times had been different in the Low Countries or if Jonghelinck would have remained in Italy, who knows what he might have achieved as a sculptor. J. Chipps Smith, Review of *Jacques Jonghelinck: Sculpteur, Médailleur et Graveur de Sceaux (1530-1606)* by Luc Smolderen', *The Burlington Magazine*, 139.1135, October 1997, p. 698.

[8] The Christ for the Antwerp Pont de Meir (unrealised upon Jonghelinck's death) would have been a bronze cast after an existing model. J. Van der Stock and H. Nieuwdorp, 'Het Christusbeeld van de Meir te Antwerpen: Een meesterwerk van de gebroeders De Nole uit de vergeethoek', *Revue belge d'archéologie et d'histoire de l'art*, LV, 1986, pp. 69–95.

[9] For the decline of the monumental brass tradition and its impact, see L. Wiersma, 'Monumental Dinanderie: Achievement and Tradition of Metal Sculpture in the Low Countries in the Late Gothic and Renaissance Period', in N. Thomas, P. Dandridge, *Medieval copper, bronze and brass: History, archaeology and archaeometry of the production of brass, bronze and other copper alloy objects in medieval Europe (12th-16th centuries), Proceedings of the symposium in Dinant and Namur, 15-17 May 2014*, Études et documents, Archéologie, Namur, 2017, in press.

[10] R. Mulcahy, *Philip II of Spain, Patron of the Arts*, Dublin: Four Courts Press, 2004, pp. 126–127.

[11] L. Smolderen, 'Jonghelinck en Italie', *Revue belge de Numismatique et de Sigillographie*, 130, 1984, pp. 119–139; Smolderen, 2010, as at note 2, pp. 138, 143.

[12] For exposure to similar themes in Italy, see Smolderen, 1984, as at note 11, pp. 133–135. For the wider culture of cosmology in art, see Buchanan, 1990, I, as at note 4; Buchanan, 1990, II as at note 4; M. Bull, *The Mirror of the Gods*, Oxford; New York: Oxford University Press, 2005.

