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A photograph showing several stone buildings on a hillside covered in yellow gorse bushes. The buildings are simple, rectangular structures with dark roofs. A red rectangular border surrounds the image.

A view of the Silvermines Works complex buildings, as they were in May 2008 (view taken from scaffolding on the Ballygowan pumping engine house). See paper by John Morris inside.

Iris don Iontaobhas um Oidhreacht Mhianadóireachta



MINING CORPORATIONS OF WESTERN EUROPE: A SUCCINCT SURVEY OF BUSINESS MODELS OF THE MEDIEVAL WORLD*

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Abstract: The article describes the organization of private shareholding mining corporations that appeared in the Alps, Carpathians, Tuscany, Sardinia, and the Balkans from the twelfth to the fifteenth centuries. Drawing upon the study of medieval mining statutes, it describes the ways in which private investors in each region put their capital together to pay the costs of keeping feudal mines under continuous operation. The article succinctly discusses the reasons behind the rise of mining corporations and why they matter for understanding the history of mining in the Latin West. *Journal of the Mining Heritage Trust of Ireland*, 16, 2018 3-20.

INTRODUCTION

'Piercing mountains with tunnels':¹ sinking shafts at depths that could reach 300 feet; timbering adits and galleries; transporting rocks and materials outside shafts; building artificial water streams; hiring and paying land surveyors, foremen, and miners; in situ ore washing; renting beasts of burden; and ore testing and smelting; were costly stages of production necessary for acquiring private claims. They required money. Above all, solving what miners called *fondinae aquaticeae* or shaft flooding, required fixed investments in the mines. The latter was to be provided by medieval mining corporations.

The twelfth and thirteenth centuries provided propitious conditions for the emergence of mining corporate businesses. Silver was, 'the oil that moved the wheels of the global economy.' Western Latin Europe is in ascent, medieval Islamic caliphates are falling, and European kingdoms are accumulating the necessary resources for their expansion a couple of centuries later to the rest of the world. It is no exaggeration to say that the medieval corporate mining business appeared when Europe needed it the most. Its legal principles and practices embodied and in turn absorbed, the culture of its times. Liberating capital from feudal bonds was the symbol of success of the medieval mining corporation. The richest source of evidence for studying the *how, when, and why* of mining corporations is medieval mining laws and charters. The oldest charter is *Carta laudamentorum et postarum in facto arzenterie* (A.D. 1185/1207), a compilation of contracts and grants recording exchanges, donations, and leases of mines in the medieval district of Trento. *Carta laudamentorum* contains rich details about the corporation that worked the mines of Argentarie,

Falumberg, and those located in *mons vaccae* or *monte de la vacca* in Kühberg, today in the region of Trentino-Alto Adige/Südtirol. It became part of a voluminous charter of the same period known as *Codex Wangianus*, which contains all contracts and grants recording legal transactions pertaining to the rural and urban property under the jurisdiction of Wanga. The *Codex Wangianus* is preserved today at the Trento State Archives, Italy.²

The second mining charter is *Ordinamenta super arte fossarum rameriae et argenteriae et civitatis* (A.D. 1225), the statute of the commune of Massa Marittima in Tuscany, Italy. Civil wars, not uncommon in medieval Tuscany, were the main instrument for encroaching upon a neighbor's mining land. And Massa, a rising independent commune, took great care in enacting mining laws covering all aspects of the business, from mine geometry, to credit for investments, determined as it was to keeping mines under its jurisdiction. *Ordinamenta* is preserved today at Florence State Archives, Italy. A third mining charter is the *Breve di Villa di Chiesa* (A.D. 1327), the famous mining statute of Iglesias, Sardinia. An island endowed by nature with rich sources of raw materials including silver ores, rarely went unnoticed by expansionist Mediterranean powers. Pisa and Genoa, Italian city-states, and the Iberian kingdom of Aragon competed against each other for the treasures of the island. The Christian *Reconquista* to north Africa served them well for invading Sardinia many times starting in the early years of the eleventh century. In the process, they left their imprint in the mining laws contained in the *Breve*. The *Breve di Villa di Chiesa* is today preserved at the Municipal Historical Archive of Iglesias, Sardinia.³ The last mining charter is *Constitutiones*

* This article borrows extensively from my book, *The underground wealth of nations* (Yale University Press, forthcoming 2019).

¹ Chadbourne, *Lectures on natural history*, p. 92.

² The following transcriptions of the *Codex* are available: Curzel and Varanini, *La documentazione dei vescovi di Trento*; Kink, *Fontes Rerum Austriacarum: Oesterreichische Geschichts-Quellen, Diplomataria et Acta, V Band, Codex Wangianus*.

³ There are many studies on the *Breve di Villa di Chiesa*, but only one transcription of the entire charter, as follows: Baudi di Vesme, *Historia Patria Monumenta, Codice diplomatico di Villa di Chiesa*.

juris metallica (A.D. 1300), a comprehensive mining code enacted by King Wenceslas II (r. A.D. 1271-1305) of Bohemia for mining cities located under his jurisdiction in the Carpathian mountains. The charter was a legal and political attempt at centralizing the many autonomous mining towns dominated by a foreign business and political culture.⁴

What follows is a succinct sketch of the prototypes of the mining corporations that emerged in the medieval cities of Trento, Massa Marittima and Iglesias, Sardinia, and Kutná Hora in Poland. These cities were centers of mining activity in early medieval Europe, and belonged to different jurisdictions, as described below. The *why*, *when*, and *how* of each corporation requires a different and lengthy work. The goal of this brief article is to present the reader with a picture of the structure and general legal principles of the medieval mining corporations, by drawing upon a fruitful source of evidence ignored by economists, social scientists and historians of landscape change, medieval mining charters and laws. The overarching goal of the paper is to shed light upon urgent theoretical and practical questions for advancing the study of the relationship between mining and the rise of Western capitalist civilization.

A. MINING CORPORATIONS

1. Small corporations: the *consilium wercorum* of Trento

Silbrarii or private silver producers appeared for the first time in the mines of *Mons Arzentarie* in A.D. 1185. Trento, a city with prosperous agrarian valleys and nested near the Adige River in north Italy, was a quasi-sovereign city ruled by the bishops of Trento. Its corporate mining history started when Count Henry of Eppan donated to Bishop Albert (A.D. 1184-1188) of Trento, rights over silver mines and vassals of Breguzzo, Bondone, and Tione.⁵ The Bishop had one problem: the mines were flooded, and money was in dire straits.⁶ The loss of mining rent was at stake, a loss that gave no one cause to rejoice. Bishop Albert, determined not to sink in the flooded mines, granted a contract to *silbrarii* or free miners on March 24, 1185 for exploiting the silver mines under his jurisdiction.⁷

The contract was the beginning of the rise the *consilium wercorum*,

Trento's mining corporation. This type of corporation exploited the mines under the jurisdiction of the bishops of Trento, especially Argentarie, located between Fersina and Avisio, north of Civezzano and overlooking Trento.⁸ The *consilium* possibly worked the mines extending into the Austrian Alps and the *territori montuosi* or mountains that group themselves around Lake Lugano, between Lake Maggiore and Lake Como.⁹ Evidence of how this mining corporation was organized comes from the contracts and exchanges compiled by the notaries of Prince-Bishop Frederick Wanga (c. A.D. 1194-1250). Entitled *Carta laudamentorum et postarum episcopi factorum in facto arzenterie* (A.D. 1185/1207), the compilation contains notarized documents pertaining to the mines of *Mons Arzentarie* or Monte Calisio in Trento and neighboring lands. The *Carta* is part of *Codex Wangianus* (A.D. 1185/1207), a voluminous compilation of all legal documents concerning the property of the Bishops of Trento.¹⁰ When Bishop Wanga succeeded Albert in A.D. 1207, he decided that a compilation of documents recording the legal history of the Bishopric was in order.

The first Wanga contract, dated June 19, 1208, identified *silbrarii* as members of a *consilium suprascriptorum wercorum*.¹¹ The *consilium* divided each mine into sixteen shares or *partem*, and a share represented a fixed amount of money expended by *silbrarii* in a specific shaft or section of a mine. Calculated on a weekly basis by a technical expert, the cost of all sixteen shares equaled the total expenditure in mining works undertaken by the *consilium wercorum*.¹² The documents contained in *Carta laudamentorum* specify that a shareholder had fifteen days to bring his shaft into work.¹³ If anyone owning a claim in *Mons Arzentarie* neglected his duty of investing money, while the rest of the members of the corporation paid total expenses of mining works, that shareholder was responsible for reimbursing expenses to the rest of the corporation. This could end his participation in mining works. If a shareholder was not able to pay off nor reimburse the members of the *consilium* in a period of fifteen days, including payments owed to technical specialists and workers, his share 'in total' was transferred to other members of the same *consilium*. This condition leaves no doubt as to the legal weight of mining shares; shares were notarized documents that could be seized by lordly court action.

⁴ The nineteenth-century edition of the charter by H. Jirecek is the one widely used today. Jirecek, *Codex juris Bohemici*.

⁵ Kink, *Fontes Rerum Austriacarum*, pp. 438-439.

⁶ Curzel and Varanini, *La documentazione dei vescovi di Trento*, pp. 122-127; Kink, *Fontes Rerum Austriacarum*, p. 96; Sperges, *Tyrolische bergwerksgeschichte*, pp. 263-265.

⁷ Braunstein, 'Les statuts miniers de l'Europe médiévale,' p. 42; Curzel and Varanini, *La documentazione dei vescovi di Trento*, pp. 122-127; Kink, *Fontes Rerum Austriacarum*, p. 96.

⁸ Perini et al., *Illustrazione del Tirolo italiano e della Svizzera italiana*, p. 73; for the historical geography of the region, see Dai Prà, 'La cartografia storica come interfaccia dialettica tra discipline e competenze territoriali.'

⁹ Umlauft, *The Alps*, p. 236. For general reference, see D'Achiardi, 'La miniera del Bottino nelle Alpi Apuane'; Garlandini, Il patrimonio storico industriale della Lombardia; Giovanelli, Intorno all'antica zecca Trentina e a due monumenti Reti; Hoffman, 'The commerce of the German Alpine passes during the early middle ages'; Hunt and Murray, *A history of business in medieval Europe 1200-1550*; Kellenbenz, ed., *Precious metals in the age of expansion*; La Salvia, Iron making during the migration period: the case of the Lombards; Marinelli, 'The regions of mixed populations in northern Italy'; Rosa, *Delle leggi di Bergamo nel medio evo*; Saggioro, 'Insediamenti, proprietà ed economie nei territori di pianura tra Adda e Adige'; Scheuermann, *Die Fugger als montanindustrielle in Tirol und Kärnten*; Timberlake, 'Early leats and hushing remains: suggestions and disputes of Roman mining and prospection for lead.'

¹⁰ Curzel, *Il Codice Vanga*; Curzel and Varanini, *La documentazione dei vescovi di Trento*.

