REGIONAL ARCHAEOLOGICAL MUSEUM
"LUIGI BERNABÒ BREA - LIPARI

AEOLIAN ISLANDS

# VOLCANOLOGY

## LAND, MAN AND ENVIRONMENT SECTION

Maria Clara Martinelli
Pietro Lo Cascio

**Sicily**
Department of Cultural Heritage and Sicilian Identity
PALERMO 2015

Dipartimento Beni Culturali e dell'Identità Siciliana

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INTRODUCTION

The Volcanology pavilion includes the **Land Man and Environment** section on the ground floor. This section is divided into two exhibition halls, examining the use man made of the land of the Aeolian Islands and its raw materials during prehistory, early history, the Greek, Roman and medieval periods. One part is dedicated to paleontology and natural sciences in which fossils found in the Aeolian Islands are exhibited. The exhibition, already proposed and realised by Luigi Bernabo Brea and Madeleine Cavalier, was updated in 2012 with recent scientific studies and new information panels.

# Paleontology

## The Aeolian Islands before humans: plant and animal assemblages

Emerged since 500,000 years ago, the Aeolian Islands have volcanic origin and were not connected to the neighboring mainland (Sicily, Calabria) even during the Maximum Glacial, when the sea was 130 meters lower of the current level. So, their plant and animal assemblages have been originated by "founders" able to cross the sea barrier which separate the islands. This is not a limit for plants (whose seeds have generally a high potential for dispersal) and flying animals (insects, birds, bats), but can represents an obstacle for the colonization of terrestrial animals. It is likely, for instance, that all the mammals occurring in the Aeolian Islands were introduced by man. However, unusual colonization may occur even for species which have not good dispersal ability. During excavations carried out at Valle Pera (Lipari), the fossil remains of a Hermann's tortoise (*Testudo hermanni*) were found from

soil layers dating back to 40,000 years ago. This species is not able to swim, therefore it could have reached the island through the occasional transportation of eggs included in the soil of plant roots and then drift by marine currents, or even from a pregnant female on a natural floating raft formed by shrubs or trees.

**Testudo hermanni** is distributed in Southern Europe, where occurs mainly in the coastal maquis. The activity is concentrated in spring and autumn. Males and females (the latter characterized by larger size) reach the sexual maturity in the tenth year of age. Females lay from one to three clutches per year (1-3 eggs per clutch), and incubation is completed in three months. The diet is essentially based on vegetable matter and small invertebrates.

### The paleo-lake of Timpone Pataso

Between 125,000 and 80,000 years ago, a lake existed near the volcanic centre of Timpone Pataso in the western sector of Lipari. This basin was gradually filled by pyroclastic material deposited during the eruptions of Monte Sant'Angelo. The stratigraphy consists of an alternance of primary and secondary layers. The latter have been produced by sin-depositional remobilisation processes and include remains of the plants growing along the shores of the lake. In this site have been found three woody species. The dwarf palm (*Chamaerops humilis*) is the only that still inhabits the surrounding areas. The laurel (*Laurus no-*

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*bilis*) is currently common as cultivated plant but is extinct from the local wild flora, probably due to the climate changes that occurred during the last glacial period. The endemic *Cytisus aeolicus* has disappeared from Lipari more recently, probably as consequence of the strong deforestations carried out during the last centuries, and survives with small and threatened populations only at Stromboli, Vulcano and Alicudi.

Table on fossils of Timpone Pataso (from *Gaudin and Pirajno Mandralisca*, 1860)

**Paleobotanical research** on the Aeolian Islands began in the 19th century, thanks to the pioneering studies of Pietro Calcara, Antonio Prestandrea, Juan Vilanova and, above all, Enrico Pirajno di Mandralisca and Charles T. Gaudin. These latter published in 1860 the first scientific paper exclusively dedicated to the fossil plants from Timpone Pataso, describing a new species (*Leguminosites robiniaeformis*) whose taxonomic status needs however to be clarified.

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## Other sites of paleo-botanical interest

*Pollara (Salina)*

Between 24,000 and 13,000 years ago, the crater of Pollara was characterized by an eruptive phase concluded by a strong explosive event (the last of the volcanic activity of Salina). The coastal cliff represent the deposits which filled a volcanic lake, whose section is strongly reduced by natural erosion. In the tuff layers dating about 20,000 years ago have been found remains of broadleaf plants and a single leaf of *Potamogeton* cf. *polygonifolius*, an aquatic perennial herb belonging to the family Potamogetonaceae and currently absent from the Aeolian Archipelago.

*Piano Aligheri (Vulcano)*

In the wide plateau of Piano, some lacustrine basins existing between 15,000 and 6,000 years ago were filled by pyroclastic material erupted by the volcanoes of the northern sector of the island (Lentia and La Fossa). This area was occupied by a maquis dominated by the holm oak (*Quercus ilex*). Among the few other identified species, there is also the ivy (*Hedera helix*), a lianose plant typical of shady forestry habitats that may grow even in thermophilic shrub formations.

*Fossa Valle (Lipari)*

At Fossa Valle, the erosional channels have been filled by pyroclastic material erupted from the southern volcanoes of the island between

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Some plant fossils (imprints of leaves and a strobilus) of *Pinus sp.* at Fossa Valle

40,000 to 15,000 years ago. Unlike from the paleo-lake of Timpone Pataso, the plant remains are here mostly burnt and mineralized. The most common species is a pine tentatively identified as belonging to the black pine group, that in Sicily and Calabria is represented by the endemic, montane *Pinus laricio* ssp. *calabrica*. A radiometric dating carried out at the ENEA laboratory of Bologna has indicated for such deposits an age limit of > 20.000 years, which corresponds to the last glaciation (Würm). If confirmed, the occurrence of a montane conifer may outline an ecological context characterized by a dry and slightly colder climate, but also affected by fire disturbance due to the volcanic activity: a situation similar to the Etna areas where black pine is a pioneer species able to colonize also the recent lava flows.

## Marine terraces

The present morphology of the coastal slopes of the Aeolian Islands is due to complex interactions between endogenous (volcanic activity, tectonic dislocations, crustal uplifting and subsidence) and exogenous processes, mostly subaerial erosion and eustatic variations. These latter have been interested by marine sedimentation and deposits that offer significant evidence of climate and environmental changes occurred during the last 500,000 years. The deposits are

generally composed by carbonate encrustations which include several marine organisms, whose age has been obtained through both the absolute datation and that of the upper and lower volcanic layers, as well as from their correlation with the peaks of sea-level according to the eustatic curve. These paleo-communities are generally very similar to those currently widespread in the sandy bottom and coastal debris, while the species typical from coralligenous are less represented.

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# Land use in antiquity

## Raw materials: obsidian, pumice, flint, clay, kaolin, alum, sulphur

### Obsidian

Obsidian is a natural glass that originates when a magma of special, very viscous, composition escapes from a volcano and solidifies quickly.