[13] J. C. Calvete de Estrella, *El Felicissimo Viaie D'el Muy Alto Y Muy Poderoso Príncipe Don Phelippe, Hijo D'el Emperador Don Carlos Quinto Maximo, Desde España à Sus Tierras Dela Baxa Alemaña: Con La Descripcion de Todos Los Estados de Brabante Y Flandes*, Martin Nucio, 1552, pp. 204–206.
[14] See K. Dyballa, *Georg Pencz: Künstler zu Nürnberg*, Berlin, Deutscher Verlag für Kunstwisschenschaft, 2014, p. 65; J. C. Smith, *German Sculpture of the Later Renaissance, C. 1520-1580: Art in an Age of Uncertainty*, Princeton University Press, 1994, pp. 250, on Burgkmair p. 473. See Buchanan, 1990, I, as at note 4, pp. 11-12; I. Veldman, 'De macht van de planeten over het mensdom in prenten naar Maarten de Vos', *Bulletin van het Rijksmuseum*, 31, 1983, pp. 21-53; and J. Seznec, *The survival of the pagan gods, The mythological tradition and its place in renaissance humanism and art*, New York: Pantheon Books, 1953, p. 71.
[15] Smith 1994, as at note 15, pp. 222–223, 389–390.
[16] Ibid., pp. 247, 377.
[17] Johan Gregor van der Schardt made seasons for Wenzel Jamnitzer, Willem van Tetrode several statuettes, Giambologna worked on many statuettes and two studiolos, for which Jacques Bylivelt made seven silver statuettes, and Elia Candido one *Boreas*. See, for parallels with Giambologna, Smolderen, 1996, as at note 2, p. 16.
[18] Smith 1994, as at note 15, p. 197.
[19] Mauritshuis, The Hague, inv.nr. 875.
[20] Philip Galle made prints of each Jonghelinck planet and the *Bacchus*. See collection British Museum, inventory numbers 1862,0712.308-314. In addition, Jupiter and Luna prints from the late sixteenth century by Jan Collaert after Stradanus and published by Galle, could have been inspired by Jonghelinck's Planet series. Smolderen 1996, as at note 2, p. 112.
[21] Still common as the following publication shows, C. Ripa, *Iconologia overo Descrittione dell' Imagini universali cavate dall'antichita et da altri luoghi Da Cesare Ripa Perugino Opera non meno utile, che necessaria à Poeti, Pittori, & Scultori, per rappresentare le virtù, vitij, affetti, & passioni humane*, Roma: Heredi di Gio. Gigliotti, 1593.
[22] E. Jorink, *Wetenschap en wereldbeeld in de Gouden Eeuw*, Hilversum: Verloren, 1999, pp. 22; It was suggested that Philip Galle meant his print series of Jonghelinck's *Planets* and *Bacchus* to take a stand in the contemporary astronomical discussion: Saturn is presented as the first print. Saturn is the sphere most far out from the earth - following the Ptolemaic, earth-centred system. L. Smolderen, 'Los Planetas y el Baco de Jacques Jonghelinck', in Morán Suárez, as at note 5, pp. 164–169.
[23] In scale, antique and Renaissance details Jonghelinck must have learned from his experiences in Italy. See Buchanan, 1990, I, as at note 4, p. 111. And in both shape and style, similarities with the sculptures of Leone Leoni, Giambologna, Lorenzi, Bandini and Cellini are evident. Additionally, soon after Jonghelinck's return to the Low Countries, Poggini worked in Brussels (1555-1559). Smolderen 1984, as at note 11, p. 133. In the late sixteenth century, and after the execution of Jonghelinck's Planet Series and the print series made after it by Philip Galle, this type was used in prints published in the Low Countries after designs by Jan van der Straet (Stradanus), after and by Hendrick Goltzius (i.a. depicted as life-size, antique or Renaissance sculptures), and by Crispijn de Passe.
[24] Buchanan 1990, I, as at note 4, p. 106. Note that the *Bacchus* is emphasised in the restriction.
[25] And earlier, in 1582, a fountain with Bacchus (alongside a fountain of Parnassus and Neptune). K. Helmstutler Di Dio and R. Coppel, *Sculpture Collections in Early Modern Spain*, Farnham: Ashgate Publishing, Ltd., 2014, pp. 14, 28, 134.
[26] See note 21.
[27] Smolderen 1984, as at note 11, pp. 124–125.
[28] E. Plon, *Leone Leoni, sculpteur de Charles-quint, et Pompeo Leoni, sculpteur de Philippe II*, Paris: Plon, Nourrit, 1887, pp. 86. This letter is also noted by P.H. Smith and T. Beentjes, 'Nature and Art, Making and Knowing: Reconstructing Sixteenth-Century Life-Casting Techniques', *Renaissance Quarterly*, 63.1, 2010, pp. 140, n31. Smith interprets the letter as being sent from Rome, where Granvelle resides at the Vatican only from 1565.
[29] Smolderen 1996, as at note 2, p. 15; C. Banz, *Höfisches Mäzenatentum in Brüssel: Kardinal Antoine Perrenot de Granvelle (1517-1586) Und Die Erzherzöge Albrecht (1559-1621) Und Isabella (1566-1633)*, Berlin: Gebr. Mann, 2000, pp. 24.
[30] Plon, as at note 29, pp. 85–86, n.32. For the transciption, see: 366.
[31] W. Cupperi, 'Beyond the Notion of German Medals: Some Cases of Transnational Patronage', in *Wettstreit in Erz: Porträtmedaillen Der Deutschen Renaissance*, (eds.) W. Cupperi and others, Munich, Deutscher Kunstverlag GmbH München Berlin, 2013, pp. 82.

