

The Lombard Iron Masters Migrations and the Spread of the Blast Furnace in Europe, with a Focus on the 16th-17th Centuries

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Keywords

Lombardy, iron masters, migration, Europe, blast furnace

Abstract

The spread of the blast furnace in some parts of Europe was connected to the migration of miners, iron masters, charcoal burners and entrepreneurs from the Alpine valleys of the Lombard Iron Basin, from what are now the provinces of Bergamo and Brescia (Italy). The authors have gathered all the published evidence from many different sources and arranged it in geographical and chronological order. The preliminary results of the study show that masters provided what we may call an integrated approach to iron production: from the mine to the forge with the optional support of charcoal burners. It seems that they tried to keep their technological knowledge as a trade secret. They were hired through middlemen, of whom we only know that they acted as intermediaries between the masters and the private entrepreneurs or the rulers. One important reason for the spread of blast furnaces can be seen in the increase in conflicts at the end of the 15th century. These led to a need for blast furnaces in areas of Europe where they had not previously existed.

Introduction

This paper is the English preliminary report of our study about the Bergamasque/Brescian blast furnace, which was established in some areas of Europe by the Lombard iron masters from the 13th up to the end of the 17th century. The focus of our investigation lies in the first step on the compilation of the sources available to us concerning the spread of the Bergamasque/Brescian blast furnace by the Lombard iron masters and their associated crafts. The master craftsmen's crews were not only involved in the construction and operation of the blast furnaces and

forges, but also in mining and charcoal production. This spread is an important phenomenon in the development of European technological and economic history that so far has been largely overlooked by historians. The largest number of preserved documents belong to the 16th and 17th centuries, which is the period of focus for this study. All the data gathered here are from documents held in public archives (primary sources) and from bibliography (secondary sources). In our tables, we summarize all mentions and provide reference information from the special collections to locate the documents (including call numbers or shelf area).

Our study is based on primary sources. Where possible, all secondary literature has been crosschecked with the primary archival sources quoted. Some of the authors from the secondary literature (mainly those not offering the documents' transcripts, and/or their archival information) must be used with extreme caution because they frequently confuse names of master, villages and geographical locations. More than 320 primary sources have been used so far, in order to create the most reliable picture of a very complex subject. This subject involves other European areas beyond Italy, but for the present study, we focus on the Italian sources.

The Lombard iron masters and charcoal burners were from the area of the so-called "Lombard Iron Basin". This is the area between the eastern shores of Lake Como and the western shores of Lake Garda. The side valleys of the southern side of Valtellina belong to this area (Figure 1). The valleys in this area from which the masters came are: Val Sassina, Val Brembana, Val Seriana, Val Camonica and their smaller side valleys (e.g. Val Gerola, Val di Scalve, Val Sabbia etc.). It seems that the masters from the different valleys of this basin were often specialised in different work areas and processes of iron metallurgy and mining. For example, most specialists



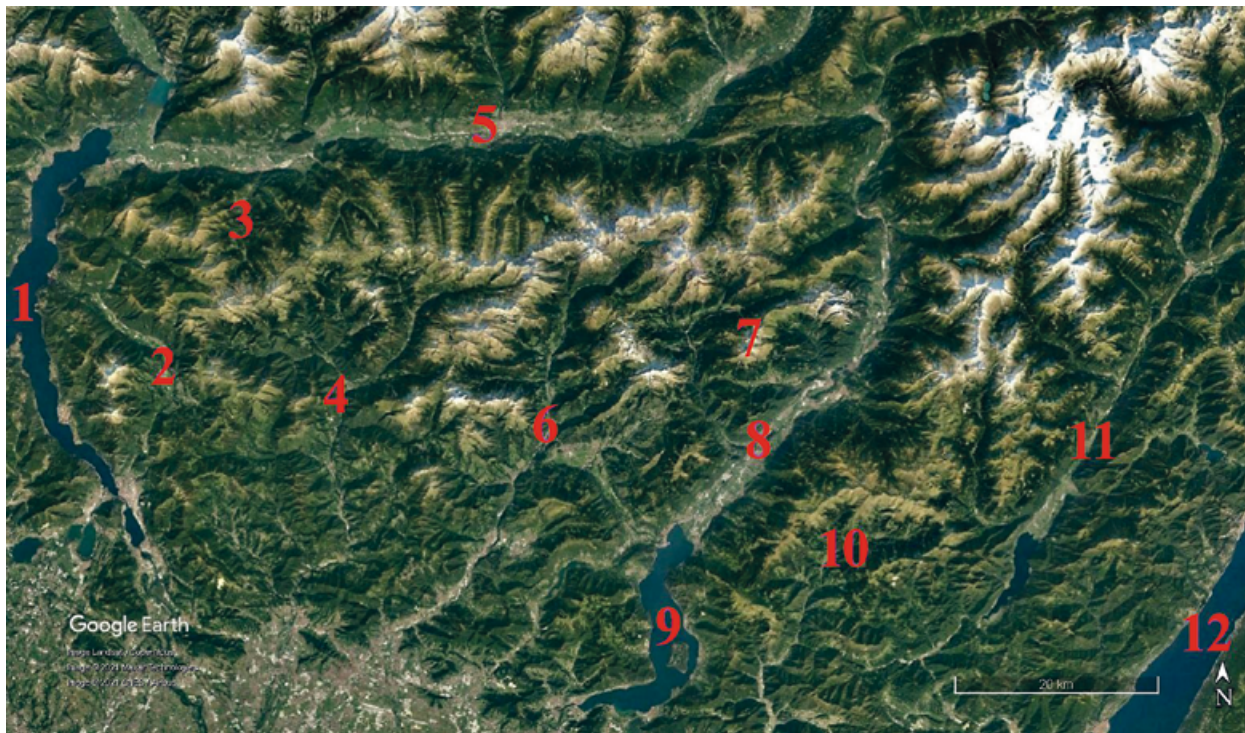


Figure 1. The area of origin of the Lombard iron masters in the Alpine region (picture from Google Earth). 1-Lake Como, 2-Val Sassina, 3-Val Gerola, 4-Val Brembana, 5-Val Tellina, 6-Val Seriana, 7-Val di Scalve, 8-Val Camonica, 9-Lake Iseo, 10-Val Trompia, 11-Val Sabbia, 12-Lake Garda.

from Val Sassina either worked in forges and foundries producing finished objects or were iron merchants.

“The people in the valleys are very industrious, they trade and they do not spare their efforts, nor do they shy from hard work. They travel all over the world and you can find them in every country,” wrote Francesco Bernardo, the Venetian Capitano of Bergamo, in 1553 (Tagliaferri, 1978, p.26). This portrait of the mountain folks in the provinces of Bergamo and Brescia as hard workers, reliable and tight-fisted is reported by many authors of this period to such an extent that by the end of the 16th century it had become a common place (Tizzoni, 2015, pp.92-93). The Venetian Capitani of Bergamo and Brescia were often amazed by the wealth the valleys’ inhabitants had amassed without boasting about it and which allowed some of them to move to Venice or Milan and to buy noble titles (Tizzoni, 2015, p.96). These migrants were not unskilled poor people, even when they did menial jobs, they organized themselves. For example: since the Middle Ages the harbour of Milan and Bergamo was Genoa, here they managed to have the sole access to load and unload the ships of the harbour which also included the removals of furniture and of any other heavy item in town (the *Compagnia dei Caravana*) (Costamagna, 1965). Amongst the migrants, there were also iron masters. We can trace their migrations first horizontally across the Alpine valleys. For example, in Piedmont in

the 13th century, the word “bergamasque” had already become synonym of iron master (Cerri, 1990, p.64). While at the end of the 15th century in the Kingdom of Sicily we find a “brescian” iron master, Giovanni Pages, whose surname betrays a Southern French or a Catalan origin, who worked with other folks from Biscay (Conte, 2012, p.39-42, with previous bibliography).

Many metal entrepreneurs were part of this Lombard migration, some of them settled in the countries where they had moved. Here some of these families rose to the highest social classes and were often admitted to the local nobility (e.g. Caccia and Gibboni in Poland, Moscon(i) from Lefé in Slovenia, Castelli and Giovanelli in Hungary) (de Daugnon, 1905, pp.156-157; 1907, p.287; Müllner, 1909, p.406; Stanislaw and Nosek, 1981, pp.184-185). The first historian to discover the role of the Lombard Alps in the development of European iron metallurgy was R. Sprandel (1969), who had already recognised the importance of the role of the Lombard valleys. In the Nineties of last century, these studies had a revival (for example the volume edited by Ph. Braunstein in 2002). Unfortunately, some of the later studies on this subject are marred by mistakes in interpretation and reading of the ancient documents, which sometimes led the students to follow “red herrings”. For this reason, we directed the focus of our investigation on piecing together all the published and unpublished documents with the

aim of reconstructing the diffusion of the Bergamasque/Brescian blast furnace in many areas of Europe. We are not only tracking the blast furnaces; the charcoal burners and blacksmiths have been taken into account by us because it is stated in many documents that the masters wanted to work with people from their own valleys, because only their fellow countrymen were considered capable enough or could do the jobs properly.

Historical setting and documents

In the second half of the 15th century, the political situation in Europe began to deteriorate, leading to the so-called “Iron Century” characterized by almost continuous wars. This greatly increased the demand for iron and steel, but, above all, the need for cast iron for the shells of the cannons was decisive for the increase in the diffusion of blast furnaces. The Lombard iron masters had mastered the blast furnace technique in a period when only bloomeries were used in large parts of Europe. Lombard documents of the beginning of the 13th century make clear reference to blast furnaces and to the production of cast iron (*ferrum crudum*) (Cucini, 1994). Moreover, the masters had devised their own method to decarburize cast iron (Zoppetti, 1873, pp.134-137; Cucini, Riccardi and Tizzoni, 2019) which was different from the Walloon process (Perez, et al., 2012; Belhoste, 1991b, p.328). For a description of the Walloon and of the other methods used in France see Sütterlin (1981, pp.45-47). The Bergamasque/Brescian method implied the usage of a single forge’s hearth and it was apt for the production of steel and of high-quality iron, while the Walloon method was used for the production of cast iron casting and cheap iron (Belhoste, 1991b, p.333). So far, more than 4000 unpublished *regesta* of public notaries’ documents dealing with mining and metallurgy in Val Brembana and Val Sassina from the 15th until the 17th century have been published (Tizzoni, 1997; 1998). Of this large number of documents, only a small percentage deals with migration. This is because these private documents, not notarized documents and deeds, are mainly hiring contracts and accounting records (Cucini and Tizzoni, 1993). This means that they were not handed over to the central state archives, but if they were preserved, they were handed down through the mistake of a messy public notary or because they were in family archives, later handed to the state archives. Because of this, our documentation is patchy and far from homogeneous. The Sicilian documents are an exception: they are blast furnace and forge production accountings kept by the royal steward (*regio credencerio*).

The sources of our study are mainly the public notaries’ documents discovered by the authors in the Italian State Archives of Bergamo, Milan, and Vercelli sez. Varallo Sesia and in Los Angeles. Furthermore, we added evidence from other Italian public archives (e.g. Genoa, Naples, Palermo, Modena, Florence etc.), from other countries (e.g. France, Switzerland) and information published by other authors. In addition to the conventional sources mentioned above, there are also other amazing examples of transmission. In San Giacomo’s church at Varallo Sesia (Vercelli) there is a large late 17th century religious painting donated by “Rocco and the Bergamasque charcoal burners”, as it is possible to read at the bottom of the painting itself. On this instance, it is possible to identify this Rocco as Rocco Milesi from Val Brembana, who was working in the nearby village of Locarno for ten years, 1681-1690 (Tizzoni, 1991, p.218).

The Bergamasque documents are written in Italian with variations due to the local dialect. Only those meant to be used in non-Italian speaking areas were written in an international language, i. e. Latin (see appendix A).

From these documents, we know also:

- Exactly where they were stipulated, for example at Bordogna in the *stufia* (German: Stube; Ladin, Romance dialects: Stüa) of the house of Sir Cesar Pagnone.
- The witnesses were mostly other masters or prominent people in the valleys, sometimes priests and only once a woman. She must have been somebody in the local community, since the appellation *Donna* (lat. *domina*) is used for her. If the master was from another valley or was obviously considered unreliable, some of the witnesses stood as guarantors, especially if the recruited master received a large deposit (usually in hard currency such as gold écus) when the contract was signed. – Overall, the hiring contracts stipulated outside the villages of Bordogna, Baresi and Branzi in Val Brembana are rare. The notary archives of nearby Val Sassina contain in contrast only a handful of hiring contracts. It seems that these nearby villages (Bordogna, Baresi and Branzi) were the hiring places par excellence.

In fact: the masters from other valleys, e.g. Val Camonica in the Brescian district, came here to be hired. The clients came to these three villages from far off place such as Calabria (a 30 days long travel) to find the iron master.