¹¹ Emanuele Curzel, in Curzel and Varanini, *La documentazione dei vescovi di Trento*, pp. 350-351.

¹² Curzel, *Il Codice Vanga*, pp. 172-173, 184-187, 350-354.

¹³ Kink, *Fontes Rerum Austriacarum*, p. 448.

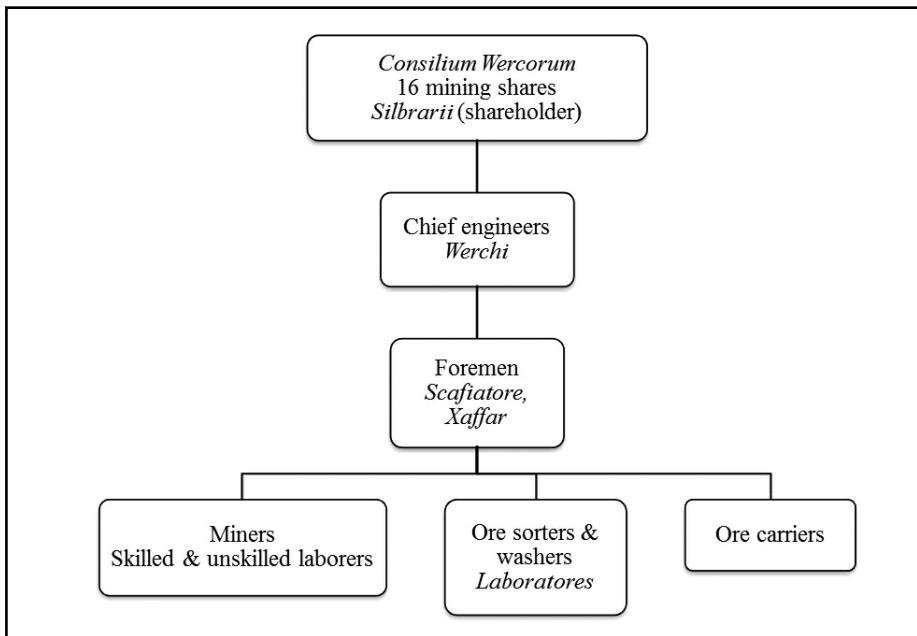


Fig. 1: Structure of Trento's mining corporation, according to Carta laudamentorum (A.D. 1185/1207).

Membership in a *consilium* required the typical feudal pre-requisite, and one that Latin Christendom was very fond of, a sworn oath. The latter guaranteed a respectable transition from *silbrarii* to *socii affidati* in the legal documents of the city. Once a member, the main obligation of a *silbrarii* was paying for mining expenses on a weekly basis and sharing costs of infrastructure improvements.¹⁴ Only citizens of Trento could join a *consilium wercorum* and own shares in *Mons Arzentarie*.¹⁵ Bishops charged the *fictum*, a special rent collected from the *consilium*, in exchange for the Bishop's grace in helping the *silbrarii* 'profiting from their affairs'.¹⁶ Thus, the *consilium* paid an additional tax, set at one tub of extracted ore every week, from each one of the sixteen mining shares. A tub was an open flat-bottomed container used for ore-packing and storage, with a volume capacity of almost one hundredweight.¹⁷ A third tax was owed based upon occasional gains of mining operations, and determined in agreement with the Bishop. The latter was understood as a special subsidy from the corporation to the Bishopric, and established 'under imminent necessity' by the Bishop. Other taxes included the following: a one-ninth of mine incomes; a one-tenth of total mine revenues on behalf of the Archbishop; and a fixed share over the total revenues of

metal sales.¹⁸ All this, of course, conditioned to *silbrarii* fulfilling their contractual obligations, which included avoiding shaft flooding: *vel aquam fraudulenter intus vergerit contra statum montis*.¹⁹ They were charged a fine of fifty pounds if shaft flooding occurred. In addition, the corporation paid a tax of two talents for each *Werhe* or mine specialist employed in its mining business.²⁰ Two talents were paid for each *Xaffar* or mine foreman; two for each *Waffar* or ore-washing laborer; one talentum for the Master of the *Waffar*; two for each *Smelzer*; and ten *solidos* for *in situ* mining operations, twice every year.²¹ Below these occupations, there was a diverse group of skilled miners, hired by foremen for sinking *xafetus* or shafts, digging tunnels, and ore extraction, over which no taxes were paid. Other laborers worked crushing and hammering ores, transporting materials, and other manual tasks in foundries.

When Wanga came to power in A.D. 1207, he maintained certain restrictions to the *consilium* in the areas of mine geometry, ore sales, and oversight of mining works. New shafts had to keep a distance of at least ten *passus* or paces from existing shafts, equivalent to approximately fifty-one feet.²² The penalty against this rule was fifty Verona pounds. In cases where

¹⁴ Braunstein, 'Les statuts miniers de l'Europe médiévale,' p. 42.

¹⁵ Kink, *Fontes Rerum Austriacarum*, p. 442, 444.

¹⁶ Collatera and Primerano, *Un Vescovo, la sua Cattedrale, il suo tesoro*, p. 22; Kink, *Fontes Rerum Austriacarum*, pp. 434-435.

¹⁷ Braunstein, 'Les statuts miniers de l'Europe médiévale,' p. 41.

¹⁸ *Si vero diius episcopus, necessitate imminente, ab ipsis subsidium aliquod exigeret (...).* Poggi, *Discorsi economici, storici e giuridici*, p. 496.

¹⁹ Kink, *Fontes Rerum Austriacarum*, p. 448.

²⁰ Ibid., 441.

²¹ The talent or *talentum* was used as a weight unit, or money of account. The *libra* was 'the chief unit in the Roman weight system.' It was equivalent to 327.45 grams, 'though the precise figure is uncertain.' The word *libra* was used either as the local weight standard, or as money of account divided into twenty *solidi* each of twelve denari. The *solidus* or *solidi* in plural, was 'originally the standard gold coin of the late Roman Empire,' weighing twenty-four carats (4.55 grams) and of pure gold when it was introduced in A.D. 309. The *solidus* was often qualified by the name of an emperor. It was a money of account in certain parts of Italy, equivalent to four *taris* (2.78 grams of gold). The *solidus* in Western Europe was a multiple of twelve silver *denarii*. Grierson and Travaini, Medieval European coinage, p. 473, 466.

²² A pace was a Roman unit of distance, consisting of five Roman feet. It was employed in continental Europe, with some regional variations. The ordinary pace of Germany was equivalent to five *Rheinfuss*, or 5.1486 English feet. Emanuele Curzel, in Curzel and Varanini, *La documentazione dei vescovi di Trento*, pp. 350-351; Jackson, *Modern metrology*, p. 62; Kink, *Fontes Rerum Austriacarum*, p. 448.

miners encountered a hard-rock wall that could not be easily broken, miners had to identify softer limestone or *falumberg* and break and cut through it, until reaching the point where the hard rockwall allowed them to dig no further.²³ Miners were required to open slits in shafts prone to be affected by shaft-flooding and poisonous vapours. In cases when conflict arose over a gallery connecting several shafts, all parties involved in the dispute had to reach an agreement concerning the disputed gallery. Work in the shafts ceased, the text reads, 'until the law-suit or quarrel is settled by our *Gastaldiones*, and if anyone contravenes this rule, incurs in a penalty of twenty-five pounds.'²⁴ To avoid any escalation of quarrels, the law prohibited miners from carrying *fraudulenta arma* or weapons to underground working sites.²⁵

Ore sales by members of the *consilium* were also restricted. The law prohibited the selling of silver ores outside Trento's main market or at night, when the *gastaldia* was off-duty. An exception was made for cases where drainage works required that corporation officers stayed on the mining site. Those audacious enough to violate the law incurred in a severe penalty: losing all silver-ores. If and when caught, the buyer paid a fine of ten Verona pounds. The seller paid a fine of 100 solidi.²⁶ Any *silbrarii* who refused to pay faced 'extreme punishment'.²⁷ Shareholders accepting money in advance for their metal outputs were bound to give up and sell to those who made such payments. Under no circumstance could the original shareholder rescind from the sale of his share once he collected payment.

Oversight of mining works was in the hands of a *gastaldia*. The latter were Lombard notaries of old and new noble families, whose role was to manage estates on behalf of, and paid by, ecclesiastic and secular lords. *Gastaldia* had a long history in Lombardy, making it oftentimes difficult to identify specific responsibilities. In some jurisdictions, *gastaldia* officers were tax collectors; in others, they were civil judges. In Wanga's first contract with *silbrarii*, a *gastaldionibus* by the name of Ambrosio settled disputes over mining works, and had the responsibility of general oversight of mining works.²⁸ Any *Werchi* who rejected a decision by a *gastaldionibus* incurred a penalty of 100 solidi.²⁹

Was Wanga, as lord of the land, an agent of economic change and not simply a burner of the rent of land? Possibly so. By

A.D. 1213, the situation changed to the detriment of Wang and in favor of the *consilium*. Drainage became a problem to deal with.³⁰ The contract confirmed by Wang prohibited miners from carrying on work that in any way obstructed a corporation's drainage-adit. It made no reference to a drainage-adit owned by Wang, something that suggests that the *consilium* was the exclusive 'owner' and manager of this type of adit. The contract also created a mining tribunal composed of technical experts, whose duties included settling controversies among owners of mining claims in cases when a shaft was sunk in the direction of a drainage adit.³¹ Under no circumstance could miners sink a shaft near drainage adits. Miners were forbidden from abandoning work in a drainage adit, for the sake of exploiting discovered or to be discovered ore veins. The astonishingly high fine that violators paid, 300 pounds, shows the importance that the law gave to drainage works.

By then, a fixed amount of ore was to be paid to the Bishop, but only after technical experts appointed by the corporation assessed the silver content of extracted ores. Incomes to be delivered to the Bishop 'under imminent necessity' disappeared from Wang's last contract with *silbrarii*. The Bishop would only receive ten percent of the final sales price of mining shares.³² This contract contained a provision that gives an idea of how powerful the *consilium* became: mine management and administration was in the exclusive hands of foremen designated by the corporation, conditioned to the payment of the *jus custodiae*. Albeit feudal, the tax gave *silbrarii* exclusive rights of oversight of underground mining operations. From that moment forward, the Bishop's *gastaldia* had no business in supervising or overseeing mining works. Mines were closed to them. The greatest liberty that *silbrarii* enjoyed was that they could buy and sell their shares without intervention by the Bishop. The mining laws of Trento, written by Bishop Frederick Wanga (c. A.D. 1194-1250), unleashed the rapid development of capitalist mining works. *Argentarie* was 'entirely perforated by subterranean adits'.³³ Evidence that miners found much silver here is the fact that the north side of the mountain facing Trento was a *monte calvo* or bold hill, entirely denuded of vegetation by the thirteenth century.³⁴ Today, experts estimate that *Argentarie* contains more than 2,000 kilometers of underground galleries and more than 20,000 mining shaft relics.³⁵ No doubt, this is an archeological treasure waiting to be fully studied.

