Mining and metallurgical activity in the Campiglia Marittima region (Tuscany) and the archaeological excavation at Rocca San Silvestro

By Riccardo Francovich

1. Introduction

Mining, for both mineral ores and »marbles«, has been and is a characteristic feature of the region of Campiglia (Fig. 1). The »signs« of such acitivity are particularly clear and marked. In some cases there are extremely significant records of the history of mining and metallurgical techniques, and of European importance; in others they are unsightly scars which disfigure an area which is exceptionally rich from both an archaeological and naturalistic point of view. It is superfluous to say that the former are those left by »historical« activity, whilst the latter are those inflicted by contemporary activities. This is not only because our judgements are conditioned by a blind »historicism«, but also because of the different methods which have been used in the various phases of exploitation. In this context it must be said that the »industrialization« of mining which began at the end of the last century, with a few notable exceptions, was not as destructive as some of the quarrying carried out in the period after the second world war.

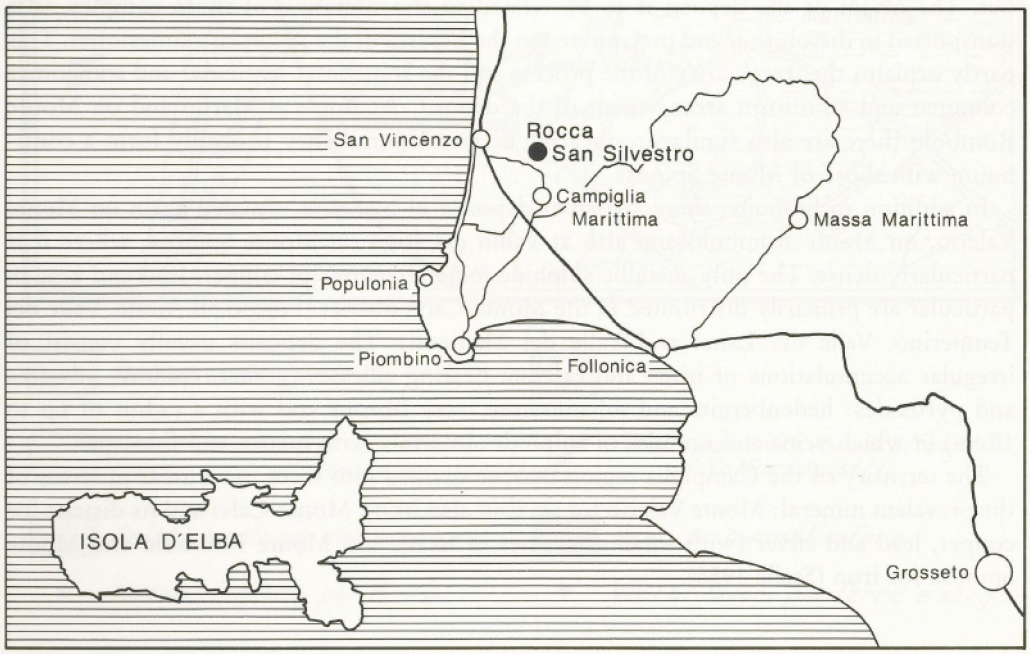


Fig. 1 The region of Campiglia with Rocca San Silvestro.

But what are the circumstances which have made the central part of the Campiglia region so important in the context of Tuscan mining and metallurgical acitivity, allowing the etruscologist A. Minto to suggest that Baratti's function as a port might be linked originally to the marketing of products from that area itself (Minto 1954), rather than to the working of iron from Elba?

The geological formation of the Campiglia Marittima mountains (Fig. 2), which culminate in the summit of Monte Calvi (646 metres), consists of white limestones which, on Monte Rombolo (391 metres) and on Monte Spinosa (386 metres), cover a bedded grey limestone. The latter is almost always crystalline, whilst the white limestone graduates between crystalline and compact wax. The metalliferous mineralizations of the Campiglia region were, and still are in part, rich in cassiterite, limonite, haematite, pyrite, galena, chalcopyrite and blende. This therefore allows the extraction of tin – in the form of an oxide (SnO_2) –, of iron – in the form of an oxide hydrate ($2Fe_2O_3$, $3H_2O$), an oxide (Fe_2O_3) and of a sulphide (FeS_2) –, of lead, of copper and of zinc (the latter practically unknown in antiquity) – in the form of sulphides (PbS, $CuFeS_2$, ZnS) – and also of silver contained in the galena.

The deposits of cassiterite are concentrated primarily on Monte Valerio (264 metres). Here the mineral is linked to the oxide hydrates of iron; in places where there is contact with the limestone, the surrounding rock, it is enfolded with calcite concretions. The cassiterite is found in small accumulations of various forms, within the iron-bearing veins: for this reason it is difficult to recognize. Other small deposits of lesser importance are located on Monte Rombolo, here also inserted in limonite-bearing veins, but embedded in a more ancient limestone than that of Monte Valerio.

Iron, in contrast, is present throughout the region since the superficial outcrop of each deposit, of whatever sort, is formed by limonite. Monte Spinosa is particularly rich in it. In some zones, including some close to Monte Spinosa, the underlying granitic intrusion, which can be seen clearly at Botro ai Marmi, raising the ground, has made the iron crop out. The origin of the deposit is to be related to the alteration of more complex salts transported in dissolution and precipitated in the fissures of the secondary limestones. This partly explains the irregularity of the process and the sometimes lenticular and sometimes columnar and stratiform arrangement of the deposit. At Botro ai Marmi and on Monte Rombolo there are also similar ironbearing accumulations. They probably form a continuum with those of Monte Spinosa.

In addition to limonite, there are other deposits of hematite, situated again on Monte Valerio, on Monte Rombolo and also at Vallin del Rigo on Monte Spinosa, where it is particularly dense. The poly-metallic sulphide mineralizations of copper, lead and zinc in particular are primarily distributed in the Monte Calvi district (Poggio all'Aione, Valle del Temperino, Valle dei Lanzi and Valle dei Manienti). The deposits usually consist of irregular accumulations of iron- and calcium-bearing silicates (garnet, epidote, »ilvaite« and pyroxides: hedenbergite and johannsenite, very fibrous and with a radius of up to 10 cm) in which veins and nodules of sulphides intermix with quartz and fluorspar.