- Often, the contractors were masters from these villages who could sign the hiring contracts as they could legally represent the owners of the ironworks/mines as they had power of attorney from the owners. In order to have the large amount of gold coins needed to

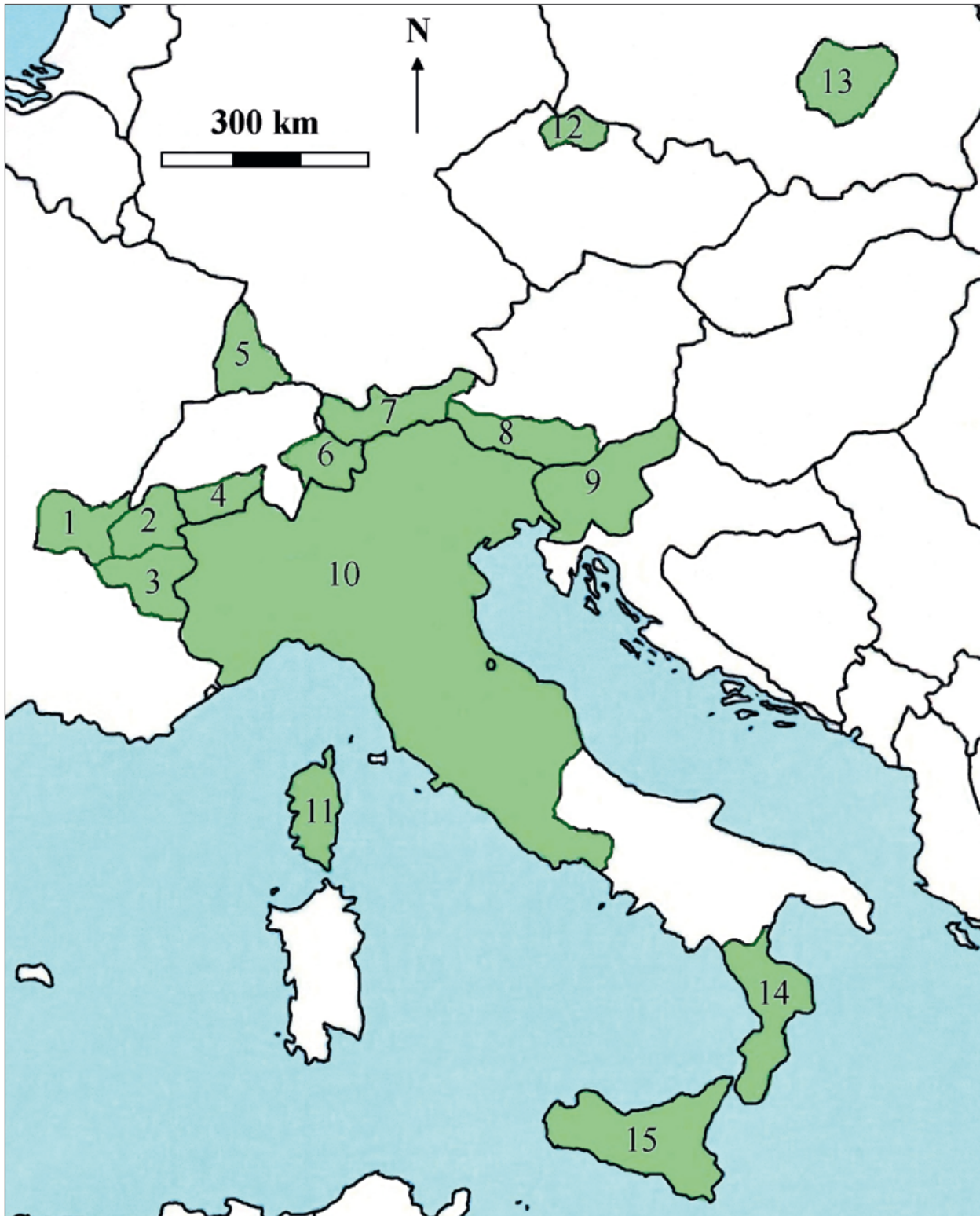


Figure 2. The masters' migration areas.
 1-Dauphinè, 2-Isère, 3-Savoy, 4-Vallis, 5-Baden, 6-Grisons, 7-Vorarlberg, 8-Carintia, 9-Slovenia, 10-Northern and Central Italy,
 11-Corsica, 12-Region of Liberec, 13-Kielce county, 14-Calabria, 15-Sicily.

hire the masters, the clients had bills of exchange with them, which were exchanged in Milan. Useless to say that travelling from Milan to upper Val Brembana with a large amount of gold coins must have been not so easy. Possibly the masters ensured their safety in the valley and during their journey. Words such as “Brescian furnace” or “*cannecchio alla bresciana*” and the like are rare in Lombard documents. A blast furnace is simply called a furnace to make cast iron. In the Brescian dialect there is the word “*canet*” which is the chimney of the blast furnace (Melchiori, 1817, p.115). Possibly the word “*cannecchio*” was used for the first time in a book of 1678 by the Bolognese della Fratta e Montalbano (1678, pp.139-140), but in earlier Tuscan (1561) and Sicilian (1562) documents the words “*canicchio*” and “*canecho*” can be found. They are a corruption of the Brescian dialect.

A final note: not all the documents quoted in this paper are hiring contracts, some of them deal with or just refer to forges belonging to the smiths from the Lombard valleys (sales, inventories, rents etc.). An asterisk (*) was used to show them.

Geographical distribution of the iron masters and discussion of the sources (Figure 2)

The political geography of Europe not only has changed considerably since the time of the iron masters, but was also frequently changing during the period we are writing about here. Sometimes this makes the usage of modern geographical names awkward and some identifications of locations doubtful. Moreover, the same site can be found in different states according to the years of the documents. The modern province is given in brackets after the sites’ names.

In the following catalogue, we present the working years and the hiring sites of the masters from the Lombard Iron Basin.

Sometimes both the Italian names in foreign documents and the foreign names in the Italian ones have been mangled in such a way to make their recognition rather difficult (for example, Gibboni in Poland becomes Dzyboni). Another problem is that if the Italian surname had a meaning, sometimes it was translated into a foreign language and this makes them unidentifiable. The same happens with some site names.

There are many more documents referring to Bergamasque and Brescian people living abroad, often in mining and metallurgical sites, but since their professions are not quoted, they have not been included in our list.

Habsburg Austria

There are important iron deposits in the eastern part of the Alps (in Carintia and in the Julian Alps) (Juve, 1984). There are no recent studies about iron masters’ migration into these areas, which seem to begin as early as the middle of the 14th century, but it is not clear from which part of Northern Italy they came. After this first wave of immigration, in which the origin of the immigrants remains unclear, there was a second one around the middle of the 16th century from Bergamo and Brescia.

Most of our data are still from the monumental study of A. Müllner (1909). Unfortunately, this book deals more with the Lombard entrepreneurs than with the masters themselves. Müllner notes that there are Italian iron masters in the region without further explanation. It is possible that some of them were Bergamasque by their surnames (e.g. Locatelli). Finally, Müllner did not provide the Italian original texts of the documents, which could have been helpful in suggesting the origin of the masters. He does not inform us very often about the archives where are the documents and when he does it, he does not provide the reader with the expansions of the abbreviations used.

It seems that during the 16th and 17th centuries, the influx of Italian investors, traders and entrepreneurs stimulated the local economy. Many of these individuals, or their families, became closely involved in the politics through their ennoblement, commercial activities and financial power (such as the Moscon(i) family in Styria).

1538, 1574	Blast furnace, forges: Jesenice (Plavž Sava, (Slovenia))	Arch. not quoted or not identified	Müllner, 1909, p.382, 401
1538, 1568, 1569, 1589, 1598	Ironworks: Sava valley	Arch. not quoted or not identified	Müllner, 1909, pp.382-383, 393, 398-399, 401
1541	Blast furnace: Kremsbrücke (Carintia)	Arch. not quoted	Belhoste, 1991b, p.330
1563	Blast furnace: Pludicio, Cesi valley (Bludesch in Vorarlberg)	ASBg, Not. 491, 09/04/1563	Cucini and Tizzoni, 1993, p.111 (see appendix A)
1581	Ironworks: Carniola	Arch. not quoted	Müllner, 1909, p.393
1595	Ironworks: Kren (Upper Austria)	Arch. not quoted or not identified	Müllner, 1909, pp.402-403, 405
1600	Blast furnaces: Treomi (?), or Gorizia (Italy or Slovenia)	ASBg, Not. 4015, 06/18/1600	Cucini and Tizzoni, 1993, p.137

1604	Forges: "Milmer in Val Borgeti", lands of the Austrian archduke	ASMi, Not. 23654, 09/18/1604	Tizzoni, 1998, p.286
1657	Blast furnace: Reichenberg (Liberec, Czech Rep.)	Arch. not quoted or not identified	Müllner, 1909, p.405
1663	Forge: Cescamme (Tschagguns?, Montafon, Vorarlberg)	ASBg, Not. 4178, 12/02/1663	Cucini and Tizzoni, 1993, p.150
1671	Fron works: Carinthia	Arch. not quoted	Müllner, 1909, p.440
1673	Fron works: Wochein (Bohini, Upper Carinthia)	Arch. not quoted	Müllner, 1909, p.438

France

So far, immigrant masters have been found in only two areas of present-day France: Isère and Savoy (see Piedmont). Possibly this is because there were strong commercial ties with Lyon and Grenoble (where many Lombard merchants had settled) and because in the other areas of France other methods of forging had spread. It can be assumed that the very conservative and traditional Bergamasque or Brescian masters would not have changed their method of working iron.

It is interesting to observe that still during the 19th century in Isère cast iron was decarburized according to the Bergamasque method (Gueymard, 1831, pp.171-173). About the mines and the iron metallurgy of this Departement see Gueymard (1831).

1567	Miners: Dauphiné (Isère)	ASBg, Not. 2393, 08/24/1567	Cucini and Tizzoni, 1993, p.118
1598-1614	Blast furnaces, mines: Allevard, Dauphiné (Isère)	Arch. not quoted; ADI, 3E, 1234/8	Belhoste, 1991a, p.268; 1996, p.71
Beginning of the 17 th cent.	Blast furnace: La Pelouse, Allevard, Dauphiné (Isère)	Arch. not quoted	Belhoste, 1991b, p.331
1610	Blast furnace: La Chevrette, Dauphiné (Isère)	ADI, 3E, 1234/1 and 2	Belhoste, 1996, p.71
1612, 1613	Forges: Vizille, Dauphiné (Isère)	ASBg, Not. 2620, 02/04/1612, 01/31/1613	Cucini and Tizzoni, 1993, pp.143-144

1614-1615	Blast furnace: La Chevrette Dauphiné (Isère)	ADI, III E, 1234/2, 02/05/1615	Belhoste, 1991a, p.271
1614-1616	Blast furnace: La Gorge, Allevard, Dauphiné (Isère)	ADI, III E, 1234/3, 02/08/1616	Belhoste, 1991a, p.270; 1996, p.72
1616	Blast furnace: La Chevrette Dauphiné (Isère)	ADI, III E, 1234/3, 09/12/1616	Belhoste, 1991a, p.270
1616	Blast furnace: Sailles, Dauphiné (Isère)	ADI, 3E, 1234/3, 12/26/1616	Belhoste, 1996, p.72
1616	Charcoal burners: Dauphiné (Isère)	ADI, III E, 1234/3, 01/05/1616	Belhoste, 1991a, p.271
1618	Charcoal burners: Allevard, Dauphiné (Isère)	ADI, III E, 1234/5, 03/05/1618	Belhoste, 1991a, p.269
1625	2 doc., blast furnace, forges, charcoal burners: La Gorge, Allevard, Dauphiné (Isère)	ADI, Not. d'Allevard, III E, 1234/8, 04/26/1625; III E, 1234/2, 03/21/1625	Belhoste, 1991a, p.268
1632	Forge: Pinzot, Dauphiné (Isère)	BMG, R 8395, 10/25/1632	Belhoste, 1996, pp.74-75
1637	Ironworks, charcoal burners: La Chapelle du Bard, Allevard, Dauphiné (Isère)	ADI, III E, 1234/18, 02/17 and 18/1637	Belhoste, 1991a, p.270
1639	Ironworks: Dauphiné (Isère)	ADI, III E, 1234/20, 01/02/1639	Belhoste, 1991a, p.270
1640	Blast furnace: Vaulnaveys, Dauphiné (Isère)	ADI, 11 J 20	Belhoste, 1991a, p.269
1640	Forges: Vizille, Dauphiné (Isère)	ADI, 11 J 20	Belhoste, 1991a, p.269
1647	Blast furnace: Allevard, Dauphiné (Isère)	ASBg, Not. 4085, 02/04/1647	Unpublished
1647	Forges: La Chapelle, Dauphiné (Isère)	ADS, B 5700, Bellet, not, fol. 31, 37 and 43, 1647	Crabières, 2001, p.65
1650	Blast furnace, forge: La Gorge, Dauphiné (Isère)	ADI, 94 J 42, 02/02/1650	Belhoste, 1991a, p.270
1653	Forge: Allevard (Isère)	ADI, II C 935, 10/07/1653	Belhoste, 1991a, p.20
1689-1690	Blast furnace: Dauphiné (Isère)	ASBg, Not. 4903, 03/11/1690	Unpublished

Germany

For this area, so far there is only one document, so it is not yet possible to draw an evaluative conclusion.

Margraviate of Baden:

1589	Forges: Site "Todeo" (Todtnau or Todtmoos?) "in Alemania Bassa"	ASBg, Not. 3105, 01/02/1589	Cucini and Tizzoni, 1993, p.130
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Poland

The connections between Italy and Poland have existed for a very long time due to the contacts with the Roman clergy, which sent many of its dignitaries there. This created commercial and cultural ties with the main Northern Italian cities (Milan and Venice). A further impulse in this direction was given in 1517, by the marriage of Sigismund I of Poland with Bona Sforza, the daughter of Gian Galeazzo, the Duke of Milan. Because of this, Italian culture and arts became fashionable at the Polish court. This explains why the first Bergamasque iron masters called in Poland in 1610 were the Caccia brothers, one of them was the doctor and librarian of crown prince Wladyslaw (Stanislaw and Nosek, 1991, p.184). Between 1605 and 1618 there was the Polish-Russian war and this could explain why there was a sudden interest in blast furnaces in the country. The area of the ironworks was in the Kielce district, Świętokrzyskie voivodate, an important iron mining area with gossans with siderite and pyrite deposits (Bielenin, et al., 1998, pp.139-193).

1610-1611	Blast furnaces: Site Bobrza	Arch. not quoted	Stanislaw and Nosek, 1991, p.184
1624	Ironworks: Site Chieltz	Arch. not quoted	Stanislaw and Nosek, 1991, p.184
1628	Ironworks: Site Bobrza	Arch. not quoted	Stanislaw and Nosek, 1991, p.184
1641	Ironworks: Site Samsonow	Arch. not quoted	Stanislaw and Nosek, 1991, p.185
1645	Ironworks: Site Bobrza	Arch. not quoted	Stanislaw and Nosek, 1991, p.185
1658	Ironworks: Site "Poland"	Arch. not quoted	de Daugnon, 1905, p.82
1660	Ironworks: Site Umer	Arch. not quoted	Stanislaw and Nosek, 1991, p.185
1675	Ironworks: Site Bobrza	Arch. not quoted	Stanislaw and Nosek, 1991, p.185
1680	Blast furnaces: Site Samsonow	Arch. not quoted	Stanislaw and Nosek, 1991, p.185

Switzerland

Both the County of Bormio and the Grisons are quite close to the masters' native valleys, possibly the masters' migrations to those districts had begun at a much earlier date than our documents.

From 1512, the county of Bormio (Worms) was more a protectorate of the Grisons than an independent state and the Grisons themselves joined the Swiss Confederation only on 1798. While Val Tellina (Veltlin) belonged to the Grisons in the period 1512-1620 and 1639-1797. In any case, we must bear in mind that the area of Oberengadin (Engiadina Bassa, Engiadin 'Ota, Val Müstair, Val dal Spöl) and Valtellina, Val di Livigno, Val Gerola, upper Brembana valley had strong family and cultural ties (e.g. they spoke the Rhaeto-Romanic language, and similar Alpine dialects having a common Latin origin). They had the same economic and social structures and shared a common mining and metallurgic tradition, even the same site names can be found on both sides of the border. In addition, the hematite and siderite ores in this area are manganiferous like those of the Lombard Alps (Heim, 1923, pp.229-239).

So far, we have only one document from Valais that we have been able to evaluate. At that time, the region was an associate member of the Swiss Confederation (it entered the Confederation in 1815). This strictly Catholic canton was ruled at the time by a prince-bishop. Even if we know of many migrants from the Italian Val d'Ossola and upper Val Sesia (Tizzoni, 2015, p.93) to and from Valais, the relationships along this border were not always friendly and we do not know if this area was a customary migration place for our iron masters. There are no iron deposits in the Brig district. The nearest iron mines in Valais are those with magnetite ores of Mont Chemin near Martigny (Serneels and Beck, 1998, pp.43-65). However, there are limonite mines across the Simplon Pass at Montescheno and Vigarella (Jervis, 1873, pp.165-166) in Val d'Ossola, then belonging to the Duchy of Milan, where the Bergamasque masters had been working since the 14th century (see p.46 in this paper).