The obsidian produced from the crater of Monte Pelato and used by humans during the Neolithic period, from the end of the sixth millennium BC, was dated by Jörg Keller (1970) using the radiocarbon method, and dates back to 9000 years ago. Scholars have found that the obsidian lava during the Neolithic was mainly located in the Valley of Gabellotto in Canneto. Today these are partially buried by the enormous blanket of pumice from the last eruption, which occurred in the seventh century AD. The violent explosion in the High Middle Ages formed the new cone of Monte Pelato and towering deposits of pumice that were exploited by the mining industry until 2007. The recent lava of Rocche Rosse and Forgia Vecchia brought active volcanic activity on the Island of Lipari to an end, only 1300 years ago. The Greek and Roman writers do not speak of active volcanoes on the island of Lipari. Evidently these were dormant at that time. But some popular legends, handed down by Leandro Alberti (1550), Pietro Campis (1694)

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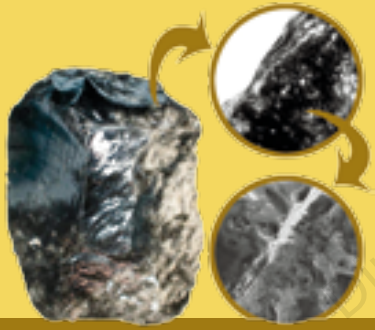
and the testimony of San Willibald in his journey of 727 AD, seem to preserve the memory of the resumption of volcanic activity in the High Middle Ages. In the Aeolian Islands obsidian is present only in the North East of Lipari, in the region of pumice, with which it is closely related.

A quarry workshop of the Neolithic age in which the obsidian was extracted and processed to reduce it to blades or nuclei that were more easily transportable, was sectioned with the edge of the Canneto-Lami road. Another similar field was dissected by the cut of the Canneto Acquacalda road in the district Papesca. In the archaeological layer rich with blocks, cores, splinters and blades of obsidian, a fragment of Neolithic pottery in the style of Diana was also found.

The huge number of chips from working and used cores that were found in several areas inhabited from Neolithic times to the Early Bronze Age show that the processing of this material occurred as a domestic craft within villages.

◂ Obsidian processing residues from Neolithic settlements: splinters, blades and core

Analysis on **signs of use** makes use analysis detailed on stone tools to deepen the relationships between form and function and to try to reconstruct the subsistence activities of human groups that inhabited the Aeolian Islands during the Neolithic age. The analysis is performed using a metallographic microscope. It has been observed that many of the analysed artefacts were used for transforming animal bone material. The tools with signs of use relating to working with bone were mainly used to perform crossways actions. Evidence of leather and wood processing activities has also been found.



Traces of use on a tool made of obsidian

## The obsidian trade

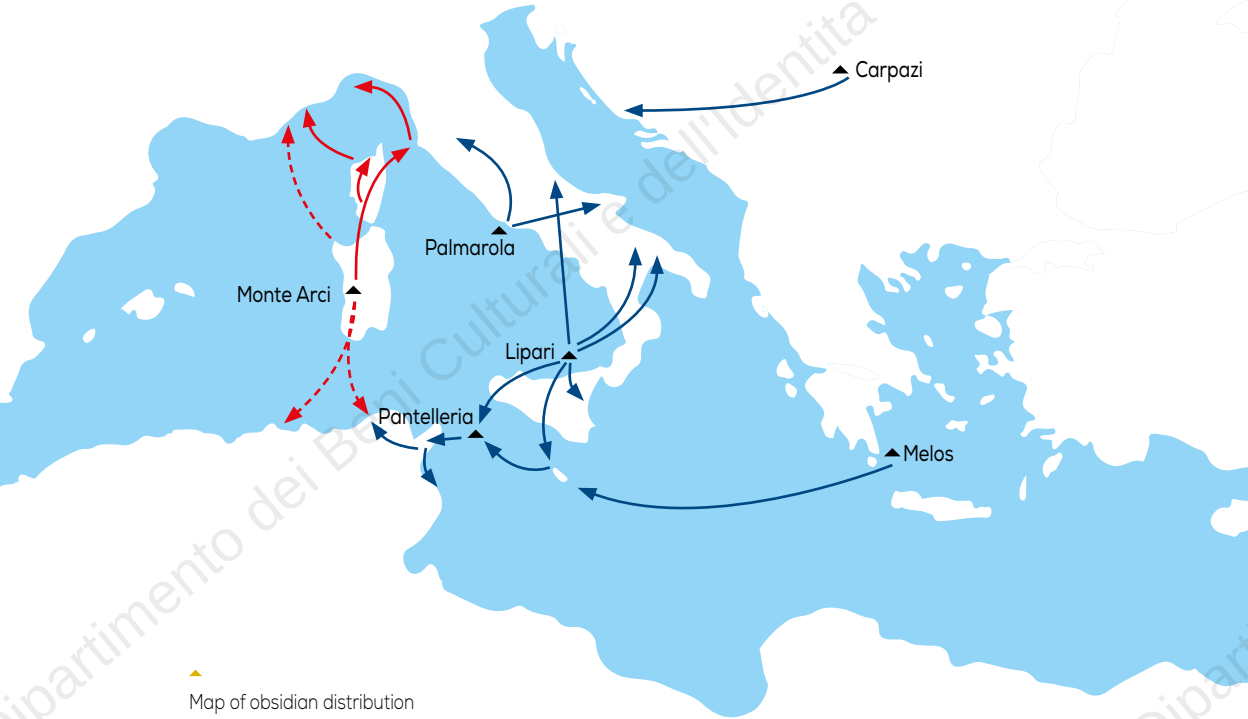
Obsidian was an important raw material, much appreciated by prehistoric man, who actively sought it and used it to make work tools. In Italy the spread of obsidian was tied to a specific geographical location, in fact, deposits are only found on the islands: Lipari, Palmarola, Pantelleria and Sardinia (Monte Arci). Thus man could not reach these sources of raw material until he was able to navigate.

The boats were simple canoes carved from a tree trunk. Most likely man extracted obsidian before table population groups settled on the islands. The obsidian trade was the main reason for the first settlements on Lipari and Salina.

Obsidian from Lipari artefacts have been found in many places in Sicily, the Italian peninsula, Calabria and Puglia, as far away as Dalmatia and Croatia, including some regions of northern Italy such as Emilia and Liguria and also Sammardenchia in Friuli and outside Italy. On the basis of chemical and physical analysis of the single artefact, it is possible to trace the source of origin that is the reservoir from which the rock was extracted. Thus, obsidian is evidence of the first great trade movement recognisable in the prehistory of the Mediterranean. In the Mediterranean the most exploited obsidian reserves are those of the islands of Melo (Greece) and Lipari. Less well-known is the obsidian from Pantelleria and the Pontine Islands (Palmarola), while that from Sardinia (Monte Arci) is common in Neolithic sites of Tuscany and Liguria.

In exchange for obsidian the inhabitants of the Aeolian Islands received consumer goods that increased the quality of life of a popula-

tion that was exceptionally large for the Neolithic age. Tools made of materials foreign to the geological nature of the islands arrived such as flint, axes of green stones and especially clay. With the spread of metal sheet demand for obsidian gradually decreased until it disappeared almost completely around 1500 BC In Greek and Roman times it was still sometimes used but only as a semi-precious material for luxury items.




