



EuroLithos Country Atlas Cyprus

EuroLithos Atlas

Ornamental stone resources in Cyprus

Thematic focus: Cyprus

Responsible partner(s): GSD

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Geology of Cyprus

The genesis of the island of Cyprus was the result of a series of unique and complex geological processes, which established Cyprus as a geological model for geoscientists around the world and contributed to the understanding of the evolution of the oceans and planet Earth in general. At the top of Troodos, are outcropping rocks of the deepest layer of a fragment of oceanic crust and the Earth's upper mantle, an ophiolite complex, which was formed 92 million years ago, several kilometers below sea level. The complex geological processes in the region of Cyprus formed unique geodiversity rich in mineral resources, especially copper.

The geological structure of Cyprus

Cyprus is divided into four geological zones: (a) the Pentadaktylos (Keryneia) Zone, (b) the Troodos Zone or Troodos Ophiolite, (c) the Mamonia Zone or Complex and (d) the Zone of the autochthonous sedimentary rocks.

The Pentadaktylos (Keryneia) Zone is the northern-most geological zone of Cyprus and is considered to be the southern-most portion of the Tauro-Diranide Alpine Zone. It has an arciform disposition with an east-west direction and is characterised by southward thrusting. The base of the Zone is mostly composed of a series of allochthonous massive and recrystallised limestones, dolomites and marbles of Permian-Carboniferous to Lower Cretaceous age (350-135 Ma). These are stratigraphically followed by younger autochthonous sedimentary rocks of Upper Cretaceous to Middle Miocene age (67-15 Ma), on which the older allochthonous formations have been thrust southward.

The Troodos Zone or the Troodos Ophiolite dominates the central part of the island, constitutes the geological core of Cyprus, appears in two regions (main mass of the Troodos mountain range and in the Limassol and Akapnou Forests south of the range) and has a characteristic elongated dome structure. It was formed in the Upper Cretaceous (90 Ma) on the Neotethys sea floor, which then extended from the Pyrenees through the Alps to the Himalayas. It is regarded as the most complete and studied ophiolite in the world. It is a fragment of a fully developed oceanic crust, consisting of plutonic, intrusive and volcanic rocks and chemical sediments. The stratigraphic completeness of the ophiolite makes it unique. It was created during the complex process of oceanic spreading and formation of oceanic crust and was emerged and placed in its present position through complicated tectonic processes relating to the collision of the Eurasian plate to the north and the African plate to the south. The stratigraphy of the ophiolite shows a topographic inversion, with the lower suites of rocks outcropping on the highest points of the range, while the stratigraphically higher rocks appear on the flanks of the Troodos massif. This apparent inversion is related to the way the ophiolite was uplifted (diapirically) and then differentially eroded. The diapiric uplift of its core took place in many episodes with more intense uplift taking place in the Pleistocene (2.6 Ma).

The Mamonia Zone or Complex appears in the Pafos district in the southwestern part of the island. It constitutes a series of igneous, sedimentary and metamorphic rocks, ranging in age from Middle Triassic to Upper Cretaceous (230-75 Ma). These rocks, which are regarded as allochthonous in relation to the overlying autochthonous carbonate successions and the Troodos ophiolite rocks, were placed over and adjacent to the Troodos ophiolite during the Maastrichtian.

The Zone of the autochthonous sedimentary rocks, ranging in age from the Upper Cretaceous through the Pleistocene (67 Ma to recent years), covers the area between the Pentadaktylos and Troodos Zones (Mesaoria) as well as the southern part of the island. It consists of bentonitic clays, volcanoclastics, marls, cherts, limestones, calcarenites, evaporites and clastic sediments.

The Troodos Ophiolite

The Troodos Ophiolite consists of the following stratigraphic units, in ascending order: Plutonics (mantle sequence and cumulates), Intrusives, Volcanics and Chemical sediments.

The mantle sequence is thus termed because the rocks that form this suite are considered to be the residuals after the partial melting of the upper mantle and the formation of basaltic magma, from which the remaining rocks of the ophiolite

have been derived. It is mainly composed of harzburgite and dunite with 50-80% of the original minerals altered to serpentine, and serpentinite (with or without concentrations of asbestos) where the alteration is almost complete.

The cumulate rocks are the products of crystallisation and concentration of the crystals at the floor of the magma chamber, beneath the zones of sea floor spreading. The main cumulate rocks include dunite with or without chromite concentrations, wehrlite, pyroxenite, gabbro and plagiogranites, which are observed in small discontinued occurrences.

The Intrusive rocks (Sheeted Dyke Complex - Diabase) have a basaltic to doleritic composition and were formed by the solidification of the magma in the channels, through which it intruded from the magma chambers at the bottom of the oceanic crust, feeding at the same time the submarine extrusion of lava on the sea floor. The Sheeted Dyke Complex is followed by a suite of volcanic rocks that consist of two series of pillow lavas and lava flows, mainly of basaltic composition. The pillow lavas have a characteristic spherical to ellipsoidal pillow shape, 30-70 cm in diameter, which were formed as a result of submarine volcanic activity. Between the intrusive rocks and the pillow lavas a transitional zone known as the Basal Group occurs. Dykes dominate the Basal Group while pillows are less common.

The Pera Pedhi Formation is composed of umber (chemical sediment), radiolarites and radiolaritic shales. These were the first sediments to be deposited over the ophiolite rocks as a result of hydrothermal activity (hot solutions rich in Fe and Mn) and sedimentation on the sea floor.

The Autochthonous Sedimentary Rocks

The sedimentation in the geological history of Cyprus started 80 Ma in a deep sea which becomes gradually shallower. The sedimentation begins with the deposition of the **Kannaviou Formation** (bentonitic clays, volcanoclastics), followed by the deposition of the **Moni and Kathikas Formations**. Carbonate sedimentation begins 65 Ma with the deposition of the **Lefkara Formation**, which includes pelagic marls and chalks with characteristic white colour, with or without cherts. The Lefkara Formation is followed by the **Pakhna Formation** 22 Ma, which consists mainly of yellowish marls and chalks. The colour of the rocks, the presence of calcarenitic layers and the occasional development of conglomerates are characteristics that differentiate the Pakhna from the Lefkara Formation. Sedimentation of the Pakhna Formation began and terminated in shallow-water environment with the development of reefal limestones (Terra Member at the base and Koronia Member at the top of the Formation).

The deposition of the evaporites of the **Kalavassos Formation** (6 Ma), was the result of the isolation of the Mediterranean Sea from the Atlantic Ocean and the subsequent evaporation of its waters. The Formation is composed of gypsum and gypsiferous marls that cover extensive areas.

Upon the reopening of the Gibraltar Strait and the reconnection of the Mediterranean Sea with the Atlantic Ocean, a new cycle of sedimentation began (5 - 2 Ma). The **Nicosia Formation** was deposited first and contains grey and yellow siltstones and layers of calcarenites and marls. Upwards it consists of calcarenites interlayered with sandy marls (**Athlassa Member**). They follow the **Apalos and Fanglomerate Formations**, which consist of clastic river deposits (gravels, sand and silt).

The Mamonia Zone

The Mamonia Zone is named after the village of Mamonia in Pafos, where classic outcrops of the Zone occur. It consists of a series of allochthonous volcanic, sedimentary and in smaller proportion metamorphic rocks that were formed 230-75 Ma and it includes the following:

- I. Volcanic (lavas) and sedimentary rocks (recrystallised limestones) of the Diarizos Group.
- II. Pelagic sedimentary rocks (limestones, mudstones and quartzitic sandstones) of the Agios Photios Group.
- III. Metamorphic rocks (schists and marbles) of the Agia Varvara Formation. These rocks were derived from the metamorphism of the Diarizos Group.

The rocks of the Mamonia Zone have been intensely deformed and mixed with large fragments of the Troodos ophiolite rocks forming extensive zones of melange.