Bormio, County of:

1563-1579	Blast furnace: Fraele	StAGR, legacy of Salis, B 220-222	Schläpfer, 2013, p.121
1579	Blast furnace: Bormio	ASBg, Not. 491, 08/24/1579	Cucini and Tizzoni, 1993, pp.125-126
1592	Forges: Bormio	ASBg, Not. 3629, 12/11/1592	Cucini and Tizzoni, 1993, p.131
1592-1597	Forge: S. Giovanni Salgio	StAGR, legacy of Salis, B 220-222	Schläpfer, 2013, pp.121-122

Grisons:

1556	Mine: Site unspecified	Arch. not quoted	Krähenbühl, 1994, p.553
1561	Blast furnace: "Borgogno" (Bergün)	ASBg, Not. 491, 07/04/1561	Cucini and Tizzoni, 1993, p.108; Schläpfer, 2013, p.122
1577, 1585-1590, 1600, 1684	Blast furnace, forge: Ofenpass, Sassalb	StAGR, legacy of Salis, B 220-222	Schläpfer, 2013, pp.76-78, 115-122

Italy

Bologna, Dominion of:

The state of Bologna was ruled by the Bentivoglio family from 1401 until 1506 when the Bolognese people revolted and in 1507, it became part of the Papal States. In 1456, an iron mine was found near Porretta Terme (Zagnoni, 1997, p.110). Possibly, it was just the gossan of a copper sulfide deposit since nothing further is reported of iron mines in the Bolognese Apennines (Jervis, 1874, pp.126-150). The local ore must have been of inferior quality, since in later times the iron ore from Elba was used.

1506	Forges*: Bologna	ASMi, Not. 3319, 10/23/1506	Tizzoni, 1998, p.111
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della Scala family, Dominion of:

The county of Velo was under the Dominion of the Scaliger (della Scala family) which ruled Verona from 1262 until 1387.

1282	Mines, blast furnaces: Altopiano Asiago, Alto Vicentino (Vicenza)	Arch. Conti Velo, Perg. 47, BBV, sezione manoscritti, b.241, fasc. 10, cc. 44-48	Pegoraro, 2014, p.42
1325	Forge: County of Velo (Vicenza)	Arch. not quoted	Pegoraro, 2014, p.43

Estensi, Duchy of (Figure 3, Fornovolasco as Cavalaccio): The Duchy of the Este family's main towns were Ferrara and Modena. The territory of Modena reached the Apennines as far as the territory of Lucca. In this mountain area there were few iron-ore deposits of low quality, possibly gossans of chalcopyrite deposits were exploited here (Jervis, 1874, pp.109-116, 121-125). However, most of the ore reduced in the blast furnaces there came from the island of Elba. We know of mining and smelting activities here since 1308, but we do not know the identity of the masters involved at this early date.

1450	Forges: Ferrara	ASVr, Antico Uff. Registro, Serie Istromenti, reg. 152, f. 841r-842v; 925r.	Varanini and Faes, 2002, p.277, note 112
1496-1497	Mines, blast furnace: Fornovolasco (Lucca)	Arch. not quoted	Biagioni and Orlandi, 2008, p.232
1500	Blast furnace: Fornovolasco (Lucca)	ASMo, Arch. per Materie, Miniere e Ferriere 4, fasc. "1498-1543", 07/18/1500	Baraldi, 1989, pp.101-102
1542-1543	Blast furnace: Fornovolasco (Lucca)	ASMo, Arch. per Materie, Miniere e Ferriere, 3, 4	Calegari, 1989, p.78
1545	Blast furnace: Fornovolasco (Lucca)	ASMo, Arch. per Materie, Miniere e Ferriere, 5, 01/16/1545	Morelli, 2002, p.401

Florence, Republic of:

Our few documents belong to a very complex period of the Florentine history. Two of them refer to sites (Barga and Scarperia, Figure 3) near the Apennines and along the connecting routes between northern Tuscany and the Po plain. One of them was the fortified village of Scarperia, founded in 1306 by Florence, and was a renowned place for iron knives and scissors production at least since 1479 (Ardiccioni and Contini, 1989, p.13).

1499	Forges: Scarperia (Florence)	ASMi, Not. 3317, 01/17/1499	Tizzoni, 1998, p.110
1500	Ironworks: Colle Val d'Elsa (Siena)	ASFi, S. e c. C. e s., 17, c. 237v.; 18, c. 125r.	Ansani, 2017, p.101
1502	Forges: Arezzo	ASMi, Not. 3317, 01/08/1502	Tizzoni, 1998, p.110

Genoa, Republic of (Figure 4):

Genoa had close connections with Milan and Bergamo since the Middle Ages (Mazzi, 1909, pp.19-34). There are few iron deposits in the territory of the Genoese Republic (Jervis, 1873, pp.18-20; 1874, pp.54, 55, 61, 64, 69, 84, 308-325), so most of the iron ore needed there was shipped from Elba by the *Maona* Company (see p.58 in this paper). From Genoa, it was carried across the Apennines as far as the Duchies of Parma and Piacenza and Modena and the territory of Bologna. In the territory of Genoa there were some large ironworks belonging to the richest and more powerful Genoese families (e.g. Doria, Spinola, Centurione). A Milanese document of 1471 reports, among other things, the beautiful and large ironworks of Francesco Spinola da Campo (A.S.Mi., Sforzes-

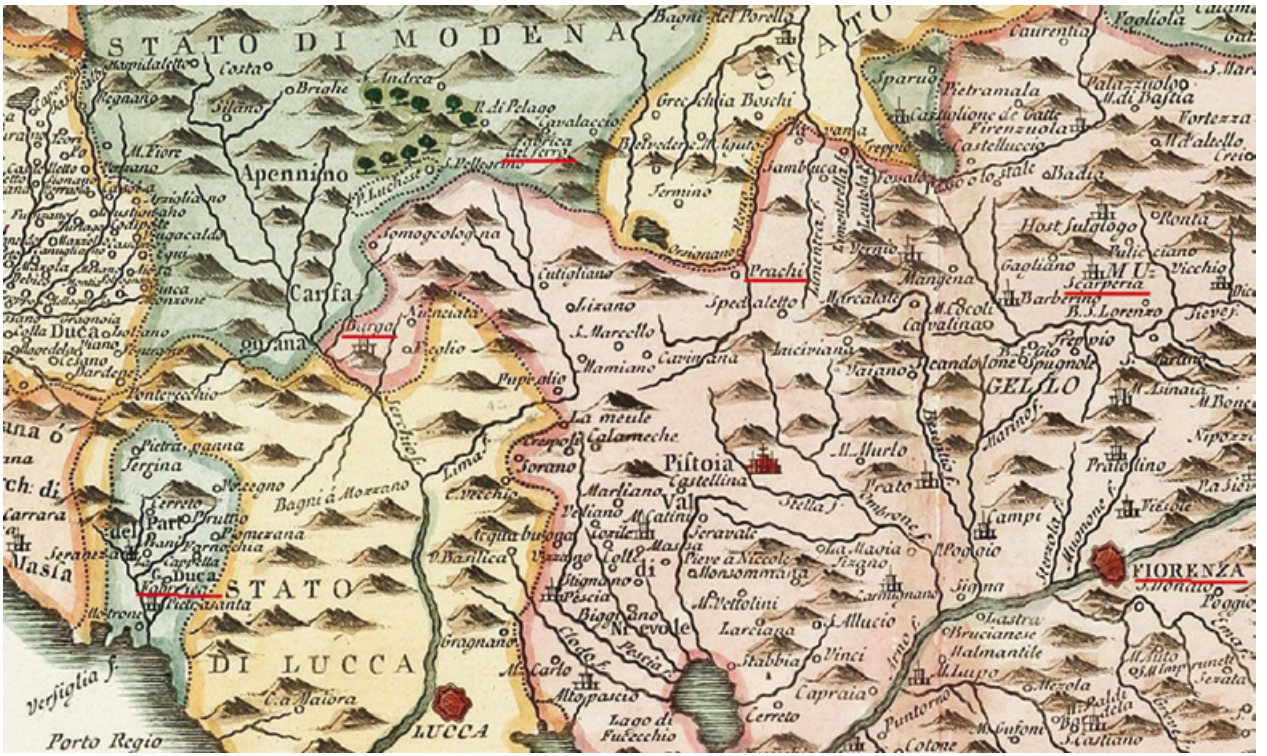


Figure 3. Northern Tuscany and bordering states (Albrizzi, 1750). Underlined in red the sites quoted.



Figure 4. The Republic of Genoa (Magini, 1630-1650). Underlined in red the sites quoted. Note that on ancient maps the word *Edificij* or *Fabriche* means ironworks.

co, 900. “*ha una bella e grande ferrera*”). It seems that in the territory of the Republic the bloomery furnaces continued to exist along with blast furnaces, possibly this was due to the lack of ore and above all of charcoal. It seems that in the 16th century in Italy “to make iron the Genoese way” (*ferro alla Genovesa*) meant to reduce the ore using a type of bloomery furnace. This method was used until the 19th century (Baldracco, 1847).

The Genoese influence in Corsica began in 1284 after the Meloria battle. The Peace of Chateau-Cambresis (1559) confirmed the Genoese supremacy over the island, which lasted until the Corsican revolution.

1563	Blast furnace: Montoggio (Genoa)	ASBg, Not. 491, 10/03, 04, 05, 06/1563	Cucini and Tizzoni, 1993, pp.112-113
1571	Blast furnace: Lago, Montoggio, Campo Ligure (Genoa)	ASBg, Not. 491, 07/08/1571	Cucini and Tizzoni, 1993, p.121
1582	Forges: Lame di Santo Stefano (Genoa)	ASBg, Not. 3766, 01/10, 16, 18/1582	Cucini and Tizzoni, 1993, pp.127-128
1635, 1646	Forges: Rutali (Corsica)	ASBg, Not. 4174, 09/10, 10/01/1635; ADC, d.S., Fonds Camerali, liasse 206, 04/14/1646	Cucini and Tizzoni, 1993, pp.148-149; Comiti, 1997, p.48

Masserano, Princedom of (Figure 5):

It was a small and odd state between the state of Piedmont and the duchy of Milan created in 1394 by the Pope for Antonio Fieschi, brother of the Bishop of Vercelli. It became a principality in 1598 with Francesco Filiberto Ferrero-Fieschi and existed until 1776.

There are magnetite deposits at the site of Oro del Ferro near Postua (Tizzoni, 1988, pp.45-46). In the period between the second half of the 17th century and the end of the 18th the agents of the d’Adda family, who owned the nearby blast furnace of Locarno Valsesia (Vercelli) in the Duchy of Milan, had organised the transport of iron slags from Postua in order to re-smelt them in this blast furnace (Cucini and Tizzoni, 2001, p.169).

1570	Charcoal burners: Crevacuore (Biella)	ASBg, Not. 491, 01/05/1570	Cucini and Tizzoni, 1993, p.120
1570	Forges: Postua (Vercelli)	ASBg, Not. 491, ?/?/1570	Cucini and Tizzoni, 1993, p.120
1584	Forges: Storno, Postua (Vercelli)	ASBg, Not. 3105, 01/20/1584	Cucini and Tizzoni, 1993, p.130

1668	Forges: Postua (Vercelli)	ASBg, Not. 4179, 07/24/1668	Cucini and Tizzoni, 1993, p.151
1691	Mines: Postua (Vercelli)	ASVc, Sez Var., I, 13, A, C1/B	Tizzoni, 1988, pp.42-50

Milan, Duchy of:

The Visconti family ruled Milan first as lords and after 1395 as dukes until 1447. After a short spell as Ambrosian Republic, which lasted 3 years, the Sforza family ruled Milan until 1535. Then, after a few years under the French, in 1559 it fell under Spanish rule, which lasted until 1707.

Besides the iron mines of Val Sassina, there were mines in the valleys Cavargna, Sesia, Ossola, at Dongo on Lake Como and at the southern tip of the state in Val Nure (for this last site see Ferrere, Figure 4). An exception was the iron mine of Canzo, not far from Milan, but the ore deposit here occurred in the form of hematite-rich layers in a sedimentary formation (Tizzoni, 1989, p.154).

1392	Blast furnace, charcoal burners: Villadossola (Novara)	ASMi, Not. Rolandi Antoniolò, 04/03/1392	Motta, 1904, p.121
1464	Forges: Cremona	ASMi, Not. 2067, 07/05/1464, 10/22/1464	Tizzoni, 1998, pp.105-106
1470	Blast furnace, forges, charcoal burners: Canzo (Como)	ASMi, Not. 1423, 08/01/1470	Tizzoni, 1989, pp.148-149
1477, 1480, 1482	Blast furnace: Ferriere, Val Nure (Piacenza)	ASBg, Not. 625, 01/15/1477, ASMi, Famiglie 25, Bordogna, ?/?/1480, Sforzesco 784, 11/21/1482	Tizzoni, 2002, p.311-312
1504	Blast furnace, charcoal burners: Fomarco (Novara)	ASBg, Not. 626, 04/10/1504	Tizzoni, 1997, p.97
1524	Forge*: Vigevano (Pavia)	ASMi, Not. 5475, 09/16/1524	Tizzoni, 1998, p.113
1576	Mines: Porlezza (Como)	ASMi, Not. 16784, 06/07/1576	Tizzoni, 1998, p.223
1580	Charcoal burners: Porlezza (Como)	ASBg, Not. 491, 03/28/1580	Unpublished
1588	Forge*: Milan	ASMi, Not. 21068, 10/17/1588	Tizzoni, 1998, p.255
1589	Forge*: Como	ASMi, Not. 21068, 04/26/1589	Tizzoni, 1998, p.255

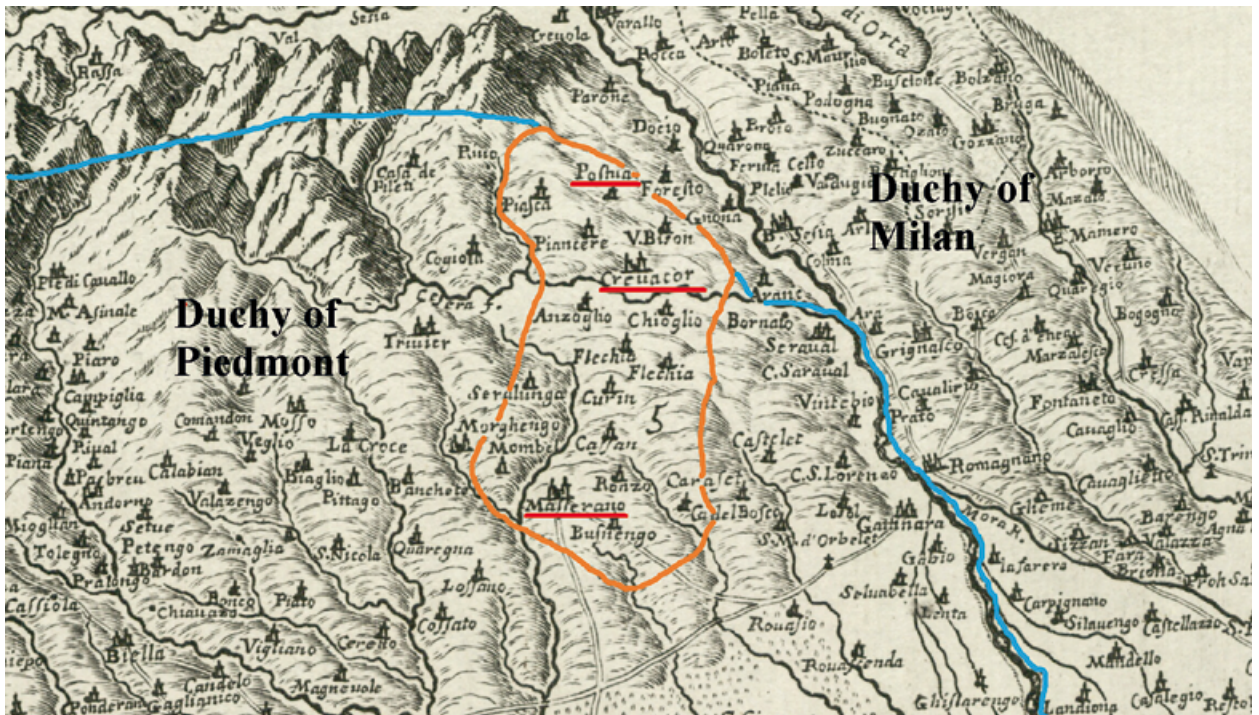


Figure 5. The principedom of Masserano (Frattini, early 18th century) between the Duchy of Piedmont and that of Milan.