The territory of the Campiglia region may be divided into three main areas in terms of the prevalent mineral: Monte Valerio for tin (but also iron), Monte Calvi and its district for copper, lead and silver (with small quantities of iron), and Monte Rombolo and Monte Spinosa for iron (Stella 1955).

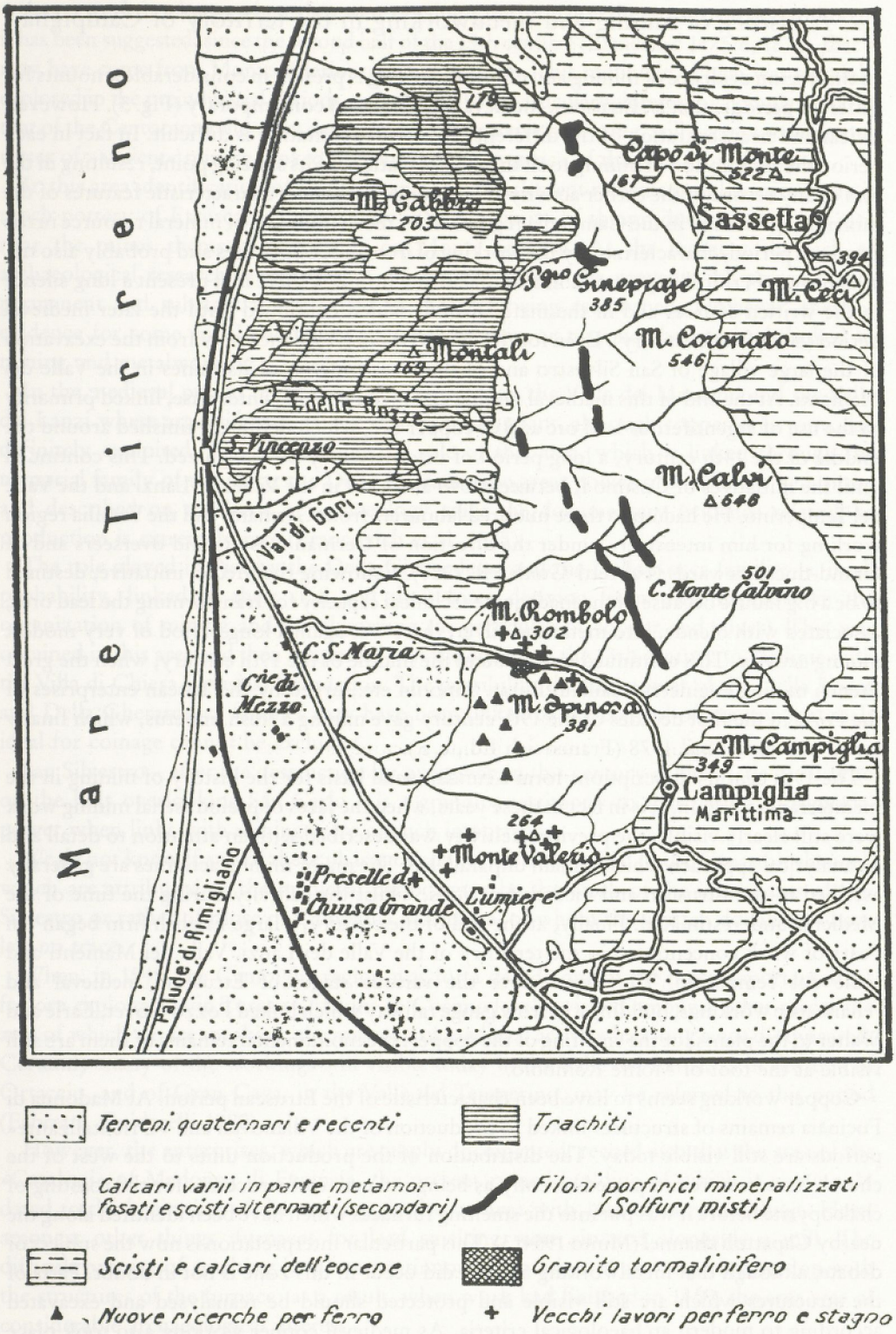


Fig. 2 Geological map of Campiglia's landscape (MINTO 1943).

2. A history of mining and metalworking in the territory of Campiglia

In this region evidence of mining and of metalworking is present in considerable amounts for different periods: that is, Etruscan, medieval, modern and contemporary (Fig. 3). However, a clear and neat separation of the different phases of exploitation is difficult. In fact in each period the resumption of mining took the old excavations as its starting point, resulting in the loss of any record of the earlier activity. This is one of the most characteristic features of the mineral exploitation in the Campiglia region. After the definite use of mineral resource in the Etruscan period, characterized by the working of iron and copper ores and probably also tin, which was of critical importance in manufacturing bronzes, there is at present a long silence in the written sources and in the material finds which continued until the later medieval period (end of 10th century). Even for this period there is evidence only from the excavation of the large village of San Silvestro and of the areas in front of its mines in the Valle dei Manienti. At the end of this medieval mining and metalworking enterprise, linked primarily to the use of argentiferous lead ore and of copper ore, which definitely finished around the middle of the 14th century, a long period of inactivity may be recognized. This continued until the initiatives of Cosimo I, between 1549 and 1559 in the Valle dei Lanzi and the Valle del Temperino. He had up to three hundred labourers from Germany and the Versilia region working for him intensively, under the direction of German masters and overseers and of Grand-ducal stewards (Fabretti-Guidarelli 1980). Following the Medici initiative, destined to be a big failure because of the inadequate technical capacity for transforming the lead ores, associated with blende, into metal and silver, there was again a long period of very modest mining activity. This continued until around the middle of the 19th century, when the great French mining engineers, Caillau, Burat, Simonin etc., urged by the Tuscan enterprises of the Porte in the first decades of the 19th century gave mining a fresh impetus, which finally lasted this time until 1978 (Francovich Ed., c.s.).