²³ Kink, *Fontes Rerum Austriacarum*, pp. 445-449.

²⁴ Ibid., 446.

²⁵ Ibid.

²⁶ Ibid., 435.

²⁷ Ibid., 448.

²⁸ Ibid., 443.

²⁹ The *solidus* in Western Europe was a multiple of twelve silver *denarii*. Grierson and Travaini, *Medieval European coinage*, p. 466; Sperges, *Tyrolische bergwerksgeschichte*, pp. 263-264; Spufford, *Money and its use in medieval Europe*, pp. 225-239.

³⁰ Kink, *Fontes Rerum Austriacarum*, p. 433.

³¹ Ibid., 448.

³² Salvioli, *Manuale diritto italiano*, p. 395, footnote 1.

³³ Perini et al., *Illustrazione del Tirolo italiano*, p. 73.

³⁴ Dai Prà, 'La cartografia storica come interfaccia dialettica tra discipline e competenze territoriali.'

³⁵ Collatera and Primerano, *Un Vescovo la sua Cattedrale, il suo tesoro*, p. 22.

2. Advanced corporations: the *societas* of Tuscany and *communitas* of Sardinia

Italian mining corporations refused to lag behind. The mining business structure in Tuscany and Sardinia was more advanced than in Lombardy or the Carpathians. The commercial and banking revolution taking place in autonomous city-states endowed these corporations with enough momentum to take the lead in the mining business. Massa was an independent commune, with an urban centre and a medieval tower, symbol of political power, surrounded by villages and *curtis* tied to its jurisdiction. But it was surrounded by Florentine banking culture, which had a spillover effect in the corporation structure of the city. Many castles dotted the landscape, overlooking many of Massa's mines in the *Colline Metallifera*, or the Ore Hills of Tuscany. The hills are part of the Apennines, the long mountain range that traverses the Italian peninsula in north-south direction.³⁶ The statute of Massa granted mining rights to private persons under two conditions. First, a claim holder was required to 'waste no time' and 'keep the mines in operation' - *fovea que erat viva et tempus non perdidere*.³⁷ Second, ownership of a mining claim required proof of citizenship. Staking a claim by planting a cross in a prospection site gave the claimholder a period of three days for starting extraction works. This time period could be extended, after a *magistri montis* or

mine clerk certified the legitimacy of the claim.³⁸ Landowners, possibly well-to-do and small-scale farmers, were forbidden from removing planted crosses marking prospection sites, suggesting that conflicts between farmers and miners were not uncommon.³⁹ A stake was licit if, after one month and three days, it showed signs of improvement, *hedificando et abbocando dictum signum*, and such improvement was new, and not done before.⁴⁰ This was a non-negotiable condition: the owner held mining rights as long as work at the site continued.

Mine geometry in Massa was slightly different than in Trento. The land surface of Massa, in the Tuscan coastland, with layers of unevenly spread *sasso morto*, prevented a perfect symmetry in shaft and mine design. Archeological research confirms that shafts generally reached one hundred meters depth, and 1 to 1.2 meters diameter. The minimum distance separating shafts was fifteen meters, and maximum, twenty meters, or sixty-six feet.⁴¹ A mine was divided in thirty-two *trente*, the maximum number of shares a corporation could own. *Ordinamenta* identified shareholders by the noun of *partiarii*, or members of the *societas foveae* or corporation.⁴² A *societas* required a vote by its members representing three-fourths of the total number of mining shares for withdrawing investments. Only one vote was required for the decision of continuing mining works, irrespective of the total number of shares represented by such vote.⁴³

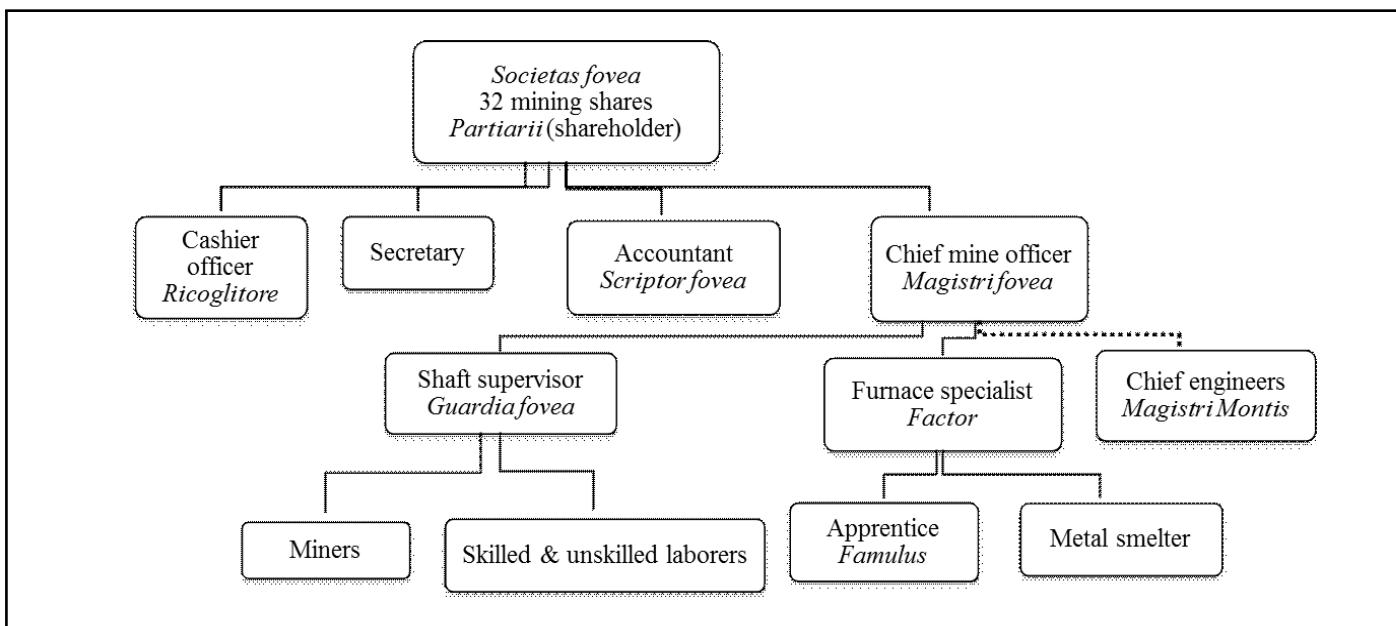


Fig. 2: Structure of the corporation of Massa, Tuscany, according to *Ordinamenta super arte fossarum* (A.D. 1225).

³⁶ For general reference, see Carobbi and Rodolico, *I minerali della Toscana*; CMCM, Colline Metallifere; Morini and Bruni, The Regione Toscana project of geological mapping; Preller, *Italian mountain geology*, pp. 121-133.

³⁷ Rodolico, cur., *Ordinamenta super arte fossarum*, 'Item X,' p. 69.

³⁸ Braunstein, 'Les statuts miniers de l'Europe médiévale,' p. 45.

³⁹ Rodolico, cur., *Ordinamenta super arte fossarum*, 'Item I,' p. 65.

⁴⁰ Ibid., 65.

⁴¹ Based upon archeological findings in Serrabotini and Poggio Montierino, Massa Marittima. Aranguren, 'Serrabottini (Massa Marittima, GR): indagini archeologiche,' p. 80.

⁴² Mispoulet argued that *trente* meant thirty, an interpretation that others reject. Baudi di Vesme argued that the number of shares was always divisible by four. Thirty-two was also 'more or less in agreement with customs and traditions in other parts of the world.' The number of *trente* for the Montieri mines was seventeen. Baudi di Vesme, *Historiae patriae*, p. cv; Mispoulet, *Le régime des mines à l'époque romaine et au Moyen Âge*, p. 35, footnote 2; Simonin, 'De l'ancienne loi des mines de la République Italienne de Massa-Marittima,' p. 4.

⁴³ Baudi di Vesme, 'Dell'industria dell'industria nel territorio di Villa,' p. 198.

This meant that the majority of shareholders were obliged to cover expenses of mining works, even if only one shareholder actually invested in the mine.⁴⁴

Ordinamenta defined a *trente* as part of a mine's assets, along with shafts, veins, and crude ores. However, unlike other property, a share was no real estate, but an investment asset that could be bought and sold in any of the jurisdictions of Massa.⁴⁵ As in Trento, the tangible evidence of a mining share was a notarized document, which, once owned legitimately, could be leased or sold by *partiarii*. None of these transactions could obstruct or hamper mining works owned by the other members of the corporation.⁴⁶ A mine master or *Magistri fovea* calculated production costs at the end of every day's work and registered the sum in an accounting book. Every three days, he aggregated expenses to be claimed, and expenses 'lost to the mine'.⁴⁷

The banking culture of Italian city-states created a positive spillover effect, so to speak, in the principles of the charter about mining governance. First, Massa had a large mining bureaucracy, with elected mining officers that played a role in private *societas* and found nowhere else in Western Europe. A 'Captain of the People,' the city's most important public officer, authorized mining concessions, executed the mining law, and had jurisdiction over general functions of corporations. This officer attended meetings held by the *Consiglio Maggiore* and was in charge of daily policing of the city. This was a very nice job for ambitious citizens, with a 1,000 florins salary paid by the city, consistent with the good life that many Tuscan politicians enjoyed in this period. No Captain, however, could own shares in any *societa*. In front of this officer, *partiarii* and all others holding economic interests in the mines of Massa swore oath. The Captain declared final sentence with respect to shafts available for sale: 'shafts that reach the ore source, and show no sign of work, are open to partitioning' -*ad petitionem partis petentis*. It was the Captain's duty to sell shafts, observing the *primum fonderatum* or 'first discoverer' principle established by the law.⁴⁸ He met with different *Magistri* for gathering information on mining works, prepared official reports, and ordered changes to surveying and mining works if needed. When disputes over boundaries occurred, the Captain was responsible for

inspecting shafts, tunnels, and underground works. Afterward, he made a decision which could include a new division of shares. This officer was not expected to remain lenient in cases when *partiarii* 'negligently' set fire in a mine, or 'malevolously' inundated a shaft. In such cases, a Captain imposed a fine of twenty-five Volterra pounds to the *societas* to which the *partiarii* belonged.⁴⁹ He had the obligation of imposing fines against any *partiarii* who obstructed ventilation galleries, blocked access to another *partiarii*'s work in a *fovea stantiale* or a common shaft or hampered a mining shaft that followed an ore-vein strike.