[32] Signed letter from 2 December 1549, sent from Augsburg. Plon, as at note 29, pp. 54–55. Leoni speaks of a beautiful woman he is to meet, who could have been the 'bella Felipina'. M. Van Durme, 'Antoon Perrenot van Granvelle En Leone Leoni', *Revue Belge de Philologie et D'histoire*, 27.3-4, 1949, pp. 6–7.
[33] His training with Jerome Manacker in the Antwerp Mint being the first. Smolderen, 1996, as at note 2, p. 14.
[34] *Calvete de Estrella, as at note 14, pp. 204–206; H. de Cabanillas, Relation muy verdadera de las grandesfiestas que la Serenissima Reyna dona Maria ha hecho al Principe nuestro sehor en Flandes en un lugar que se dize Vince, desde XXII. de Agosto hasta el postrero dia del mes. Embiada por el sehor don Hieronymo Cabanillas, Hecha imprimir por Juan Rodriquez librero de Medina del campo a diez y ocho de Noviembre, Ano.M.D.XLIX,* cited in C. Pérez Pastor, *La Imprenta en Medina del Campo, Madrid, Sucesores de Rivadeneyra,* 1895, pp. 66-67.
[35] L. Giucciardini, cited in *Archives Historiques et Littéraires Du Nord de La France et Du Midi de La Belgique Tome 6*, Valenciennes: Bureau des Archives, 1847, pp. 102.
[36] L. Smolderen, 'Jacques Jonghelinck, waradin de la Monnaie d'Anvers de 1572 à 1606', *Revue belge de Numismatique et de Sigillographie*, 115, 1969, pp. 168.
[37] See note 1.
[38] Victor Tourneur, 'Jan Symons, Médailleur Anversois', *Revue Belge de Numismatique et de Sigillographie*, 77, 1925, pp. 55; Smolderen 1984, as at note 11, p. 126.
[39] Smolderen 1996, as at note 2, pp. 61, 76–77.
[40] See for instance: G. van Doorslaer, Dr Georges. *L'Ancienne Industrie Du Cuivre à Malines IV. La Fonderie Du Laiton et Du Bronze*. L. Godenne, 1922, pp. 61, 63-65, 78.
[41] Prado museum, Madrid, inv.nr. E00273, Charles V and the Fury; E00271, Charles V bust; E00272, Philip II; E00263, Mary of Hungary; E00274, Isabella.
[42] E. Arias, 'Esculturas de Leone y Pompeo Leoni: técnicas escultóricas sobre metal', in *Leone y Pompeo Leoni*, (ed.) Stephan F. Schröder, 2012, pp. 160–72.
[43] Plon, as at note 29, pp. 365, n. 30; 87–88.
[44] For a schematic description, see: Arias, as at note 43, p. 164, fig. 125.
[45] Ibid., p. 167.
[46] V. A. Solé, E. Papillon, M. Cotte and others, 'A Multiplatform Code for the Analysis of Energy-Dispersive X-Ray Fluorescence Spectra', *Spectrochimica Acta Part B: Atomic Spectroscopy*, 62.1, 2007, pp. 63–68; A. Heginbotham, J. Bassett, D. Bourgarit and others, 'The Copper CHARM Set: A New Set of Certified Reference Materials for the Standardization of Quantitative X-Ray Fluorescence Analysis of Heritage Copper Alloys', *Archaeometry*, 57.5, 2015, pp. 856–68.
[47] Some parts of the drapery of the Mary of Hungary statue at the Prado, clearly separated by a seam and attributed to cold shuts by Arias, might be cast-in repairs too. The combination of cast-in and cold worked repairs also occurs in the Alba bust: small, cold worked inserts at the shoulders are reported by Day.
[48] For flow-welding techniques used in the Susini workshop, see: Dylan Smith, 'Technical Characteristics of Bronze Statuettes from the Workshops of Antonio and Giovanni Francesco Susini', in *The Renaissance Workshop: The Materials and Techniques of Renaissance Art*, (eds.) David Saunders, Marika Spring and Andrew Meek, London: Archetype Publications, 2013, pp. 37–37.
[49] Smolderen, 2005, as at note 2.
[50] Smolderen, 1996, as at note 2, p. 77; Octave Delepierre, 'Compte de Jean Peres de Malvenda, de La Tombe de Bone Mémoire Le Duc Charles de Bourgoingne En l'Eglise de Nostre Dame En Bruges Anno 1566', in *Annales de La Société d'Emulation de Bruges, Vol. 2*, Bruges: Vandecasteele-Werbrouck, 1840, pp. 60. Pierre d'anaines could refer to pierre d'Avesnes or avender stone, a white lime stone found near Avesnes in Northern France.
[51] Buchanan, 1990, I, as at note 4, p. 106. As indirect casting methods were traditionally used by brass founders, the expertise for making piece moulds was probably readily available.
[52] Smolderen, 1996, as at note 2, pp. 20, 102–103.
[53] R. van Langh, A. Pappot, S. Creange and others, 'The Effect of Surface Changes in Heat Treated Bronze Samples Analyzed by X-Ray Fluorescence Spectrometry', in *Metal 2010: Proceedings of the Interim Meeting of the ICOM-CC Metal Working Group, October 11-15, 2010, Charleston, South Carolina, USA*, (eds.) P. Mardikian and others, Clemson (SC): Clemson University, 2011, pp. 273–80.
[54] Smolderen, 1996, as at note 2, pp. 121–122.
[55] Ibid., pp. 102–103.
[56] L. Ghiberti, G.M. Radke and A. Butterfield, *The Gates of Paradise : Lorenzo Ghiberti's Renaissance Masterpiece*, Atlanta, Ga.; New Haven; Florence: High Museum of Art; Yale University Press; in association with Opera di S. Maria del Fiore, 2007, pp. 61, 142, 180 n. 43. For alloy compositions of Italian bronzes see: C. Davis, B. Paolozzi Strozzi and I. Museo nazionale del Bargello (Florence, *I grandi bronzi del Battistero:*