Map of obsidian distribution

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## Pumice

The volcanoes in the north-eastern part of the island of Lipari have spewed out immense masses of pumice in successive eruptions, the export of which was one of the main economic resources of the island for centuries until 2007 when the mining and processing ceased. The last eruption, which is dated to the seventh century AD from the crater of Mount Pelato, ended with the obsidian flows of Rocche Rosse and the Forgia Vecchia and has given this part of the island its present appearance that has been changed by quarrying. The pumice thrown into the air covered more than a quarter the surface of the island, forming deposits hundreds of metres thick around the crater.

The pumice from the eruption of Mount Pelato in Lipari ▸

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Far away from the crater, carried by the wind, a thin layer of fine powder was deposited that has spread all over the island covering the remains of the Greek and Roman city of Lipari and its necropolis and it can also be found on the neighbouring islands of Vulcano and Panarea.

Pumice is therefore an explosive magmatic rock, very light because of its high porosity and, therefore, it is the only rock that floats on water.

Prehistoric people collected the pumice washed up on the beaches by the sea and used it as a grinding stone to smooth and refine arrows or bone awls.

In the Greek and Roman era pumice (in greek *Kiseris* in Latin *Pumex)* had numerous uses as an abrasive for working marble and metals. In particular it was used to prepare the tools for writing: stylus in bone. It was also used for building, as today, as a component of mortar, for lightening the archway, etc. or in cosmetics for cleaning teeth and smoothing skin and also in medicine for the treatment of wounds and ulcers. For this reason pumice was widely exported.

In the modern age pumice is used in cosmetics and in industrial washing (stone wash). In construction is used to lighten the concrete and as acoustic and thermal insulation, both as a powder and in blocks or panels. It also has other uses mainly related to its absorbent and abrasive properties such as absorbing and filtering industrial oils and cleaning surfaces in general.

Layer of flint in limestone rocks ▸

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## Flint

Flint was the main raw material used by prehistoric communities. It is a sedimentary rock of biochemical or organic origin, with a compact glassy appearance, composed for the most part of silica. The silica may be present in crystalline form (quartz), fibrous (chalcedony) and amorphous or partially crystalline (opal). Flint is widely present in nature and can be found in primary position in Mesozoic and Cenozoic flint limestone formations of marine origin, either in the form of continuous layers, slates or nodules.

In the secondary position it is generally in the form of pebbles in the beds of rivers or on ancient sea beds that have now emerged. The flint is quite easy to chip creating sharp edges because it has the same properties in all directions. This characteristic, combined with the hardness equal to that of quartz, has made it one of the stones most used by man to make weapons, work tools and jewellery.

It was used for a long time, especially in the Paleolithic and Neolithic periods. Following the introduction of copper in the Eneolithic period, the use of flint was slowly abandoned.

This rock was one of the first commodities to be traded among prehistoric human communities. Its great variability in colour and composition makes it difficult to identify the distinctive characteristics that may indicate its place of origin. It varies in texture (essential for processing), structure, lustre, transparency and colour, due to the presence of certain minerals. For example, iron oxides give colours in shades of red, yellow and brown; sulphides give grey-blue, whereas traces of hydrocarbons give a black colour. Studies to discover the sources of origin now make use of innovative techniques such as geochemical, petrographic and micro paleontological analysis.

Man has collected flint since the Paleolithic period but he also started searching for this rock by digging underground mining structures very early, in the Middle Paleolithic era (about 40,000 years ago). Mines have been discovered in Europe and in Italy one of the largest is Defensola, in the province of Foggia, dated to 7000 years ago. In Sicily mines have been discovered at Monte Tabuto (Ragusa). These were both surface and underground mines. The extraction technique involved the excavation of tunnels, chambers and wells to provide deep access. The limestone was excavated to free the flint nodules using pickaxes made of stone and the galleries were illuminated with torches or lamps in stone.

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Wall with layers of flint in Bagno Secco in Lipari

## The flint of Bagno Secco in Lipari

The town Bagno Secco takes its name from thermal springs formed on the mouth of the fumaroles, which are still active today. Below the ancient pyroclastic deposits of Monte Sant'Angelo (125,000-80000 years), a spring emerged that developed into a stream that flowed into the sea at the tip of Palmeto, where, you recall, the mills worked. We observe a high wall, like a cliff, in which there are several paleosols in layered deposits corresponding to long periods of volcanic inactivity of Monte Sant'Angelo alternating with volcanic deposits witnessing the resumption of activity.

In paleosol relating to the presence of an ancient lake (about 100,000 years), there are fossil plants, (*Cytisus aeolicus, Laurus nobilis* and especially palms) and layers of flint. Human groups who settled in Lipari in the Neolithic period to the end of the sixth millennium BC and lived on the plateau above Castellaro, used it to make tools.

Soon, however, it was abandoned because the type of flint at Bagno Secco, being very grainy, could not compete with obsidian and better-structured flint that was imported from Sicily and certainly traded with obsidian. Almost all flint artefacts unearthed in the prehistoric sites of the Aeolian Islands were imported as finished tools from the coast of Sicily and the Italian mainland, as evidenced by the absence in the Aeolian settlements of flint waste products.

Flint, Lipari

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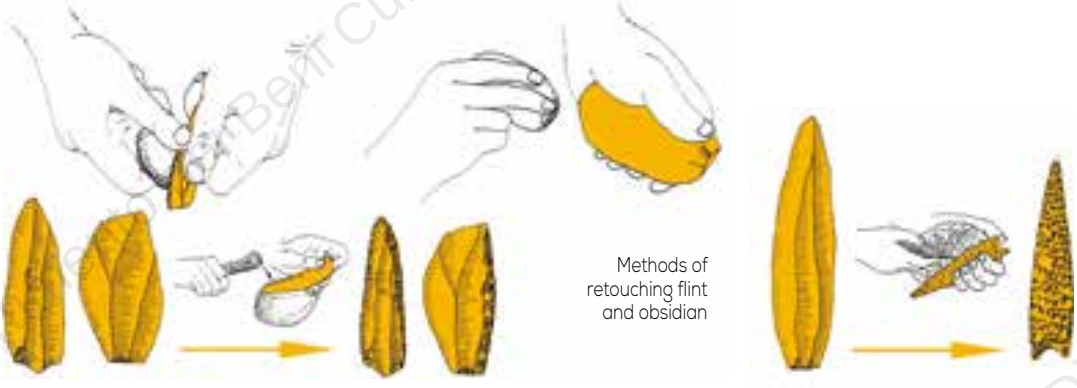
## Obsidian and flint technology

The obsidian chipping technique is the same as that used for flint and other stones used by man since the Paleolithic period for making tools from blades and flakes. The manufacture of tools was achieved by chipping which consisted of preparing the stone block (core) to create a flat striking surface from which numerous flakes and blades were extracted. The most frequently used chipping technique was the striking method, either striking the core directly with a hard object such as stone, bone or wood or indirectly by inserting a bone or wood chisel between the core and the object used for striking. Another technique used in the Neolithic period was pressure that was applied by pressing a pointed stick against the core with the chest. The second action pertained to retouching. It was used to give the flake or blade a more functional shape by trimming the edges with a tiny chip via a hard (stone) or soft (bone) retoucher. The specialised tools thus obtained