The Pentadaktylos Zone

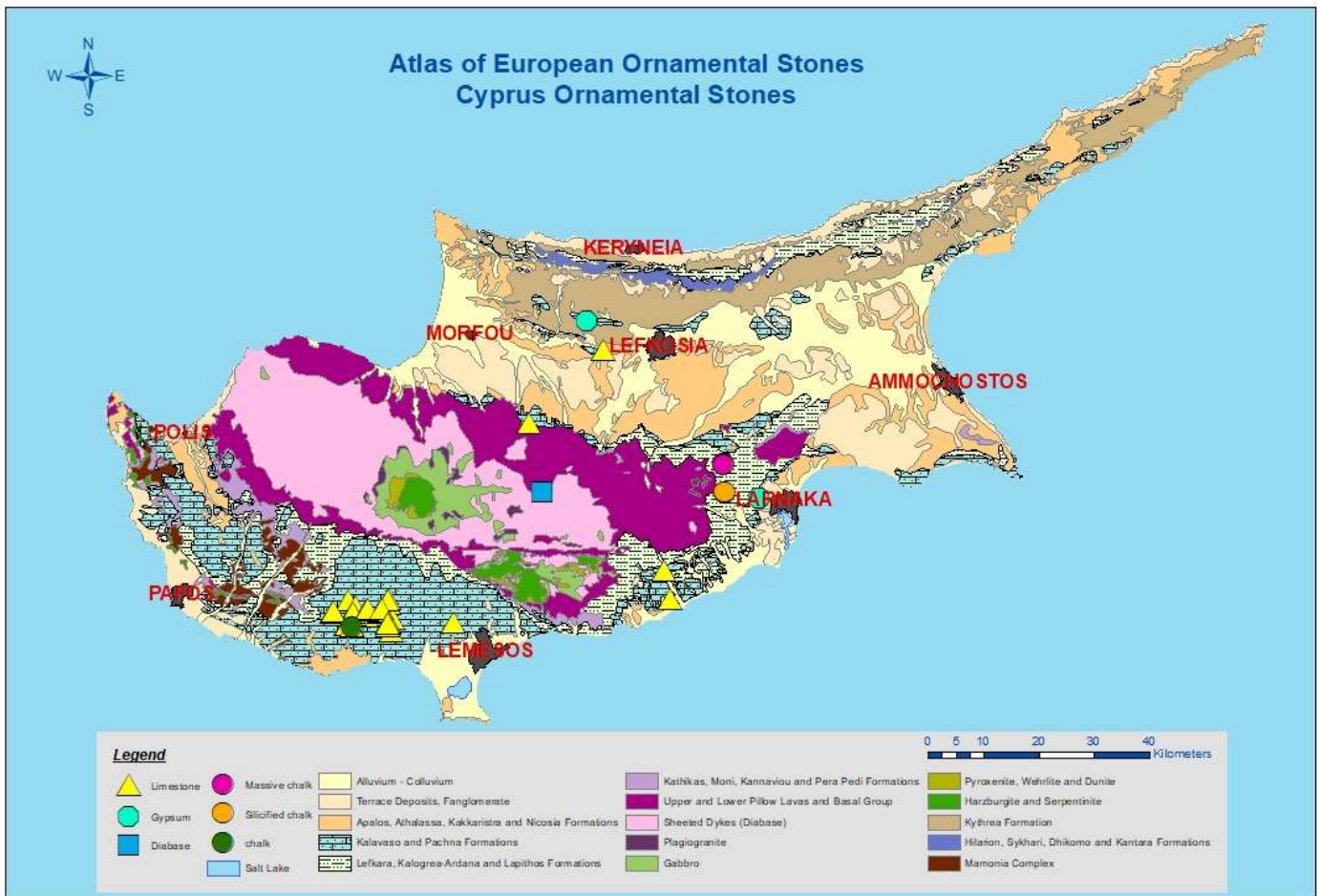
The three main geological formations aged between 250 and 135 Ma are the **Dhikomo, Sykhari and Hilarion Formations**, which form the main carbonate masses of the Kyrenia Range. The Dhikomo Formation consists of deformed thinly bedded limestones with layers of grey and green phyllites. The Sykhari Formation is composed of massive to thickly bedded dolomitic limestones. The Hilarion Formation consists of medium-bedded to massive limestones, which were subjected to a very low degree of metamorphism. These formations were placed southward over the younger autochthonous marine sediments, which are known as the Lapithos, Kalogrea-Ardana (Belapais) and Kythrea Formations. Impressive and continuous outcrops of limestones occur in the central part of the range, whereas in the eastern part they occur in the form of olistholiths over the younger sediments. These limestones (olistholiths) are referred to as the **Kantara Formation** aged between 350 and 250 Ma.

The geological evolution of Cyprus

The genesis of Cyprus took place through a series of complex tectonic processes in the broader context of the subduction of the African plate under the Eurasian plate. Thus, about 90 Ma, a new oceanic crust was created, part of which was cut off and later formed the Troodos ophiolite. About 75 Ma, older rocks (230 to 75 Ma) of the African plate have been thrust onto the ophiolite and are currently found mainly in the southwestern part of the island. Then a period of relative tectonic inactivity followed that lasted up to 10 Ma, resulting to the deposition of a sequence of carbonate sediments, in progressively uplifted area.

About 6 Ma, a series of allochthonous limestones, aged between 350 to 135 Ma were thrust over the northernmost flanks of the Troodos Ophiolite, forming the Pentadaktylos range. At the same time, the Mediterranean Sea was isolated from the Atlantic Ocean resulting to intense evaporation, drastic sea level drop and salinity increase resulting in gypsum and salt deposition throughout the Mediterranean region, with thickness of up to 3 km. These rocks form today the impermeable layer (trap), beneath of which the hydrocarbon reserves of the eastern Mediterranean are found.

The reopening of the Gibraltar Strait, reconnected the Mediterranean Sea with the Atlantic Ocean, 5,3 Ma, and caused its flooding and the quick rise of the sea level, thus resulting in the deposition of marls and calcarenites. During the last 2,6 Ma, there was an abrupt uplift of the Cyprus area where in this period the Troodos and Pentadaktylos ranges were gradually uplifted to their current position. The abrupt uplift, combined with intense rainfall, resulted in extensive erosion of the ranges, particularly that of Troodos, and the transportation of large quantities of clastic sediments that were deposited in river valleys developing the most important aquifers of Cyprus.



Ornamental stone resources in Cyprus

Cyprus has ornamental stones which have been used since prehistoric period. These stones are considered as commercial limestone, such as the limestones (calcarenites) originated from the Geological Formation of Pachna (end of the Oligocene/ 22 million years ago) and from Athalassa member of the geological formation of Nicosia (Beginning of the Pliocene / about 5 million years ago). Additionally, reef limestone from Koronia Member (Messinia - Upper Miocene / 7,2- 5,3 million years ago) originated from the Geological Formation of Pachna and also limestone (chalk) from the Geological Formation of Lefkara (Upper Maastrichtian / 67 million years) until the end of the Oligocene (22 million years). Cyprus also has miscellaneous dimension stones, such as chert (silicified chalk) originated from the Geological Formation of Lefkara (22 million years), gypsum from the Geological Formation of Kalavassos (Messinia - Upper Miocene) / 7-5 million years ago). Finally, some other stones such as basalt, which is diabase (sheeted dyke complex) and some other rocks from Troodos Ophiolite (92 Ma) are considered as commercial.

Ornamental stone production

Ornamental stone Production in Cyprus for the last five years, are described below in the order shown in Table 1.

Stone name	Commodity	Lithology	Production in tones for the last 5 Years
Petra Pachnas (Petra Pachnas)	Limestone	Limestone	14.045
Petra Pachnas (Petra Kyvidon)	Limestone	Limestone	114.520
Petra Pachnas (Klimara)	Limestone	Limestone	No data
Petra Pachnas (Petra Anogyras)	Limestone	Limestone	45.254
Petra Pachnas (Petra Prastio Avdimou)	Limestone	Limestone	6.516
Klimara Agias Annas (Petra Agias Annas)	Silicified chalk	Silicified chalk	125
Petra Lym pion	Massive chalk	Massive chalk	6.250
Plakes Avdimou (Klimara)	Chalk	Chalk	No data
Gypsomarmaro	Gypsum (Laminated)	Gypsum	No data
Petra Yerolakkou	Limestone	Limestone	No data
Petra Troodous	Basalt	Diabase	1.560.833
Petra Mitsrou	Limestone	Limestone	1.500.000

Use of ornamental stone and heritage values

The decorative stone of Cyprus has been used since prehistoric period (13th century BC, the famous ancient port and settlement of Kition). From the beginning of the 1st century AD (Roman period) until the 4th century AD, ancient theatres of large capacity of spectators, were built from limestone rocks from several geological formations, based on the proximity to the archaeological sites. Throughout the Middle Ages, castles and other were built using the same type of rocks. During the 19th century, many buildings (schools, museums, etc.) were built using limestone from Yerolakkos area as a building material. Today the various types of Cyprus limestone, gypsum, silicified chalk, massive chalk, diabase and other ultramafic and mafic rocks are used for the construction for decoration of walls and floor pavement. Additionally, Cyprus limestone are used for the restoration of older buildings and ancient monuments. The various types of rocks that were used are: From all types of ornamental stone that were used two were the predominant: The calcarenites from the Geological Formation of Pachna and that of the Athalassa member of the geological formation of Nicosia.

Descriptions of ornamental stone resources

Ornamental stone resources in Cyprus are described below in the order shown in Table 2.