The 19th century descriptions form a fundamental basis for the history of mining in the mediterranean region. It is in fact in these years, when the faces of preindustrial mining work were still clearly visible, the previous acitivity was described with an attention to detail and an analytical approach which remain unparalleled. The major mining activities are generally ascribed to the Etruscan and medieval periods, whilst the acitivity during the time of the Medici is underestimated. Finally, at the end of the century, a large English firm began ten years of work concentrated in the territory of the Valle dei Lanzi, Valle dei Manienti and Valle del Temperino. They went over the various stages of Etruscan, medieval and renaissance workings, building a harrow gauge railway which linked Pozzo Govet, Earle and Walter to the plants for the smelting of the copper: the monumental remains of them are still visible at the foot of Monte Rombolo.

Copper working seems to have been characteristic of the Etruscan period. At Madonna di Fucinaia remains of structures linked to production of the Villanovan and »Orientalizante« periods are still visible today. The distribution of the production units to the west of the church have been reinterpreted recently as being indicative of structures for the roasting of chalcopyrite before it was put into the smelting furnaces which have been identifed along the nearby Capattoli channel (Minto 1954, 3). This particular interpretation is now the subject of debate, although that metalworking activity did occur in this zone is not in doubt. Parts of the structures which are still visible and protected should be reanalysed and excavated according to modern archaeological criteria. As medieval copper working also took place along the Capattoli channel (Voss 1990), we are not sure of the extent of the Etruscan workings, although they are definitely present here.

As yet we do not know where they were obtaining the bronze in the etruscan period, although it has been suggested, since the second half of the 19th century (Blanchard 1875/6, 1876), that it may have come from Monte Valerio, together with tin. This mountain, which was certainly explored in the preindustrial periods, as is shown by a particularly interesting complex such as that of the Centocamerelle, now devastated by destructive quarrying, still perserves numerous traces of »ancient« mining, linked not only to the presence of thin but also of iron.

In this area identification of an Etruscan period settlement remains problematic. There is much pottery of Etruscan date not only in the vincinity of the production units but also near the mines themselves, such as on Monte Spinosa. At the moment the lack of archaeological research in the area of present day Campiglia prevents the presence of a permanent and substantial settlement in the area being established. However, there is evidence for some small habitation sites, which may or may not be seasonal, linked to mining and metalworking.

In the medieval period mining was concentrated in the Valle dei Manienti and the Valle dei Lanzi where argentiferous galena was more abundant, although copper ores were also definitely exploited. The history and the role of this area, which is linked through the manorial family of the place, the Della Rocca, to the great power of Pisa, must be written and described on the basis of archaeology since the documentary evidence relating to production is extremely rare (Francovich et al. 1985).

The role played in Pisa by the Della Gherardesca and the Della Rocca families is, in all probability, linked to their skill and their force deriving from their expertise in the organization of mining and metalworking (in particular of copper and silver). This was obtained in this area and then »exported«, in the course of the 13th century to Sardinia with the Villa di Chiesa (Iglesias) foundation. The possibility that the power of the Della Rocca and Della Gherardesca families may have been linked to the control of the raw materials ideal for coinage cannot be excluded.

San Silvestro – after the destruction by quarrying in this century of the castle of Biserno on the hills overlooking San Carlo – is a grandios testimony to that period of signorial power when links with mining were of such importance.

We de not know if any of these phases of copper working noted in the Capattoli channel, which are attributed to the medieval period, may be the work of the inhabitants of San Silvestro or rather of those of Campiglia Marittima, of whom the written documents have left no trace.

When, in 1549, the Campiglia region was for a decade one of the most important areas for ore exploitation in Tuscany, thanks to Cosimo I, who visited amongst other places the area of which we are speaking, the memory of medieval activity had long since disappeared. Certainly many of the workings still visible today in the Valle dei Lanzi, as in the area of Ortaccio, and of Gran Cava, in the Valle del Temperino, may be referred to this period (Fabretti, Guidarelli 1980).

However, the enterprises, which are amply documented, record also that the area of the »Casaloni« of Madonna di Fucinaia, the present ruined building of which is commonly dated to the beginning of the century, is also an area with 16th century buildings. Here, amongst other things, furnaces for lead smelting were situated alongside a mill. The difficult process of smelting involves continuous adaptation of and experimantation with the structures of the furnace: as a result, when work had finished in 1559, the area was of considerable archaeological interest.

The present physical character of the region between Monte Rombolo and Temperino, which will soon be turned into an archaeological park on mining (Francovich Ed., c. s.) was