Methods of retouching flint and obsidian

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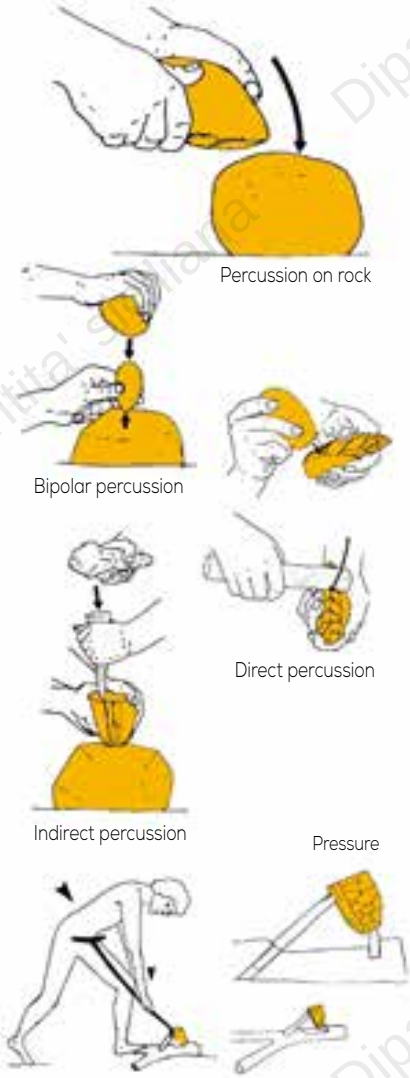
Use of sections of flint blades for sickle

could have handles fitted, that is they were inserted into a wooden or bone handle to facilitate their use. The main tools were burins, graters, arrowheads, scrapers, awls, geometry tools, axe heads and handstones. The vitreous consistency of obsidian facilitated the creation of cutting tools, but it was also used for arrowheads, scrapers and other types.

Methods of chipping flint and obsidian

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## Clay

Clay is only found in the Aeolian Islands as a product of degradation by the action of the fumaroles on the volcanic rocks of the geologically oldest areas. The most obvious deposits, although very limited in extension, are those of the valley Fuardo. Their exploitation since antiquity is attested by the presence of pottery dating from the VI-III century BC. From the point of view of industrial use, the clay in Lipari

**Archaeometry** (literally *measure of what is old*) is the application of scientific disciplines, including natural, chemical and physical methods, on antiquities in order to solve problems of a historical and archaeological nature. The archaeometric analysis of ceramics consists of identifying the origin of the raw material, through the comparison with the geological formations of origin, and in assessing variability and complexity of technological processes to define the degree of specialisation of the artisan and understand the social organisation of production.

is of poor quality, however, it has fuelled the production of ceramics since Neolithic times and throughout antiquity. Better quality clay was imported from Sicily.

In prehistoric times clay was also used for the construction of huts as a lining for the reed walls or plaster for stone walls, as beaten flooring and also to coat the silos used for storing food.

In Greek and Roman times the local clay was only used for the production of tiles and other building materials, of *pithoi* and other large vessels, pottery of poor quality and especially the myriad of jars, by this time devoid of practical use but of symbolic meaning and deposited as a kit in tombs. A Roman craft industry with a furnace for baking the pottery must have existed in Lipari near the beach of Portinenti, as documented by some tanks used to store clay and then filled with the waste products of amhorae processing Richborough 527 today identified as Lipari type (Classic pavilion).

◂ Bowl with clay found in the Bronze Age village (Capo Graziano culture) on the acropolis of Lipari

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## Kaolin

Via a narrow road that branches off from the main road towards the town hospital, in the hamlet of Quattropani, you can reach the kaolin cave, in use from ancient times until 1972, managed by the ABCD Company of Ragusa and then by Italcementi.

It has spectacular formations of kaolinised clay and banks of more or less impure kaolin, snow white in some places, especially in surfaces vividly coloured by the action of the fumarolic gases; the area, which represents the geologically oldest part of the island, is still affected by phenomena of secondary volcanism visible along the path down to the sea, to the left of the quarries, that leads to the cliffs of Palmeto. The ancients did not have a name for kaolin (the current name is of Chinese origin, which means Gaoling *high hills*with reference to the region where it was discovered in the eighteenth century) and this could lead one to sup-

Coroplast (third century BC)
with white surface made of kaolin ▸

pose that they had not identified this mineral and did not recognize its use. The exploitation of these quarries, however, dates back to very ancient times, as, in the Greek period, kaolin was already being used by local craftsmen for manufacturing vessels, mixed with clay imported from the nearby coast of Sicily, and for the white slip that covered terracotta statuettes. Ceramics found in these galleries (fragments of amphorae that must have held water for the workers, of pots and black cups that must have contained their food) allow us to date this activity between the middle of the fourth and third century BC. The kaolin quarries continued to be used for the construction industry until modern times and new tunnels partially cut into the older ones.

The use of kaolin was characteristic of *Lipàra* in the Greek

Detail of the decorations on the vessels
of the artists of Lipari ▸

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period especially vessel production in the workshopof the ***Pittore di Lipari***, active in the island from the end of the fourth century to the middle of the third century BC The high-quality vessels, found in tombs in the necropolis of the Diana are characterised by very pure clay imported from the nearby coast of Sicily. A thin layer of pure kaolin was applied on vessels. The surface was decorated in bright polychrome by figures painted with beautiful pastel colours applied cold, tinted blue, yellow, pink, red and white. In some cases the polychrome was enriched by thin strips of gold to bring alive the designs of the jewels on the female figures. Kaolin was also used for the white paint, shiny, like porcelain, which is observed on small terracotta objects (figurines, models of theatrical masks, flowers, etc.) produced during the same period in Lipari and not found anywhere else in the Greek world. Coming out of the kiln for the first time, small terracotta objects had to be painted with a whitish colloidal suspension, obtained by washing kaolin, and then placed in the kiln again to fix this paint. Sometimes this painting was only the substrate on which colours were applied, other times this coat was itself coloured.

## Sulphur

The intense fumarolic activity on the island of Vulcano in the area of the Faraglioni di Levante and up to Vulcanello deposited a number of products useful to man: sulphur, alkaline sulphates, boric acid and various borates, sal ammoniac and alum, which were exploited from remotest antiquity and which constituted one of the major economic resources of the Aeolian Islands at certain periods. Sulphur was collected by scraping the ground around the fumeroles that was impregnated or by passing the vapours through soft material that had been heaped on smaller fumaroles and then gathering the products that were deposited. The ancients did not know the techniques for obtaining sulphur by chemical processing of sulphates. They used it just as it was in nature and distinguished it as native sulphur (APYRON = not burned i.e. usable as gathered) and molten sulphur (i.e. PEPYROMENON obtained by melting minerals containing it). The first was much appreciated and was collected on the island of Vulcano. (Pliny, *Naturalis Historia* 35, 15: *Born in the Aeolian Islands ... but the best is on the Island of Melos. It is also found in Italy in the Naples and Campania regions, in the hills called Leucogei.*

Aeolian sulphur was also mentioned by Pedanius Dioscorides, Greek physician, botanist and pharmacist who practised in the first century AD. The industrial exploitation of sulphur began in Roman times. It was in fact already mentioned by Ovid in the first century AD and flourished between the second and fourth centuries AD.