1641	Forges: Porlezza (Como)	ASMi, Comm. p.a., 211, ?/1641	Tizzoni, 1988, p.11
1650, 1651	Blast furnace, forges: Locarno Val Sesia (Vercelli)	ASVc, Sez. Var., Not. 64B, 01/07/1650, 06/02/1651	Cucini and Tizzoni, 2006, p.219
1652	Forge*: Soncino (Cremona)	ASMi, Not.23007, 04/22/1652	Tizzoni, 1998, p.278
1670, 1681, 1689-1699	Charcoal burners, ironworks: Locarno Val Sesia (Vercelli)	ASVc, Sez. Var., Arch. d'Adda, Reg. 8, 9, 11	Tizzoni, 1991, pp.218-222
1678	Blast furnace, forges: Locarno Val Sesia (Vercelli)	ASMi, Comm. p. a. 210, 01/1678	Tizzoni, 1988, p.15; Tizzoni, 1991, p.204, 214
1680	Blast furnace, forges: Locarno Val Sesia (Vercelli)	ASVc, Sez. Var., Arch. d'Adda, Reg. 27	Tizzoni, 1988, p.30
1680	Forge*: Asso (Como)	ASMi, Not. 35128, 11/21/1680	Tizzoni, 1998, p.373
1682	Blast furnace, forges, iron trader: Locarno Val Sesia (Vercelli)	ASVc, Sez. Var., Arch. d'Adda, I, 13, A C1/B, 05/13/1682	Tizzoni, 1988, p.38
1683, 1685, 1688, 1690	Mine, blast furnace, forges: Locarno Val Sesia (Vercelli)	ASVc, Sez. Var., Arch. d'Adda, I, 13, C1/B	Tizzoni, 1988, p.39; Tizzoni, 1991, p.222

Naples, Vice Kingdom of:

The first attempts of establishing ironworks in the Aragonese kingdom, which ruled over southern Italy and Sicily, were made by king Ferrante around the year 1490. In this year, two Bergamasque masters (the brothers Enrico and Bartolomeo) were commissioned to build blast furnaces in Sicily and Calabria. After the defeat of the Aragon king in 1501 and a short French occupation, this kingdom was ruled directly by Spain since 1503. It was split into two vice kingdoms (Naples and Sicily). The only iron mines in the vice kingdom of Naples are the large limonite and siderite deposits of Pazzano and Bivongi, near Stilo (Jervis, 1881, pp.298-300).

It seems that the early ironworks were deteriorated or even abandoned around the half of the 16th century. At that time, both Sicily and southern Italy were on the front line in the fight against Ottoman expansion. Because of this a revival and refurbishing of the mines and ironworks was needed. Each vice kingdom had rented mines and iron plants to private entrepreneurs. Their agent was Master Recuperato son of Master Giacomo Gervasoni grandson of the late master Recuperato della Cuminenza di Baresi, from Val Brembana. The hiring contracts began in the year 1560. Five years later prominent Calabrians went to Val Brembana with large amounts of gold coins in order to stipulate hiring con-

tracts with iron and steel masters. We find Bergamasque masters in Calabria as late as 1576 (Cucini and Tizzoni, 1993, pp.108-125).

1490	Blast furnace building: Calabria	ASPa, TRP, num. provv. Reg. 3, c. 219r, 05/22/1490	Conte, 2012, p.42
1491	Mines, blast furnaces, forges: Calabria	ASNa, Cancelleria Aragonese, <i>Capitulorum</i> , f. 117 a.t.-119, 10/25/1491	Trinchera, 1874, p.212
1560	Blast furnace, charcoal burners: Calabria	ASBg, Not. 491, 09/16/1560	Cucini and Tizzoni, 1993, p.108
1561	Blast furnace, mines, charcoal burners: Stilo (Reggio Calabria)	ASBg, Not. 491, 08/17/1561	Cucini and Tizzoni, 1993, p.109
1565	Blast furnace: Stilo (Reggio Calabria)	ASBg, Not. 491, 08/15, 21 and 30/1565	Cucini and Tizzoni, 1993, pp.113-116
1565	Carpenters, blast furnace: Stilo (Reggio Calabria)	ASBg, Not. 491, 08/25/1565	Cucini and Tizzoni, 1993, p.115
1565	Forges: Stilo (Reggio Calabria)	ASBg, Not. 491, 08/26/1565	Cucini and Tizzoni, 1993, p.115
1565	Blast furnace construction: Calabria	ASBg, Not. 491, 08/29/1565	Cucini and Tizzoni, 1993, p.115
1566	Forges: Stilo (Reggio Calabria)	ASBg, Not. 491, 10/17/1566 (2 copies of the same doc.)	Cucini and Tizzoni, 1993, pp.116-117

Papal States (Figure 6):

In these states, limonite mines were few and often low-grade, so most ore were shipped from Elba to the mainland, which explains why most furnaces were built not far from the sea. In this large state, there are four distinct areas of master's migration:

Northern Lazio: the hinterland of Civitavecchia is where most of the Elba ore arrived (Mariani and Mazzantini, 2001, p.70). It was the duchy of Bracciano belonging to the Orsini family and after 1596 to the Odescalchi.

Clemente Bucelleni, a Bergamasque entrepreneur, formed a company (1566-1576) with Orsini in order to build a blast furnace at Cerveteri. Bucelleni and Gero-

lamo Varesio (another Lombard entrepreneur) worked in the same company for the ironworks at Monterano, where Bergamasque masters also worked (1595-1619). Later (1578), Bucelleni left the company and in the following year the duke Paolo Orsini made an emphyteutical sale of his part to Varesio. In the meantime, Varesio had become partner of Riccardo Mazzatosti and of Francesco and Antino Fioravanti, who had the forges of Casal Giuliano near Cerveteri (Mariani and Mazzantini, 2001, p. 80-86).

Forno Nuovo of Rome was built in 1602. Seven years later the Senese noble Solderio Patrizi sold it to the monks of San Paolo Fuori le Mura (Cavallini, 2006, pp.47-48). In 1640, the duke of Bracciano had a blast furnace built at Cerveteri.

There is iron ore in the Tolfa Mountains, but it is of low quality (Jervis, 1874, pp.491-494). The Bergamasque entrepreneur Bucelleni had already understood this problem in 1569. For this reason, he had arranged the transport of Elba ore in the Bracciano area (Mariani and Mazzantini, 2001, pp.71-73).

Southern Lazio: the hinterland of Nettuno, the Elba ore was floated upstream along River Astura (Marino, 2009, p.49). At the time, this was a wild and marshy area that belonged to the Colonna family. The iron masters can be traced here from the year 1568. Conca was a huge estate belonging first to Camera Apostolica and later to Sant'Uffizio. Since 1559, Bucelleni and Del Monte exploited the local iron mines. In 1566, these mines were given by Pope Pius V to Sant'Uffizio, who rented them to the Odescalchi family. In 1578, the building of a blast furnace and five forges was planned by Bucelleni and Sant'Uffizio and built in 1588/1592. The activities of masters can be proved for the period 1599-1688.

Umbria: at Monteleone di Spoleto there were iron mines belonging to the Orsini family. With Pope Urban VIII Barberini it became an important mining site. In 1630, there were German miners; in 1637, Bergamasque miners exploited the deposit (Barbieri, 1940, pp.76, 78-85, 152, 164, 260).

Marche: there is low quality iron ore near San Severino (Jervis, 1874, p.217). To these areas, the urban and village forges (e.g. Rome, Bologna, Forlì, Rimini etc.) must be added. A very strong stimulus for the popes' interest in blast furnaces must have come from the Great Siege of Malta in 1566. Marco Antonio Colonna, who had married in the Orsini family, participated in the siege. He would later become the commander of the papal fleet at Lepanto in 1571.

Seutter's map (Figure 6) is earlier and shows two ironworking sites (*Ferriera*) that we could not identify according to our records. The map shows the blast fur-

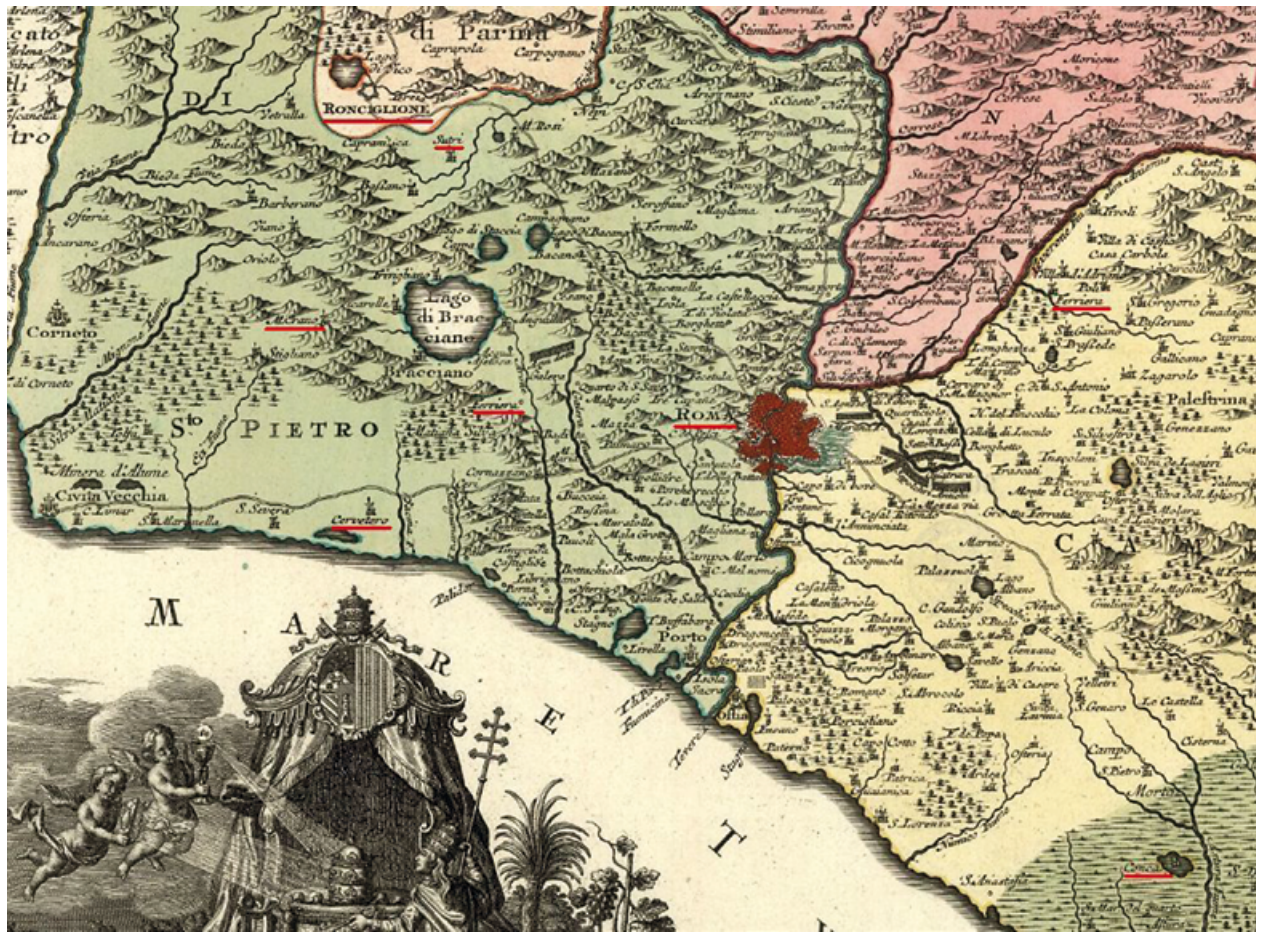


Figure 6. The Papal States (Seutter, 1678-1757). Note the site of Conca on a small lake in the middle of a swamp (right below).

nace of Conca on an islet in a lake in the middle of a swamp (the Pontine Swamps drained in the 1930's).

