

## THE “VALLE DEL SABATO” AND THE SULPHUR MINES OF TUFO AND ALTAVILLAIRPINA

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### **Abstract**

Two the mining companies, two the properties, two the related factories: the Di Marzo and the Società Anonima Industrie Minerarie (SAIM); two the families, of noble origins, who contributed to the mid-1800s to radical changes in the Valley, including through a direct and personal relationship with social initiatives in favour of the working society.

The phenomenon began a new era of development resulting in significant transformations in the social-economic structures and in the organization of the inhabitants. Along with tanning pole, sulphur mines soon became the flagship reality of entrepreneurship irpina, attracting the interest of other businessman and banking groups. The thriving mining went on until the early 1970 's when the international competition and of the oil companies made cheaper sulfur extraction for other routes.

At present the Administration and municipalities concerned intended to start an enhancement of industrial archaeology, preparing a feasibility study for the use of such mines by large sections of the people. It is an immense historical, cultural, industrial and natural and anthropological heritage, that should not be lost; therefore the project of a geomining park of the sulphur mines of Tufo and Altavilla Irpina (Italy) can offer to local populations another opportunity for development.

Pending its establishment, the production of DOCG wines with the presence of the Greco di Tufo, a white wine produced in the municipalities of the province of Avellino, including Tufo and Altavilla Irpina, continues to enhance the Irpinia territory.

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**Keywords:** Enhancement territory, Irpinia, sulfur extraction, industrial archaeology, geomining park

It was due to deputy Aurisicchio if the sulfur mines of Tufo and AltavillaIrpina(Italy) have had in the recent 2008 an unexpected visibility, when it was presented, for the first time, at the Chamber of Deputies the proposal of the foundation of geo-mining park. Proposal validity of which is still in progress, and that tends to recover not only the historical and cultural heritage, but also those industrial and natura, and it could represent a further opportunity for social development. The affected area covers 20 square kilometers and includes not only the two municipalities concerned, but tends to create "a veritable network of natural parks geo-mineral" (Aurisicchio, 2008). At the same time the conversion of an area already affected by mining activities now disused, pushes new tourist-hotel activities of small and medium enterprises as well as the recovery and redevelopment of the historic centers of mining countries, with particular attention to the restoration of monuments.

"Unique mining south peninsular area" defines the proposer "with exhibition stands present in the fairs of Milan and Bari". The tunnels stretched for 30 km underground coming up to 300-400 meters deep: in brief, a town! Requests for sulfur came from all over the territory, and it was mostly for agricultural use. The transformation from small agricultural centers in engines of the local economy availed at economic and demographic development of the two countries.

Through the "way of the workers" a team, consisting of two men, the miner and the assistant, accessed the basement with the task of identifying the mass of sulfur and prepare the holes for the mines. Detonated the charges, other employees were provided sulfur transport by trucks outside.

Since 1891, the river transport on barges was replaced by the railroad with great advantage for sulfur suffering the problem of moisture. Innovation was also a victory for the workers so that they could more easily reach the mines, but primarily to acquire raw materials such as coal, required for the boilers of the industrial plant. The increase of mining then began a process of overall development of the area that involves not only the road conditions, but also the construction and transport. The commercialization of the product outside the narrow provincial level was favored by the construction, in 1888, the railway line Avellino-Benevento. A curious fact is represented by the small railway station of Tufo and located outside of the country and then served as a goods yard as it was located right near the main building of the sulfur mines (called *Molino Giardino* or *MolinoGiardino*).

The history of the station is then connected to the mines until the sixties, with the onset of the crisis, the production of sulfur became uneconomic and with it the freight went to wane until the close of the same in 1972. A followed of the disastrous earthquake that struck the Irpinia in

1980 the building was demolished and replaced and, since September 2012, also the train service has been suspended.

The mineral was however transferred to mills for grinding and subsequent sale, once bagged, to the various customers who came not only from all over the Campania; Giuseppe Garibaldi even for their own vineyards in the quiet of Caprera favored as a fungicide sulfur coming from Tufo.



An old picture of the goods yard where the sulfur of Tufo, sacks, was loaded on freight cars to be shipped to different parts of Italy

The Molino Giardino was surrounded by greenery and fully integrated into the surrounding environment, in fact within its walls there were trees and gardens which made the work lighter and the air more breathable; modern concept of a production site which will meet again only in the modern era made by Ing. Olivetti in Ivrea (Turin) and Bagnoli (Naples).

It was a completely self-sufficient , which included, on two levels, offices, guest quarters, garages and warehouses; a real town where they worked carpenters, blacksmiths, mechanics, trainers bags, electricians.