Stone name	Commodity	Lithology
Petra Pachnas (Petra Pachnas)	Limestone	Limestone
Petra Pachnas (Petra Kyvidon)	Limestone	Limestone
Petra Pachnas (Klimara)	Limestone	Limestone
Petra Pachnas (Petra Anogyras)	Limestone	Limestone
Petra Pachnas (Petra Prastio Avdimou)	Limestone	Limestone
Klimara Agias Annas (Petra Agias Annas)	Silicified chalk	Silicified chalk
Petra Lymphion	Massive chalk	Massive chalk
Plakes Avdimou (Klimara)	Chalk	Chalk
Gypsomarmaro	Gypsum (Laminated)	Gypsum
Petra Yerolakkou	Limestone	Limestone
Petra Troodous	Basalt	Diabase
Petra Mitserou	Limestone	Limestone

Commercial Limestone

Petra Kividon

Petra Pachnas

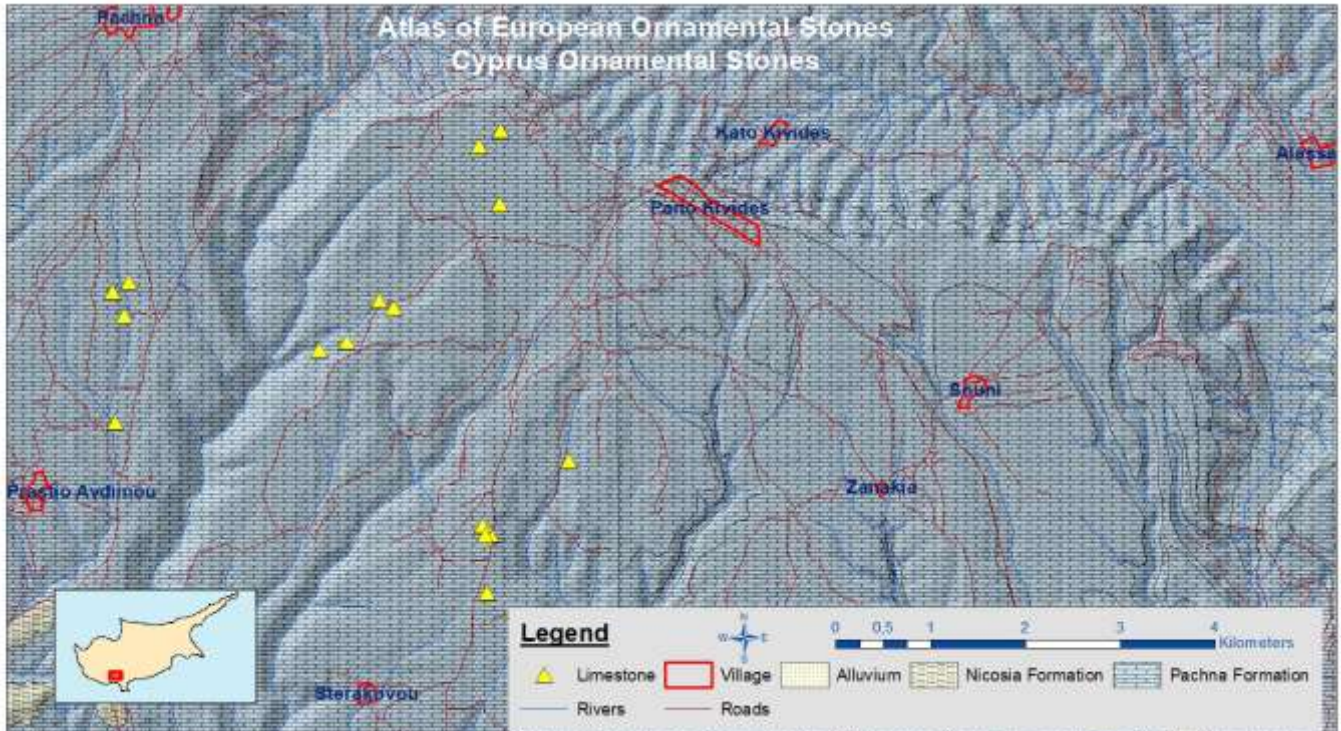


Scale: 1,9 cm

Short description: Limestone (Calcarenite)

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Commercial limestone	Limestone	yellow	Cyprus	Limassol	Kivides	Kivides

Geological setting



Geology: Pachna Formation

The Pachna Formation 22 Ma, consists mainly of alternating layers of yellowish marls and chinks with the presence of calcarenite layers and occasional development of conglomerates. Sedimentation of the Pachna Formation began and terminated in shallow-water environment with the development of reefal limestones (Terra Member at the base and Koronia Member at the top of the Formation).

Production: In 2020, 1412 tons were produced. The quarries area are near Kivides village, located west of Limassol.

Geological age: End of the Oligocene period / 22 million years ago

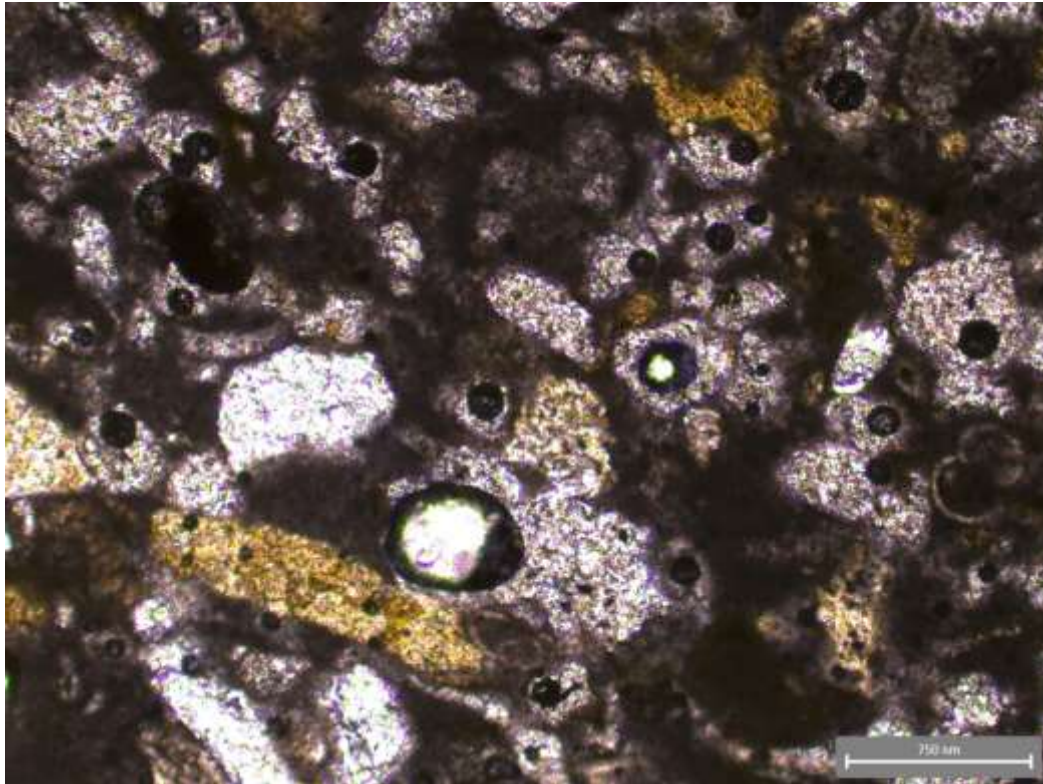
Geological unit: Pachna Formation

Application, use and heritage



Description: Saints Joachim and Anna Church was built in 2007 located in Agios Tychonas Municipality, and it built with Limestone (calcarenite) quarried from Kivides village.

Petrography



Description: Microphotograph of calcarenite (packstone), showing organogenic detrital limestone sediments including fragments of fossils, microfossils micrite and sparry calcite.

Source of information: Cyprus Geological Survey Department

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Quartz (%)	Montmorillonite (%)	Plagioclase (%)			
97	3	trace	trace			

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Physical properties

Apparent density (EN 1936) kg/m ³	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
1841	31,6	-	16	11,3

Real density (EN 1936) kg/m ³	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m ² x s ^{0,5})	Flexural strength under constant moment (EN 13161) MPa
2723	32	38,399	

Frost resistance (EN 12371) R				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, mm ³	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
	25551				

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
		Dry test condition	Wet test condition	
	92	84		

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Chemical properties

Main elements

SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	TiO ₂ (%)	MgO (%)	CaO (%)	Na ₂ O (%)	K ₂ O (%)	MnO (%)	P ₂ O ₅ (%)	SO ₃ (%)	LOI (%)
9	2	2	0,05	2	85	0,062	0,16				

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
31	41,2	317	7,5	23,8	19	9,9	3,1
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
737	0,12	56,6	4,3	0,2	11,3	0,04	0,9
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
3,7	9,4	1,1	0,22	0,03	0,3	2,8	0,35
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
0,001	0,5	0,49	0,05	3,12	0,05	0,4	0,48
Tl (ppm)							
0,12							


REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
8,5	14,5	1,9	7,36	1,6	0,4	2	0,2
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		
1,59	0,3	0,9	0,1	0,6	0,1		

Methods applied and source of information: ICP, Geochemical – Chemical Laboratory of Cyprus Geological Survey