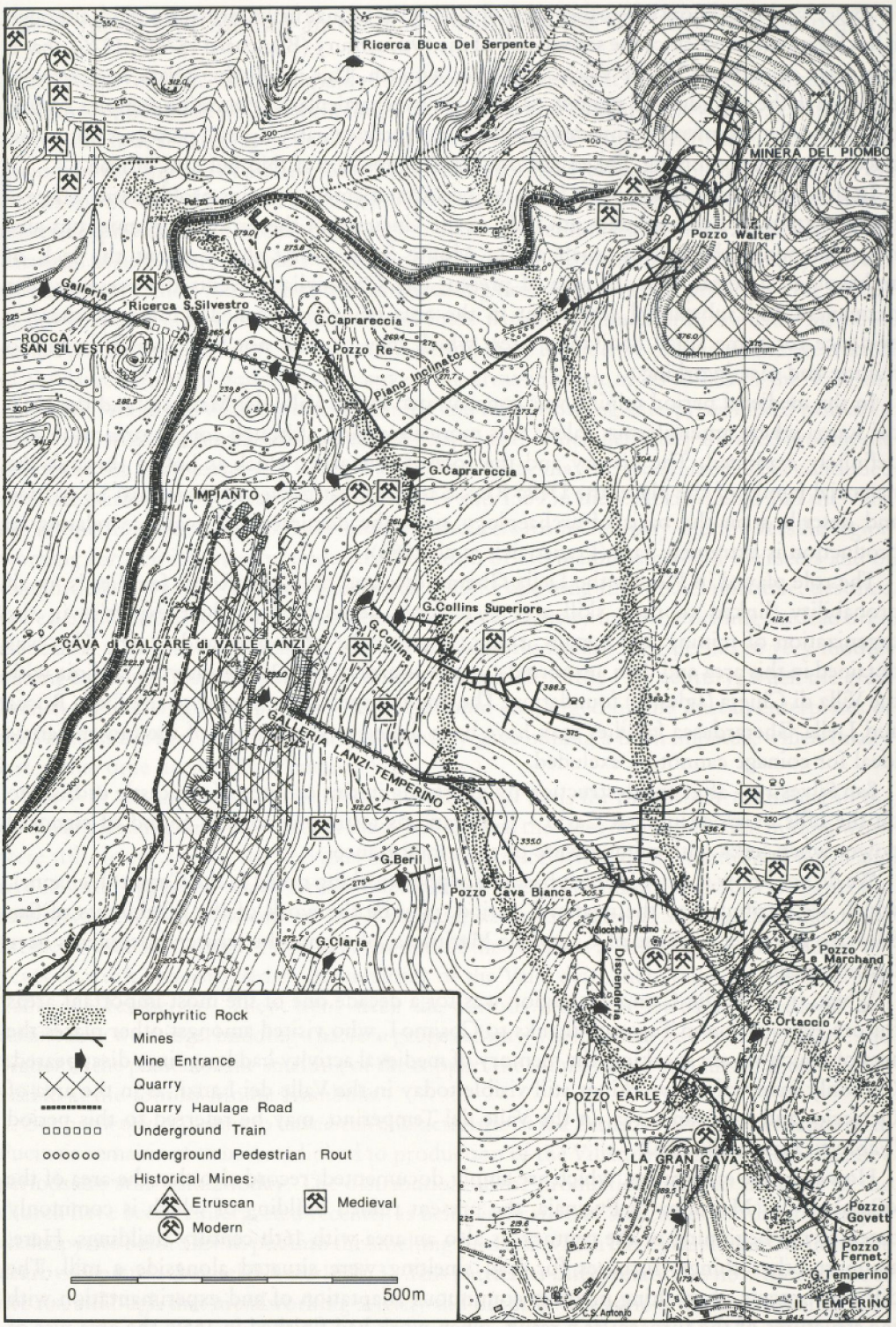


Fig. 3 The landscape of San Silvestro with the mining extractions areas.

acquired from the mid 19th century, when exploitation concentrated in the areas now occupied by the Govet, Earle, Le Marchand and Walter shafts. In fact, it is possible today to travel along the route between Temperino and Lanzi, the valleys in which galena, chalcopyrite and iron oxides have been exploited, completely underground, admiring in the upper levels the »ancient« workings.

Although the mining activity linked to copper and lead ores has had this cyclic course in the Campiglia territory, the picture for iron is somewhat different. At Caldana the introduction of a furnace »alla bergamasca« in the 16th century is an event which provides continuity for the indirect production of iron. It involved the use, through the Magona (iron industry association), of iron primarily from Elba: this travelled from the coast by Baratti to Venturina, via the Fossa Calda. The presence of a permanent structure for the production of iron also provided an incentive for the exploitation of local resources. In fact when it became difficult to find Elban iron, it was the iron ores of Monte Valerio, of Campo alle Buche, of the Fierle and of Poggio all'Aione which were used. The local iron, as in the medieval period, had a supporting and integrating role, although it has never been the principal source. The hopes and the successes of the »industrialization« of Campiglia are linked not only to the fundamental »coupler« to the iron metallurgy of the Tuscan coast and the series of furnaces for the working of Elban material at Valpiana, Suvereto, Cecina etc., but to the alternative possibilities that exist for exploiting mixed sulphide ores: this has always overridden the agricultural and woodland-pastoral aspect.

Today the proposal for an archaeological park on mining, which recaptures the successful times of this region and demonstrates the historic role of the Tuscan area in certain critical periods (Etruscan, medieval, renaissance and »industrial«) may perhaps happily bring to an end one cyclic phase and start another in which the historical, archaeological and environmental resources form a permanent and systematic line of development.

3. Rocca San Silvestro

The castle of Rocca San Silvestro, so called after the Saint to whom the castrense church is dedicated, is a village founded in the second half of the 10th century as a result of signorial initiatives aimed at the exploitation of the ore deposits of the area (Francovich et al. 1985) (Fig. 4). The first written account of the castle dates to 1108, although references to a fortified site »... *in loco ubi dicitur Monte Calvi* ...« are to be found as early as 1004. The castle appears in the contemporary documents of the more well-known centre of Campiglia. However, whilst we can be certain on the basis of the archaeological evidence that San Silvestro was a new foundation, there are some indications that lead one to suggest a rather longer life for Campiglia, possibly starting in pre-Roman times. This is shown by some fragments of black slip pottery which have been found on the uppermost part of Campiglia itself.

To return to San Silvestro, the first document which explicitly refers to a tower and to specialized cultivation around the settlement with garden plots, vineyards, and olive trees, dates to 1271. A few years later we have mention of pasture within its district. Throughout the life of the village agriculture and sheep raising were a small and integrative, but important, part of the local economy, based as it was primarily on mining and metalworking.