Designed to be a monument and a factory, it is characterized, starting from the center and from above by a triumphal arch celebrating the discoverer of the mines, Francesco Di Marzo, and a scroll commemorating the enterprise (“FRANCESCO DI MARZO discovered the sulphur mines in the year 1866”). The central part has a rusticated stone from Vesuvius in memory of the town, San Paolo Belsito (Naples), from which came the family Di Marzo who was forced to emigrate because of the great plague of ‘600.



Remains of the goods yard near the building called Molino Giardino

### **Sulfur: mining techniques in use**

Until then, the extraction of the ore was the prerogative of Sicily, but the production of Tufo was affirmed by:

- extraction less expensive (although more dangerous);
- the setting of entrepreneurial Di Marzo;
- the material extracted qualitatively superior to a profitable use in agriculture.

The oldest method of extraction of sulfur by fusion is the so-called "Calcarella", widely used in Sicily; it was nothing more than a pit ("furnace") circular and inclined, at the end of the filling with mineral had a conical shape. Once completed the office, at the top of the cone was set on fire in general at the end of the day and was allowed to burn until the next morning, the sulfur flowed from an opening. Not negligible, however, the damage to the environment and agriculture in particular, resulting in the production of sulfur dioxide, in fact, the installation of these systems was made at a distance of not less than three kilometers from the towns. In addition, being able to collect a little more than one-third of the sulfur content in the ore, the yield was not high indeed it was in danger of not getting any product in the days of strong wind.

Derived from this method then is the "Calcarone" which, again in Sicily since 1850, made it possible for an extraction yield increased by a third to almost two, while minimizing both the risk of loss of product and dioxide sulfur production. With the term "Calcarone" was identified a pit of circular shape, of variable size and with inclined bottom between 30 and 35 degrees, built on sloping ground; formed a combination of mineral following precise rules (the larger pieces in the middle and bottom of the cone and the smaller ones in the suburbs), it covered everything with the residue of the previous meltings ("rosticci") in order to smother the flame and make it less vivid combustion. The heat from the bricks used for the closure revealed to the workers involved in the casting ("badatori ") the formation of the molten sulfur .

The "ovens GILL", appeared later in the 1880s, represent a further refinement, and both systems were adopted for a long time, it can mean the demise of the industry in Italy. Also used in Tufo and Altavilla mines, their extraction yield was much higher compared to Calcaroni because, by decreasing the amount of sulfur to be used as fuel through a suitable heat recovery system, it was possible to obtain on average 75% of the sulfur content in the ore.

The irreversible crisis of the sulfur mines Italian was more evident in the mid-fifties, when the Frasch mining method in use in Louisiana and Texas, turned out to be much cheaper. In fact, with this procedure, the solfiferoreservoir is reached through bores, with augers consisting of three concentric tubes; in the outer one was entered superheated water at 165 ° C and 18 atm, which is necessary to melt the sulfur that went through the central cavity following injection of compressed air at 35 atm. Once on the surface, the aqueous emulsion was collected in special tanks and allowed to cool, the sulfur which is separated in the solid state showed a degree of purity directly used for various uses.

The Gill ovens, however, continued to be widely used in the mining in Irpinia so that the phenomenon began a new era of development resulting in significant changes in the economic and social structures and organization of the inhabitants. Along with the tanning center, the sulfur mines soon became the reality of entrepreneurship tip of Irpinia, attracting the interest of other entrepreneurs and banking groups. The thriving mining continued until the early 1970s when the international competition and the oil companies made it more convenient for the extraction of sulfur from other sources, but also to the inability of the local industry to meet the challenge of technological innovation. In 1972, the caves were then closed and the beginning of the nineties also the processing plant and sales ceased its activity.

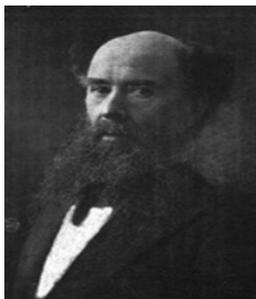
Both mines Irpinia, after nearly a century in business, began their decline. For AltavillaIrpina determinant was the flood of October 19, 1960, which caused the destruction of many plant and equipment and dragged away more than 16 kilometers the so-called "pani", that is the finished product of sulfur, while that of Tufo was the earthquake of 1980. Cessation of mining activity is a negative impact on the lives of countries partly because of migration of the inhabitants.

The presence of the Sabato river, once semi-navigable, was certainly instrumental in the initiation of mining as the outcrop of the ore, due to centuries of water erosion, on the one hand he had favored the discovery and the other had meant that the early work of extraction were made at the open.