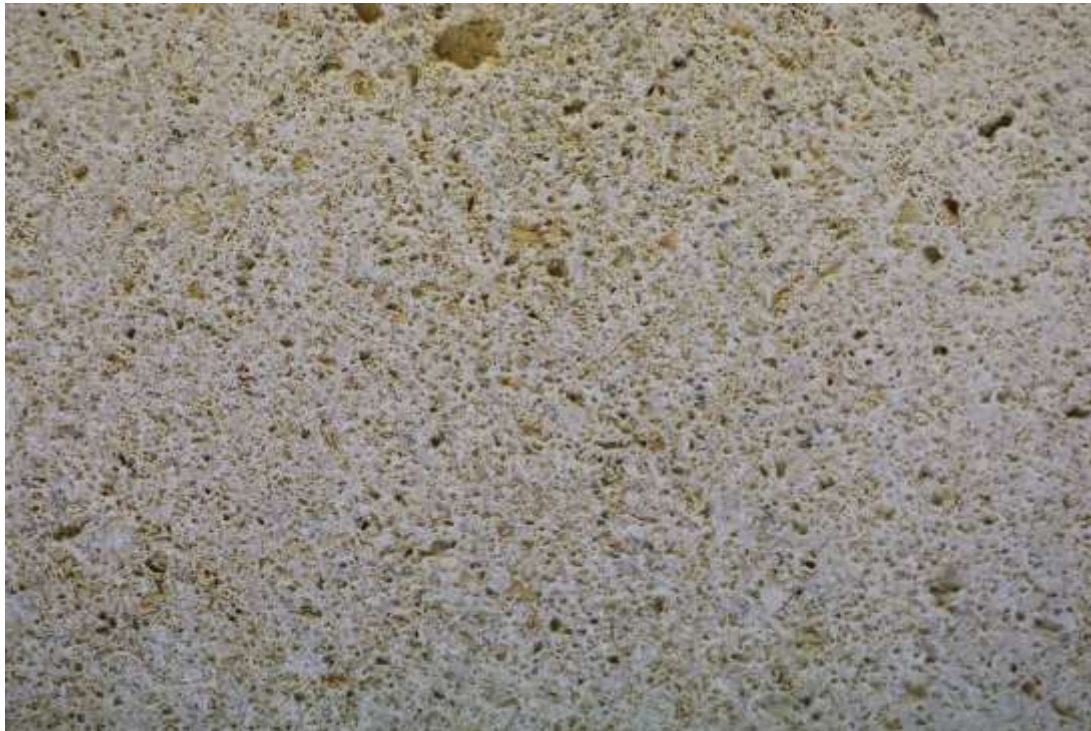
Sources of more information

Type of information	Name of provider	URL
This data sheet	Cyprus Geological survey	http://www.moa.gov.cy/moa/gsd/
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

Compiled by:	Cyprus Geological survey http://www.moa.gov.cy/moa/gsd/	
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Petra Anogyras

Petra Pachnas

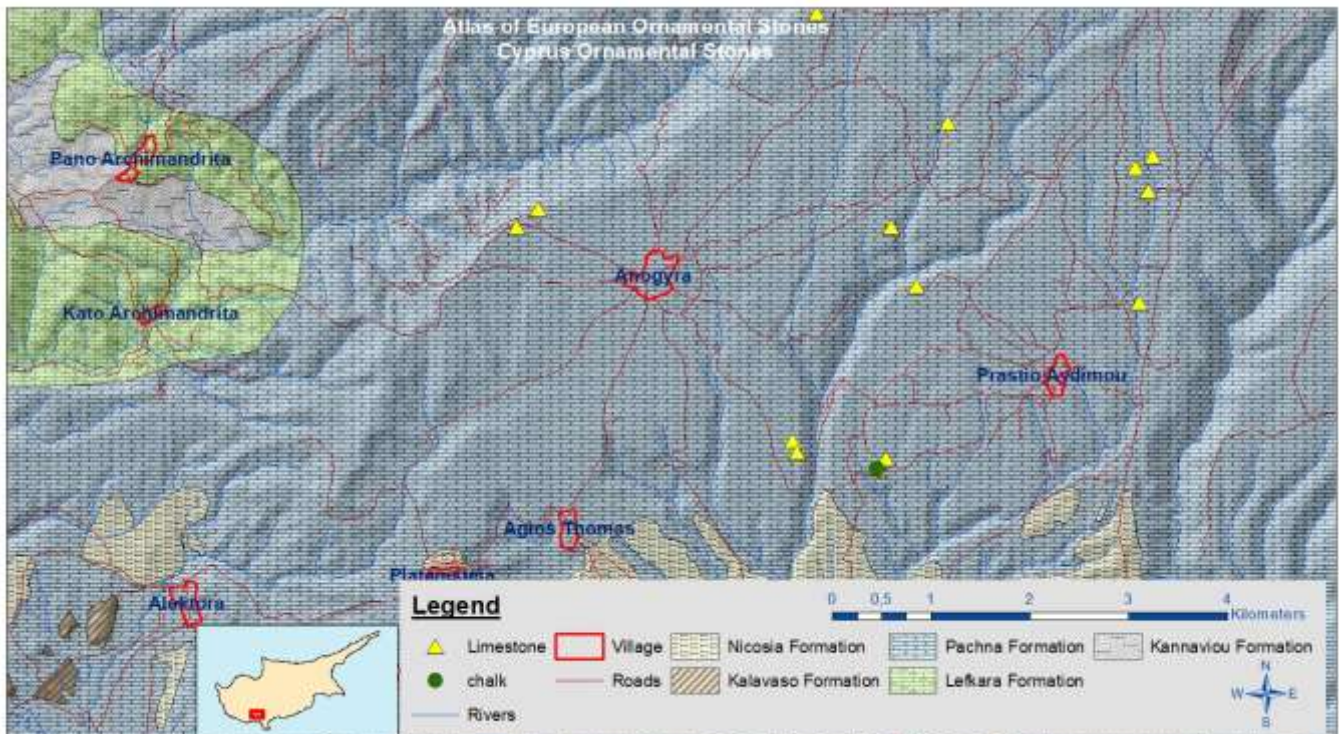


Scale: 2 cm

Short description: Limestone (Calcarenite)

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Commercial limestone	Limestone	yellow	Cyprus	Limassol	Anogyra	Anogyra

Geological setting



Geology: Pachna Formation

The Pachna Formation 22 Ma, consists mainly of alternating layers of yellowish marls and chinks with the presence of calcarenite layers and occasional development of conglomerates. Sedimentation of the Pachna Formation began and terminated in shallow-water environment with the development of reefal limestones (Terra Member at the base and Koronia Member at the top of the Formation).

Production: In 2019, 1935 tons were produced. The quarries area is near Anogyra village, located west of Limassol.

Geological age: End of the Oligocene period / 22 million years ago

Geological unit: Pachna Formation

Application, use and heritage

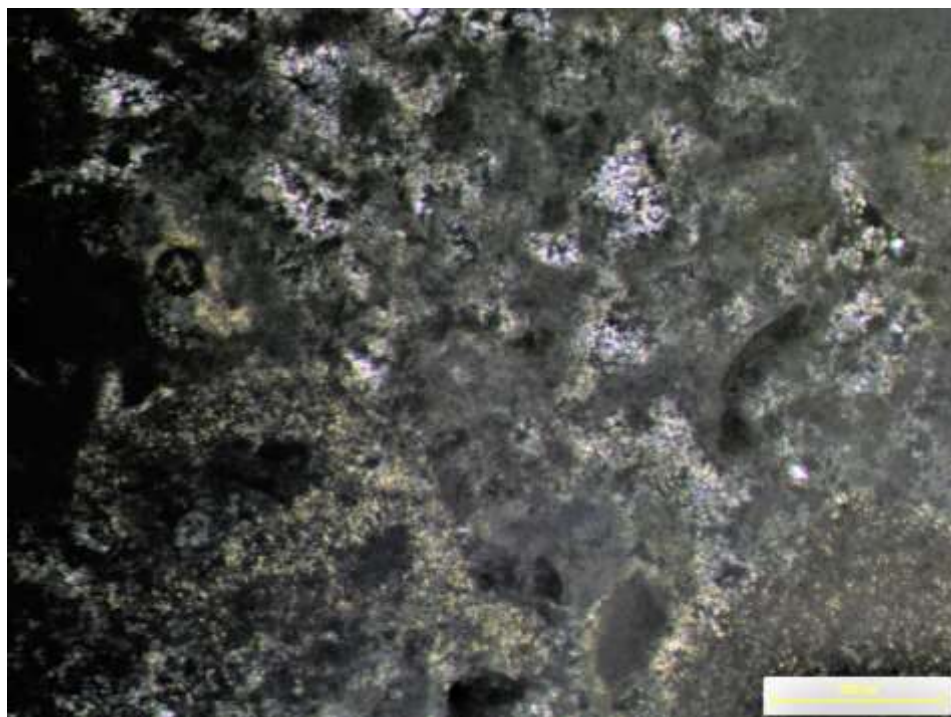
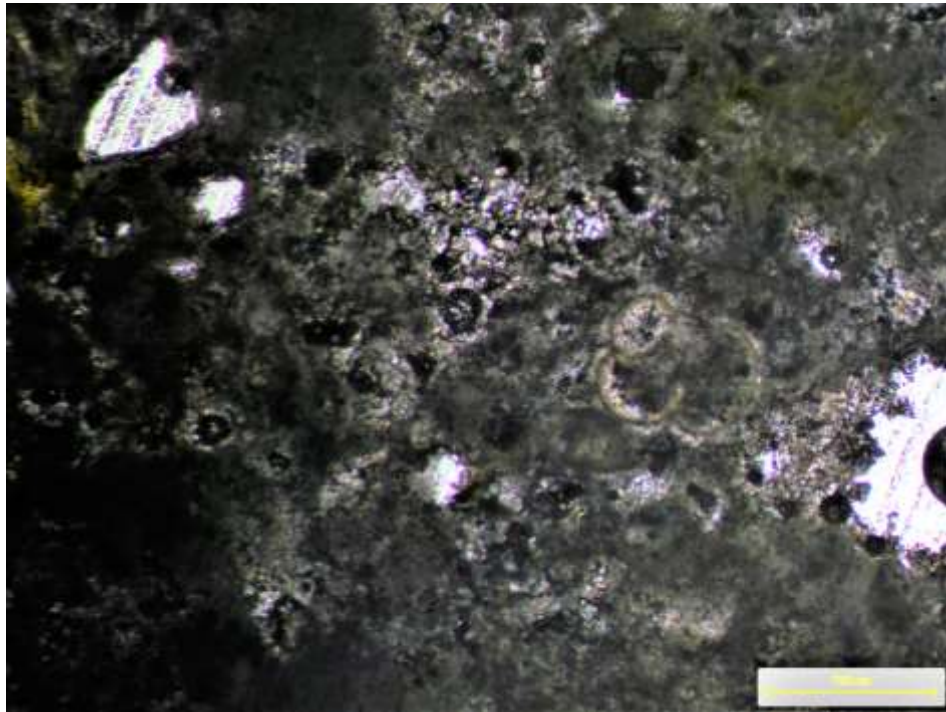


Description: a. Church of Timiou Stavrou (Holy Cross) in Anogyra village and is situated southwest of the core of the village. The Church of Timiou Stavrou is built over the foundations of an early Christian Basilica at the end of the 15th century.