l'arte di Vincenzo Danti, discepolo di Michelangelo, Firenze: Firenze musei: Giunti, 2008; T. Mozzati, B. Paolozzi Strozzi, P. Sénéchal and others, *I grandi bronzi del Battistero: Giovanfrancesco Rustici e Leonardo*, Firenze: Firenze musei: Giunti, 2010; L. Dolcini, *Verrocchio's Christ and St. Thomas: A Masterpiece of Sculpture from Renaissance Florence*, New York: Harry N. Abrams, 1993.

[57] L. S. Maclehose, *Vasari on Technique*, London: J. M. Dent, 1907, pp. 163. This would yield a copper alloy with ±10% of zinc. For the original publication, see: Vasari, G. *Vite de Piu Eccellenti Architetti, Pittorie Scultori Italiani Da Cimabue Insino a Tempi Nostri, Vol. 1*. Lorenzo Torrentino, 1550, p. 65.

[58] A. Boström, 'Daniele Da Volterra and the Equestrian Monument to Henry II of France', *The Burlington Magazine*, 137.1113, 1995, pp. 814. This recipe would result in a copper alloy with ±12% tin and ±7% zinc.

[59] Plon, as at note 29, pp. 182–183.

[60] Ibid., pp. 202–203.

[61] C. Priesner, *Bayerisches Messing: Franz Matthias Ellmayrs 'Mössing-Werkh AO. 1780': Studien Zur Geschichte, Technologie Und Zum Sozialen Umfeld Der Messingerzeugung Im Vorindustriellen Bayern*, Boethius (38), Stuttgart: Franz Steiner Verlag, 1997, pp. 51–56.

[62] G. von Pölnitz, *Jakob Fugger: Quellen Und Erläuterungen*, Tübingen: Mohr, 1951, II, pp. 230–31.

[63] V. Biringuccio, M.T. Gnudi and C.S. Smith, *The Pirotechnia of Vannoccio Biringuccio*, New York: The American institute of mining and metallurgical engineers, 1943, pp. 70–71.

[64] See, for instance, M. De Ruette, 'Etude technologique des dinanderies coulées', *Bulletin des Musées Royaux d'Art et d'Histoire / Musées Royaux d'Art et d'Histoire*, 1987, pp. 5–42.

[65] E. Westermann, *Das Eislebener Garkupfer Und Seine Bedeutung Für Den Europäischen Kupfermarkt 1460-1560*, Köln; Wien: Böhlau, 1971, pp. 105–108.