### **Contemporary history of the families capone and di marzo**

Thanks to the contribution of two families, Capone and Di Marzo, the territory of the Valle del Sabato underwent considerable changes, including not only in history, but also in the reality today is testimony.

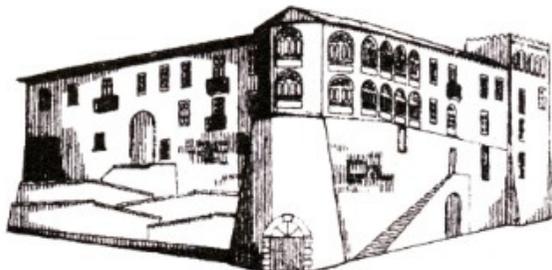
In 1869, Ferdinand Capone with some members constitute the SocietàMiniereSolfuree ofAltavillaIrpina, in order to coordinate the extraction, processing and sale of mineral. At his death, there is the son Frederick: eclectic figure, a fervent partisan, member of the Republican faith in Parliament and firm believer in the economic development of the region of Campania; he is also remembered in the history of Italian aviation for his extraordinary flying machines. It was he also the replacement of river transport on barges with the railway (1891) which served as a means of transport for the workers, as well as to market the bags of sulfur and acquire the necessary raw materials.



Federico Capone

The Di Marzo, a family from Avellino and owns several lots in the area, on the other hand are the architects of the social development of Tufo with the creation of the first educational facilities, a movie theater, a day care, freeing the territory by prolonged isolation. Without a doubt the most impressive noble building of the village, overlooking the valley below, it is their building that invites the visitor to enter the old town. Typical

nineteenth-century cellars, which you can visit during the period of the "Open Cellars" in the month of June, are now home to the famous exhibition "Greco di Tufo". The role played in the political life (as deputies and/or senators) of other family members are widely reported in the history of the territory, which gave a significant contribution.



Two mining companies, two owned, two factories connected: the Di Marzo and Società Anonima Industrie Minerarie (SAIM); both families of noble birth, who have contributed in the mid- nineteenth century to radical changes in the valley, through a direct and personal relationship with social initiatives for the company's workers. Like the story of the discovery of mineral deposit that goes back to the bucolic episodes of peasants intent to burn weeds and shepherds thesis to turn stones to warm up.

With the discovery of the mines of sulfur in 1863, Altavilla , Tufo, but also Petruro, agricultural centers near the Valle del Sabato, they become in a short time in the industrial environment of the South, worthy of note. Contribute to this metamorphosis the Capone family for AltavillaIrpina, Di Marzo for Tufo and Troisi for Petruro, thanks not only to their spirit patriotic ideal but also to large business skills give a decisive turn to an established territory, until then, only on a discrete farm activity.

The last mentioned locality enters the history of the valley because of the Troisi revenge towards his friend partisan Capone, who is accused of having exploited the vein sulphurous present not only in his farm in the territory of Petruro, but also in the entire containment of Petruro.

After a dispute that lasted 50 years, was achieved an agreement extremely favorable to his municipality, in fact, the worker places from mining Altavilla and Tufo were to be reserved for nationals as a percentage of Petruro, obtaining the mining rights, paid to heirs until a few years ago.

The mining Irpinia were subjected to mining legislation already in force at the time of the Borbone, they could count on a large number of agricultural laborers and on a selective framing of the workers, operated by

the plant itself, which ensured, at least until the end of the Twentieth century, a some stability and functionality of the structure.

The majority of the workforce had, therefore, no professional qualification, being essentially constituted by local men (boys, women and unskilled workers), while the regions of Abruzzo, Molise and Romagna helped to thicken the ranks of the miners themselves. In fact you could glimpse into what an example of women's emancipation since for the Southern woman for the first time envisaged the possibility of a gain, even if the path is littered with too many deaths at work.

The dominant form of remuneration was the salary in the day, with rare examples of contract by the piece, which seems to consist in a modest integration of basic pay which, however, remained in the day. Of course, with regard to the remuneration of women and child it was lower by about half compared to the male.

The women were exclusively intended for "bagging" and storage, taking advantage of a feature of southern women that is to bring weights on the head in a confident way. So much so that the meal eaten by the men was taken from them, strictly at noon, in a wicker basket ("cuofono" or "sporta") skillfully kept in balance on the head, protected by a cloth twisted ("a ' Sparra" or "turciniello") to reduce fatigue.

The result is a new type of worker, the "peasant workers" who, without abandoning their land, accept the security of a job and retains its rural culture in the mine, to the point of appeal "culture" the amount of sulfur extracted in a specified period of employment.