Description: Restored listed building house is located in Anogyra village and it built with Limestone (calcarenite) quarried from Anogyra village.

Petrography



Description: Microphotograph of calcarenite (packstone), showing organogenic detrital limestone sediments including fragments of fossils, microfossils micrite and sparry calcite.

Source of information: Cyprus Geological Survey Department

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Quartz (%)	Montmorillonite (%)	Plagioclase (%)			
97	3	trace	trace			

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Physical properties

Apparent density (EN 1936) kg/m ³	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2006	25,5	-	49	11,5

Real density (EN 1936) kg/m ³	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m ² x s ^{0,5})	Flexural strength under constant moment (EN 13161) MPa
2729	26,5	26,556	

Frost resistance (EN 12371) R				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, mm ³	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
	20092				

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
	86	79		

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Chemical properties

Main elements

SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	TiO ₂ (%)	MgO (%)	CaO (%)	Na ₂ O (%)	K ₂ O (%)	MnO (%)	P ₂ O ₅ (%)	SO ₃ (%)	LOI (%)
3	-	-	-	1	94	ppm levels	ppm levels	0,054	ppm levels	-	-

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
37	27,6	537	8	15	17,9	17,7	2,3
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
168	0,21	76	7	0,6		0,07	0,6
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
1,3	11,5	0,6	0,49	0,03	0,3	3,2	0,53
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
0,03	0,5	0,71	0,05	2,37	0,05	0,9	0,16
Tl (ppm)							
0,07							


REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
12,6	22,6	1,7	12,1	1,6	0,6	3	0,4
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		
2,16	0,4	1,1	0,2	0,9	0,2		

Methods applied and source of information: ICP, Geochemical – Chemical Laboratory of Cyprus Geological Survey

Sources of more information

Type of information	Name of provider	URL
This data sheet	Cyprus Geological Survey Department	http://www.moa.gov.cy/moa/gsd
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

Compiled by:	Cyprus Geological Survey Department http://www.moa.gov.cy/moa/gsd	
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Petra Prastio

Petra Pachnas

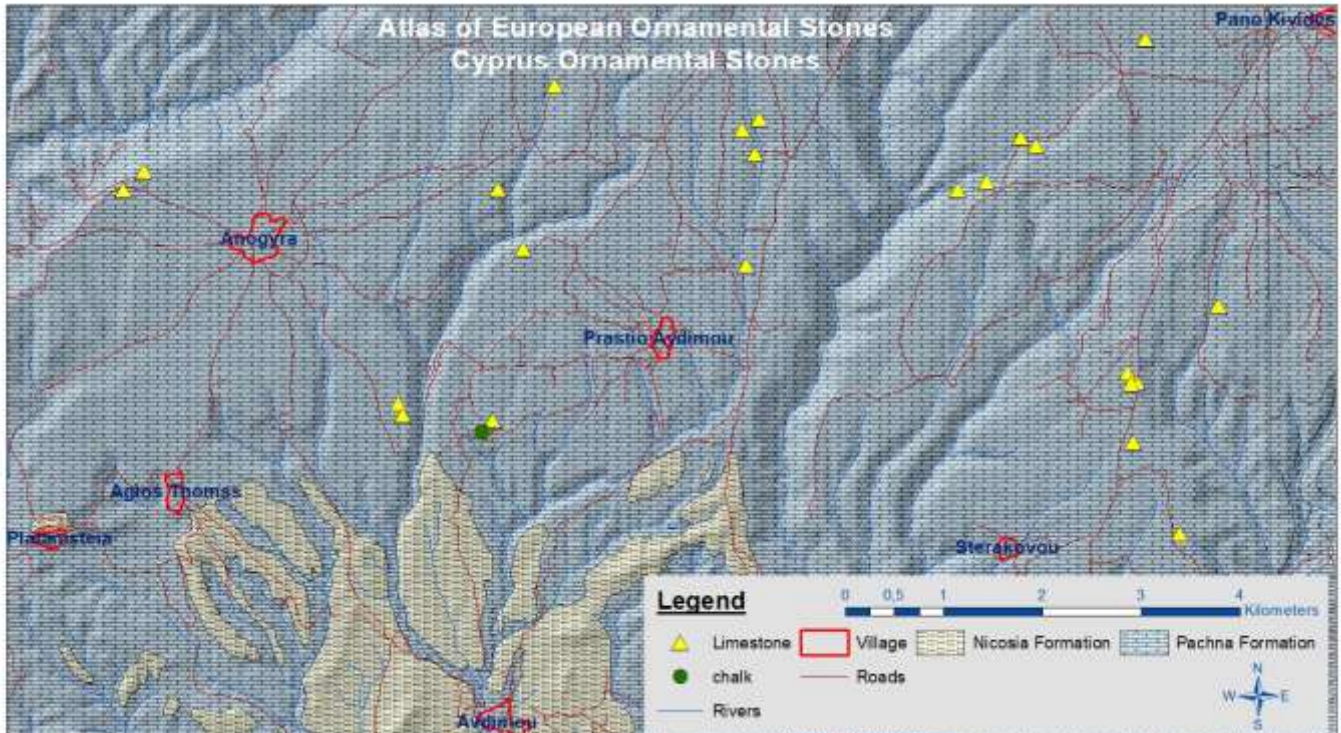


Scale: 2.6 cm

Short description: Limestone (Calcarenite)

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Commercial limestone	Limestone	yellow	Cyprus	Limassol	Prastio Avdimou	Prastio Avdimou

Geological setting



Geology: Pachna Formation

The Pachna Formation 22 Ma, consists mainly of alternating layers of yellowish marls and chinks with the presence of calcarenite layers and occasional development of conglomerates. Sedimentation of the Pachna Formation began and terminated in shallow-water environment with the development of reefal limestones (Terra Member at the base and Koronia Member at the top of the Formation).

Production: In 2019, 1935 tons were produced, quarried from local quarry in Prastio village.

Geological age: End of the Oligocene period / 22 million years ago

Geological unit: Pachna Formation

Application, use and heritage



Description: A private building (was built during the period 1997 – 2017) builded with Prastio limestone (calcarenite) quarried from local quarry in Prastio village.



Description: Details of the pediment of a private building.



Description: Part of the interior of the building.



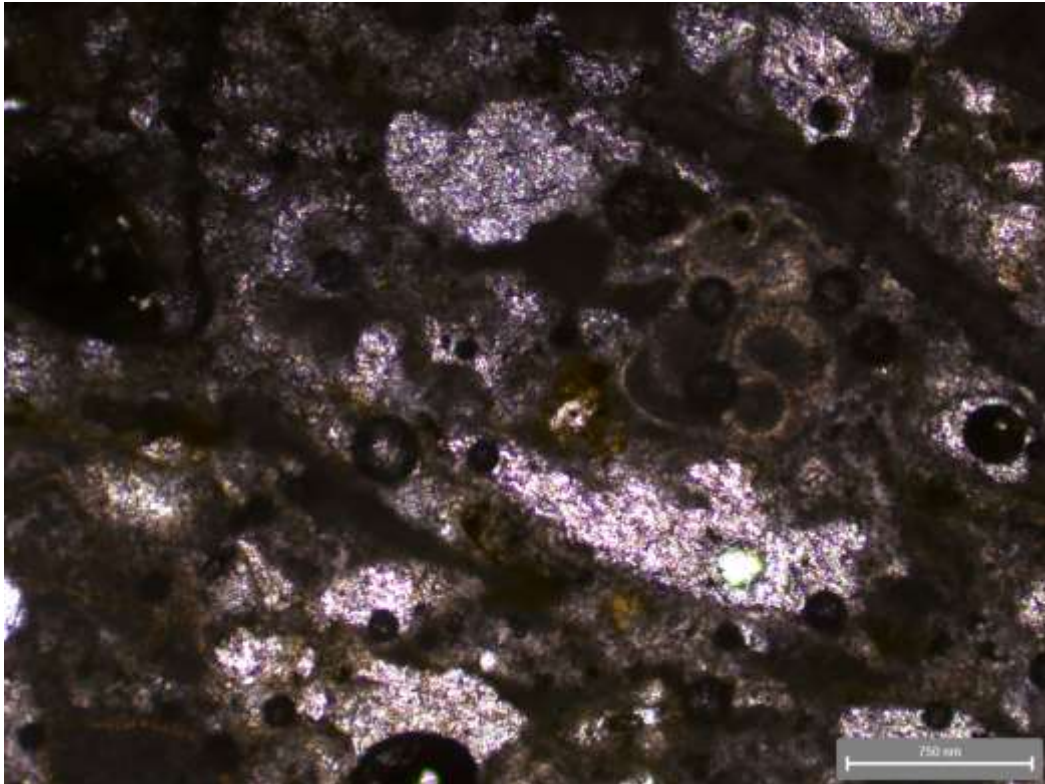
Description: Details for the external walls of the building.