The Greeks called the sulphur *theion* meaning "divine" because the thunderbolt hurled by Zeus was accompanied by the smell of sulphur.

Pliny in *Naturalis Historia* 35, 177: *The lightening had the smell of sulphur and its light was made by sulphur.*

It was used in religious rites for purification (after the massacre of the suitors, Ulysses purifies the house by fumigating it with sulphur) and also in rituals of witchcraft and enchantment. Like today it had many uses in agriculture and craft industries. Pliny recalls a sulphur putty to repair broken glass. Sulphur in an oily solvent was used to bleach wool fabrics and to light the fire. In metallurgy sulphur was used in the niello (a metal alloy, black in colour that includes sulphur, copper, silver and often lead, used as an inlay in the engraving of metals) technique, already known to the Egyptians. In medicine it was used in the preparation of ointments for external use.

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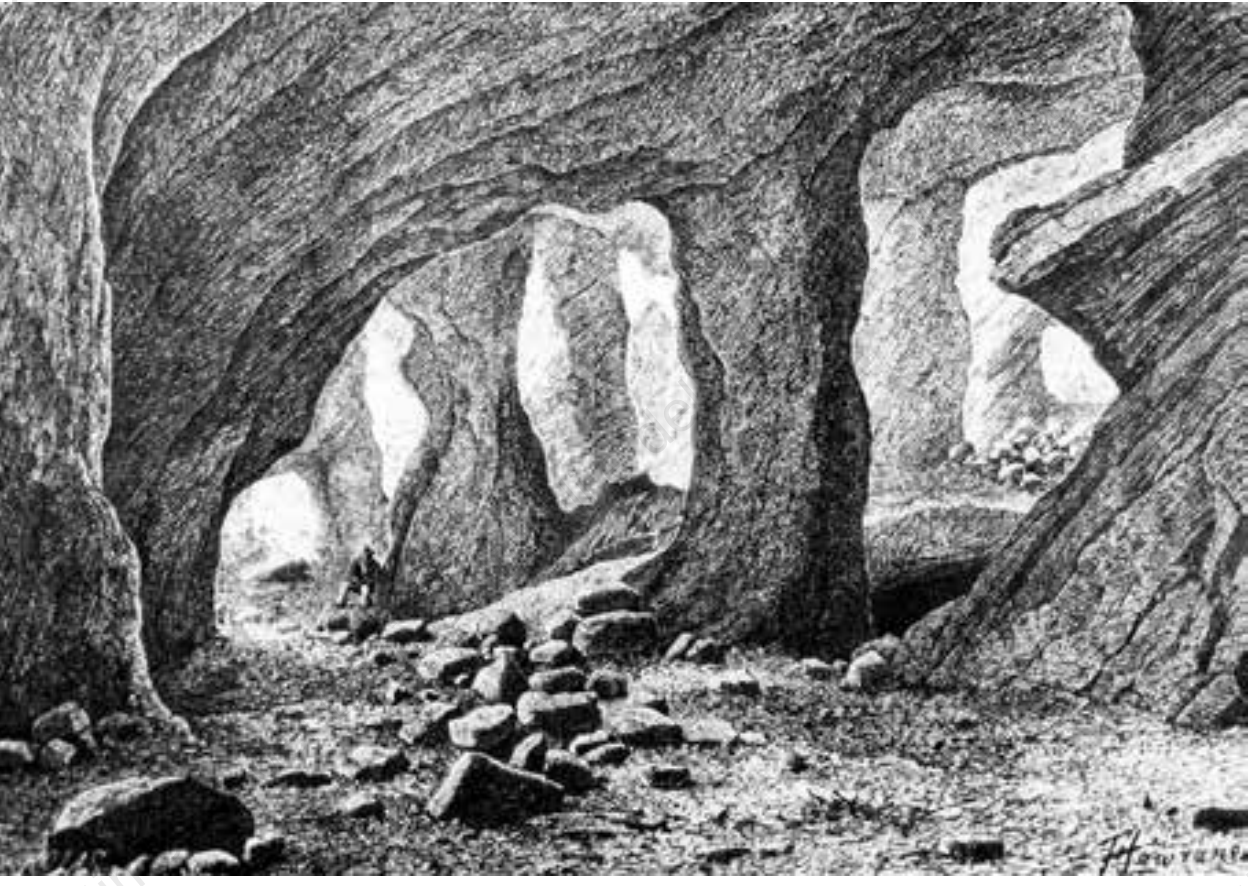
Volcano. The caves of alum (*by Ludwig Salvator of Austria 1894*)



Dipartimento

## Alum

Alum was obtained from the Faraglioni di Levante where the land, originally trachyte, was severely decomposed by the action of the fumaroles. Here large caves were dug, in the largest of which the vault is supported by numerous pillars left during the excavation. In one of these there was a layer of hot water, whose temperature rose during certain periods up to 82-84 degrees centigrade. These waters impregnated the walls of the cave, where they formed stalactites of alum and mixtures of various salts. Alum and other products (boric acid, sal ammoniac, etc.) were obtained by subjecting the minerals that contained them to washing and boiling.

By adding copper sulphate to the mother liquor, loaded with sulphuric acid, copper was obtained.

Alum from the Alum Cave in Faraglione Levante on the island of Vulcano was known by prehistoric people at least from the Bronze Age and was the subject of a large-scale Mediterranean trade. Mycenaean tablets written in Linear B clay from 1200 BC found in the excavations of the "Palace of Nestor" in Pylos in Messenia, are reminiscent of alum (in Greek *strypteria*). In Lipari the testimonies to trade with the Aegean world are particularly numerous (Prehistoric pavilion).

In classical period, alum was one of the main resources of Lipari.

Diodorus V, 10: *The island of Lipari is famous for its alum quarries from which the people of Lipari and the Romans derive large profits. Because alum is found nowhere else on earth and because it is very useful, they have a virtual monopoly and by raising the prices*

*they make incredible gains, in fact only the island of Melos has a small amount of alum, not enough to supply many cities.*

Strabo also recalls "the profitable cave" of Lipari and from Pliny we know that alum was also extracted at Stromboli. Pliny tells us that it was used in tanning, dyeing fabrics, as an astringent and styptic in pharmacy and as a conductor for fire.

Mining was practised by the Romans. Indeed amphorae, known to scholars such as Richborough 527 (Lipari type 1 and 2), produced in Lipari, where the furnace was found, transported alum, sulphur and capers. Alum was actively extracted in Volcano until 1888-1890, when it was discontinued due to a strong eruption of the volcano. Before 1888, Faraglione was known as "The Factory". At the time of the Bourbons, General Nunziante, who had participated in the battles against Napoleon, exploited the alum mine. Ferdinand I, King of the Two Sicilies, had granted the use of about 400 "forced" labourers who lived in small caves dug into the Faraglione near the large cave of the alum mine. Fifty workers from Lipari and Salina, who lived with their families in the caves in appalling conditions of poverty, were added to these. In 1878, the heirs of General Nunziante ceded the rights to the Stevenson family from Glasgow, who bought the island for 8,000 pounds and who already operated the pumice industry in Lipari. Their palace with its towers and battlements (the "little castle" or "Scottish Castle") that was partially destroyed by the eruption of 1888 is still visible.