Not to be forgotten, however, countless accidents, most often fatal, work in the mines so promptly reminded by Gennaro Russo, great-grandson of a miner who died tragically in 1911.

It was an experienced miner, from the province of Chieti called by the Direction of mine Altavilla as a foreman and his expertise made it possible to discover a new gallery of sulfur. The tragic episode that tells us the nephew refers in particular to an explosion occurred in the year of the cited to give off poison gas inside. With his courage he was able to rescue eleven of his workers not before he recommended to brick up the entry in the event of his failure to return; in the absence of oxygen in fact sulfur would no longer activated combustion (Gennaro Russo, Storia e Dintorni).

### **A valid supporting the protection of land: greco di tufo wine**

In anticipation of the establishment of a geo-mining park of the sulfur di Tufo and AltavillaIrpina, the production of DOCG wines with the presence of the Greco di Tufo, a white wine produced in the municipalities of the province of Avellino, including Tufo and AltavillaIrpina, continues to exploit the territory. The Greco is a white wine whose origin comes from an

ancient vine (*AmineaGemina*) of Greek origin, in particular of Thessaly, who came to us thanks to Aminei population that settled on the slopes of Vesuvius.

Scipione, the founder of the family Di Marzo, back in 1647 away from Nolan because of the epidemics of the time, he found suitable for the climate of Tufo for implanting the lush vines. The descendants, men and women equally bound by love for the land and the passion for the cultivation of the vineyard, they have continued the tradition. They are in fact four family generations involved in enology and viticulture, and have given rise to a real path of business which are also witness the famous wine cellars, perhaps the most ancient and characteristic of Campania. These tunnels and rooms dug into the tuff for hundreds of meters below the palace of properties that favor the ideal transformation of grapes into wine. The province of Avellino offers internationally acclaimed wines such as the Greco di Tufo, Taurasi and Fiano, the first of which is undoubtedly the oldest as evidenced by the fresco found in Pompei and dating from the first century bC (Agraria.org).

Its product specification (DOCG) provides the chemical- physical and organoleptic characteristics listed below (Procedural Guidelines – Greco di Tufo DOCG):

#### **Vines - Degree minimum strength - Aging and qualifications**

Vines: Greco: at least 85 % ; Coda di Volpe white: up to 15 %

“**Greco di Tufo**”:

Minimum total acidity: 5.0 g / l

Minimum total alcoholic strength by volume: 11.50% vol

Retrieved non-reducing minimum: 16.0 g / l

“**Greco di TufoSpumante**”

Minimum total alcoholic strength by volume: 12.00% vol

Minimum total acidity: 6,0 g / l

non-reducing extract minimum: 15.0 g / l

The wine "Greco di Tufo" can be processed in the type "spumante" by the method offermentation in the bottle (classic method), provided that aged for at least 36 months in bottlewith effect from November 1 of the year of harvest.

ORGANOLEPTIC CHARACTERISTICS	
<b>“Greco di Tufo”</b>	
Color	Straw yellow more or less intense
Pleasant	Smell, intense, fine, characteristic
Taste	Fresh, dry, harmonious
<b>“Greco di TufoSpumante”</b>	
Foam	Fine and persistent
Color	Straw yellow more or less intense with greenish hues or golden
Odor	Characteristic, pleasant, with a delicate hint of yeast
Taste	Tangy, fine and harmonious, like "extrabrut" or like "brut"

The production of DOCG wines with the presence of the Greco di Tufo, therefore, continues to enhance the region of Irpinia. In this regard, it is an ongoing project for the promotion and protection of DOC and DOCG wines of the Campania Region, which uses a system of automatic identification chemometrics. Counterfeit wine is in fact a growing phenomenon, which is often about Italian wines, many of which are considered valuable assets in the international market.

Recognize a counterfeit bottle is anything but simple: they are often reproduced in an almost perfect both the label and the bottle, so that the container of the counterfeit product, unlike the content, is identical to that of the original, and only a expert may be able to recognize small details. The economic damages caused by this illegal activity are estimated at approximately \$ 60 billion a year, those of image are incalculable.

At present there is not an international law that adequately protects the industry, but only bilateral agreements on the protection of designations, which allow you to just deal with the phenomenon, with very high costs.

The system to be developed would thus represent an effective and scientifically validated to certify the membership of a wine at a defined type of goods, independently of other investigations. This tool therefore, in addition to being a new weapon against counterfeiting, could help relieve manufacturers from existing strict controls which they are subjected, while at the same time guarantees the end users.

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