Description: A small theater built at the back yard of the house.



Petrography



Description: Microphotograph of calcarenite (packstone), showing organogenic detrital limestone sediments including fragments of fossils, microfossils micrite and sparry calcite.

Source of information: Cyprus Geological Survey Department

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Quartz (%)	Iron oxides (%)				
98	2	trace				

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Physical properties

Apparent density (EN 1936) kg/m ³	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
1882	30,40	-	28	8,8

Real density (EN 1936) kg/m ³	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m ² x s ^{0,5})	Flexural strength under constant moment (EN 13161) MPa
2753	30,2	45,577	

Frost resistance (EN 12371) R				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, mm ³	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
	25332				

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
	95	84		

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Chemical properties

Main elements

SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	TiO ₂ (%)	MgO (%)	CaO (%)	Na ₂ O (%)	K ₂ O (%)	MnO (%)	P ₂ O ₅ (%)	SO ₃ (%)	LOI (%)
4	1	-	-	1	91	-	-	-	-	-	-

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
32	23,8	295	7,6	15	14,4	21,1	3,6
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
355	0,16	54,4	4,7	0,4	10,1	0,6	0,6
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
3,2	9,7	0,8	0,15	0,03	0,4	1,3	0,55
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
0,017	0,5	0,5	0,05	3,53	0,05	2	0,54
Tl (ppm)							
0,05							


REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
8,4	12,2	1,7	6,59	1,6	0,4	2,3	0,3
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		
1,65	0,3	0,9	0,05	0,7	0,1		

Methods applied and source of information: ICP, Geochemical – Chemical Laboratory of Cyprus Geological Survey

Sources of more information

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Non-commercial directory		
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Scientific publication		
Other publication		

Compiled by:	Cyprus Geological Survey Department http://www.moa.gov.cy/moa/gsd	
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Petra Agiou Theodorou

Petra Pachnas

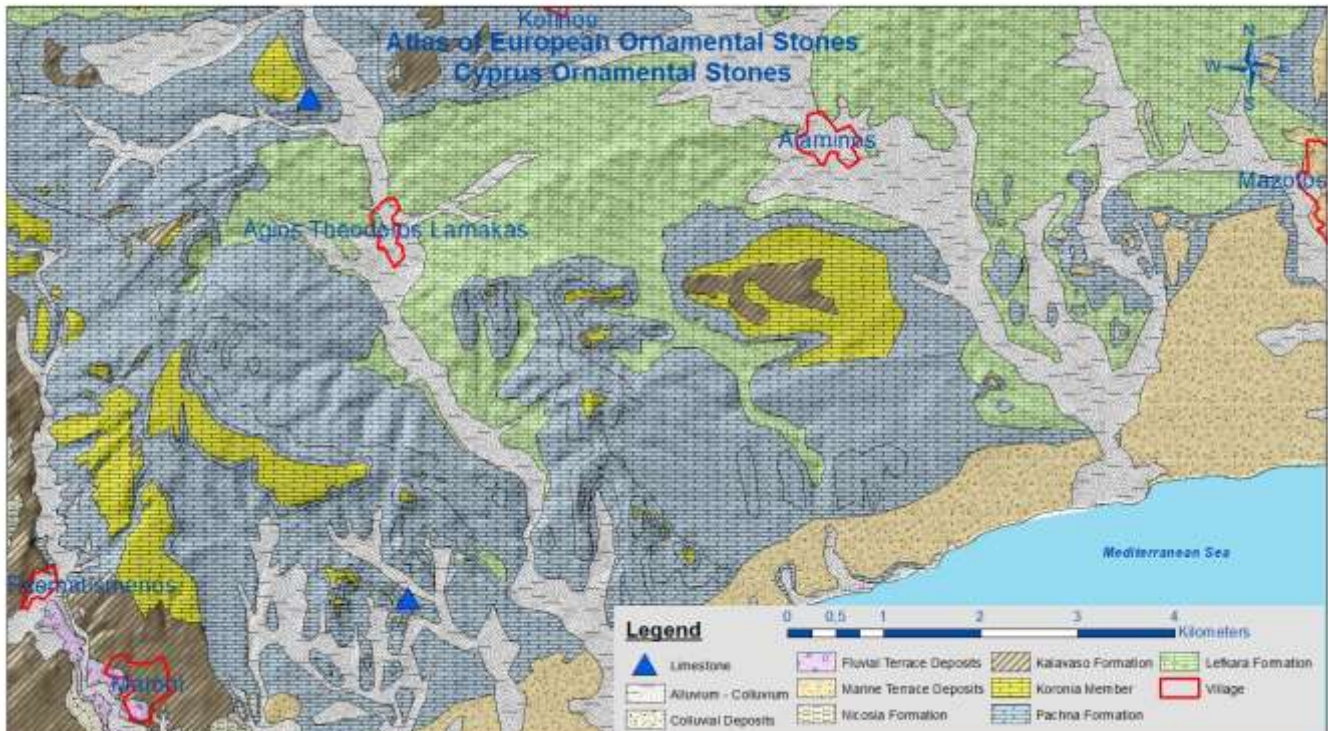


Scale: : 1: 0,42

Short description: Limestone (Calcarenite)

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Commercial limestone	Limestone	yellow	Cyprus	Larnaka	Agios Theodoros	Agios Theodoros

Geological setting



Geology: Pachna Formation

The Pachna Formation 22 Ma, consists mainly of alternating layers of yellowish marls and chinks with the presence of calcarenite layers and occasional development of conglomerates. Sedimentation of the Pachna Formation began and terminated in shallow-water environment with the development of reefal limestones (Terra Member at the base and Koronia Member at the top of the Formation).

Production: In 2020, 219.445 tons were produced. Production: In 2020, 1412 tons were produced. The quarries area are near Agios Theodoros village, located west of Larnaca.

Geological age: End of the Oligocene period / 22 million years ago

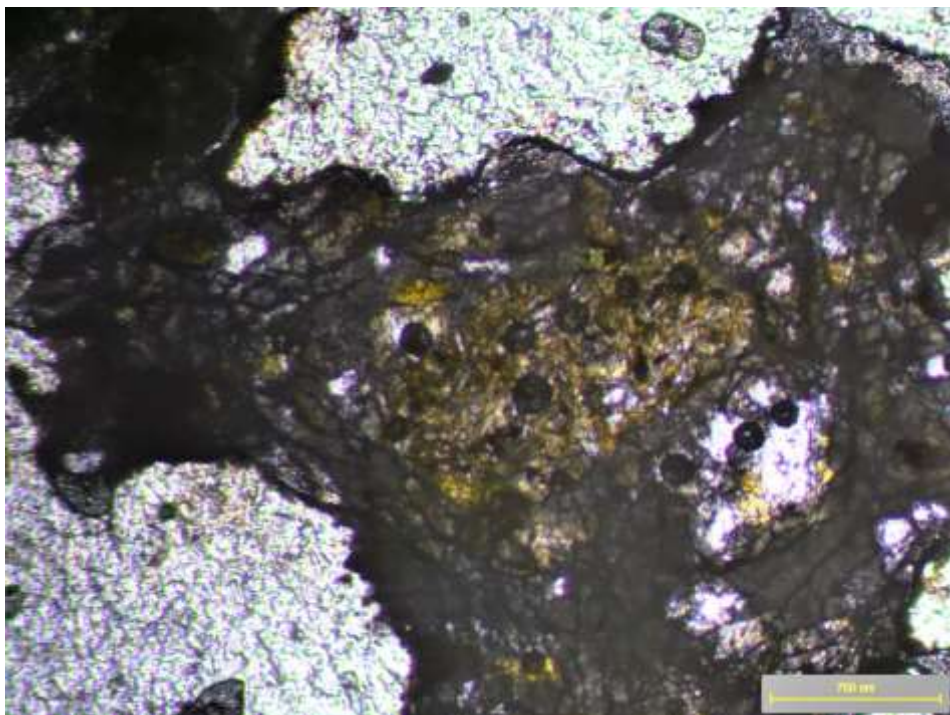
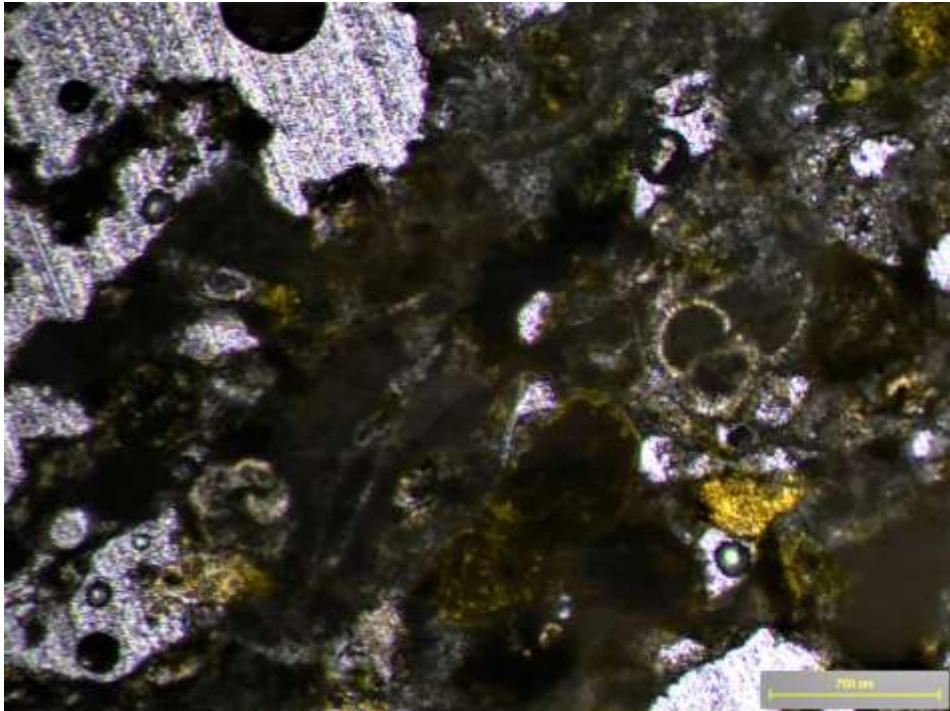
Geological unit: Pachna Formation