Additionally an act from 1310 is important for indicating those districts (Biserno, Campiglia and Suvereto) which adjoin Rocca San Silvestro (whose name then was Rocca a

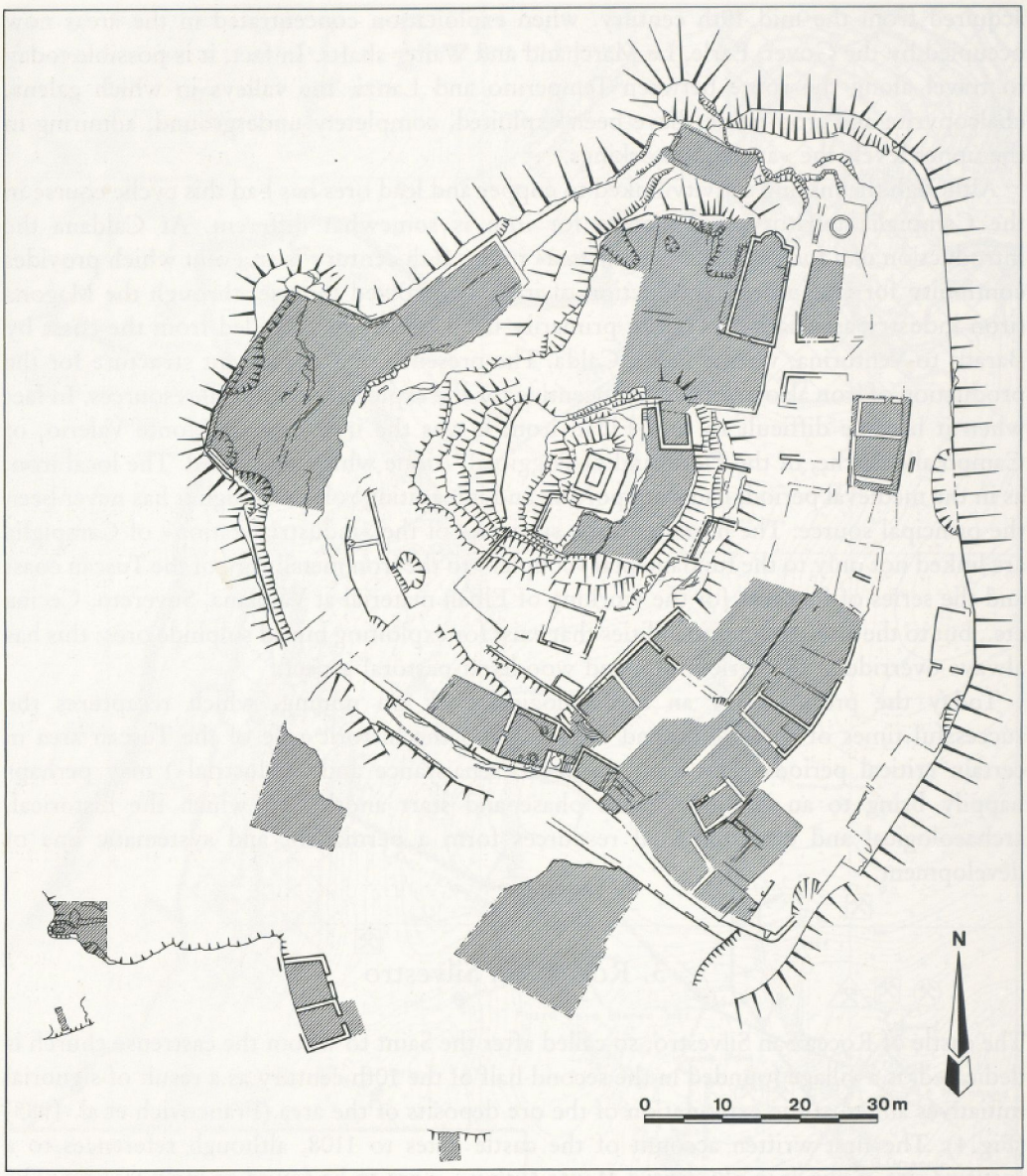


Fig. 4 Plan of San Silvestro.

Palmento, the name San Silvestro being assumed in the renaissance), it lists its principal natural resources: »*silvis ... fluminibus ... salinis ... venis, metallis*«. The last reference to the castle as a still occupied nucleus dates to 1323. However, from the archaeological evidence we know that it continued to be in use at least in part until the second half of the 14th century, and was used as living quarters, perhaps by a shepherd, until the early 15th century.

Right from the start Rocca San Silvestro was linked to the role played by the Della Rocca family, who firmly maintained their own manorial rights even in the face of Pisan political-territorial advances.

Of the village one can see, in addition to the essentially romanesque urban lay-out (divided into manorial area, residential area, industrial area, church, cemetery, metalwor-

king installations), a bloomery furnace, situated by an abandoned quarry, the forge, at the foot of the entrance to the castle, in a position which indicates that it was directly controlled by the manorial family, and the remains of copper and lead smelting furnaces, in the »industrial« area. In the Valle dei Manienti, a few hundred metres from the castle, the mines and their associated working areas, contemporary with the settlement, are still visible, whilst in the Valle dei Lanzi recent and present workings have left only a few suggestive traces of »ancient« activity.

For the investigation of this site, began in 1984, an archaeological research strategy has been formulated which foresees a balanced investigation of the different parts of the settlement, aimed at understanding the following:

1) The social framework during the different phases of life of the village, with particular reference to the consolidation of the manorial system and to its »weakening«, until the demise of the village itself in relation to its specific vocation and to its production infrastructure, to be studied in relation to the topographical context.
2) The chronological phases of the settlement, trying in particular to establish wether the origin of the »castle« is due to manorial initiative or wether it should be seen as part of the more general phenomenon which seems to characterize »incastellamento« in Tuscany. For here the fortification of a rural settlement seems to be the final phase of an earlier phenomenon of reoccupying hilltops, a process which had begun in the early medieval period and, in some cases, even in late Antiquity.
3) The technological aspects of building a fortified settlement, from the quarrying to the wall construction techniques.
4) The economic basis of the village by the study of the organic remains and the agricultural production system.
5) The production of metals, which from the technological point of view must be divided into at least three parts, each corresponding to an independent stage:
   a) from the deposit to the commercial ore (mining stage),
   b) from the ore to the semi-worked metal, pigs, bars, and ingots (metalworking stage),
   c) from the semi-worked metal to metal objects (manufacturing stage) (Francovich, Parenti 1987).