1479	Forges: Rome	ASMi, Not. 2067, 12/31/1479	Tizzoni, 1998, p.106	1567	Opening ceremony of the blast furnace of Monterano	ASRm, Succursale di via Galla Placidia, Not. G. B. Martini, 1563/73, c. 134r-v, 05/26/1567	Mariani and Mazzantini, 2001, p.70
1524	Forges: Forli	ASMi, Not. 5969, 05/24/1524	Tizzoni, 1998, p.116	1568	Blast furnace: Nettuno (Rome)	ASBg, Not. 491, 09/12/1568	Cucini and Tizzoni, 1993, p.119
1527, 1533	Forges: Bologna	ASMi, Not. 9476, 11/02/1527; Not. 5972, 06/18/1533	Tizzoni, 1998, p.116, 118	1569	Blast furnace: Campoleone (Rome)	ASBg, Not. 491, 09/05/1569	Cucini and Tizzoni, 1993, p.120
1557	Forges: Site Bologna	ASMi, Not. 10163, 09/18/1557	Tizzoni, 1998, p.138	1570	Blast furnace: Monterano	ASRm, Not. AC, Vol. 1680, cc. 239 r-240v, 12/01/1570	Mariani and Mazzantini, 2001, pp.72-73
1566	Permit of blast furnace, forges etc.: Cerveteri	UCLA, Box 65, Fold. 1, 12/10/1566	Unpublished	1570	Mine, blast furnace: Guarcino (Frosinone)	AVa, AA. Arm. I-XVIII, num. 986, 09/23/1570	Barbieri, 1940, pp.72-75
1566	Building of blast furnaces and forges: Monterano	UCLA, Box 97, Fold. 6, 12/10/1566	Unpublished	1571	Forges: Rimini	ASMi, Not. 17647, 03/14/1571	Tizzoni, 1998, pp.227
1566	Emphyteusis for the blast furnace and forges: Cerveteri	Archivio Capitolino, Cerveteri – 1 A – V 31, 12/10/1566	Mariani and Mazzantini, 2001, p.70, nota 3	1574	Blast furnace: Monterano Forges: Ronciglione	ASRm, Notai AC, Vol. 1680, cc. 239r-240v, 10/23/1574	Mariani and Mazzantini, 2001, pp.72-73

1574-1575	Deliveries of Elba ore to blast furnace and forges: Monterano, Colonna, Corcolla, Ferentino, Grottaferrata, Passerano, Subiaco, Vicarello	ASRm, Notai AC, Vol. 1680, c. 114 r-v, 10/13/1574, c. 665 r, 12/10/1574; Vol. 1681, c. 51r, 01/03/1575, c. 82 r, 01/07/1575, c. 423r, 02/12/1575, c. 720r, 03/16/1575, c. 720 r-v, 05/06/1575, c. 20 r, 01/30/1575; Vol. 1682, c. 112 r, 04/12/1575, c. 113 v, 04/16/1575, c. 486 r, 05/09/1575, c. 749 v, 05/26/1575	Mariani and Mazzantini, 2001, pp.77-79	1603	Blast furnace: Conca (Rome)	ASBg, Not. 5824, 09/18/1603	Cucini and Tizzoni, 1993, p.137
1575	Blast furnace: Campoleone (Rome)	ASBg, Not. 491, 09/29/1575	Cucini and Tizzoni, 1993, pp.124-125	1604	Blast furnace: Monterano (Rome)	ASBg, Not. 5824, 10/11/1604	Cucini and Tizzoni, 1993, p.137
1575-1576	Blast furnace: Monterano Forges: Ronciglione (Rome)	ASRm, Not. AC, Vol. 1682, c. 900 r-v, 06/03/1575; Vol. 1687, cc. 194 r-195r, 07/17/1576	Mariani and Mazzantini, 2001, pp.92-94	1604	Blast furnace: Monterano or "the new furnace of Rome" (Rome)	ASBg, Not. 5824, 10/18/1604	Cucini and Tizzoni, 1993, p.137
1576	Charcoal burners, forges: Ronciglione (Rome)	ASRm, Not. AC, Vol. 1687, c. 486r-v, 08/06/1576	Mariani and Mazzantini, 2001, p.76	1604	Blast furnace: "State of Rome"	ASBg, Not. 5824, 10/18/1604 (2 doc.)	Cucini and Tizzoni, 1993, pp.137-138
1576	Blast furnace: Monterano Forges: Ronciglione (Rome)	ASRm, Not. AC, Vol. 1687, c. 559r-v, 08/13/1576	Mariani and Mazzantini, 2001, pp.95-96	1604	Blast furnace: Sambuca (Rome)	ASBg, Not. 3342, 10/19/1604	Cucini and Tizzoni, 1993, p.138
1576	Iron trader: Viterbo	ASRm, Not. AC, Vol. 1687, c. 366r-v, 07/27/1576	Mariani and Mazzantini, 2001, p.94	1604	Blast furnace: Sambuca, or Monterano or Conca (Rome)	ASBg, Not. 3342, 10/19/1604	Cucini and Tizzoni, 1993, pp.138-139
1579	Blast furnaces, forges: Monterano and Cerveteri	UCLA, Box 65, Fold. 1, 03/23/1579	Unpublished	1605	Blast furnace: Monterano (Rome)	ASBg, Not. 5824, 09/10, 11, 22, and 26/1605	Cucini and Tizzoni, 1993, p.139
1579	Blast furnace: Monterano Forges: Cerveteri and Casal Giuliano	UCLA, Box 97, Fold. 6, 03/23/1579	Unpublished	1605	Blast furnace: Sambuca or Forno Nuovo	ASBg, Not. 5824, 10/06/1605	Cucini and Tizzoni, 1993, p.140
1579	Blast furnace, forges: Cerveteri	UCLA, Box 65, Fold. 1, 03/31/1579	Unpublished	1605	Blast furnace: Forno Nuovo "State of Rome"	ASBg, Not. 5824, 10/06/1605	Cucini and Tizzoni, 1993, p.140
1595	Blast furnace: Rome or Monterano unspecified	ASBg, Not. 4015, 09/18, 26 and 27/1595	Cucini and Tizzoni, 1993, pp.131-132	1606	Blast furnace: Sambuca (Rome)	ASBg, Not. 5824, 08/10/1606	Cucini and Tizzoni, 1993, p.140
1598	Blast furnace: Monterano or Conca (Rome) unspecified	ASBg, Not. 4015, 09/30/1598	Cucini and Tizzoni, 1993, p.134	1606, 1607	Blast furnace: Monterano (Rome)	ASBg, Not. 5824, 09/23/1606 (2 doc.), 07/30/1607, 10/10/1607	Cucini and Tizzoni, 1993, pp.141-142
1599	Blast furnace: Conca (Rome)	ASBg, Not. 4015, 09/16/1599	Cucini and Tizzoni, 1993, pp.134-135	1607, 1608	"New furnace of Rome"	ASBg, Not. 5824, 10/25/1607, 10/02/1608 (2 doc.)	Cucini and Tizzoni, 1993, p.142
1599	Blast furnace: Conca or Monterano (Rome) unspecified	ASBg, Not. 4015, 09/22/1599, 10/03/1599	Cucini and Tizzoni, 1993, p.135	1610	Blast furnace: Conca, or Forno Nuovo, or Monterano (Rome)	ASBg, Not. 5824, 09/13/1610	Cucini and Tizzoni, 1993, p.143
				1612	Blast furnace: Monterano (Rome)	ASBg, Not. 5824, 01/14/1612	Cucini and Tizzoni, 1993, pp.143-144
				1612	Blast furnace: "New furnace of Rome"	ASBg, Not. 5824, 10/11/1612	Cucini and Tizzoni, 1993, p.143
				1613	Blast furnace: Monterano (Rome)	ASBg, Not. 5824, 09/21/1613	Cucini and Tizzoni, 1993, p.145
				1613	Blast furnace: "Rome"	ASBg, Not. 5824, 09/19/1613	Cucini and Tizzoni, 1993, p.145

1613	Blast furnace: "New furnace of Rome"	ASBg, Not. 5824, 09/19, 21 and 22/1613	Cucini and Tizzoni, 1993, pp.145-146
1615	Blast furnace: Monterano, or "New furnace", or "where the master will desire"	ASBg, Not. 5824, 09/27/1615	Cucini and Tizzoni, 1993, p.146
1617	Iron trader: Sutri (Viterbo)	Arch. Storico Com., Sutri, Arch. Not., prot. 9, (Atti della Comunità 1616-23), 02/08/1617	Passigli, 2014, p.89
1619	Blast furnace: Conca (Rome)	ASBg, Not. 5824, 09/03/1619	Cucini and Tizzoni, 1993, p.147
1619	Blast furnace: Monterano (Rome)	ASBg, Not. 5824, 10/09/1619	Cucini and Tizzoni, 1993, p.147
1623	Forge*: Campoleone (Rome)	ASMi, Not. 35799, 10/19/1623	Tizzoni, 1998, p.329
1634	Forge*: Rome	ASMi, Not. 28575, 07/27/1634	Tizzoni, 1998, p.346
1637	Mines: Monteleone (Spoleto)	ASRm, Buon Governo, b. 2604 (rogiti P. Salvatori)	Barbieri, 1940, p.81
1561	Forge: Vicarello (Rome)	UCLA, Box 173, Fold. 6, 10/17/1561	Unpublished
1653	Blast furnace: Cerveteri (Rome)	ASBg, Not. 5786, 07/07/1653	Cucini and Tizzoni, 1993, p.149
1669	Iron trader: Sutri (Viterbo)	Arch. Storico Com., Sutri, Arch. Not., prot. 490, T. Lezi, 12/11/1661	Passigli, 2014, p.94
1672	Blast furnace: Conca (Rome)	ASBg, Not. 5829, 09/16/1672	Cucini and Tizzoni, 1993, pp.151-152
1672	Blast furnace: San Severino Marche (Macerata)	BCSS, Manoscritto n. 9 05/18/1672	Paciaroni, 1980, p.174, note 29
1679	Blast furnace, forges: Conca (Rome)	ASBg, Not. 4182, 07/16/1679	Cucini and Tizzoni, 1993, p.152
1688	Blast furnace: Conca (Rome)	ASBg, Not. 4903, 10/30/1688	Cucini and Tizzoni, 1993, p.152

Parma and Piacenza, Duchy of:

Pope Paul III Farnese created this state in 1545 for his illegitimate son Pier Luigi Farnese out of the church's territories. The Farnese family ruled it until 1731, the year of the death of the last Farnese. There are hematite and

copper sulfides deposits in Val Nure (Jervis, 1874, pp.88-89), an area of the Apennines previously belonging to the Duchy of Milan (see p.46 in this paper).

1547	Blast furnace: Val Nure (Ferriere, Piacenza)	ASBs, Not. 588, 05/03/1547 (3 doc.)	Scognamiglio, 1981, pp.224-226
1567	Forge*: Parma	ASMi, Not. 12664, 04/04/1567	Tizzoni, 1998, p.155
1572	Charcoal burners: Site unspecified	ASBg, Not. 3105, 10/01/1572	Unpublished
1574, 1582	Charcoal burners for the blast furnace: Val Nure (Piacenza)	ASBg, Not. 491, 01/28/1574 (2 doc.); Not. 766, 01/16 and 17/1582	Cucini and Tizzoni, 1993, pp.124, 128
1618	Charcoal burners, mines, blast furnace: Riva (Piacenza)	ASBg, Not. 529, 03/08/1618	Cucini and Tizzoni, 1993, p.147
1647	Charcoal burners: Piacenza, possibly Val Nure	ASBg, Not. 4885, 01/01/1647	Cucini and Tizzoni, 1993, p.149
1647	Charcoal burners: Riva (Piacenza)	ASBg, Not. 4885, 12/23/1647	Cucini and Tizzoni, 1993, p.149
1647	Charcoal burners, forges: Val d'Auci (Piacenza)	ASBg, Not. 4885, 12/16/1647	Cucini and Tizzoni, 1993, p.149
1654	Blast furnace: Piacenza, possibly Val Nure	ASBg, Not. 4177, 01/19/1654	Cucini and Tizzoni, 1993, pp.149-150
1679	Blast furnace: Val Nure (Piacenza)	ASBg, Not. 4182, 06/18/1679	Cucini and Tizzoni, 1993, p.152

Piedmont, County, Duchy and later Kingdom of:

This territory was quite different from today Piedmont; it stretched to the north of the Alps as far as the shores of Lake Lemman near Geneva. For an excellent description of its ancient iron mines, see Barelli (1835). Since the 14th century, there was an early Bergamasque migration to this state, but it seems that these masters were only engaged in blacksmithing there. In Savoy, ironworks on a large scale were started in 1510 by the Castagneri family, which had migrated there from Genoa (de Mortillet, 1858, pp.13-14).

The aggressive policy of the duke Charles Emmanuel I of Savoy (reign 1580-1630) must have given a strong impulse to the iron production. The important magnet-

ite deposits of Cogne and Traversella, those of hematite and magnetite in the area of Lanzo and the siderites of Savoy gave large amounts of high-quality ores.

1374-1391, 1412	Forges: Lanzo (Turin)	ASTo, C.C.L., mazzo 8, rot. 35, mazzo 9, rot. 37, 38; mazzo 18, rot. 58, 59	Cerri, 1990, pp.59-67
1562	Iron mines: Hurtières (Savoy)	ASBg, Not. 491, 12/06/1562	Cucini and Tizzoni, 1993, p.110
1568	Forges: Argentine (Savoy)	ASBg, Not. 491, 01/12/1568	Cucini and Tizzoni, 1993, p.119
1571	Forges: Epierre (Savoy)	ASBg, Not. 491, 06/06/1571	Cucini and Tizzoni, 1993, pp.120-121
1572	Forges: Argentine and Epierre (Savoy)	ASBg, Not. 491, 02/03/1572	Cucini and Tizzoni, 1993, pp.122-123
1573, 1575, 1580	Forges: Argentine (Savoy)	ASBg, Not. 491, 01/23/1573, 08/18/1573, 03/07/1575, 02/25/1580	Cucini and Tizzoni, 1993, pp.123-124, 126
1581	Charcoal burners for ironworks: "Turin"	ASBg, Not. 3105, 12/27/1581	Unpublished
1590	Charcoal burners: Argentine (Savoy)	ASBg, Not. 3629, 12/15/1590	Unpublished
1590	Forges: Lanzo (Turin)	ASBg, Not. 2414, 01/08/1590	Cucini and Tizzoni, 1993, p.131
1592	Forges: Epierre (Savoy)	ASMi, Not. 14612, 01/14/1592	Tizzoni, 1998, p.189
1594	Blast furnace: Lanzo (Turin)	ASBg, Not. 4015, 08/01/1594	Cucini and Tizzoni, 1993, p.131
1597	Forges: Argentine (Savoy)	ASMi, Not. 14616, 01/07/1597	Tizzoni, 1998, p.195
1599	Charcoal burners: Cogne (Aoste)	ASBg, Not. 2620, 03/29/1599	Unpublished
1607	Ironworks: Maurienne (Savoy)	Arch. not quoted	Crabières, 2001, p.64
1617	Blast furnace, forge: Maurienne (Savoy)	ASBg, Not. 3632, 11/24/1617	Cucini and Tizzoni, 1993, pp.146-147
1625-1626	Charcoal burners: Allevard (Savoy)	ASBg, Not. 4897, 02/20/1674	Unpublished

1635	Iron traders: Epierre (Savoy)	ADS, B 4632, fol. 18 et 23, 02/28/1635, 03/04/1635	Crabières, 2001, p.65
1637	Ironworks: Bochaissou (Cogne, Aoste)	Arch. not quoted	Di Gangi, 1999, pp.109
1641	Forge, charcoal burners: Argentine (Savoy)	ADS, 12 F 75, 1640	Crabières, 2001, p.63
1645	Charcoal burners: "Piedmont"	ASBg, Not. 4175, 01/15/1645	Unpublished
1647	Blast furnace: Saint-Alban-d'Hurtières (Maurienne)	ADS, B 5700	Garioud, 2001, p.35
1650	Forge: Saint-Pierre-d'Albigny (Savoy)	Arch. not quoted	Garioud, 2001, p.35
1647-1655	Blast furnace: Saint-Pierre-d'Albigny (Savoy)	ADS, E 8, fol. 5, 07/27/1647, fol. 18 et 26, 01/29, 04/27 and 10/08/1655	Crabières, 2001, p.67
1656	Mines: Cogne (Aoste)	Arch. not quoted	Sapegno, 2002, pp.28-29
1672	Blast furnace, forge, Argentine (Savoy)	ADS, B 3933, Grand Not., 02/18 and 21/1672	Crabières, 2001, p.62
1671	Blast furnace: Savoy	ASBg, Not. 4895, 01/23/1671	Cucini and Tizzoni, 1993, p.151
1677	Blast furnace: Site "Aoste"	Arch. not quoted	Di Gangi, 1999, pp.109
1677-1678	Blast furnace, forges: Valmeriana (Aoste)	Arch. not quoted	Sapegno, 2002, pp.30-31
1688	Blast furnace: Site Tamié, Seythenex (Savoy)	AD Haute-Savoie, 2 E 2635, fol. 469	Belhoste, 1991a, p.269, not.26
1689	Mine: Site Epierre (Savoy)	ASBg, Not. 4903, 01/14/1689	Cucini and Tizzoni, 1993, p.152
"End of the 17 th century"	Blast furnace: Site Saint-Pierre-d'Entrèmont (Savoy)	Arch. not quoted	Belhoste, 1991b, p.331

Piombino, Dominion of (Figure 7):

This state, which was formed by Elba, Pianosa and Montecristo islands and by a small area of Tuscany around the town of Piombino, lasted from 1399 until 1814. During the period of our documents, it was ruled by the Apiani family and after 1628 by the Ludovisi. For years,



Figure 7. The continental part of the principality of Piombino (Albrizzi, 1750) where there was the blast furnace of Follonica (not shown on map) and just beyond the border those of Campiglia and Massa Marittima (Masfa on map), site of Valpiana.

the border between the Dominion of Piombino and the Duchy of Tuscany was rather elusive. The sites close to it sometimes belonged to one state sometimes to the other, when they were not even rented to the Papal State, as was the case for Follonica.