Another public officer was the *Magister curiae*, responsible for ensuring that boundaries of mining claims were valid. Members of this body visited mines and ore-smelting factories, and made recommendations for improving mining works.⁵⁰ They also mediated among *partiarii* in cases of conflicts over mining works. They were accountable to the Captain of the People. All *Magistri* belonged to a professional and technical class enjoying association rights.⁵¹ A *Gobernatori* appointed two mine accountants known as *guercos de arte ariale*.⁵² Entrance to metal foundries was forbidden to these supervisors during holidays and days of rest.⁵³ Massa's metallurgical office functioned as a warehouse, protected by city laws, where ores made a brief stop for accounting purposes while en route to smelting factories.⁵⁴ Mine surveying instruments were under the custody of city officers known as *penes camerarios comunis*;⁵⁵ surveyors were technical experts, with offices located in Massa's main quarters. Their duties were to be vigilant when measuring claim areas and use plumb-lines, quadrants, and compasses when surveying claims.⁵⁶

Besides this diverse group of judges, there were semi-technical and manual laborers or *laboratores*. The *bolgaiuolus* was a worker in charge of removing extracted ores from shafts; the *carbonaiolo* was responsible for working with charcoal, measuring and recording amounts of charcoal used in the commune's furnaces in every stage of the cupellation process.⁵⁷ Among the unskilled laborers, there were *picconero* or ore diggers, workers with pickaxes; *molentaro* or *carratore*, in charge of transport of materials; *colatores* or metal smelters; factor or general mine workers; *famulii* or apprentices; *guardia* or shaft

⁴⁴ Rodolico, cur., *Ordinamenta super arte fossarum*, p. 77.

⁴⁵ Ibid., 72-73.

⁴⁶ Ibid., 71-72.

⁴⁷ Ibid., 91.

⁴⁸ Ibid., 67.

⁴⁹ According to Simonin, following Ulrich, the Volterra pound was equivalent to 7.82 Francs in A.D. 1890s; and 3.26 Francs in A.D. 1300. Ibid., 68-69; Simonin, 'De l'ancienne loi des mines de la République Italienne,' p. 9, footnote 1.

⁵⁰ The category comes from territorial administrative divisions of Roman law (*curia*) -a canton officer. Simonin, 'De l'ancienne loi des mines de la République Italienne,' p. 5.

⁵¹ Rodolico, cur., *Ordinamenta super arte fossarum*, p. 21.

⁵² Ibid., 99.

⁵³ Braunstein, 'Les statuts miniers de l'Europe médiévale,' p. 46.

⁵⁴ Petrocchi, *Massa Marittima, arte e storia*, p. 336.

⁵⁵ Rodolico, cur., *Ordinamenta super arte fossarum*, p. 73. For a general description of European surveying instruments, see Glick, 'Levels and levelers: surveying irrigation canals in medieval Valencia'; Korey, *The geometry of power*, pp. 17-18, 22-25; Price, 'Medieval land surveying and topographical maps.'

⁵⁶ Rodolico, cur., *Ordinamenta super arte fossarum*, p. 65, 73.

⁵⁷ The unit of measurement was *bigongius*, a unit of volume used in the period. Ibid. 96-97.

custodians.⁵⁸ The latter enjoyed no association or guild rights.

Massa's corporation was a success in consolidating the supremacy of *partiarii* over mining affairs. No civil servant was above the law, and *Ordinamenta* included penalties against fraud committed by *magistris* and other public servants.⁵⁹ Book accounting became a routine affair of the corporation. Officers known as *recollectoribus* and *portitoribus* undersigned all pecuniary affairs concerning mining works and kept different accounting books according to the law.⁶⁰ Much remains to be known about this corporation, but it is possible to argue that *societas fovea* contributed to the commune's growth.⁶¹ Its miners earned fame and reputation traveled as far as Calabria, possibly allowing the corporation to extend its sphere of influence into other mining regions.⁶²

a) The *communitas fovea* of Iglesias, Sardinia

The corporation of Iglesias, Sardinia, shared some common characteristics with Massa's *societas fovea*. Iglesias' landscape had no *castello minerario* such as the castles that dotted the Ore Hills of Tuscany. It had, nonetheless, geological endowments that made Iglesias a competitive mining district in the medieval world. Politically, Iglesias belonged to a judicate, an administrative division under the rule of the King of Aragon. It was an old ally of Pisa, an Italian city-state with extensive trade net-

works in Tuscany. Its territory, however, belonged to the dominions of Count Donoratico.⁶³ Thus, the city was caught up between the most influential politicians of the region,⁶⁴ on one hand, and absentee landlords,⁶⁵ on the other. Yet, the mining corporation of Iglesias found a way of leaving feudal quarrels behind, and exploiting the abundant mines of the region. Mines were exploited in an area roughly covering 2,500 square kilometers. This quadrant included today's Monteveccchio, Fluminimaggiore, Iglesias, Carbonia, San Giovanni, Nuxis and their vicinities. Some 200-meters long medieval galleries found in this area still yielded metallic veins in the twentieth century.⁶⁶

The *Breve di Villa di Chiesa* appeared in A.D. 1302-1304, in a *Breve anteriori* enacted under Pisa's rule, and *redatto in volgare italiano*, in the words of Mattone and Ferrante.⁶⁷ From the 'old' *Breve*, the new charter borrowed the principle of freedom to all citizens for exploring and mining in the land of Iglesias.⁶⁸ Staking a claim required planting a cross in a prospection site and registering the claim with a *Camerlingo*, the city officer who authorized mining claims.⁶⁹ After proper inspection, the mining claim was granted if the shaft kept a distance of twenty-one braccia from existing claims. The legal condition for keeping a claim got trickier from that stage forward. If a prospector opened a new shaft, or water channel in *montagna nuova*, and

⁵⁸ Ibid., 22, 98.

⁵⁹ Ibid., 91-92.

⁶⁰ Ibid., 81-83.

⁶¹ Lampertico, *Sulla legislazione mineraria*, p. 58; Wickham, 'Paludi e miniere nella Maremma Toscana, XI-XIII secoli,' p. 453.

⁶² The Duke of Calabria asked for one hundred miners from Massa, *magistros centum suf?cientes ad cavas facendum ante castra, et fortelicias destruendas* in August 15, 1326. The Count of Savoy had made a similar request in A.D. 1300. Nardi (ed.), *Condizioni economiche dell'industria mineralogica in Toscana durante il medio evo*, p. 3; Simonin, 'De l'ancienne loi des mines de la République Italienne de Massa-Marittima (Toscane)', p. 3.

⁶³ The earliest feudal grant that mentions the mines of Iglesias was dated A.D. 1131, when Gonnario II of Turris granted to Pisa's Santa Maria Church half of the Argentiera mine located in Nurra. The text of the grant stated: *medietatem montis qui dicitur Argentei*. Rowland states that 'Comita III of Arborea donated to San Lorenzo and to the commune of Genoa the church of S. Petrus de Claro and a village (curia) with all of their appurtenances, 100 surfs, 2,000 sheep and other animals, numerous lands, fishing rights and "half of the mountains in which silver is found in all my kingdom"! Tenneant mentions the grant to the Genoese, but under Comita II of Arborea, accompanied by the Latin text that mentions the silver mines *-medietatem moncium in quibus inventibur vena argenti in toto regno meo*. He also mentions a letter by the 'Comita d'Arborea' granting to Iglesias jurisdiction over half of a mine in Turris. Silver mines appeared again in A.D. 1253, in a contract concerning German technical mining experts in *la Nurra*. In A.D. 1282 the Donoratico Count donated in a *podestà* mining rights to *Bartolomeo detto Bacciameo del fu Gherardo Guinizelli* for mines of Villa di Chiesa. Two years later, Ugolino, the new Donoratico Count granted another *podestà* to Guidone. It is possible the old Breve was written in this period, a time when Pisa dominated Villa di Chiesa's mining industry as well as its *zecca*. These grants suggest that money from Pisa, and Genoa, came to the mines of Chiesa long before the emergence of *Breve*. Baudi di Vesme, 'Dell'industria dell'mineraria nel territorio di Villa di Chiesa,' p. 234, footnote 6, and p. 235; Dyson and Rowland, *Archaeology and history in Sardinia*, p. 106, pp. 172-174; Forbes, *Studies in ancient technology, ancient geology*, p. 226; Gallin and Tykot, 'Metallurgy at Nuraghe Santa Barbara (Bauladu), Sardinia'; Rowland, *The periphery in the center: Sardinia*, p. 160; Tennant, *Sardinia and its resources*, p. 4; Vargas-Bedemar, *Sulle miniere della Sardegna*, p. 5.

⁶⁴ Grierson and Travaini, *Medieval European coinage*, p. 292.

⁶⁵ Tennant, *Sardinia and its resources*, p.4.

⁶⁶ Tangheroni and Mercuriali, *La città dell'argento: Iglesias*, p. 95.

⁶⁷ The first written document mentioning the *Breve* is dated 16 September 1304. The document states that the *Anziani del Popolo Pisano*, a council of old men of Pisa, nominated four citizens who were responsible for revising the *Breve Ville Ecclesie de Sigerro*. The *Breve* is also mentioned in Pisa's *Breve del Commune e del Popolo di Pisa* in A.D. 1313. In the summer A.D. 1327, a reform to the old Statute ordered by King Alfonso IV (A.D. 1299-1336) of Aragon was completed. The new *Breve* was confirmed in A.D. 1358 by King Pedro of Aragon, Alfonso's successor. For a general history, see Baudi di Vesme, *Historiae patriae*, pp. 325-326. Ferrante and Mattone, 'Le comunità rurali nella Sardegna medievale (secoli XI-XV)'; Manca, 'Colonie iberiche in Italia nei secoli XIV e XV'; Olla Repetto, *Studi sulle istituzioni amministrative e giudiziarie della Sardegna*; Tangheroni, *Pisa e il Mediterraneo*.

⁶⁸ Baudi di Vesme, 'Dell'industria dell'mineraria nel territorio di Villa,' p. 375.

⁶⁹ Sella, *Relazione del Deputato Sella alla commissione d'inchiesta (...)*, p. 6.