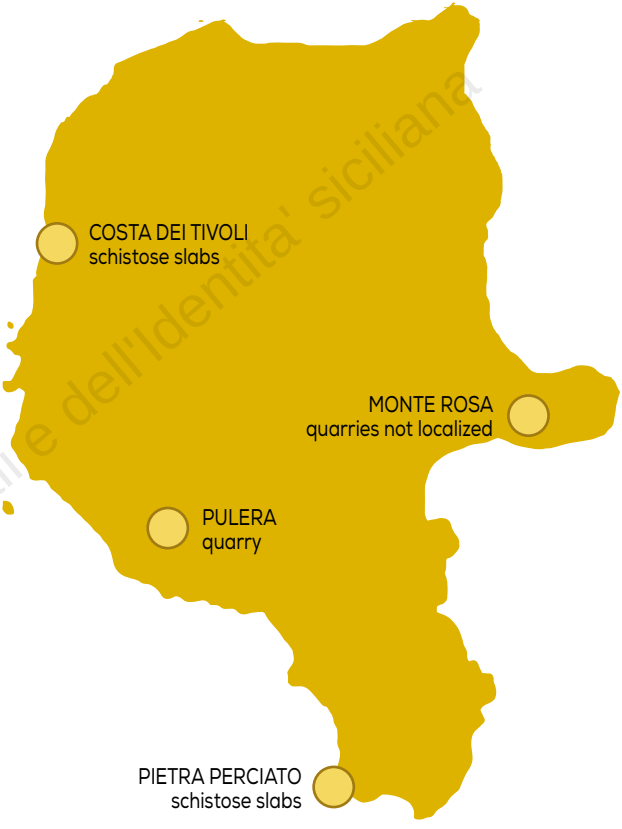
Dipartimento siciliano

## Stone extraction

### Schist slabs

In the bronze age large schist slabs were used for furnishing huts.

They were used as work surfaces, hearths or even as thresholds or lintels, or flooring or to coat the outside of the base of the walls of the huts. These slabs, often measuring more than one metre, were detached by the natural cleavage of the rock in places, accessible only by sea, on the west coast of Lipari (Coast of Tivoli) or from the bay of Porto Filicudi and at Salina. Slabs of this type closed cremation urns in the tombs of the culture of Capo Graziano.

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## The stone of Monte Rosa

The stone of Monte Rosa is a volcanic rock (latitandesite) deep red in colour, belonging to the oldest geological formations of the island of Lipari.

The promontory that divides the bay of Lipari from Canneto takes its name from the colour: Monte Rosa. Hence evidently it was extracted, but nothing remains of the ancient quarries.

It is not a very compact stone, easy to manufacture but also easy to break, not suitable for items subject to particular stress. It can be used to make good square blocks for masonry. It was widely used by the Greeks in the fifth and fourth centuries BC for this purpose, being used to make all the city walls and fortifications of the Acropolis. Many sarcophagi of the necropolis are cut from the stone of Monte Rosa.

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Lipari. Fuardo stone sarcophagus
from the necropolis in the Diana

### The stone of Fuardo or Pulera and Serra

It is a Rhyodacite (effusive rock) in various colours from havana brown to dark grey, flowing down from the crater of Monte S. Angelo to the South East divided into two branches, that of Fuardo and that of Pulera, separated from each other by the deep pit of Fuardo. In the district of Pulera (hamlet of Pianoconte) there are the remains of extraction site of the stone that was used in Greek and Roman times for buildings and obtaining the slabs of the funeral sarcophagi and *ste-*

*lai*. Rock boulders are still visible on which you can see the cuts and grooves made by the wooden wedge method and an unfinished rock column (hence the slang term "pulera" to indicate column). The area of the Pulera district must have been in use for a long time, even up to the Middle Ages, as is evidenced from the large processing waste dump that extends into the cliffs below. In Serra, grey stone that was used for tombstones and building blocks must also have been excavated.

### Hot springs and fumaroles

Ancient sources (Strabo, Ateneo) often report news about the hot springs of Lipari and Diodorus (V.9,10) is the most direct:

*Regarding the city of Liparesi, we should recall the reasons why in recent times it has seen development that have enhanced not only health but also reputation. This comes from the nature of good harbours and the famous thermal springs among the most well-known. In fact these baths are not only of benefit for healing the sick, the particular properties of the hot springs also offer extraordinarily refreshment and relaxation. Hence many people from Sicily affected by specific diseases have come here, taken advantage of the baths and recuperated wonderfully*. Medieval legends ascribe the rediscovery and reactivation of the sources to San Calogero.

Pietro Campis (1694): *There was a tradition in that part of the island where Calogero had his hovel of some famous baths, the warm waters of which had been lost in time immemorial because of lack of care by the villagers and with a noticeable impact on the sick. Calo-*

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*gero obtained the word from God in his prayers that those waters should come forth again for the common benefit ... so, he built that vaulted room that you can see and placed in it a large vessel in which the steaming waters are collected.*

One of the most important testimonies was that of Jean Houel, a traveller, painter and engraver, a native of Rouen, who lived in Sicily from 1776 to 1780. In 1778, he visited Lipari and designed the thermal structure of Saint Calogero formed by a domed building. Houel recalls that above the spring that flows from the rock, a quadrangular building with a vaulted roof was built. It was used for immersion into the water and as a stove for steam baths.

### The thermal baths of San Calogero

The domed thermal building of exceptional interest, in its original structure dates back to the Early Bronze Age and has been used and frequented until modern times. The thermal heater consists of a *tholos* partially built into the slope of the mountain, constructed with rows of overlapping blocks protruding on each other and forming circles sloping upwards. The characteristic architectural structure with pseudo dome compares to the *tholos* tombs of Greece in the Mycenaean period, dating between 1600 and 1400 BC, and in particular with those of the princely necropolis of Mycenae (Treasury of Atreus). The *tholos* of San Calogero is the only Mycenaean-influenced architectural monument used for a thermal source. Inside the building ceramic fragments characteristic of the culture of Capo Graziano, widespread in the Aeolian

Islands in the second millennium BC, were found. They have allowed us to date the structure to around 1600 BC.

The surrounding area is crossed by several channels in which the sulphur water flowed, including the main one connected to the source. The baths were used from the time of the founding of Greek Lipara (580 BC). In the Roman period, the baths were enlarged with tanks of different sizes and with a swimming pool with steps dating back to 1st-2nd century AD. At the base of the rocky cliff, the water from the spring that flows into the large thermal pool gushes from a deep cave.

In 365 AD at the time of the emperors Valentinian I, Valens and Gratian, while the pool was still in operation, a violent earthquake destroyed the building, the ceiling of the pool collapsed completely and today there remains a part as witness to the event that still covers the NE corner of the bath. The dating of the catastrophic event to the fourth century AD is confirmed by the discovery of four bronze coins of Emperor Valentinian. The earthquake, noted in the sources, also caused considerable damage to the *tholos* causing part of the ceiling to collapse and slip downhill. The Roman bath complex was then

abandoned and only the *tholos* structure where the thermal waters were and are conveyed remained in operation. Adjacent to the archaeological remains, a building functioning as a sanatorium was built in 1865-1870 and remained in use until 1975.