The questions posed are, as a result of archaeological excavation at San Silvestro, receiving extremely important replies, such as to allow us to respond with extraordinary effectiveness to some historiographic questions relating not only to the technology available but also to the social context. In fact it depends on the close relationship between these two aspects that the most significant data are emerging, beginning with the matter of the end of the village, which may be related not only to the complex demographic decline which characterizes this part of Europe in the mid 14th century and the »political« clash which characterizes the end of the »manorial« system, but above all it depends on the production system and to the technological apparatus which, not being able to utilize hydraulic power, had from the 13th century already begun to be obsolete.

With regard specifically to the matter of ancient mining and metalworking, the archaeological investigations undertaken have been directed towards the following:

1) A systematic survey of the now wooded area surrounding the castle in order to identify ancient shafts and pits. In this respect circa 10 preindustrial mines are being surveyed analytically and an excavation has begun of a mine in the Valle dei Manienti. In addition the later phases of mining activity (16th and 19th century) are being »re-read« in an

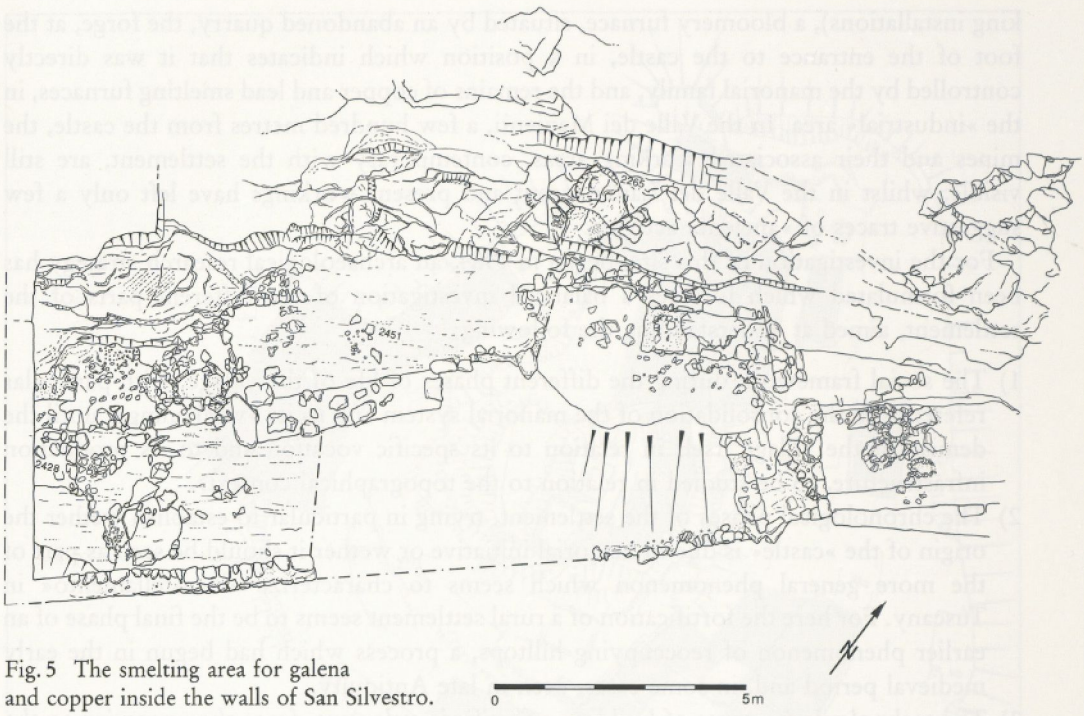


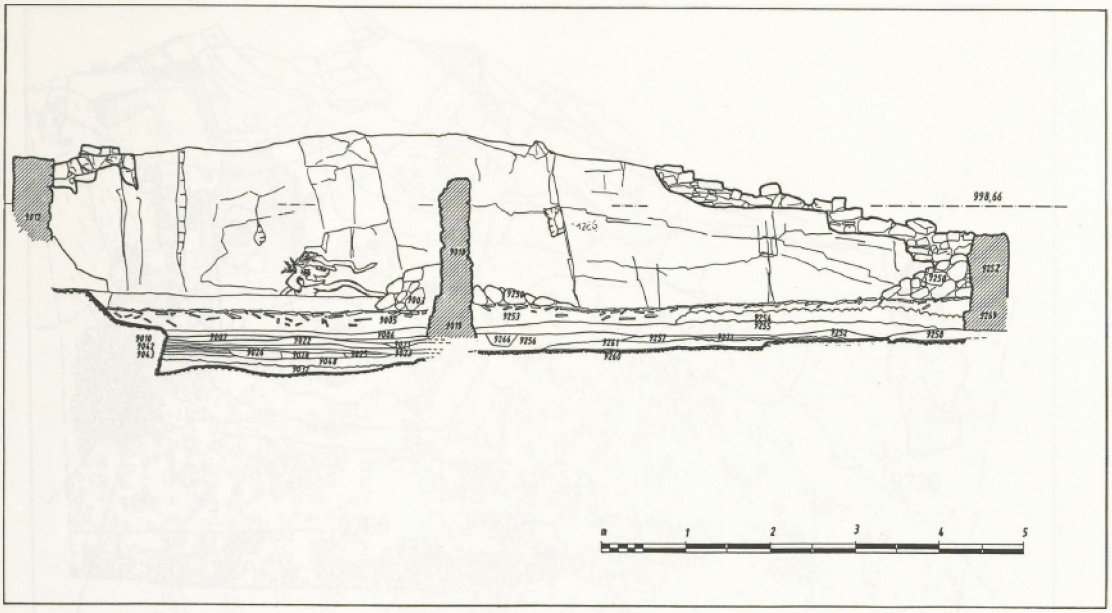
Fig. 5 The smelting area for galena and copper inside the walls of San Silvestro.

attempt to create a »typology« of mining techniques. So far we have no clear evidence for pre-Roman mining activity, although it should be located not far from the metal-processing areas of the Temperino region (work in progress – A. Casini supervisor).