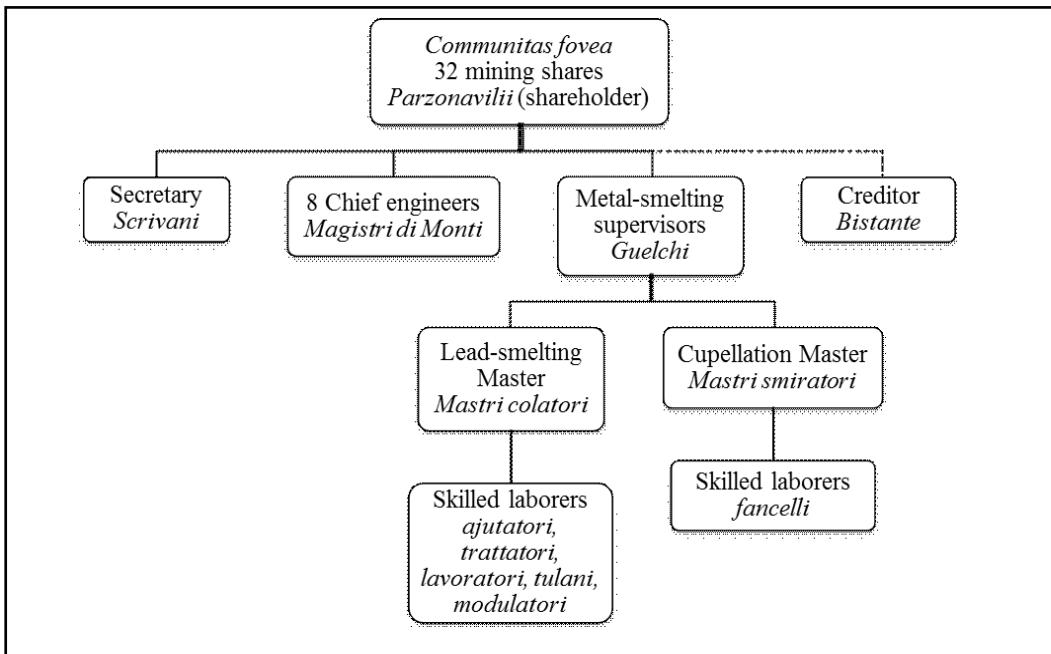


Fig. 3: Structure of the mining corporation of Iglesias, Sardinia, according to Breve di Villa di Chiesa (A.D. 1327).

discovered silver ores, which, after deduction of expenses, were worth five pounds per *corbello*, he paid a tax of ten pounds *per una robba* to the city's *Camerlingo*.⁷⁰ He enjoyed a five-year period of tax exemption, comparable to the dogana tax exemption that merchants enjoyed for the trading of wine, chestnut, figs, and raising grapes. The *dogana* tax on galena was two *denarii*. This sum was a fixed amount paid for the weighing of galena with the *Camerlingo*.⁷¹ Payment of the ore-discovery tax made the prospector a holder of a private mining stake.⁷²

Shafts belonged to a *communitas fovea*, the medieval mining corporation of Sardinia.⁷³ Mines were the *partitura comunale* or property to be divided in 'XXXII *trente*' among corporation members.⁷⁴ The thirty-two shares or *trente* were further divided into quarters, a division that aimed at enhancing mine accounting and facilitating the settling of legal disputes. *Parzonavili* or shareholders enjoyed the right to claim their shares within a month after the division of *partitura comunale* took place. An investor's duty included registering his claim in Iglesias' Court, located in the old quarter of the medieval district possibly near the Pisan-style church of San Simplicio still standing today. Registering the claim was a must, without this step, shareholder rights were not valid.

Mining expenses here had the flair of the culture of Italian Renaissance banking.⁷⁵ A shareholder could rescind from ownership of *trente* and refuse spending money into his share of

extraction works. This right, however, did not exempt him from cancelling debts incurred in mining works. A *parzonavili* also enjoyed the right to donate or transfer his *trente* in inheritance to a family member. He could give shares in dowry, and women could own them. By no means an invention of Sardinia's *communitas*, this idea originated in an old practice among Florentine banking families, for which dowry and credit many times meant one and the same thing.⁷⁶ A shareholder also enjoyed the right to lease his mining shares, but kept his economic obligations to the mining corporation. A lease was a contract, fixing the price of shares. Its most dangerous feature was that it allowed entrepreneurs to speculate with the value of shares. The tone of the Breve is suggestive on this point. Legally, the lease allowed shareholders to sell anticipations of metal outputs in amounts proportional to the number of shares held by the seller. The buyer paid in advance expecting to see the promised quantity of metal output in the future; however, entrepreneurs possibly promised too much, or too little, depending upon conditions that most likely they never disclosed to their clients. Thus, the mine did not always yield the anticipated amounts of metal outputs.⁷⁷ Gains outweighed risks: a *parzonavile* obtained ready cash when he needed it, at the expense of a poor devil, before silver-ores were materialized. Reminiscent of a business method that the sixteenth-century family of the Fugger took to great heights in its dealings with the Spanish Empire!⁷⁸

⁷⁰ Baudi di Vesme, *Historiae patriae*, p. cxxxiv; Tangheroni and Giorgioni Mercuriali, *La città dell'argento*, p. 116.

⁷¹ Baudi di Vesme, *Historiae patriae*, p. xxxiii, cclviii.

⁷² Sella, *Relazione del Deputato Sella alla commissione d'inchiesta*, p. 7.

⁷³ The noun *parzonavili* was used in other regions of Tuscany. In Florence and Siena, the form of the word was parsonavoli. In Massa, *parzonaoili* appeared by the late thirteenth century. The forms of the noun in Sardinia's Breve are *parsonavili*, *parsonaveli*, and *parsonavoli*. Baudi di Vesme, *Historiae patriae*, p. cvii.

⁷⁴ Ibid, cv.

⁷⁵ Ehrenberg, *Capital and finance in the age of the Renaissance*, p. 22.

⁷⁶ Kirshner, *Marriage, dowry and citizenship in late medieval and Renaissance banking*

⁷⁷ Baudi di Vesme, *Historiae patriae*, pp. cxii.

⁷⁸ Ehrenberg, *Capital & finance in the age of the Renaissance*; Graulau, *'Finance, industry and globalization in the early modern period'*; Kalus, *Die Fugger in der Slowakei*; Strieder, *Jacob Fugger, the Rich*.

The *Breve* contains many articles describing the conditions under which a *communitas* could claim abandoned shafts. A miner had to plant a cross in the site. Afterwards, he had three days for *ripigliatura*, or opening the abandoned shaft.⁷⁹ The cross could be replanted, which gave a prospector three additional days for starting ore-extraction works. Time, however, was of the essence. A prospector could work during holidays and Iglesias' days of rest, with the exception of the day of the major festivities of the city.⁸⁰ If the shaft showed no sign of improvement after six days, a *Magister Montis* or chief mining-engineer had the power of selling the mining claim for the shaft and collected one silver Mark. Work on a re-claimed shaft was expected to run uninterrupted for a minimum of three months.

Total expenses of mining works were legally defined as debts of *parzonavili*. A francatura or bill of payment, written by a Master of the Mine or *Magister di Monti*, was presented in Iglesias' Court every week for debt cancellation. Information written in the bill note was also written in the mine's accounting book. The *francatura* bill was calculated based upon the price of one *corbello* of ore. Expenses incurred in producing one *corbello* of ore output, measured in money, were multiplied by the total number of *corbelli* produced in the mine; the number was then divided among the number of mining-shares.⁸¹ The bill was presented by a notary at Iglesias' Court every Saturday. A *francatura* represented a debt cancellation claim for the entire mine account, since valuing mine incomes required that expenses and earnings be calculated for the mine as a whole. The *Magister* of a corporation collected payments from *parzonavili* every Saturday based upon the number of *trente* each *parzonavili* owned. Promise of payment was accepted, if a shareholder could not pay his *francatura* but was committed to cancel the debt in the nearby future. The principle at work here was 'that a debtor can, will, and must pay.'⁸² A shareholder lost his *trente* if he was unable to cancel his debt. The law granted a period of fifteen days for *parzonavili* who lived outside Iglesias to make payments. Otherwise, the *trente* was granted to any other *parzonavili* if requested.

Calculations of debts, however, required relying upon practical mathematical artifices and experience. To start with, a *corbello* was a unit of volume used for measuring ores, equivalent to approximately 370 pounds in Massa.⁸³ But it was not the only unit used in Sardinia. Prices of ores varied, depending upon the number of *corbelli* obtained from each ore-extraction shaft. But veins were irregular and carried unpredictable ore quantities. Estimates and averages had to be taken for granted by a Master of the Mine when calculating the bill of payment. The results of the *francatura* payments say something about the

'invisible hand' that guided the economy: *trente* prices varied significantly among *societas*, according to metal output, amount of silver recuperated through cupellation, and purity of silver ores.⁸⁴ *Trente* values could vary within the same mining corporation, too, considering that investors nominally could hold claims over different sections of the same extraction shaft. A *francatura* bill was by no means the only debt haunting investors. If an investor borrowed money for cancelling his *francatura* debt, his credit relations included a *bistantaria* contract. The latter was an agreement whereby a creditor or *bstante* advanced money to *parzonavile* only for paying mine expenses, and collected payments *ad usura*.⁸⁵ Under Pisa's rule, interest rates reached four *denarii* per pound every month, a number equivalent to twenty per cent every year. In the new *Breve*, *usura consueta* was equivalent to two *denarii* per pound every month.⁸⁶

Could mining investors in Iglesias thrive without credit? This question has no easy answer. The most salient feature of the *communitas fovea* was that a *bstante* became a partner of the mining company, providing certain financial services. This was unique to the medieval mining corporation of Iglesias. Once a notarized letter appointing a *bstante* was issued, the name of the *bstante* was added to a mine's accounting book. Information contained in the letter could be changed, after a party's request, within two months after the notarized letter was issued. Once a *bstante* contract was registered in Iglesias' Court, the letter could not be changed. A copy of the letter was held by *parzonavili* and *bstante*, both copies stating the amount of loaned money. A *bstante* stayed with the society as long as the contract was active, because the contract guaranteed a legal settlement of debts and payments in the event of a mine shutdown. A *bstante* paid salaries of workers by the end of each week, collected his own money from the mine's incomes, and seized debtor's property if a debtor could not meet his payment obligations.⁸⁷ He was not, however, part of a *communitas'* decision-making body. Property that could be seized included a debtor's shoes, bed, guns, and horses. The most important responsibility of a *bstante*, after he became a partner of a mining society, was to deliver the promised money advance every Saturday. Violators paid a fine of one silver Mark. Most certainly, investors recuperated extraction costs with minor problems. Most mining works took advantage only of the richest silver ores; thus, *parzonavili* expended no toil and trouble processing low-quality galena ores.⁸⁸ This made sense in Iglesias, where only in Fluminimaggiore and Sarrabus producers recuperated amounts of silver that ranged between eight and nine ounces of silver per *cantaro* of ore.⁸⁹

⁷⁹ Baudi di Vesme, *Historiae patriae*, p. cxxxv.

⁸⁰ Ibid., cxxxv.

⁸¹ Ibid., cvi-cvii.

⁸² Ehrenberg, *Capital and finance in the age of the Renaissance*, pp. 38-39.

⁸³ Baudi di Vesme, *Historiae patriae*, p. 361; for a different estimate, see Tangheroni and Mercuriali, *La città dell'argento*, p. 116, footnote 87.

⁸⁴ Baudi di Vesme, *Historiae patriae*, pp. cv-cvi.

⁸⁵ Ibid., cvii.

⁸⁶ Ibid., cxvi.

⁸⁷ Braunstein, 'Les statuts miniers de l'Europe médiévale,' pp. 48-50.

⁸⁸ Sella, *Relazione del Deputato Sella alla commissione d'inchiesta*, pp. 6-7.

The mining corporation of Sardinia represents a big step forward in the development of modern business methods. Its rules connecting commodity production to banking were no small achievements, since they unleashed the much-needed standard rules that allowed businesses to exploit Sardinia's abundant mineral wealth.