Application, use and heritage



Description: The bulding of Ancoria Bank gladded with Limestone (calcarenite) quarried from Agios Theodoros village in the district of Larnaca.

Petrography



Description: Microphotograph of calcarenite (packstone), showing organogenic detrital limestone sediments including fragments of fossils, microfossils micrite and sparry calcite. Intergrain cement is microsparry calcite with some micrite.

Source of information: Cyprus Geological Survey Department

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Aragonite (%)	Quartz (%)	Plagioclase (%)	Chlorite (%)	Clino - pyroxenes (%)	K – Feldspar (%)
67	11	6	6	4	5	1
Montmorillonite (%)	Analcime (%)					
Trace	Trace					

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Physical properties

Apparent density (EN 1936) kg/m ³	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
1914	28,8	-	20	5,2

Real density (EN 1936) kg/m ³	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m ² x s ^{0,5})	Flexural strength under constant moment (EN 13161) MPa
2759	30,7	49,189	

Frost resistance (EN 12371) R				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, mm ³	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
	29109				

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
		Dry test condition	Wet test condition	
	92	86		

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Chemical properties

Main elements

SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	TiO ₂ (%)	MgO (%)	CaO (%)	Na ₂ O (%)	K ₂ O (%)	MnO (%)	P ₂ O ₅ (%)	SO ₃ (%)	LOI (%)
21	5	5	-	4	62	-				1	

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
14	18,6	1200	9,4	32,4	24,8	25	2,7
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
1200	0,13	686	4,8	0,2	7,4	0,12	0,7
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
2,5	13,2	1,3	0,23	0,03	0,05	2,5	0,19
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
0,001	1	0,66	0,05	1,17	0,1	0,3	0,16
Tl (ppm)							
0,06							


REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
12,3	16,5	2,6	9,64	2,5	0,6	3,3	0,4
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		
2,18	0,5	1,2	0,2	1,3	0,1		

Methods applied and source of information: ICP, Geochemical – Chemical Laboratory of Cyprus Geological Survey

Sources of more information

Type of information	Name of provider	URL
This data sheet	Cyprus Geological Survey Department	http://www.moa.gov.cy/moa/gsd
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

Compiled by:	Cyprus Geological Survey Department http://www.moa.gov.cy/moa/gsd	
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Petra Mitserou

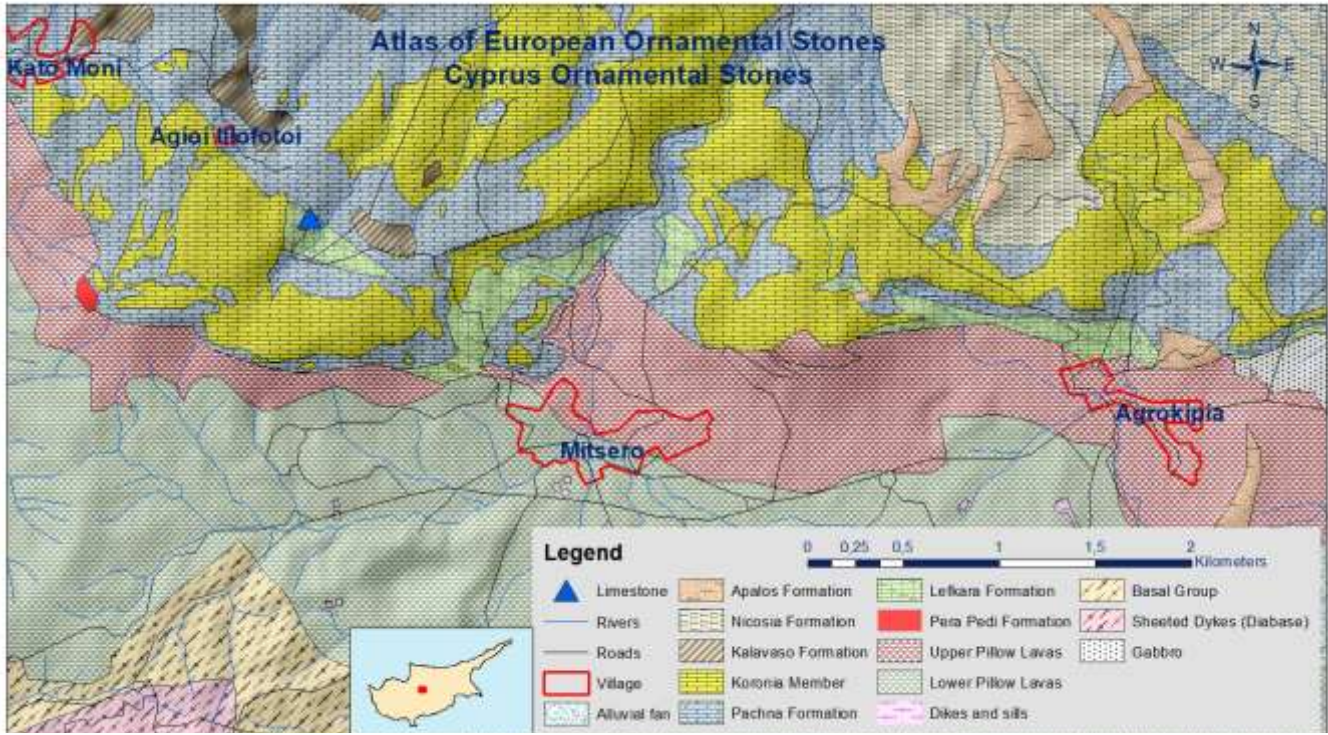


Scale: 1,69: 1

Short description: Limestone dolomite

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Limestone	Limestone dolomite	Pinkish White	Cyprus	Nicosia	Mitsero	Mitsero

Geological setting



Geology: Member of Koronia. Reef Limestone containing of coarse-grained calcareous sandstones and mudstone and marls to a lesser extent. Coarse grain rocks include fossils of species that live in shallow seas. Other components of these rocks are pieces of chalk, marl and chert derived from underlying sedimentary rocks as well as material derived from the Troodos ophiolite rocks.

Production: In 2020, 300.000 tons were produced. The quarries area is near and northwest the Mitsero village, located southwest of Nicosia.

Geological age: Messinia (Upper Miocene) / 7,2- 5,3 million years ago

Geological unit: Koronia Member / Pachna Formation

Application, use and heritage



Description: Construction of wall with reef limestone quarried from local quarry in Mitsero village



Description: Paving in Protaras with a combination of Petra Troodos (diabase) and Mitsero reef limestone.