2) With regard to the second phase, that is metalworking, a lead processing area has been identified, from the excavation of a furnace in which there was the charge of crushed galena and of wood: it is uncertain so far whether this was a structure for roasting or for smelting (Fig. 5, n. 2265). Remains of two furnaces for the smelting of copper have been found adjacent to the lead working area (Fig. 5, n. 2428): in their vicinity small piles of roasted chalcopyrite were found (Fig. 5, inside n. 2451). These structures went out of use at the beginning of the 14th century. A further structure for the smelting of copper, dating to a century earlier, has been found on a higher terrace. These discoveries were followed by the discovery in 1985 of a furnace for the reduction of iron, published in 1987 (Fig. 6a and 6b).
3) Manufacturing activity. The manufacturing stage is known only in as much as it concerns the production of iron implements. A forge was found at the foot of the single entrance to the castle, emphasizing the close manorial control over this activity (Fig. 7 and 8). It probably relates to the production of tools to be used in agricultural work or mining only by the villagers themselves.

The problems involved in an assessment of the quantity of slag, which could easily have been taken elsewhere or thrown out from the fortified structure, at present hinders any calculation of the volume of production. It poses the problem whether all production was concentrated within the walls, or if this was »assay« activity, with all »industrial« production being undertaken in nearby sites such as Madonna di Fucinaia.

It is clear that until this time the production of copper and argentiferous lead was linked to the export of ingots and pigs, destined to be worked further outside the castle. The



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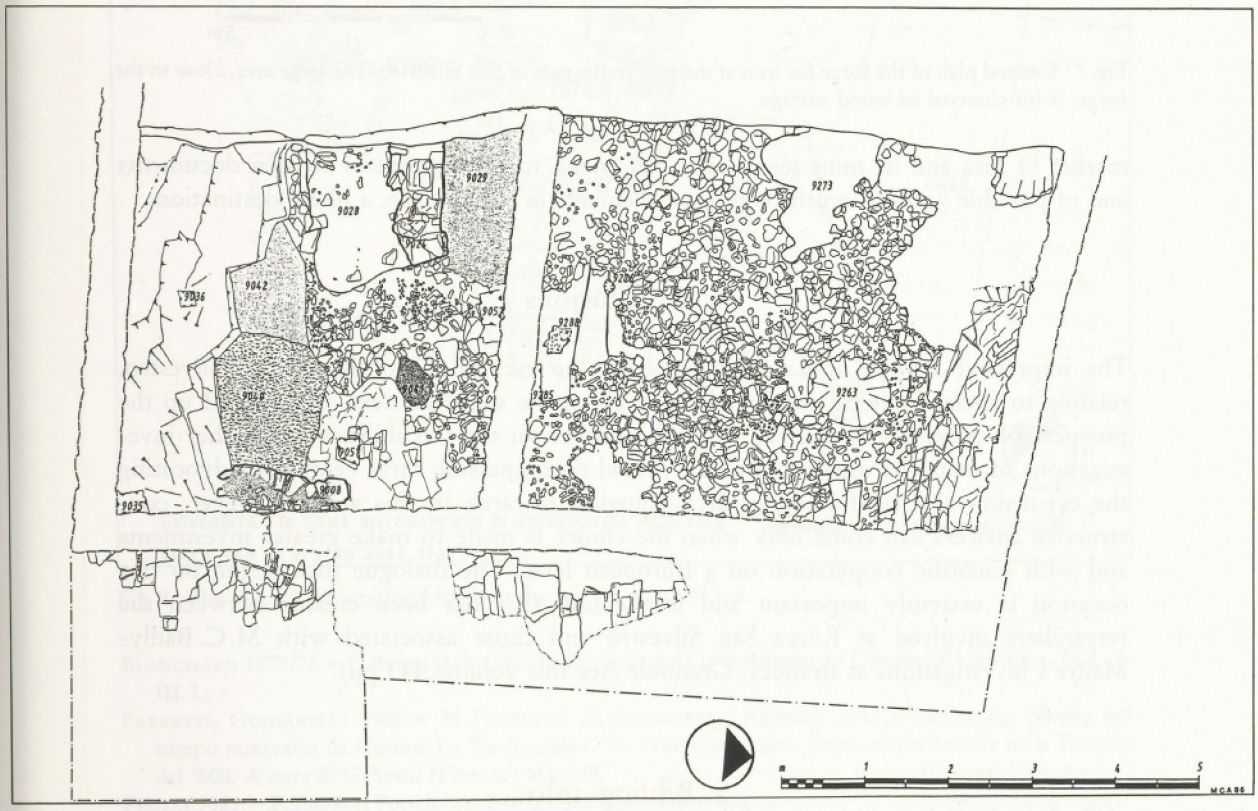

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Figg. 6a and 6b The furnace for iron reduction outside of the wall of San Silvestro.