3. Monopolistic corporations: the *universitas Gewerken* of Bohemia

Medieval mining in the Carpathians laid the foundation for the development of a hierarchy of mountain cities, an urban phenomenon unrivalled by any other mining region.⁹⁰ The history of Kutná Hora, *mons in Chutna*, the most famous mining city, speaks of the fortunes made by German miners in the silver mining industry of the city. It was in this city where the most famous lodes were exploited. It was here where *Constitutiones juris metallica* (A.D. 1300) was born, a charter that granted freedom to all subjects of the kingdom for exploring and mining Bohemia's *campo libero* or 'unclaimed' lands. 'Our silver mines, in the whole territory are to be worked freely, and be occupied peacefully and orderly by anyone.' 'Any colonist working the mines of the land in legitimate ways enjoys our royal protection.'⁹¹ No doubt, Grozio of Urbino, the professor of Roman law believed to have been the writer of the text, had a refined political sensibility, and good taste for the best political ideas of his times.⁹²

The law recognized that mining rights belonged to *colonii principali*, a group of powerful miners who possibly held the oldest claims to the mines of the kingdom.⁹³ These were German immigrants, the most enduring legacy of waves of colonization and migration of German peoples into Slavic lands centuries earlier. German colonists, however, enjoyed no absolute economic freedom. Possession of a mining claim was valid as long as its owner kept the mine in operation. Incessant labor, day and night, was the sole standard. A mining concession was a loan granted by the King. Claiming a stake required prospec-

tors to identify the ore 'in sight,' a striking resemblance to the modern idea of 'minerals must be found first.'⁹⁴ Miners had to sink a second shaft traversing the vein outcrop for investigating which shaft section yielded the best ore. The step required expert judgement. The miner sent extracted ores from each shaft to smelting factories for testing. A chief mining engineer, the *Magister Montium*, examined all ore samples. Afterwards, *scansores* or technical experts appointed by the King tested the silver content of the ore samples. They made final decisions determining profitability of an ore-vein. If *scansores* said yes, a miner hired a surveyor for demarcating the area to be worked, in the presence of *urburarii*, the chief mining judges of Bohemia. Thus, a mining claim was granted only after a miner expended much toil and trouble demonstrating the existence of a sufficient quantity of ore, enough to justifying granting the stake.

Once a concession was granted, the law mandated sinking a minimum of three shafts. The prospector who first discovered the ore bed was *colonii principalii*, and enjoyed the right to work two *Lanei* in the concession area. One *laneum* was equivalent to approximately fourteen metres.⁹⁵ A second miner, leasing mining rights from *colonii principalii* enjoyed the right to work one *Laneum* out of the total seven *Lanei* of the claim area. *Colonii tertiarii* or third colonists, hired by *colonii secundarii*, enjoyed the right to sink a shaft in the remaining area, keeping at least one *Lachter* of distance from existing shafts.⁹⁶ The *Lachter* or German fathom was equivalent to 5.62 feet.⁹⁷

A mining claim granted rights for ore-extraction in well-defined areas of the vein's hangingwall and footwall. The hangingwall, or *hangundez*, refers to the roof or top surface of layer overlying an ore bed. It is also known as headwall. The footwall, or *liegundez*, is the foot or bottom surface of layer underlying the ore vein. A mining claim encompassed a total area of seven *lanei* along the strike of an ore-vein: an area of 3½ *laneum* for each, hangingwall and footwall.⁹⁸ Royal surveyors added an additional *laneum* to be worked on behalf of the King.⁹⁹ The

⁸⁹ The *cantaro* was a medieval unit of volume used in Aragon, equivalent to forty-six kilograms; but estimates vary. Some historians state that the unit was equivalent to 104 pounds, while the *cantaro barbaresco* was equivalent to one hundred pounds. The Genoese *cantaro*, prevalent in Mediterranean markets, was equivalent to 127 pounds. Tangheroni and Mercuriali, *La città dell'argento*, p. 111; for measures of weight, see Jackson, *Modern metrology*, p. 231; Lopez and Raymond, transl., *Medieval trade in the Mediterranean world, illustrative documents*, p. 353, footnote 43; Vargas-Bedmar, *Sulle miniere della Sardegna*, p. 11, footnote 12.

⁹⁰ Postan and Habakkuk, eds., *The Cambridge economic history of Europe*, Vol. VIII, *The industrial economies*, pp. 33-42.

⁹¹ Jirecek, *Codex juris Bohemici*, I, pp. 270-272.

⁹² Lampertico, *Sulla legislazione mineraria*, p. 57, footnote no. 1.

⁹³ *Per occupationem hoc modo jus acquiritur cum quis spe ductus montanorum in campo libero, in quo ubilibet et culibet est licitum laborare et metattum quaerere, spatium ad argenti fodinam occupat faciendam, statim hoc jure montanorum suum facit, et ad eo forte in eo jus acquirit, quod ab eo non poterit, dummodo ibidem continue labore, sine juris ordine amoveri.* Einaudi, *La rendita mineraria: origini e basi*, p. 14.

⁹⁴ Stretch, *Prospecting, locating, and valuing mines*, p. 79.

⁹⁵ Jánošivoká, 'Mining business pursuant to "Ius Regale Montanorum"', p. 166.

⁹⁶ The *Lachter* in Jáchymov was equivalent to five feet and 7½ inches. Hoover and Hoover, transl., *De re metallica*, p. 80; Jánošivoká, 'Mining business pursuant to "Ius Regale Montanorum"', p. 166; Jirecek, *Codex juris Bohemici*, I, p. 318.

⁹⁷ Later, the German *Lachter* was equivalent to 6 2/3 feet in Prussia, and seven feet in Saxony. Hoover and Hoover, transl., *De re metallica*, p. 617; Jackson, *Modern metrology*, p. 31.

⁹⁸ The rule probably originated in Saxon cities, where a 3½ *lanei* rule was common. The Saxon *Quadratum* or *vierung* was an area on either zone of an ore-vein equivalent to seven *lachter* along the strike. Exploration and mining rights were granted by Freiburg's mining law depending upon the result of a first prospecting work. If a miner discovered a new vein, he was granted seven *Lehen* in the axis of progression, and 3½ *lacht*, or seven meters in cross over and from below. These dimensions were equivalent to an area of 102 meters long and fourteen meters wide. In case that a second prospector working areas near the first miner's concession was the first to extract ores, the first miner had rights over the ores. Jirecek, *Codex juris Bohemici*, I, pp. 322-324.

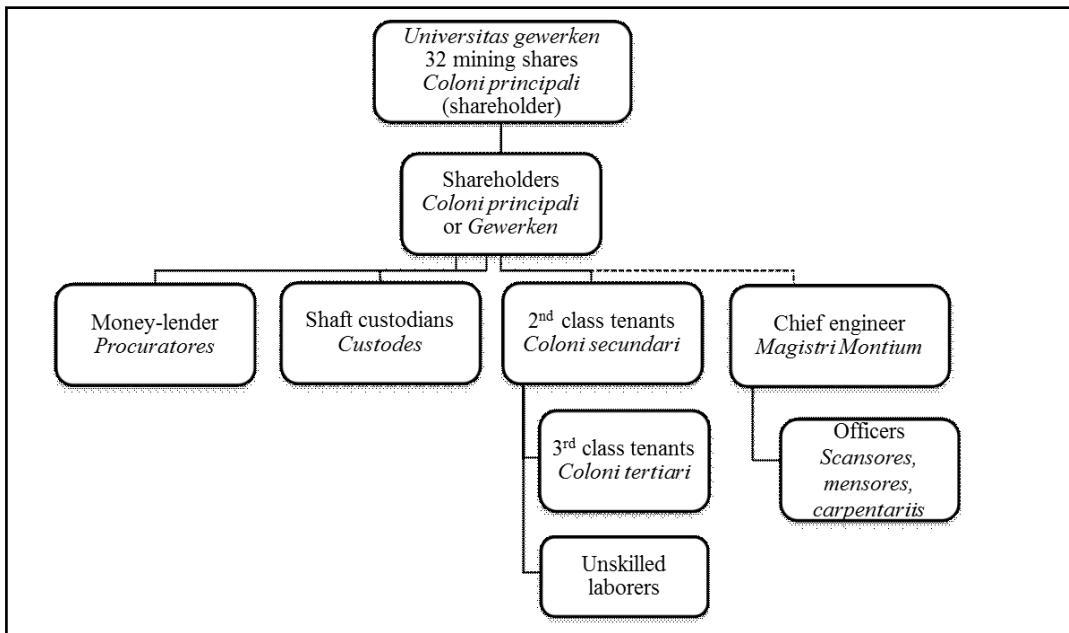


Fig. 4: Structure of universitas gewerken of Bohemia, according to Constitutiones juris metallica (A.D. 1300).

assumption was that not all the area covered under the seven *lanei* rule was to be worked, at a profit, by the first discoverer. Possibly the most resourceful miners, after costly exploration works, targeted only the sections in each shaft yielding the highest grade ores. One must wait for archeologists to shed light upon this matter.

Once an extraction shaft was sunk in the claim area, the owner had a period of six days for starting ore extraction works.¹⁰⁰ Otherwise, the city's *urborarii* transferred his mining rights to another miner. *Constitutiones* defined the *urboriorum* as the officer in charge of *urbura*, or 'faithful and loyal administration of mountain mining affairs.' His job was to 'protect mountain citizens' by 'saving them from danger of injustice.'¹⁰¹ Occupying a high position in the royal bureaucracy, these judges were the super-czars of mining.¹⁰² Their responsibilities included granting mining concessions, executing the law of *Constitutiones*, and correct any wrongdoing by corporations in *premium et mensura* of ores.¹⁰³ After a court ritual in which *urburarii* publicly swore to 'abide by and defend the mining law of the kingdom,' these officers were ready to do their job.¹⁰⁴

Urborarii required proof of an ore-digging agreement among miners, in cases when a miner, after enlarging his shaft, discovered an ore-vein at the point of contact with a neighboring shaft. Right of passage in underground tunnels belonged to those who expended toil and trouble building the tunnel. This regulation applied even in cases of discoveries of new ore veins. Flooded

shafts had to be drained in three days. Drainage-adits had to fulfill the following condition: that they effectively 'purged' shafts by removing water away *-et foveas suas debito modo purgaverit*.¹⁰⁵

Did culture impose obstacles to the king's achieving the goal of bringing justice to mining lands? Answering this question would require a lengthier discussion. One thing is clear: *urborarii* reached decisions to the point of law, relying on witness accounts. And here, the culture of the times mattered. The principle that 'all men are born free by natural law' justified the use of witnesses *-quia ab initio jure naturali omnes homines liberi nascentur*.¹⁰⁶ The article on witnesses states that because of the faculty of reason that natural law gives to all mankind, there cannot be any prohibition to the service to justice. There were, however, some exceptions. The law strictly prohibited judges to rely on testimonies and witness accounts by women, because 'a woman's mind is inconstant.'¹⁰⁷ Judges could not rely either upon witness accounts by *impuberis*, because they 'lack judgment.' *Impuberis* were males below the age of fourteen, and females below the age of twelve. A judge was expected to identify *impuberis* 'based upon the modesty of their bodies.'¹⁰⁸ *Furiosus* or madmen, 'incapable of discerning right from wrong,' served no purpose to judges seeking witness accounts.¹⁰⁹ The law made a similar prohibition targeting 'men of bad reputation' or *infamis*, infidels, 'Jews, Saracens, and heretics'.¹¹⁰

⁹⁹ The *laneum* used in Jihlava was equivalent to approximately fourteen meters, a unit possibly used throughout Carpathian mining cities. Jánošivoká, 'Mining business pursuant to "Ius Regale Montanorum"', p. 166.