### The Organ of Aeolus

In the Piano Greca district of Lipari, you can still see the ruins of a small thermal building of the Roman Imperial age that were designed by the traveller Jean Houel in 1778. The prospect of a masonry wall with a small arched brick opening was preserved from the original structure . The masonry technique allows us to date the monument to the late Roman Imperial age, or the fourth century AD, dating confirmed by

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ceramic fragments found in the neighbouring area. In local tradition the monument was called "organ of Aeolus", probably because of the noise caused by wind that crept into the hollow structures that characterised it. These small thermal baths exploited the natural phenomena of secondary volcanism still present in this area of the island.

### The thermal baths of Contrada Diana

Near the Bishop's Palace, there is a public bath complex with mosaic floors, dating back to the Roman Imperial age. It was discovered in the late eighteenth century and was designed in 1830 by the British navy officer HW Smyth. The spa building, dating from the beginning of the second century AD, was in a suburb of the Roman town, near the river S. Lucia, whose course was exploited as evidenced by the ducts found. The area is also known for the presence of natural hot springs.

The *tepidarium* and the *caldarium* originally had beautiful mosaic floors in black and white with geometric shapes, fish and fantastic creatures belonging to the marine world, today they are badly damaged and incomplete. In the floor of the second location, part of a round is preserved in which we can see the head of a griffin with fish tail held by a triton of which the arm and messed-up mane remain.

### The baths in via Franza

Archaeological excavations have uncovered a part of the suburbs used for work activities, where there was also a modest spa building. The entire building complex is dated to the late Roman period and may have

◂ Lipari. Roman baths "organ of Aeolus"

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been built after the earthquake of 365 AD. The thermal building was added at a later time, perhaps in relation to a change in the type of production. The complex was abandoned around the fifth or sixth century BC.

### Bagno Secco

The thermal stoves which gave their name to the Bagno Secco district at Quattropani were mentioned in the sixteenth century by Thomas Fazzello (*De Rebus Siculis* 1558) and Pietro Campis in 1694, but were carefully described by Deodat de Dolomieu in 1781: *I could recognise the stoves from afar because of the strong smell of sulphur... All of the soil where they are located is penetrated by burning vapours, some dry, others wet, coming out from small natural openings with a diameter of one or two inches in the form of dense smoke, which sometimes by a process of sublimation leaves sal ammoniac, sal aluminous or sulphur stuck to the stones. The stoves consist of five excavations in the form of caves four or five feet in height and the same in width opening on the top of a mound. Three of these cavities are interconnected and are of different depths. There are small openings that supply steam to the caves, which is hotter when the excavation is deeper. These stoves had to be abandoned because the heat was too great*

Lipari. Roman baths in the Diana

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*and could stifle those who were exposed to it. The warmth of these stoves varies and depends on the vicissitudes of the volcanoes. There are times when none of them are feasible... A little above the stoves there is a 4 foot wide hole connected with a deep, inclined tunnel that I could not go inside: they call it the Devil's Kettle because one tradition says that flames came out of it. Thick, burning smoke still sometimes escapes from it. About three hundred feet below the stove, a considerable source of almost boiling water comes out of the mountain side and is used to operate three mills.*

The phenomena described by Dolomieu were markedly subdued after the great eruption of the volcano from 1888 to 1890. The fumaroles are still active but of the caves there remains no trace. It is possible that the Devil's Kettle was one of the galleries used in Greek times for the extraction of kaolin.

### The Lime of Panarea

On the island of Panarea, the name of Calcara indicates a small semicircular basin overlooking the sea. Much of it is home to fumaroles with emanations of hot springs that continue even under the sea. Archaeological excavations conducted in the years 1947-1948 brought to light several layers of human presence. The most important archaeological remains include some circular wells constructed with sea pebbles. They were used during the Bronze Age by the people of the culture of Capo Graziano (2nd millennium BC). Their function is unknown, but it is assumed that the wells were intended to receive offerings.

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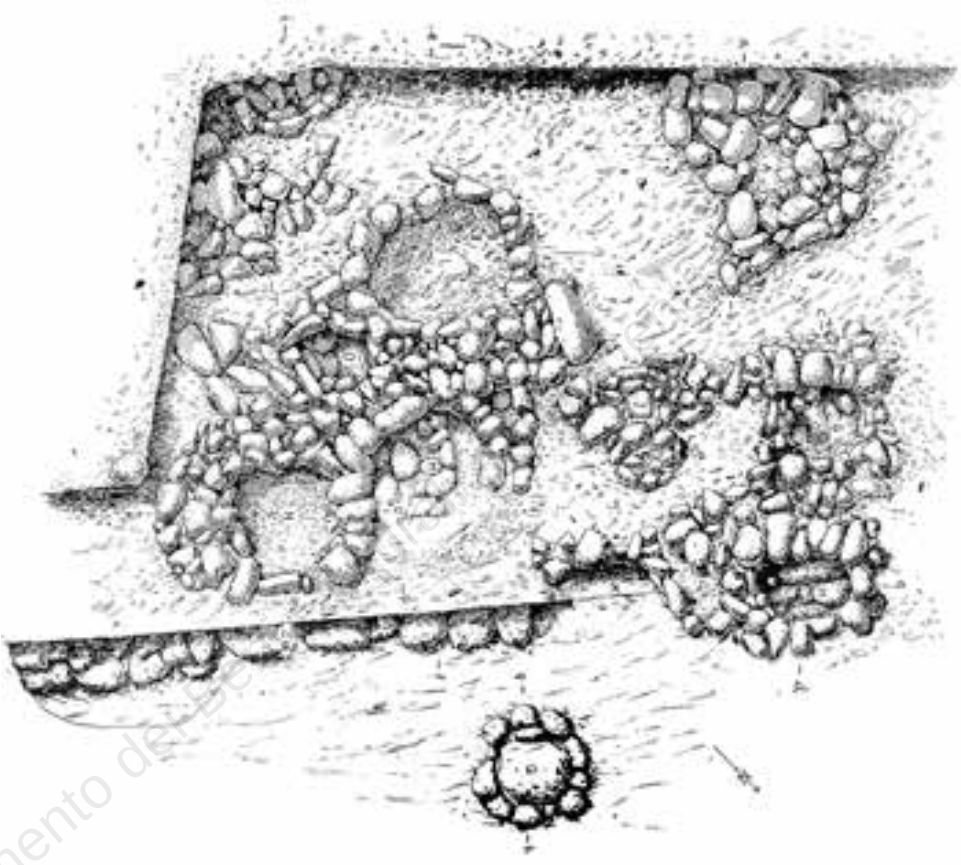


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## Agriculture

*The island of Liparesi is small in size, but remarkably fertile and offers various products for the livelihood of the inhabitants: It abounds with fish of all species and fruit trees that offer the most pleasant fruits.* (Diodorus Siculus in the first century BC.).