1553	Forge*: Piombino (Leghorn)	ASMi, Not. 9483, 04/24/1553	Tizzoni, 1998, p.123
1577- 1578	Blast furnace: Follonica (Grosseto)	Archivio Vaticano, Monterenzi, Arm. XXXVI, Tomo 5°, c. 436B, 427A	Cardarelli, 1925, p.8
1591	Blast furnace: Follonica (Grosseto)	ASBg, Not. 2620, 09/17/1591	Cucini and Tizzoni, 1993, p.131
1616	Blast furnace: Follonica (Grosseto) or Suvereto (Leghorn)	ASBg, Not. 5824, 09/06/1616	Cucini and Tizzoni, 1993, p.146
1620, 1629	Blast furnace: Follonica (Grosseto)	ASBg, Not. 5824, 10/05/1620; Not. 5825, 09/21/1629	Cucini and Tizzoni, 1993, p.148
1637	Blast furnace: Follonica or Suvereto (Grosseto)	ASFi, Magona, num. 2443, c. 20, 06/27/1637	Morelli, 1980, p.500, note 83
1654	Blast furnaces of the prince of Piombino	ASBg, Not. 4177, 10/21/1654	Cucini and Tizzoni, 1993, p.150
1672	Blast furnace: Follonica (Grosseto)	ASBg, Not. 4179, 09/13/1672	Cucini and Tizzoni, 1993, p.151

Pisa, Republic of:

These documents belong to the period of the short-lived Second Pisan Republic (1494-1509). They are too sparse to draw any conclusion.

1499, 1502	Forge and forge*: Pisa	ASMi, Not. 2071, 12/19/1499, 11/11/1502	Tizzoni, 1998, pp.107-108
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Saluzzo, Marquisate of:

France annexed this state, founded in 1142, in 1548 and later Piedmont (1601). It was ruled by the del Vasto family. According to Jervis (1873, pp.34-35), there are a few hematite mines that were exploited in “ancient” times. While according to Barelli (1835, pp.174-177) there were extensive works for hematite extraction near the village of Sampeyre, but he wrote that they date to the middle of the 18th century. Casalis (1848, pp.130-131) wrote that these mines were abandoned because they were water-logged and there was shortage of charcoal.

1519- 1520	Mines: Territory of Saluzzo	ASTo, Camerale, Protoc. F. Stanga, f. 176v	Mangione, 1999, p.87
1520- 1533, 1581	Forges: Territory of Saluzzo	Arch. not quoted	Franzoni, 1991, pp.153- 154

Sicily, Vice Kingdom of:

About the earlier ironworks in 1490 and the origin of this vice kingdom after 1503, see Naples above. “I believe there are thousands of Lombard’s in this Kingdom, they come here to work and as soon as they have gained some money they leave”, so wrote a Milanese merchant in Palermo to the Chamber of Merchants in Milano in 1543 (Vianello, 1938, p.188). Having built the first Sicilian blast furnace in 1490, the Bergamasque masters (oddly later called Brescians) were sent to Calabria to search for iron ore. In 1560, private entrepreneurs had the Sicilian mines and ironworks. In 1562, local workers under the technical management of Master Recuperato Gervasoni (see Naples) built the blast furnace of Fiumedinisi. At the same time master Giorgio, another Bergamasque, left Messina and went to Bergamo in order to hire other masters (Ventura, 2012, pp.164, 176).

There is very little magnetite in the Peloritani mountains, instead most of the ore deposits near Fiumedinisi are formed by Pb, Zn, Cu, Sb, Fe, As Ag sulfides (De Vivo, et al., 1998, p.37). Possibly the iron ore used by the masters was from the gossan of these deposits.

1490	Blast furnace: Fiumedinisi (Messina)	ASPa, TRP, num. prov., Reg. 3, c. 215r, 03/07/1490, c. 222v, 07/10/1490	Conte, 2012, p.42
1526, 1540	Forges: Palermo	ASMi, Not. 5475, 06/27/1526; Not. 5972, 03/03/1540	Tizzoni, 1998, p.113, 117
1561-1569	Blast furnace: Fiumedinisi (Messina)	ASPa, TRP, num. Provv. 2397	Baviera Albanese, 1974, pp.64-68
1563	Blast furnace, forge: Fiumedinisi (Messina)	ASBg, Not. 491, 09/01 and 05/1563,	Cucini and Tizzoni, 1993, pp.111-112
1564, 1565	Blast furnace, forge: Fiumedinisi (Messina)	ASBg, Not. 491, 07/16/1564, 08/23/1564, 08/25/1565, 09/18/1565	Cucini and Tizzoni, 1993, pp.113-116
1566	Forges: Fiumedinisi (Messina)	ASPa, TPR, n. p. 2397, 04/11/1566	Unpublished
1571	Blast furnace: Site unspecified	ASBg, Not. 1884, 09/22/1571 Not. 491, 09/28/1571	Cucini and Tizzoni, 1993, p.122
1573	Blast furnace: Fiumedinisi (Messina)	ASBg, Not. 491, 08/17/1573	Cucini and Tizzoni, 1993, p.123

Siena, Dominion of:

This republic lasted since 1125 until 1555/1559. It included roughly the areas of today provinces of Siena and Grosseto.

1519	Forge: Siena	ASBg, Not. 935, 09/25/1519	Cucini and Tizzoni, 2006, p.218
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Trent, Princedom of:

The prince-bishop of Trent ruled this small state from the 11th century until 1803. An important trade route connected it with Valle Camonica (Passo dell'Aprica). There are iron mines in Val di Sole (Ciccolini, 1935 pp.392-400).

1319	Blast furnace (?): Cusiano (Val di Sole, Trent)	Arch. Parr. Ossana, Perg. 3, 07/22/1319	Ciccolini, 1935, p.407
1399	Blast furnaces and/or forges: Val di Sole (Trent)	Biblioteca Comunale Trento, ms. 1868, pp. 1-5, 12/30/1399	Varanini and Faes, 2002, p.285
1404, 1418	Forges: Val di Sole (Trent)	Arch. Parr. Cogolo, 03/21/1404; Arch. Parr. Pellizzano, 08/20/1418	Ciccolini, 1935, pp.408-409,

1429, 1431, 1458	Forges: Val di Sole (Trent)	Arch. Parr. Ossana, Perg. 11, 09/13/1429; Arch. C. Castelfondo 10/14/1429, 02/16/1431; Perg. Paoli Dimaro 10/01/1458	Ciccolini, 1935, pp.410-411, 414
1462	Charcoal burners: Val di Sole (Trent)	ASBg, Not. 285, 09/06 and 08/1462	Unpublished
1465	Forges: Rovereto (Trent)	ASMi, Not. 898, 07/29/1465	Tizzoni, 1998, p.103
1467	Forge: Valle di Rabbi and Fucine di Volsana (Trent)	Arch. Parr., Gerola, Perg. 17, 12/26/1467, Perg. 27, 12/22/1467	Ruffoni, 1980, p.45, 49
1473, 1474	Forges: Val di Sole (Trent)	Arch. Com. Ossana, 12/21/1473; Perg. Com. Mezzana, n. 7, 02/20/1474	Ciccolini, 1935, p.416
1491, 1493, 1506, 1513, 1519, 1523	Forges: Val di Sole (Trent)	Arch. Parr. Ossana, Perg. n. 27, 09/09/1491, n. 37, 06/08/1523; Arch. Parr. Cellentino, 04/10/1493; Perg. Com. Deggiano, n. 4, 05/02/1506; Arch. C. Castelfondo, 06/19/1513; Arch. Parr. Pellizzano, 09/29/1519	Ciccolini, 1935, pp.419-420, 422-424
1530	Charcoal burners: Val di Sole (Trent)	ASBg, Not. 628, 02/03/1530	Unpublished
1537	Forges: Val di Sile (Trent)	Arch. Parr. Ossana, Perg. 46, 07/15/1537	Ciccolini, 1935, p.426
1542	Forge: Val di Sole (Trent)	Arch. C. Castelfondo 10/16/1542	Ciccolini, 1935, p.426
1563	Charcoal burners: Val di Sole (Trent)	Arch. C. Castelfondo 11/17/1563	Ciccolini, 1935, p.428

Tuscany, Duchy later Grand Duchy (Figures 3 and 7):

In 1532 Alessandro de' Medici was granted the title Duke of Tuscany by Pope Clemente VII de' Medici. His successor was Cosimo I (1519-1574) who became Grand Duke in 1569. The Medici ruled Tuscany until 1727. Cosimo being the son of a famous *condottiero* (Giovanni dalle Bande Nere), was well aware of the importance of iron metallurgy, which was desperately lagging in Tuscany when he became duke. In 1543, he had managed to have the monopoly of the Elba ore, and, possibly to make sure that Jacopo Appiani, the Elba prince, would stick to his pacts, he created a tiny Tuscan enclave on Elba Island,

where he rebuilt and fortified the free port of Cosmopoli in 1548 (today Portoferraio).

In 1518-1534, a fortress was built in the old village of Leghorn (Fortezza Vecchia). The settlement was turned into a fortified town and harbour in 1577 under the direction of the architect Bernardo Buontalenti. The duke Francesco I (1541-1587) had ordered the construction of Leghorn, which shortly thereafter became free port, in order to increase its economic standing, its population and to defend the Tuscan coast. Leghorn became the naval base of the military order of the Chevaliers of Santo Stefano, founded in 1562. Documents inform us about the complaints of the iron master, who were worried about the Berber and Turkish pirate raids along the coast, where there were the ironworks. Since the masters had asked for the permit to carry weapons in 1578, the duke Francesco I de' Medici devised a safer solution, he created squadrons of mounted soldiers to patrol the coastline. Today, there are still sites called Cavalleggeri (horse-mounted soldiers) in the area (Gabrielli, 1982, pp.134-135).

It is interesting to observe that there is a repositioning of the Tuscan ironworks. While until the third quarter of the 16th they are in northern Tuscany and some of them far inland (Pracchia, il Monachino, Figure 3, as Prachi), later they are along the coast of central Tuscany, in the so-called Maremma, just in front of the Elba Island, an area rich in woods and water but sparsely populated because of endemic malaria.

1506	Forge: Figline Val d'Arno (Florence)	ASMi, Not. 3317, 04/10/1506	Tizzoni, 1998, p.110
1507, 1538	Forges: Florence	ASMi, Not. 5966, 05/03/1507; Not. 9478, 01/09/1538	Tizzoni, 1998, p.114, 118
1542-1543	Blast furnace: Isolasanta (Lucca)	ASFi, Magona 1617, 08/07/1543; ASMo, Arch. per Materie, Miniere e Ferriere, 3, 4	Calegari, 1989, p.77-78
1543	Blast furnace, forge, charcoal burners: Pracchia, (Pistoia)	ASFi, Magona, Vol. 2248, num. 40	Cardarelli, 1938, p.144
1543	Blast furnace: Campiglia	ASFi, Magona, doc. non id.	Gabrielli, 1982, p.111
1545	Blast furnace, forge: Pracchia	ASFi, Magona, Vol. 1617, c. 88 t.	Cardarelli, 1938, p.166, note 19
1545	Forge: Ponte di Zana	ASFi, Magona, c. 103 r. e t.	Cardarelli, 1938, p.167, note 35

1548, 1559	Forges: Florence	ASMi, Not. 5974, 06/19/1548; Not. 9486, 08/13/1559	Tizzoni, 1998, p.117, 128
1561, 1563	Blast furnace: Ruosina (Lucca)	ASBg, Not. 491, 07/04/1561 (3 doc.), 01/03/1563	Cucini and Tizzoni, 1993, pp.108-109
1562	Forge: Arezzo	ASMi, Not. 12934, 04/04/1562	Tizzoni, 1998, p.160
1562	Blast furnace, forge: Site Campiglia (Leghorn)	ASBg, Not. 491, 09/03/1562, 10/28/1562	Cucini and Tizzoni, 1993, p.110
1563, 1566	Blast furnace: Site Ruosina (Lucca)	ASBg, Not. 491, 10/3, 4, 5 and 6/1563, 11/12/1566 (2 doc.)	Cucini and Tizzoni, 1993, pp.112-113, 117
1569	Blast furnace: Site Campiglia (Leghorn)	ASFi, Magona, Vol. 2473, c.79 e Vol. 1618, c.68 t.- 69 t.	Cardarelli, 1938, p.197, note 38
1569, 1571, 1574	Forge*: Florence	ASMi, Not. 9490, 05/12/1570; Not. 16249, 02/24/1569; Not. 17965, 05/03/1574	Tizzoni, 1998, p.131, 208, 234
1579	Forge: Pisa	ASMi, Not. 17348, 10/01/1579	Tizzoni, 1998, p.225
1589	Blast furnace: Valpiana (Massa Marittima, Grosseto) and Pracchia (Pistoia)	ASBg, Not. 3526, 09/26/1589	Cucini and Tizzoni, 1993, p.130
1590, 1598,	Forges: Il Monachino (Pracchia, Pistoia)	ASFi, SFFFM, n. 121, c. 15-18, 08/29/1590, 11/13/1590, n. 122, c. 1v, 08/04/1598; Not. Moderno 4168, cc. 138v-140, 11/12/1590	Toccafondi, 1997, pp.63-70
1597, 1599	Forges: Florence	ASMi, Not. 21070, 05/28/1597, 03/15/1599; Not. 23000, 11/16/1599	Tizzoni, 1998, pp.257-258, 274
1598	Forge: the duchy of Florence	ASMi, Not. 22645, 10/20/1598	Tizzoni, 1998, p.267
1598, 1599	Blast furnace: Follonica and Valpiana (Massa Marittima, Grosseto)	ASBg, Not. 4015, 07/24, 25 (2 doc.)/1598, 08/10/1598 (3 doc.), 01/07/1599 (5 doc.)	Cucini and Tizzoni, 1993, pp.132-136
1605	Forges: Site Florence	ASMi, Not. 21072, 12/10/1605	Tizzoni, 1998, p.259
1605	Blast furnace: Site Cecina (Leghorn)	ASBg, Not. 5824, 09/30/1605	Cucini and Tizzoni, 1993, p.140
1615	Forge: Florence	ASMi, Not. 23002, 04/27/1615	Tizzoni, 1998, p.275
1618	Forge*: Florence	ASMi, Not. 26619, 01/22/1618	Tizzoni, 1998, p.339