¹⁰⁰ Jirecek, *Codex juris Bohemici*, I, p. 116.

¹⁰¹ Ibid., 284.

¹⁰² Ibid., 318.

¹⁰³ Ibid., 284.

¹⁰⁴ Ibid., 274.

¹⁰⁵ Ibid., 117.

¹⁰⁶ Ibid., 408.

¹⁰⁷ Ibid., 410.

¹⁰⁸ Ibid.

¹⁰⁹ Ibid.

¹¹⁰ Ibid.

Only *colonii principalii* owned mining shares; they were organized in corporations known as *universitas gewerken* and established rules concerning mining shares. A corporation calculated the value of a mining share based upon expense of work-shifts. Day and night working-shifts were divided in four working-hours or schicht. A day work-shift had its first hour, second hour, third hour, and fourth hour; the same applied to the night work-shift. The rule was good for *gewerken*, assuming that no big labor issue emerged. Workers were required to work four hours for each shift, each day.¹¹¹ However, transgressions to labor laws were frequent, facilitated by the vastness of the Carpathian landscape, uneven stages of economic development in the population, and the fact that Bohemia's royal court was seated in Prague. It did not enjoy the good managerial side that itinerant courts had.¹¹² The text of *Constitutiones* is transparently clear about the judgment of the king with respect to *gewerken* businesses. *Gewerken* corporations were 'agents who profited from secret agreements about ore prices with the purpose of eliminating competition,' according to *Constitutiones*. They represented a much 'detestable conspiracy against the common good.'¹¹³ The charter denounced the *conspiraciones illicitas* formed by *Gewerken* in smelting factories, and granted a period of fourteen days for correcting fraudulent practice concerning ore prices committed by private investors.¹¹⁴

Every corporation had to deliver a one-ninth of its total amount of extracted ores to the kingdom's smelting factories and mints. In addition, corporations paid a one-eighth of extracted ores; 5/32 of associations' gross returns; the equivalent of the incomes of one *schichta* or work shift in extracted ores, of every four *schichtas*; and 1/16 of what the *Gewerken* collected from his *colonii secundarii*. Colonists were responsible for dividing equally the incomes collected from one *schichta*. Taxes collected by the *urburarii* went to the Kutná Hora mint factories.

Leaving aside the many problems that the corporation created to a region characterized by uneven development, the mining corporation that flourished in Bohemia astonished the medieval world. Its mining rules showed remarkable continuity with local German mining principles dating back to the eleventh century. It forced the kingdom to create a mining law drawing upon incipient political principles of natural law and common good. The many references in the articles of *Constitutiones* to Roman philosophers, and emperors, and to ancient concepts of 'human dignity,' 'common good,' and 'reason,' indicates that the mining corporation of Bohemia played a considerable role in the making of a secular view of the State, its resources and its citizens.

B. MINING ELSEWHERE: FEUDAL ENTERPRISES AND MUSLIM PARTNERSHIPS

Mining elsewhere was a totally different matter. In the lands ruled by medieval Islamic caliphates, mining took place in the western fringe of the Atlas Mountains in North Africa. Slag discoveries in Herrerías in Almería, Riotinto, Hornachuelos in Cordova, Sierra Almagrera, Sierra Morena, and Aljustrel in Portugal support the abundant literary evidence of intense mining activities in medieval Islamic Andalusia.¹¹⁵ In North Africa and Islamic Andalusia, the nature of Islamic contract laws put obstacles in the way of development of corporations. The Christian *Reconquista* made no room for the birth of mining corporations. Mining law in medieval Islamic Iberia was a set of precepts and maxims contained in *fatwā*, or notarial documents written by *mufti* scholars, the religious jurisconsult of Islamic caliphates. Investors here found that expenses and profits in the mines depended upon prevalent legal opinions, filtered through local institutions which were increasingly unstable.¹¹⁶ Questions about religious institutions holding mining claims were rarely settled. This was a highly sensitive matter, considering that religious property could constitute as much as a one-tenth of the total area in rich Muslim districts, as in Nasrid Granada, in Andalusia.¹¹⁷ A complex fiscal reality, in which military and geopolitical interests frequently dictated mining goals, was simply a bad starting point for mining corporations. Was geography to blame for the underdeveloped stage of mining in thirteenth-century Andalusia and Maghreb? Perhaps. Dry lands called for investments in irrigation and hydraulic infrastructure, especially when famines and civil wars frequently affected population, with no easy migration corridor opened to the north, nor to the south.¹¹⁸ By the thirteenth century, when private money was displacing feudal lords in other mining regions, mining in the lands of the medieval Islamic caliphates was in decline.

Mining works took place in the east and south of the Massif, covering part of the Cévennes Mountains, extending into the Pyrenees. They sprang in the part of the mountains that extends from Mount Lozère all the way into the Spanish frontier, or the Languedoc/Roussillon region, as well as the Hérault Department and the Rhône-Alps.¹¹⁹ Here, feudal institutions found a way of putting obstacles into the rise of mining corporations comparable to those described earlier. The *argentiers* investing in the mines of Saint-Laurent-le-Minier unfortunately encountered 'rapacious feudal lords'¹²⁰ unwilling to relinquish seigneurial power in key areas of justice and administration of mines. According to *Charte d'Hierle* (A.D. 1227), the charter

¹¹¹ Ibid., 314.

¹¹² Bernhardt, *Itinerant kingship and royal monasteries in early medieval Germany*.

¹¹³ Jirecek, *Codex juris Bohemici*, I, p. 316.

¹¹⁴ Ibid., 312.

¹¹⁵ Ruins of Roman mining works are still visible in Riotinto, Huelva, and Romanera, San Platón, Descamisada, Campanario, São Domingos, and Aljustrel in Portugal. Bustamante Álvarez, 'Sigillatas claras de Ajustrel: a crise do século II d.C. nas minas do Sudoeste ibérico,' p. 164; Hall, Lead ores, p. 96; Martínez Frías, 'Sulphide and sulphosalts mineralogy and paragenesis from the Sierra Almagrera,' p. 272, pp. 274-275.

¹¹⁶ Canto García and Cressier (eds.), *Minas y metalurgia en al-Andalus y Magreb occidental*, p. 37.

¹¹⁷ Domínguez Rojas, 'La economía del reino nazari a través de las fetuas,' p. 83.

¹¹⁸ Jiménez Puertas and Martínez Vázquez, 'La organización social de un espacio andalusí, reflexiones en torno a la Vega de Granada,' pp. 164-168; Martínez Girón, 'La montaña de Tudmir: introducción etnográfica,' p. 5; Serrano-Piedecasas Fernández, 'El primer siglo de la Meseta bajo el dominio islámico; la restructuración del poder,' p. 905.

establishing the laws pertaining to the mines of Hièrle, the lord's bailiff retained jurisdiction over matters pertaining to mining works and criminal law. This feudal officer could bring a case against an *argentier* to the lord's court, in which case the *argentier* had the right to pay a bond guaranteeing his presence in the lord's court. His duties included estimating ore prospects when new shafts were opened near operating shafts. He also disposed of mining tools and equipment once mining property had been seized. Was the bailiff a technical expert, a man versed in the same principles of accounting that proved successful when applied by CEOs of Tuscan and Sardinian corporations? The answer to this question must come from future historical studies. It is clear that a bailiff 'enjoyed the prestige which is always inseparable from the right to command'¹²¹ vested upon him by the coercive power of his lord. Mining remained here a seigneurial affair.

Mining works in England failed to give birth to corporations comparable to types described earlier, despite the major silver discoveries that took place in Bere Ferrers or *Bere Ferris* in North Devon.¹²² These were rather unpleasant times for the English Crown. Royal indebtedness, land market fluctuations, rising grain prices, losing territory at Bovines, and expulsion of the Jews, left no easy way out to English kings.¹²³ Conflicts with barons, monasteries, and creditors, and merchants buying and selling Jewish bonds on land, had devastating consequences for the English Crown. In this context, mining gained royal sponsorship, which meant that the king used the mines for solving his most urgent economic and credit problems. This was a bad idea, which led to a policy of leasing mining rights to a Florentine family in the last years of the thirteenth century. The portfolio of the Frescobaldi had nothing to do with mining, thus, the family had limited success with English silver mines.¹²⁴ The policy of short-term leases of mine incomes that followed, under a royal company managing the mines, was insufficient for building an autonomous corporate business

structure and culture.

Silver mining flourished in the Persian Province of Khorasan, the Samanid region of Transoxiana, and the Hindu Kush.¹²⁵ However, the history of Mongol invasions raises doubts as to how favorable geography was to the rise of corporate businesses requiring standardized legal norms. Historians have examined Japan's *ritsuryo* code, census figures, and a collection of civil and criminal laws that appeared between the ninth and thirteenth centuries, looking for clues about medieval history of extractive industries.¹²⁶ Their findings are unequivocal: there were mining operations before the thirteenth century, but no systematization of mining laws before the fifteenth century.¹²⁷ Neither historians, nor archeologists have been able to rebuild the record of China's medieval silver-production before the sixteenth century.¹²⁸

In the Balkans, there were the Ottoman mining partnerships, where the troops of Sultan Mehmed II found 'large deposits of the precious metals in great quantities and even better than those in the Indies,' according to Greek court historian Kritovolous of Imbros.¹²⁹ However, the Ottoman State had no mining charter capable of standardizing the rules of the game on behalf of its private entrepreneurs. Its mining laws were an amalgam of different acts and laws written by foreign and Ottoman rulers, and borrowing principles from German and Byzantine traditions. Moreover, Islamic contract law, the most important source of Ottoman law, recognized no *societas* or corporation, only partnerships.¹³⁰ It recognized, nonetheless, freedom for exploring and mining the lands of the State.¹³¹ Mineral exploration required sinking shafts, building underground tunnels, timbering and fortifying mine galleries, and ore-sampling and testing. Laws mandated miners to sink shafts starting at the surface level and up to the point of contact with an ore-vein strike.¹³²

¹¹⁹ I consulted the following works: Bonami, 'Dans la Haute Vallée de L'Orb: les mines de Ceilhes-et-Rocozels au Moyen Âge'; Dumoulin, 'Les mines métallifères du département de la Loire'; Durant, 'Elements for a cultural history of wood in southern France (X-XVI centuries)'; Fluck and Bruno, 'Le paysage minier des sites métalliques des Vosges et de la Forêt-Noire'; Muñoz, 'Explotación minera en el Reino de Navarra'; Porée, Études historiques sur le Gévaudan; Scoville, The persecution of Huguenots and French economic development; Serrano Larráoz, 'Item perrexil, mostarda, lechugas et raunos, notas sobre la alimentación de mineros alemanes en Pamplona a finales del siglo XIV (1392).'