Agricultural areas of the highlands of Lipari owe their fertility to soil consisting of a thick yellowish-brown layer usually one or two metres thick (that can reach 20 metres) that was formed in part because of the vegetation (*humus*) and in part due to the fine volcanic ash, carried by the wind, above the layer of rhyolitic pumice that was erupted from volcanoes of the southern end of Lipari (Monte della Guardia) and which covered almost the entire surface of the island. This fertile layer has formed in all the flat areas, but over time subsequent erosion has partly removed it, bringing to the surface the underlying layer of pumice or the older rocks that form the backbone of the island. In the north-east of the island it was covered, along with the remains of ancient human activities, by pumice from the recent eruption (7th-8th century AD) of Monte Pelato. The areas over which the yellowish-brown fertile layer extends were inhabited during all ages since the Neolithic period (Castellaro, Contrada Diana). In Roman times, farms and farming villages arose (San Nicola, Fossa di Monte Giardina, Piano Greca, Cicerata, Punta Palmeto, Castellaro Vecchio etc.).

◂ Agricultural areas of Lipari from prehistoric to Roman times

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Decorated vessel containing burnt grain found in a hut (delta XII) of the Bronze Age (Capo Graziano culture, phase II, 1700-1500 BC) on the acropolis of Lipari

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### Archaeological finds

In the villages of the Bronze Age on the islands of Lipari, Filicudi and Salina, burnt seeds related to various plant species used in agriculture were found.

Archaeobotany is the discipline that studies these particular findings, determining the species and comparing the results with other ancient settlements. Through study of wood charcoal from, for example, the fires of wood roofs of structures, it is possible to reconstruct the natural environment of the time or techniques of housing construction. This was the case of the Middle Bronze Age village of Portella (Salina) where the remains of burnt branches of the roofs are evidence of the use of the broom.

The fragments of charcoal found mainly belong to some plants of Mediterranean scrub, such as *Olea europaea*, *Erica* sp., *Genista* sp., *Myrtus communis*and other species such as Rosaceae / Maloideae, particularly *Prunus* sp. This identifies a Mediterranean environment characterised by evergreen trees which include: holm oak, arbutus, olive, laurel and shrubs like cistus, mastic, heather, myrtle, rosemary and broom.

Among the plants used for food,, the most common are the barley (*Hordeum vulgare* subsp. *vulgare)*, wholewheat or spelt (*Triticum dicoccum*) and hulled wheat or better durum wheat (*Triticum dicoccum* and *Triticum aestivum/durum)*; legumes include broad beans and vetch (*Vicia faba* var. *minor*, *Vicia ervilia)*, lentils (*Lens culinaris)* and peas (*Pisum sativum)*.

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## The *Vitis vinifera*

The earliest archaeological traces of cultivation and domestication of the vine are to be found between the seventh and fourth millennium BC, in a geographical area between the Black Sea and Iran. From this area forms of cultivated vine spread to the Near and Middle East and Europe, through processes of secondary domestication in relation to the presence of wild forms. The different varieties of grape were probably already produced and established in this phase. The oldest wine production appears to have been proved in Iran. From the eastern Mediterranean vine cultivation gradually spread to the West, with a crucial role played by the Aegean and Crete in particular. In Italy, archaeobotanical testimonies of the oldest cultivated vine are attested to the Aeolian Islands, the finds of grape seeds in the village of Filo Braccio in Filicudi (2300-1700 BC) and in the village of Portella in Salina (1500-1300 BC) both have important links with the Aegean area.

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Grape seeds of *vitis vinifera* found in hut P of the village of Portella in Salina (Middle Bronze Age / 1500-1300 BC)

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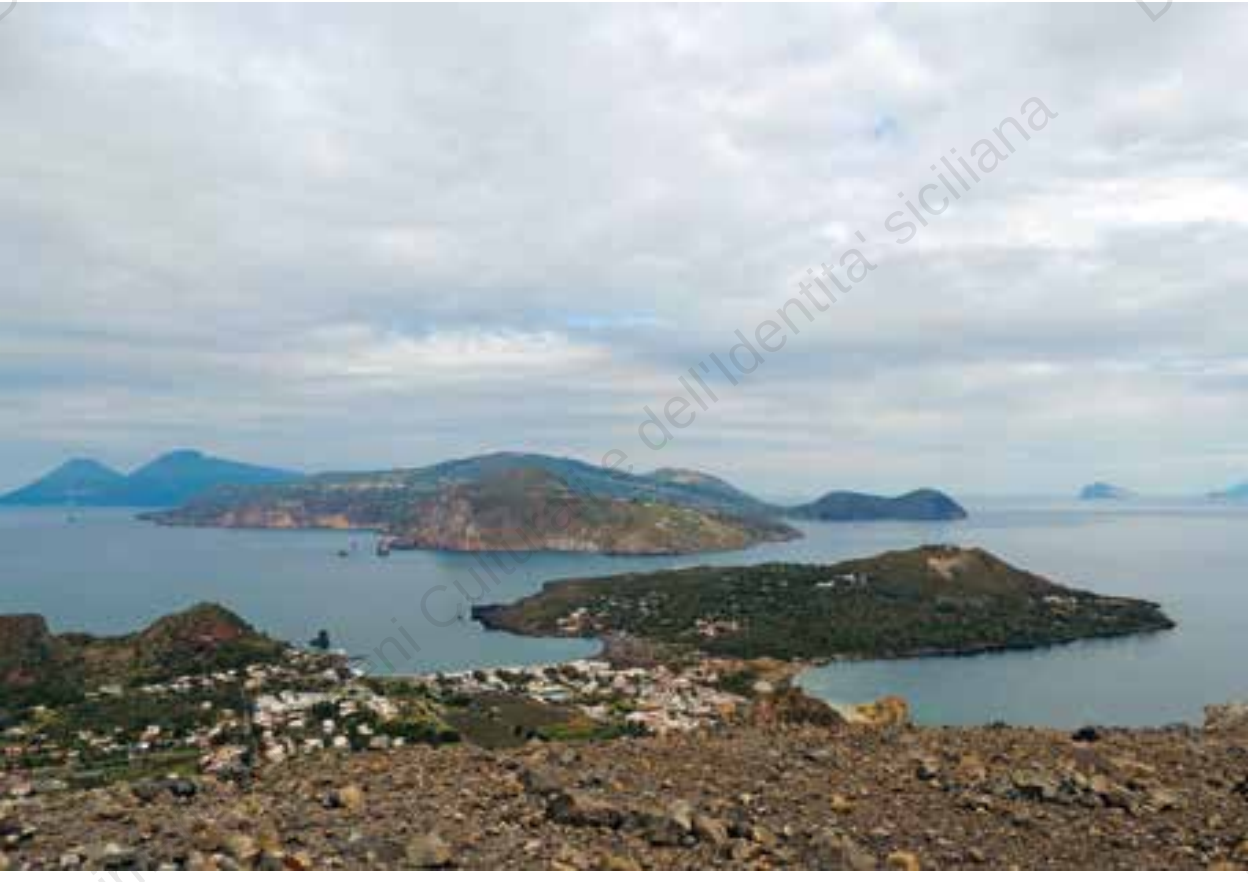
The Aeolian Islands seen from the crater of Vulcano



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