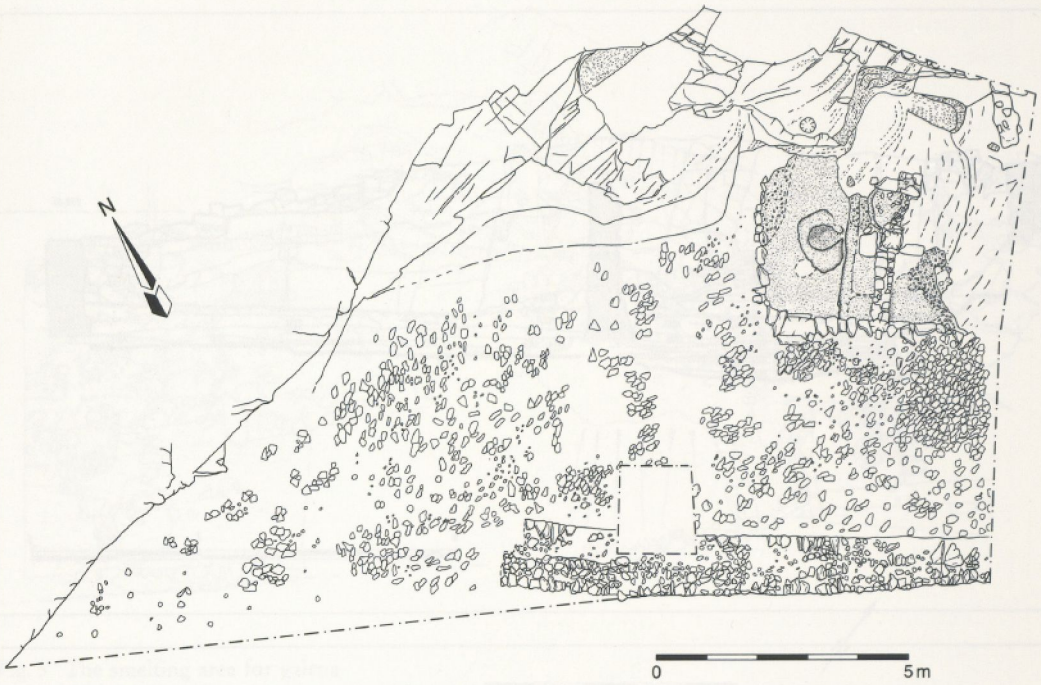

Fig. 7 General plan of the forge for iron at the foot fo the gate of San Silvestro. The large area, close to the forge, is for charcoal ad wood storage.

market of Pisa and its mint seems at the moment, in the absence of written documents and of possible verification through trace elements in the coinage, a likely destination.

4. Conclusions

The impressive corpus of data produced by the excavations of Rocca San Silvestro, relating to ancient mining and metalworking and the social context, has opened up the prospect of extremely revitalized research and shown the possibilities for further investigations of manorial organization in a period encompassing three centuries, advocating the expansion and reinforcing of archaeological research in this area. However, constructive answers can come only when the choice is made to make greater investments and with scientific cooperation on a European level. The dialogue thus begun on this occasion is extremly important and is the link that has been created between the researchers involved at Rocca San Silvestro and those associated with M. C. Bailly-Maître's investigations at Brandes, Grenoble (see this volume 443 pp).

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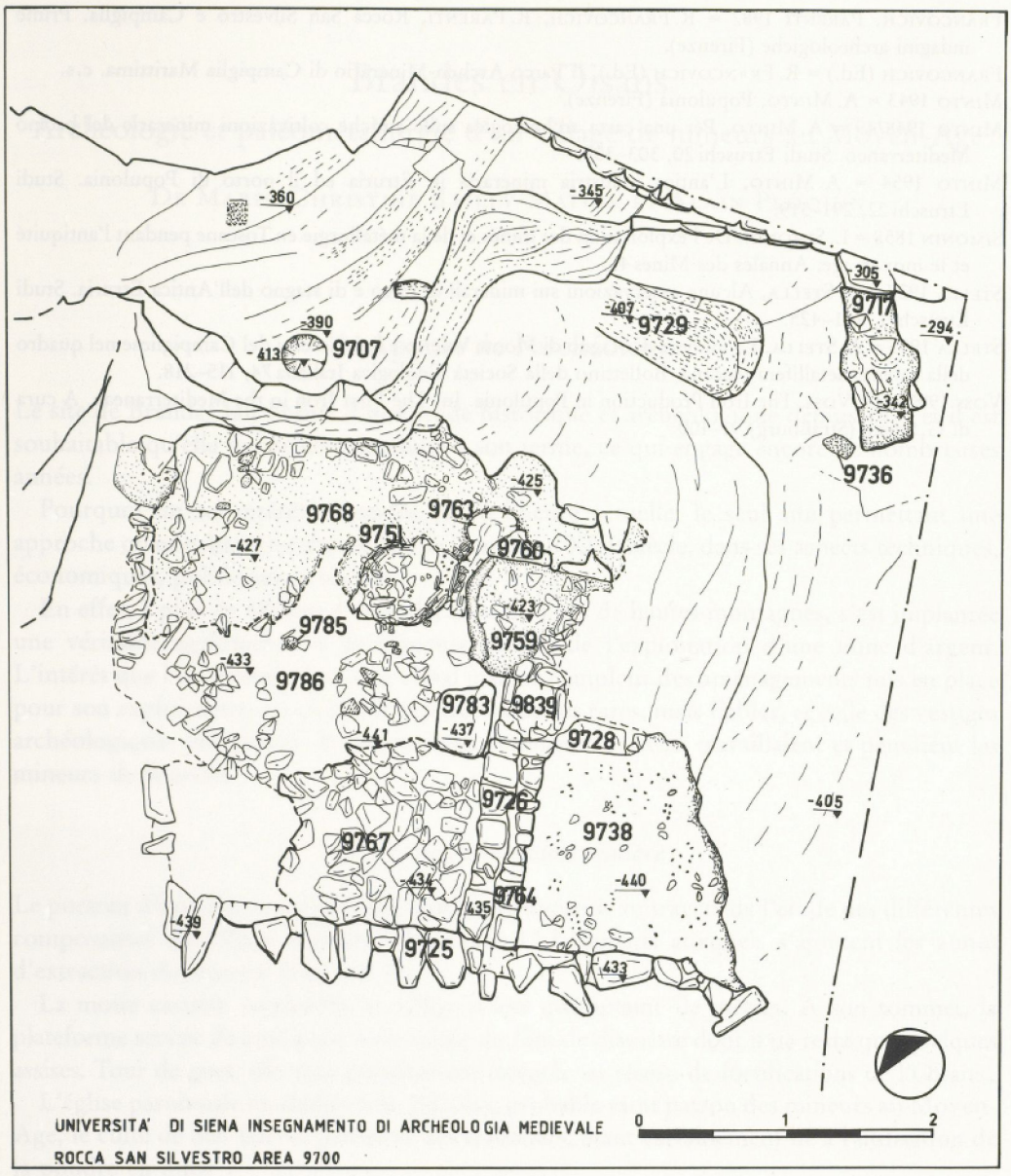

Fig. 8 The map of the smithing forge in the second phase of use.

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