1619	End of the forges: Site II Monachino (Pracchia, Pistoia)	ASFi, SFFFM, 126, cc. 5-8	Toccafondi, 1997, p.69
1629	Forges: Florence	ASMi, Not. 23004, 03/19/1629	Tizzoni, 1998, p.276
1632, 1641-1642	Blast furnace: Site Campiglia Marittima (Leghorn)	ASFi, Magona, Vol. 2444, c. 12 t e 14 r. e t; ASBg, Not. 5826, 10/09/1632	Piccinini, 1938, p.251, note 20; Cucini and Tizzoni, 1993, p.148
1642, 1643, 1650, 1655, 1657, 1675, 1697	Forges and forges*: Florence	ASMi, Not. 23007, 04/19/1650; Not. 28576, 31/12/1642; Not. 34776, 01/03/1675; Not. 29173, 04/29/1655; Not. 28580, 07/04/1657; Not. 23006, 02/15/1642; Not. 34784, 02/01/1697	Tizzoni, 1998, pp.277-278, 347, 349, 354, 369, 372

Venice, Republic of:

After the Peace of Lodi (1454), the Bergamasque and Brescian valleys were annexed to the Venetian Republic mainland (*Dominio di Terraferma* or *Stato da Tera*). They were part of the Lombard Iron Basin (see Introduction) and many masters were from these valleys. Here are the documents dealing with their hiring outside their native valleys.

There are iron mines in the area of Belluno, one of them worked by entrepreneurs from the village of Laorca near Lecco, the Della Crotta, or Crotti, family (Jervis, 1873, pp.331-333).

Friuli belonged to Venice since 1420, and the relationship between the Republic and the mountain parts of *Dominio di Terraferma* were always very complex. The iron production in Friuli was supplied with ores from the Styrian and Carithian mines. Large quantities of iron reached the Venetian *Arsenale* from the Belluno area. Great Venetian and German merchants (Braunstein, 1966, pp.275-276, 291-292) organized this iron trade.

Nothing is known about mining activities in the Venetian oversea colonies (*Dominio da Mar* or *Stato da Mar*). In 1648-1649, Lombard miners were hired to build and reinforce the fortresses of Candia (Crete), but they were rather unwilling to go there (Franzoni, 1999, p.143).

Gerola informs us that in the Old Fort of Corfu there are some Venetian cast iron guns (Gerola, 1907-1908, pp.429-430). According to their inscriptions, they can be dated to the late 17th / early 18th century and at least the master C. Camozzi of Bergamo cast two of them. Certainly, they were imported from Venice, but some iron making cannot be ruled out in some iron rich Venetian

Islands such as Serifos and Kithnos, where large iron slag deposits of unknown age can be seen.

1406	Blast furnace: Cencenighe (Agordo, Belluno)	ASVe, Prov. B. i, Processi, Busta 8, fasc. Vescovo Belluno, quoted in doc. 03/15/1712	Vergani, 1991, p.116
1453	Blast furnace: "Mountains of Vicenza"	Arch. Conti Velo, no further reference provided	Pegoraro, 2014, p.43
1477	Forge*: Ravenna	ASMi, Not. 2343, 05/05/1477	Tizzoni, 1998, p.108
1498	Forge: Site Pontebba (Udine)	Arch. not quoted	Battistella, 1910, p.361
1502	Mine: Torre Belvicino (Vicenza)	ASVi, no further reference provided	Pegoraro, 2014, p.47
1513	Forge: Site Udine	Arch. not quoted	Battistella, 1910, p.365
1526	Forge: Venice	ASMi, Not. 5970, 08/01/1526	Tizzoni, 1998, p.116
1551	Charcoal burners: "Castrum Pizzani", Feltre (Belluno)	ASBg, Not. 3101, 10/08/1551	Unpublished
1553, 1567, 1572, 1578	Forges and forges*: Venice	ASMi, Not. 9483, 04/10/1553; Not. 12622, 02/26/1567; Not. 12666, 04/10/1572; Not. 14217, 07/01/1578	Tizzoni, 1998, p.123, 152, 156, 166
1583	Blast furnace, iron mines: "Friuli"	ASBg, Not. 3105, 02/07/1583	Cucini and Tizzoni, 1993, p.129
1583	Blast furnace: Venzone (Udine)	ASBg, Not. 3105, 02/07/1583	Cucini and Tizzoni, 1993, p.129
1583	Blast furnace, forges: Borca di Cadore (Belluno)	ASBg, Not. 3105, 03/13/1583	Cucini and Tizzoni, 1993, pp.129-130
1584	Blast furnace: Borca di Cadore (Belluno)	Archivio Magnifica Comunità Cadorina, busta 150, 08/08/1584	Unpublished
1617, 1632	Forges: Venice	ASMi, Not. 27325, 04/04/1617; Not. 23005, 01/01/1632	Tizzoni, 1998, p.276, 340

Hints and doubtful evidence needing more investigations:

1536, blast furnaces "by Bergamasque masters", site En-gui (Navarra) (Belhoste, 1991b, p.330).

1556, blast furnace, site Villeneuve de l'Olme, Mirepoix (Ariège), the owner is Philippe Degandi (Filippo di Gandino?) (Cantelaube and Verna, 2000, pp.154-160).

1614, blast furnace, site Basque Countries, a wall of the blast furnace is called "bergamazo" (Urteaga, 2000, pp.138-144).

17th century, "Mallei Italici seu Preschäner Hammer" (Brescian hammer), "Bressaner" iron in Hungary (Gömöri, 1991, p.179).

Working, social and living conditions of the specialists

The Perfect Master (*Maestro perfetto in tal arte*)

After about two centuries of wild guerrilla warfare, in which sympathizers of the Duchy of Milan fought against sympathizers of the Venetian Republic, the Peace of Lodi in 1454 divided the Lombard Iron Basin between the duchy and the republic roughly along the watershed between Val Sassina and Val Brembana. This meant that the State of Milan had lost most of its iron ore resources. The Venetian policy granted a good deal of autonomy to the Lombard Mountain communities, this was because *de facto* it was not possible for the republic to rule effectively the Alpine area except for the main trade routes of the passes leading to Central Europe.

The richness of its iron deposits, the large number of its streams and forests and the socio-economic situation allowed the development of a prosperous iron industry. At first, the iron masters travelled along the well-known routes of the wool and wool cloth trade, using the same markets where some branches of the masters' families moved. In this way, they managed to open new trade routes and reach new markets.

The Lombard Alps were not an isolated area, but they were part of a complex trade network that reached distant places, for example the Iberian Peninsula via Genoa to the west. They imported Spanish and Majorcan wools in order to spin and weave and to sell their fabric on the Italian and Central European markets (Barbieri, 1961). In the northeast, trade routes extended as far as Poland (de Daugnon, 1905).

The eastern routes used by the iron masters are more difficult to determine. Certainly, some of them were engaged in the Venetian eastern Mediterranean colonies, while others travelled far away to the east on the ships of the colonial powers. We discovered the traces of two of them in 1505 in Calcutta (de Varthema, 1863, pp.260-262), but it would not be too surprising to find them in other continents as well.

As observed by Schläpfer (2013, p.122), the masters were capable not only of great mobility, but they were also able to adapt themselves to quite different environments and cultures.

Who were the masters in the context of their local societies? The local communities show a notable social mobility. Even if the valleys' inhabitants were always complaining and desperately claiming to the authorities that they were poverty stricken, this image of a miserable lot is far from the truth. Some of the Venetian officials of Bergamo and Brescia had understood that these were false claims. Through trade, some families had accumulated huge capitals, though they were parsimonious (da Lezze, 1988, p.508).

The importance of iron mining and metallurgy in the valleys was hidden and since the valleys hardly created problems with central authorities, nobody seriously investigated the origin of their wealth. For example, the Spanish government of the Duchy of Milan discovered only in 1599 that there were iron mines in Val Sassina and a flourishing iron metallurgy too, this happened just because it was pointed out to them. As the Government tried to impose taxes on mining and iron trade, the entrepreneurs answered that they did not pay anything, because they had the right to do so since they had mined and traded iron without any taxation since immemorial times! (Frumento, 1963, pp.113-115).

Although the masters migrated, they did not do it because they needed to, but simply in order to expand their financial gain. When they were not only engaged in mining and metallurgy, they were active in other family enterprises. They appear to be involved in other kinds of trade such as cattle, land properties, building and quarrying (Cucini and Tizzoni, 1993, pp.153-154; Tizzoni, 1997, p.28).

Most masters had to be literate since one of their tasks was to manage the mines' and ironworks' bookkeeping, it there was not the owner's agent on the site. For example, the bookkeeper of the ironworks of Locarno Valsesia was Master Costanzo Gervasone (Tizzoni, 1988).

To be a "Master" in the period addressed was a rather admirable social position both in the valleys and abroad. Therefore, it is not surprising to discover masters who were sons of public notaries or whose sons reached an important social standing.

How were the masters hired and by whom?

The hiring's documents were stipulated sometimes in the masters' villages, sometimes in towns (e.g. Genoa) and sometimes at the site of hiring.

In many cases, the question arises: how did the masters know that their work was needed in some far-off

places? The iron merchants and the weekly or monthly markets in nearby centres must have played a role in this. Here the masters could meet interested parties and potential customers and contact the agents (*agenti*, or *fattori*) of the ironworks owners. Once the agents learned where the masters were coming from, they were able to go to the mountain villages to hire them, according to some documents. Sometimes the agents were masters themselves who had managed to become legal representatives of the ironworks/mines owners; we do not know how they achieved this.

Sometimes they were masters themselves or iron merchants who had gained the trust and confidence of some high-standing and powerful persons. Reading the letter from Master Costanzo Gervasone to his lord, the Milanese marquis Giorgio d'Adda, it is amazing to see how familiar the two men are with each other. The marquis d'Adda entrusted his master to negotiate with other metallurgical entrepreneurs about the possible purchase/sale of ironworks and at the same time, the master kept him informed not only about the ironworks, but also about his own family problems (Tizzoni, 1988, pp.26-27, ASVc, Sez. Var., Arch. d' Adda, I, 13, C1/B, 06/06/1676). This, too, is enlightening about the masters' social position.

Certainly, some places were more favourable meeting places than others were. For example, Genoa was one of such places. Between 1518 and 1543, the Genoese Republic had gained a monopoly of the import of Elba ores for all the Ligurian area and then for more distant places, such as for the ironworks in the Apennines belonging to the Dukes of Modena and of Parma and Piacenza.

The hiring men (*ingaggiatori*) knew that in the valleys of Bergamo and Brescia it was possible to find the workers needed in every phase of iron metallurgy, from the mining work to the finished product. This and a well-known and proven technical knowledge capable of a high-quality production gave the owners of mines and ironworks a reputation for reliability. All this determined the economic choices of the clients and created a kind of monopoly, which in some European areas did not have any real competitor until the new kind of blast furnace with a round crucible (called by 19th century Italian metallurgists' "forno alla norvegiana") spread in the second half of the 18th century.

All this shows us a very different picture of the Alpine valleys; they were not the closed and conservative backwater portrayed by the 19th century tradition. Because of the masters' migrations, the inhabitants of the valleys were informed about what was happening in the surrounding world. They traded in different currencies, new goods and ideas arrived, and the Archbishops of the

Po Valleys' towns had to act quickly in order to stop the spread of heretic ideas there (Tizzoni, 1998, p.23). An example of this is a fragment of what seems to be the 1562 diary by Giovanni Pietro Cattaneo, public notary in the hamlet of Valleve in Val Brembana, reports updated news about what had happened in various parts of Italy and about the Turkish raids along the Calabrian coasts (Cucini and Tizzoni 1993, p.87).

The degree of the masters' migrations from the land of the "most serene Republic" was such that it caused a crisis in the Venetian iron production. As some of the Venetian *Capitani* (captains) of Bergamo and Brescia wrote to the senate, the masters were migrating because they were far better paid abroad than at home. This was due to the Venetian centralised iron market and to its rigid fiscal system. Unfortunately, the Venetian senate did not heed the good advice of captain da Lezze and his colleagues, so the masters continued to migrate, despite the death penalty imposed in 1622 on migrating masters (Brocchi, 1808, p.51). So far, we have no news of a single master condemned, but instead we know that masters were coming and going from their valleys at their own will. For example, master Michele Calvi was not confronted with any problems going back to his village in Val Brembana from Val Sesia for his marriage and then to return to Val Sesia with his wife (Tizzoni, 1988, p.51).

In the western Mediterranean area, from Sicily as far as Barcelona, we have Genoese companies of high-level entrepreneurs controlling the trade of the Elba ore, most of the ironworks and their production. Some of these families were important in Italian and European history, such as Doria and Spinola. This lasted until 1543, when Cosimo I de' Medici, Duke of Tuscany, grabbed the monopoly of the Elba ore from a Genoese company called *Maona* (Calegari, 1986, pp.1-14).

Sometimes the owners of the ironworks were the rulers themselves of one of the Italian states, while in the Alpine area the owners were noble families or the prominent families of the valleys. Possibly this is due to the fact that during the Middle Ages in the Lombard valleys the mines and ironworks belonged to groups of local inhabitants. In the Bergamasque valleys, this communal property lasted till the end of the 16th century, while in the other Lombard valleys, local prominent families or nobles from the Po plain towns managed to become the only owners of the mines and ironworks (Tizzoni, 2015, pp.301-302).

There is also another reason, which explains why there was a desire to control ironworks by the rulers of states. The period of increase of the masters' hiring documents, correspond to the beginning of the Italian wars (1499-1559) and lasts till the end of the 17th century. A

few examples: the documents about places like Monteglio - Campoligure, Rosina, Stilo and Fiumedinisi (1561-1571) and other yet unpublished Sicilian documents (ASPa, Real Cancelleria, R. 397, f. 272, 12/21/1562) deal with hiring of the masters for the production of castiron cannon balls and their deliveries.