[66] Ibid, pp. 131–134.

[67] See H. Kellenbenz, 'Die Aachener Kupfermeister', *Zeitschrift des Aachner Geschichsvereins*, 80, 1973, pp. 99–125.

[68] Westermann, as at note 66, pp. 170–171.

[69] J. Vlachovič, *Slovenská Med v 16. a 17. Storoči.*, Bratislava: Vydavateľstvo Slovenskej akadémie vied, 1964, pp. 295–296.

[70] As part of Arie Pappot's PD research at the Rijksmuseum, a total of 783 Netherlandish copper coins from this period were analysed of which 519 match one of these two types.

[71] M. Krismer, F. Vavtar, P. Tropper and others, 'The Chemical Composition of Tetrahedrite-Tennantite Ores from the Prehistoric and Historic Schwaz and Brixlegg Mining Areas (North Tyrol, Austria)', *European Journal of Mineralogy*, 23.6, 2011, pp. 925–36; R.F. Tylecote, *A History of Metallurgy*, London: The Metals Society, 1976, pp. 10–11, 82; L. Biek, 'The Examination of Some Copper Ores: A Report of the Ancient Mining and Metallurgy Committee', *Man*, 57, 1957, pp. 72–76.

[72] See melon ingots from the St. Anthony wreck in P. Craddock and D. Hook, 'An Economic History of the Post-Medieval World in 50 Ingots: The British Museum Collection of Ingots from Dated Wrecks', *The British Museum Technical Bulletin*, 6, 2012, pp. 59.

[73] Otto Werner, 'Analysen Mittelalterlicher Bronzen Und Messinge I', in *Archäologie Und Naturwissenschaften*, Mainz; Bonn: Verlag des Römisch-Germanischen Zentralmuseums; Rudolf Habelt Verlag, 1977, pp. 146.

[74] Otto Werner, 'Analysen Mittelalterlicher Bronzen Und Messinge IV', Berliner Beiträge zur Archäometrie, 7, 1982, pp. 89; J. Riederer, 'Die Berliner Datenbank von Metallanalysen Kulturgeschichtlicher Objekte. II. Objekte Aus Kupferlegierungen Des 17./18. Jahrhunderts, Der Renaissance Und Des Mittelalters', *Berliner Beiträge Zur Archäometrie*, 17, 2000, pp. 170–175.

[75] J. Riederer, 'Metallanalysen Historischer Bronzegeschütze', in *Wissenschaft Und Technik Im Dienst von Mars Und Bellona*, (eds.) D. Götschmann and A. Reiß, Regensburg: Verlag Schnell & Steiner GmbH, 2013, pp. 72–73; Riederer, as at note 75, pp. 198–199; Otto Werner, as at note 75, p. 154.

[76] Buchanan, 1990, I, as at note 4.

[77] Kellenbenz, as at note 68; A. Dietz, *Frankfurter Handelsgeschichte 2.*, Frankfurt a.M: Minjon, 1921, pp. 182, 183, 197–198, 220.

[78] Smolderen, 1996, as at note 2, p. 491; The first mention of the title is dated 8 November 1565. It is given in a letter in which the rate of Jonghelinck's pension is set accordingly. L. Smolderen, 'Le tombeau de Charles le Téméraire', *Revue belge d'archéologie et d'histoire de l'art*, 1981, pp. 45.

[79] The position is mentioned in several documents concerning the rate of his pension. In 1576: 'geelgieter ende ordinaries zegelsnydere van Zyne Mat in dese landen van herwaertsover', AGR, Chambre des comptes, reg. 4799/1, fol. 97 r°-v° et 98 r°, cited in Smolderen, 1996, as at note 2, p. 492, X II 2 a. In 1606, when his heirs receive overdue payments: 'wylen Jacques Jonghelinck in zynen leven geltgieter ende ordinaris segel snyder van hunne Hoocheden'. AGR, Chambre des comptes, registre n°4810/1, fol. 214 v° et 215 r°, cited in Smolderen, 1996, as at note 2, p. 494, X III 2.