¹²⁰ Hilton, English and French towns in feudal society, p. 35.

¹²¹ Bloch, French rural history, an essay on its basic characteristics, p. 192.

¹²² Rippon et al., Mining in a medieval landscape.

¹²³ Crabb, A history of English law; Miller and Hatcher, Medieval England, towns, commerce and crafts; Postan, The medieval economy and society: an economic history of Britain, 1100-1500.

¹²⁴ Sapori, La compagnia dei Frescobaldi in Inghilterra, p. 19.

¹²⁵ Lombard, 'Les bases monétaires d'une suprématie économique, l'or Musulmandu VIIe au XIe siècle,' p. 146. I consulted the following works: Freeman, The historical geography of Europe; Harvey and Press, 'Issues in the history of mining and metallurgy'; Le Strange, The lands of the eastern Caliphate; McKinstry, Mining geology; Nweeya, Persia, the land of the Magi; Sidiqqi, Indo-Persian historiography up to the thirteenth century.

¹²⁶ Totman, Pre-industrial Korea and Japan in environmental perspective, p. 66.

¹²⁷ I consulted the following works: Bishop, 'The historical geography of early Japan'; Chassaigneux, 'Rica de oro et rica de plata'; Habashi, 'The beginnings of mining and metallurgical education in Japan'; Juleff, 'Technology and evolution: a root and branch view of Asian iron'; JWM, 'Trade of Nagasaki for 1903'; Keiji and Yamamura, 'Shaping the process of unification: technological progress in sixteenth and seventeenth century Japan'; Ludwin and Smits, 'Folklore and earthquakes: Native American oral traditions from Cascadia compared with written traditions from Japan'; Narita, 'Geology and ore deposits of the Onikobe-Hosokura district'; Naumann, 'The physical geography of Japan.'

¹²⁸ Yang, 'Horses, silver and cowries, Yunnan in global perspective,' p. 301.

¹²⁹ Stanoyevich, Early Jugoslav literature (1000-1800), p. 32, footnote 11; Suess, The face of the earth, p. 273.

¹³⁰ Kur'an, 'The absence of the corporation in Islamic law: origins and persistence.'

¹³¹ The Justinian Institutes established mining rights to 'private citizens' and the payment of the one-tenth tax in the sixth century A.D. Ferluga, Byzantium in the Balkans: studies on the Byzantine administration.

The scant information available to us indicates that partnerships divided each mine into sixty-four, sixty-six, or sixty-eight *hisce* or shares. The reason for this unusually high number of shares is not easy to interpret.¹³² One sensible explanation is that mining expenses were high in the Balkans, lands raged by military campaigns. Frequent coin debasements and silver-shortages that affected the Ottoman economy also led to high mining expenses. A *varaq* provided investment capital covering exploration and ore-testing costs.¹³³ As in Latin Europe, a mining entrepreneur enjoyed no absolute right to property.¹³⁴ An investor right was conditioned to keeping mines under continuous operation, and had a period of six weeks for starting mining works.¹³⁵ Surely, rights of a *varaq* over his mining claim were protected against take-over or appropriation by the mining association. Partnerships relied upon advanced business methods, such as the buying and selling of mine leases and shares, and book accounting. But partnerships could not get rid of Sultanic patronage and intervention in mining. A *timar sahibi* represented the Sublime Porte as shareholder.¹³⁶ A *varaq* could invest money in abandoned shafts, but only after high religious officers, the *qadi* and *emin*, intervened in the transaction and certified its legitimacy. This guaranteed that investors were to be caught in a bureaucratic, cumbersome process, which included interviewing owners of neighboring shafts, completing a written report, and sending the report to the headquarters of the State, Constantinople or today's Istanbul. A *varaq* could use his mining shares as securities, but only under the condition that the loan was for investing in mine improvements.¹³⁷ When a shareholder died, his shares were sold within the same corporation, or mortgaged to outside investors, but mortgages required payment of a yearly tax to the Sultan that varied in different times between one fifth and one tenth.¹³⁸

Many aspects of mining partnerships under the early Ottoman State remain unknown. It is impossible to know if accounting for costs of new shafts differed from old shafts, as was the practice in mine accounting until recently.¹³⁹ All we can infer is that without mine accounting, financial comparability of mining operations was not possible. Also, it is difficult to say what

a typical Ottoman mine looked like. Was it simply a 'confused labyrinth of galleries'¹⁴⁰ rendering drainage impossible, as some argue? A sensible interpretation of the evidence rules out the argument that Ottoman enterprises were as competitive as those of Latin Western Europe. The Ottomans, however, had no need for enacting a coherent and comprehensive charter governing mining partnerships. The goal of the Ottoman State was, after all, to increase the flow of silver tax revenues.¹⁴¹ This, the Ottoman State achieved, by relying upon mining partnerships dependent upon 'Sultanic patronage'.¹⁴² An old Latin Western motto, 'to render to Caesar the things that are Caesar's, and to God the things that are God's,' has no analogue in early Islamic thought.¹⁴³ The latter was a real obstacle to the development of competitive partnerships. Besides, rules concerning mining shares depended upon the opinion of famous jurisconsults, or *mufti*, and this was a problem deeply ingrained in the historical development of the medieval Islamic caliphates and that the Ottomans inherited.

C. THE LATIN WESTERN CORPORATION: A SUCCESSFUL BUSINESS MODEL?

Corporations by *silvrii* in the Central Alps and Lombardy, *partiarii* and *parzonavili* in Tuscany and Sardinia, and *Gewerken* in the Carpathians were based upon private ownership of mining shares. Indeed, it was a successful business model because it allowed private citizens to exercise control over production while alienating feudal lords. Lack of evidence makes it difficult for us to have a complete picture of how corporations inhibited or suppressed competition, one of the most incisive questions that the great Armando Sapori raised many years ago. Nor can we know how corporations 'exempted themselves from societal prohibitions such as usury'.¹⁴⁴ Mining corporations restrained feudal take-overs of mines, while allowing sovereign individuals to carve out their version of the common good. What corporations did was to unify many individual wills into a single cause: to share liability, and enjoy the benefits of exploiting what became in time the underground wealth of the nations of Europe.

¹³² The word comes from the German *Schacht*. The law applied the term *chahat* for describing the way in which excavation of a pit proceeded. Deepening the *kuyu* for reaching the mineral was known as *pauñ*. Beldiceanu, *Les Actes des Premiers Sultans*, 2, p. 68, 303.

¹³³ Historian Mark Bartusis offers an excellent discussion of the historiography of the Byzantine *pronoia* in the Balkans. The later refers to a 'kind of grant from the emperor to soldiers, lords, the powerful and bishops.' None of the diverse sources discussed by Bartusis mention one single *pronoia* dealing with mining lands. Bartusis, *Land and privilege in Byzantium*, p. 2; Beldiceanu, *Les Actes des Premiers Sultans*, 2, p. 289, pp. 306-307.

¹³⁴ It appears in many forms -*gwark*, *werke*, *werki*, *werhe*, *warak* and *vurhe*. Beldiceanu, *Les Actes des Premiers Sultans*, 2, p. 90; Dvornik, *The Slavs in European history and civilization*, p. 146; Sedlar, *East Central Europe in the Middle Ages*, 1000-1500, pp. 115-116.

¹³⁵ Beldiceanu, *Les Actes des Premiers Sultans*, 2, p. 92.

¹³⁶ Ibid., 93-94.

¹³⁷ Ibid., 89, 92.

¹³⁸ Ibid., 88.

¹³⁹ Beldiceanu, *Les Actes des Premiers Sultans*, 1, pp. 297-298.

¹⁴⁰ Vent, Glenn, and Ronald A. Milne, 'The standardization of mine accounting,' pp. 60-61.

¹⁴¹ Simonin, *Underground life, or mines and miners*, p. 144.

¹⁴² Inalcik, *An economic and social history of the Ottoman Empire*, Vol. I, p. 59.

¹⁴³ Kuran, 'Absence of the corporation in Islamic law,' p. 787.

¹⁴⁴ Ibid.

¹⁴⁵ Sapori, *The Italian merchant in the Middle Ages*, p. xviii.

The business model of the corporation was based upon the standardization of principles such as share-ownership. Written and notarized documents became the life and blood of the corporate culture of *societas*, *communitas* and *universitas*. Institutionalization of dispute-settlement and appeal processes was a true innovation of the mining corporation. The latter was essential not only to the corporation, but to its clients, since corporations gained hegemonic political roles in their jurisdictions, such as the *consilium* of Trento which became a creditor to Wanga's government. The mining corporation enjoyed freedom for managing mines, and rejected any despotic intervention by princes and lords alike. Besides taxation and supervision of mining works, lords owned no mining shares. 'The very real independence' of individual members of a Latin corporation was guaranteed in the mining charters described in this article.¹⁴⁶ The process of 'decentralized incorporation,'¹⁴⁷ by which private entrepreneurs organized themselves on the margins of imperial and royal institutions while fulfilling strategic economic objectives had its most tangible form in mining corporations.

The geography of Western Europe created favorable conditions for the rise of Latin Western corporations.¹⁴⁸ No large geological or climatic phenomena affected long-term human habitation in European mountains. When these did happen, mountain peoples vigorously deepened land colonization. Europe's demographic stability meant that by the twelfth century, cessation of external and internal waves of raids by Vikings, Arabs, and the Magyars was the norm. The 'increased capacity of the land to support humans' was the main feature of the continent, unlike Central Asia or northern Africa.¹⁴⁹ Growth became a general characteristic, and the corporation became part of it.¹⁵⁰ Many questions remain unanswered: Did *silvraii* and *partiarii* form the earliest capitalist aristocracy exploiting the mines of the West? Was the Latin Western mining corporation a mere passing event, or a decisive event of rupture with feudalism? Why did mining in the West favor private over public investments? Why was 'military might' not enough for sustaining growth of mining and raw material industries? Why the West, and not the East? Mining was an advanced industry which organized productive capital in a dynamic hierarchical structure, rooted in private entrepreneurs' investments in mining claims. The sketch presented in this paper is but the tip of the iceberg. Much legal, archeological, and historical evidence still needs to be studied, for us to be able to draw a complete picture of the history of mining corporations and their role in the making of the West.

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¹⁴⁶ For a discussion on the medieval origins of the majority-rule principle, see Lewis, Medieval political ideas, vol. 1, pp. 193-240.

¹⁴⁷ Ibid. 790.

¹⁴⁸ Kuran states: 'Muhammad was both a religious and a political leader, and Islamic law meant to regulate all spheres of life, without ceding ground to secular legislation.' Ibid., 796.

¹⁴⁹ Davis, 'Regulation of human population in northern France and adjacent lands in the Middle Ages,' p. 250.

¹⁵⁰ Ibid., 251.

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