Cast-iron cannonballs replaced the stone ones, as this allowed the heavy bronze bombards to be replaced by lighter iron artillery pieces. At the same time, the armies needed larger amounts of arquebuses and muskets. The usage of projectiles with fixed diameters made the calibres of the cannons more uniform and this in its turn gave rise to the science of ballistics. Nicolò Tartaglia, born in Brescia in 1499/1500, published the first book on this subject (*Nova Scientia*) in 1537.

Since the beginning of the 16th century, the Ottoman Empire had increased its expansion both in the eastern Mediterranean and in the Balkan Peninsula toward Belgrade (fallen in 1521) and Vienna, besieged in 1529. During this expansion Genoa and Venice had lost almost all their insular colonies and on the Greek mainland in 1537-1539 to the Turkish admiral Hayreddin Barbarossa. In 1543, after heavy bombing, a French/Ottoman fleet conquered also Nice, then belonging to the state of Piedmont.

These are all but few events, which propelled many governments of the Italian peninsula to increase their iron output and above all the cast iron production of projectiles. The same has been observed in the French Pirenees (1540-1556) (Cantelaube and Verna, 2000, p.152, 159, 161) and in Poland (1641-1669) during the wars against the Kossaks, Sweden and the Turks (Stanislaw and Nosek, 1991).

The masters' duties and their team

159 documents in the State Archive of Bergamo dealing with the masters' hiring's provide us with a large amount of direct and indirect evidence about the organization of the masters' work (Cucini and Tizzoni, 1993, pp.84-88).

Since most of these documents are hiring contracts they go in every detail about tasks, payments to the team, travel expenses and any other facility offered by the entrepreneur (such as clothing). They can be synthesized as follows.

The masters could provide the iron entrepreneurs with every skill needed for iron metallurgy: from the miners to the forgers and the charcoal burners.

After a master was hired by the owner of a blast furnace or by his agent, he had to construct his own team. Generally, it was formed by a group of not less of seven people besides the master himself: the vice-master (*desente*), the learner (*desentino*), two administrators (*me-*

nestradori), two helpers (*garzoni*) and a slag crusher (*pestaloppe*).

The master had to organise everything necessary for the new smelting season, which could last months, ideally from October until June. The owner had to provide the ore and the charcoal. If the charcoal provided was not suitable for the smelt the master could arrange for the arrival of charcoal burning masters from his own valley. However, if the quality of the local ore was bad, the owner or his agent had to provide for the delivery of better ore. Another very important task of the master was the bookkeeping of the iron produced and sold, the ore used and the charcoal.

The vice-master had to keep an eye on the furnace while the master was at rest or even to run the furnace itself if the master was employed in more than one blast furnace at the same time.

We do know who was in charge of checking the bellows and the casting. Possibly the master was giving the orders which were performed by the vice-master and the learner. The two administrators had not only the duty to pour the alternate charges of charcoal and ore into the furnace, but also to check their correct descent along the chimney. They took shifts so one of them was always ready at the top of the furnace. The helpers had to carry the ore and the charcoal to the administrator at the top of the furnace. The slag crusher had the duty to recover the iron prills trapped in the slags, which were then placed in the furnace again (Cucini and Tizzoni, 2001).

Sometimes the masters also had to carry out the second phase of the indirect process, the decarburisation of the cast iron, its forging and steel making. They could make semi-finished products, such as iron bars and finished products, for example nails, buckets and keys, etc. They could also produce different kinds of steel and of wrought iron. The decarburisation and the making of finished products were made in separate forges.

One special task the master had was the casting of iron balls, something of the highest importance in that historical period (Figure 8) (Manucy, 1949, pp.5-6).

Two helpers' only, generally young lads formed the team of the forges' masters.

Besides the masters of blast furnaces and the forges there were also masters of mines, masters of forges and charcoal burners. Charcoal burners for the ironworks had to be able to produce the best suitable charcoal, because of this they also came from the valleys. All the workers could advance in this hierarchy reaching the much sought-after title of "Master". The wages of the blast furnace workers were differentiated according to their tasks. In the period 1560-1688, their wages had an



Figure 8. Lombard school, early 19th century. A cast iron balls foundry at Carvico (Bergamo). In the center of the picture, the clay moulds of the projectiles can be seen (picture courtesy of Il Ponte Auctions, Milan).

increase of about 20 %. Their average monthly wages can be summarised as follows:

Administer: from 40 up to 52 imperial liras

Learner: from 45 up to 56 imperial liras

Vice-master: from 50 up to 60 imperial liras.

Generally, the currency used were silver imperial liras and their sub-units. Anyhow, there are exceptions: sometimes the local currency was used, but this is rare, mostly they were paid in hard currency (gold florins, gold écus etc.). Only very few documents inform us about the travel itineraries of the masters; instead, they let us know how long the masters' travels lasted. Travelling to sites in Northern Italy and in the Alpine area lasted from 3 to 5 days. While up to 30 days were necessary for reaching the Kingdom of Naples and Sicily.

After 1562 travel expenses, food and lodgings were often added as extras to the workers' wages, sometimes clothing was added as well and there could be a bonus given at the end of the contract.

Special tasks such as the refurbishing of furnaces or of forges were given higher wages. It is difficult to establish the exact wages of the masters, because sometimes

their payments were inclusive of those of their teams. Regardless of whether the masters could not work for any reason, disruptions of the equipment, fires, and lack of water and so on, they would have received a monthly wage. They had to take care of the steady flow of production and maintenance of the facilities, avoid incidents and, of course, make the product they were paid for.

It is not clear from our records who the builders of the furnaces were. Possibly, they were the masters themselves. They had to know the correct kind of stones to use and above all the correct measures of the used stones and construction. We know that they attached a special value to the correct measures of each of the main stones forming its construction and each one had its own name (e.g., the stone called *Seppo*: 47 cm, *Fito*: 23 cm, etc.) (Tizzoni, 1991, p.202). They attached an almost mystical significance to the dimension of these stones, which was guarded as a secret (Brocchi, 1808, p.73).

The teams of the masters were often members of their own families or of related families. We can observe that often the masters had their nephews in their teams, but rarely their sons.

Conclusions

These are the preliminary results of a research currently underway. The Bergamasque/Brescian iron workers had mastered the blast furnace technique at least since the early 13th century as shown by some Bergamasque documents (Cucini, 1994). The earliest evidence (so far discovered!) of their employment operating a blast furnace outside their home valleys belongs to the 15th century. Their skills in iron production and working must have been well known in the southern Alpine area since the 14th as shown by the Piedmontese documents.

The masters built and worked with blast furnaces in those parts of Europe where none had previously existed. However, it seems that they made sure that their technical knowledge and the smelting technology they used did not spread to these foreign lands. The reason for this could have been a common preservation of professional secrets.

Unfortunately, having reached a high quality in iron production and working, the masters were unable and unwilling to develop it any further and did not accept any innovation. This was the main reason for the decline of the Lombard iron production. They were a very conservative profession in terms of technology.

However, one should not assume that they were a closed, static society. They showed their flexibility, among other things, by not being afraid to migrate to foreign and distant places and countries. This, of course, may have had primarily economic interests.

The master managed to adapt not only with other iron ores (e.g. magnetite) than those found in their local valleys (siderite and hematite) but also to completely different environments. The introduction of the blast furnace into new parts of the world was a heavy burden for the environment. The impact of the blast furnaces diffusion on vegetation can be seen in pollen diagrams, as already shown in 1982 by Gabrielli.

The documents we have examined confirm that people in the late Renaissance/Baroque period were very mobile and that Alpine society was indeed open to the outside world, as Bergier (1997) already showed since the 1970s. The iron entrepreneurs and the masters did not care about the national borders. They went where their technological expertise in mining and metallurgy was needed and financially profitable.

By studying this occupational group and their social environment, other questions naturally arise that will need to be addressed in the future. For example, how did they interact with the local communities in a period when the idea of nation/state did not exist yet? How did they cope with foreign languages?

We believe that many more documents dealing with the masters' migrations are still waiting for publication or have not yet been brought into light. They could help us to explain many of the questions left unanswered by this paper.

Furthermore, the problem of the iron masters' migrations was related to that of other skilled workers and also to commercial, economic, social and political aspects that also affected the complex relationship between the Alpine valleys and the towns of the plain. Not all these subjects have been covered here. The distribution, importance and influence of the Bergamo blast furnace and the Lombard iron masters *modus operandi* could not be investigated within the framework of this study. We hope to be able to publish a larger study in a second step about this subject in the next few years.

APPENDIX A

Here is the transcript of one of the hiring contracts. It is written in Latin and it is one of the shortest and simplest. It was stipulated at Bordogna in a room of the house of Master Cesar Pagnoni de Fondra. The client was from the village of Avenone in Val Sabbia (district of Brescia) and the hired was from Bordogna in Val Brembana (district of Bergamo), among the witnesses there is a master from Fusine in Val di Sole (district of Trent) and another one from Avenone. The nickname of the master from Val di Sole is *Zenovesi*, which means "Genoese", possibly this master had worked in Genoa for some time. The hirer, master Augustino Mitrali, was given a proxy by the company of the blast furnace, which means that he was well known and trusted at *Pludicio*. Master Gasparino Macheri, the hired, had the duty to go with two other people (*cum duobus alijs sociijs*) to the blast furnace. Here he was to produce cast iron and rebuild the furnace according to his knowledge (*In colando venam pro ferro faciendo ac adaptando et faciendo queque necessaria circha predictum furnum quantum est pro posse Ingenio et Industria predicti mastri Gasparinj.*). The furnace's owners will provide the stones, the wood and anything else he will need (*conducere facient lapides, lignamina et quecumque alia necessaria pro adaptando dictum furnum*). There must have been some discussion about the payment of the master as shown by the words crossed over. The master had to accept a daily payment of 23 *bazzi* (Batzen) instead of 3 ½ Brescian coins, which means an exchange rate of about 6.5. Not a small daily wage for three workers.

„Jesus

Pacta inter magistrum Augustinum Brixiansem et magistrum Gasparinum de Macheris

In Christi nomine Amen. Die quarto mensis septembris 1563, Indictione sexta. In loco et Terra de Bordogna Vallis Brembane Citra Augugiam Bergomi districtus super quadam salleta domorum Juris et habitationis magistris Cesaris quondam Francisci Pagnonj de Fondra de Bordogna presentibus testibus predicto magistro Cesare, magistro Joanne Antonio quondam magistris Alexandri de Ligetis del forno Avono, magistro Bartholomeo quondam magistris Martini dicti Zenovesi de Fuxinis Vallis Solis et magistro Joanne filio magistris Marchetti de Fondra de Bordogna aserentibus.

Ibi magister Augustinus magistris Bernardinj de Mitralibus de Avinono Vallis Sabie, Diocesis Brixianensis, agens nomine patronorum societatis feraritie furnj de Pludicio siti in valle Cesi, Diocesis Hysprochij [empty space] et pro quib ut constat et dicitur in quodam chirographo manu seu comissione dictorum patronum ad hec ac alia plura facienda et pro quibus promissit de ratho habendo etc. et de faciendo ratificare pro parte una et magister Gasparinus filius emancipatus magistris [word erased] Bartolamej de Macheris de Bordogna, parte altera devenerunt ad infrascripta pacta conventiones et obligationes ac promissiones ac primo predictus magister Gasparinus convenit et promissit eundi ad predictum locum de Pludicio una cum duobus alijs socijs et ibi laborare ad furnum constructum et fabricatum per predictos dominos patronos comparticipes dicti furni. In colando venam pro ferro faciendo ac adaptando et faciendo queque necessaria circa predictum furnum quantum est pro posse Ingenio et Industria predicti mastri Gasparinj.

Vice vero versa predictus magister Augustinus dicto nomine ut supra convenit et promissit de dando et solvendo seu predicti domini comparticipes predicti furnj dabunt et solvent predicto magistro Gasparino pro mercede et salario dicti magistris Gasparinj cum predictis duobus socijs ~~Libras~~ tres cum dimidia monette Brixianensis bazos viginti tres monette bazorum bonorum pro singulo die quo stabit et stabunt et se remittant presentes ipse in servitutum predictorum dominorum comparticipum dicti furni de Pludicio de itineribus vero tam in eundo atque in redeundo remiserunt ad arbitrium dictorum dominorum patronorum.

Item, promissit predictus magister Augustinus dicto nomine quod ipsi domini comparticipes preparabunt et conducent seu conducere facient lapides, lignamina et quecumque alia necessaria pro adaptando dictum furnum suis proprijs expensis dictorum dominorum et comparticipes predicti fuerunt tacite et contente in omnibus predictis et quolibet eorum promittentes se se ad mutuam stipulatio-

nem de sic atendendo sub obligatione etc. in pena etc. et rogaverunt me notarium etc.

[Signum tabellionis] *Ego presbiter Jacobus quondam magistris Bernardinj de Macheris de Bordogna notarius publicus Bergomensis predictis omnibusque interfui et in fidem subscripsi.*

Side notes:

“N° 170

Extensum est in imbreviatura predicta n° 158 facta est nota et affirmata Solis”

Abbreviations:

ADC = Arch. Départ. Corse.

ADI = Arch. Départ. Isère.

ADS = Arch. Départ. Savoy.

Arch. = Archivio/Archive.

ASBg = Archivio di Stato, Bergamo.

ASBs = Archivio di Stato, Brescia.

ASFi, S. e c., C. e s. = Archivio di Stato, Firenze, Signori e collegi, Condotte e stanziamenti.

ASFi, SFFFM = Scrittoio delle Fortezze e Fabbriche, Fabbriche Medicee.

ASMi = Archivio di Stato, Milano.

ASMo = Archivio di Stato, Modena.

ASNa = Archivio di Stato, Napoli.

ASPa = Archivio di Stato, Palermo.

ASRm, Notai AC = Archivio Stato, Roma, Notai Auditor Camerae.

ASTo, C.C.L. = Archivio Stato, Torino, Computi Castellanae Lancei.

ASVc, Sez. Var. = Archivio di Stato, Vercelli, Sezione di Varallo Sesia, Arch. d'Adda.

ASVe, Provv. B. i. = Archivio di Stato, Venezia, Provveditori ai Beni inculti.

AVa = Archivio Vaticano.

ASVr = Archivio di Stato, Verona.

BCSS = Biblioteca Comunale San Severino (Marche).

BMG = Bibliothèque Municipale Grenoble.

Com. = Comune.

comm. p. a. = Fondo Commercio, parte antica.

doc. = document/documents.

Not. = Fondo Notarile.

Parr. = Parrocchiale.

Perg. = Pergamena

Protoc. = Protocollo.

Provv. = Provveditori.

rot. = rotolo.

StAGR = Staatsarchiv Graubünden.

UCLA, Box, Fold. = University College Los Angeles, Dept. of Special Collections, Collection 902, Orsini Family papers, Box, Folder.

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