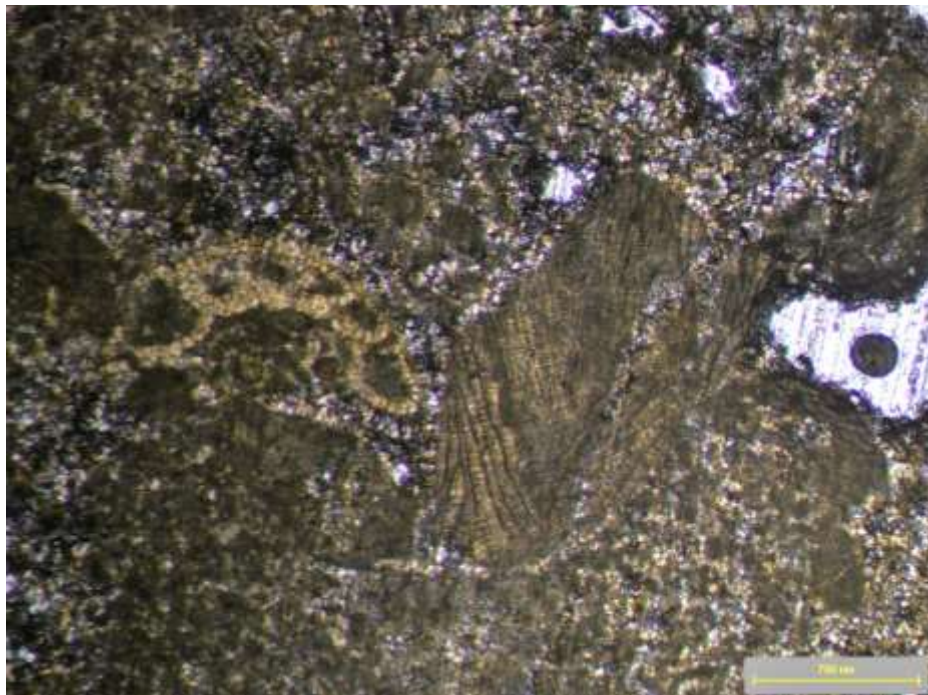
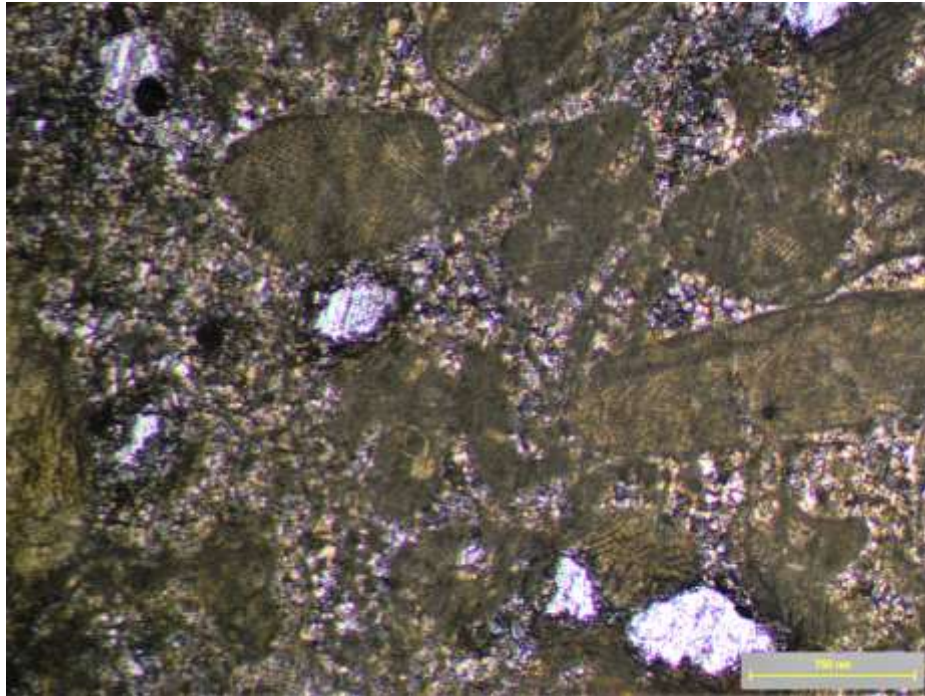


Description: Reef Limestone of Mitsero is suitable for exterior uses, such as on wall and floor coverings and public areas. The pictures above show an unfinished Winery in the village of Stroumbi in the province of Paphos.



Description: Paving with Mitsero limestone.

Petrography



Description: Microphotograph of reef limestone, showing organogenic limestone sediments including fragments of fossils, micrite and sparry calcite.

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Dolomite (%)					
20	80					

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Physical properties

Apparent density (EN 1936) kg/m ³	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2413	10,0	-	111	16,1

Real density (EN 1936) kg/m ³	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m ² x s ^{0,5})	Flexural strength under constant moment (EN 13161) MPa
2840	15,0	5,918	

Frost resistance (EN 12371) R				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, mm ³	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
	n/a		2,41		

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
	n/a	n/a		

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey,

the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Chemical properties

Main elements

SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	TiO ₂ (%)	MgO (%)	CaO (%)	Na ₂ O (%)	K ₂ O (%)	MnO (%)	P ₂ O ₅ (%)	SO ₃ (%)	LOI (%)
2	-	-	-	24	72						

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
82	57,4	849	19,5	53	63,4	54	3,5
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
299	0,08	229	12,9	0,5	16,3	0,34	0,5
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
11,2	20,5	2,9	0,11	0,03	14	3,1	0,62
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
0,026	8	0,2	0,1	6	0,05	0,6	0,48
Tl (ppm)							
0,14							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
21,2	33	3,8	14	3,3	0,9	4,4	0,5
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		
3,35	0,6	1,7	0,3	1,4	0,2		

Methods applied and source of information: ICP, Geochemical – Chemical Laboratory of Cyprus Geological Survey

Sources of more information

Type of information	Name of provider	URL
This data sheet	Cyprus Geological survey	http://www.moa.gov.cy/moa/gsd
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

Compiled by:	<p>Cyprus Geological survey http://www.moa.gov.cy/moa/gsd</p>	
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Petra Yerolakkou

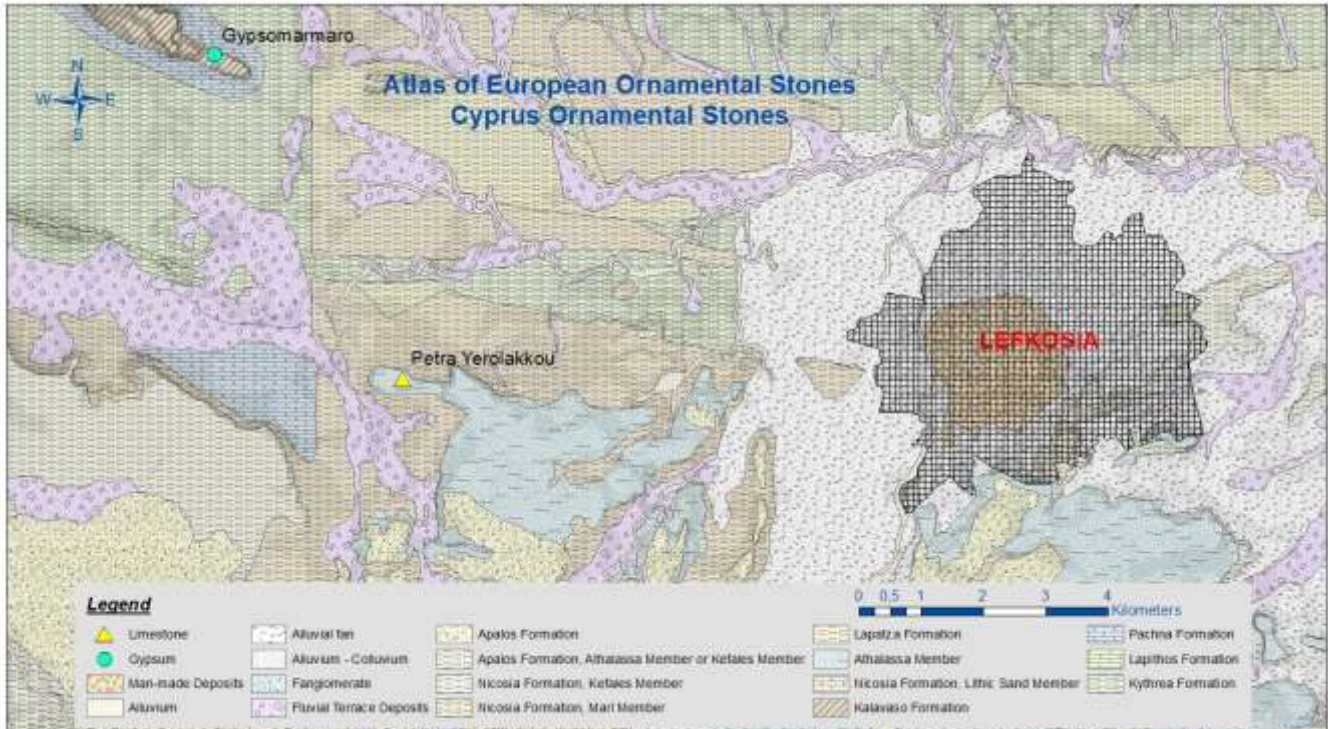


Scale: 1,8 cm

Short description: Bioclastic Limestone (calcareous grainstone)

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Commercial limestone	Limestone	yellow	Cyprus	Lefkosia	Yerolakkos	Yerolakkos

Geological setting



Geology: Nicosia Formation

Mainly margins with fine-grained and coarse-grained calcareous sandstones were deposited. From the bottom up there is a gradual transition from fine-grained sediments, such as siltstone, to more grainy, such as sandstones. This transition reflects the gradual rise of Cyprus and the continuous reduction of the depth of the sea basin. Typical appearances of the formation exist in the wider area of Nicosia and in its full development the formation has a thickness of 900 meters and is subdivided into several members.

Production: The quarries area is near Yerolakkos village, located north of Nicosia.

Geological age: Beginning of the Pliocene / about 5 million years ago

Geological unit: Nicosia Formation

Application, use and heritage



Description: Nicosia Sewerage Council builded with Yerolakkos limestone quarried from quarry in Yerolakkos village.

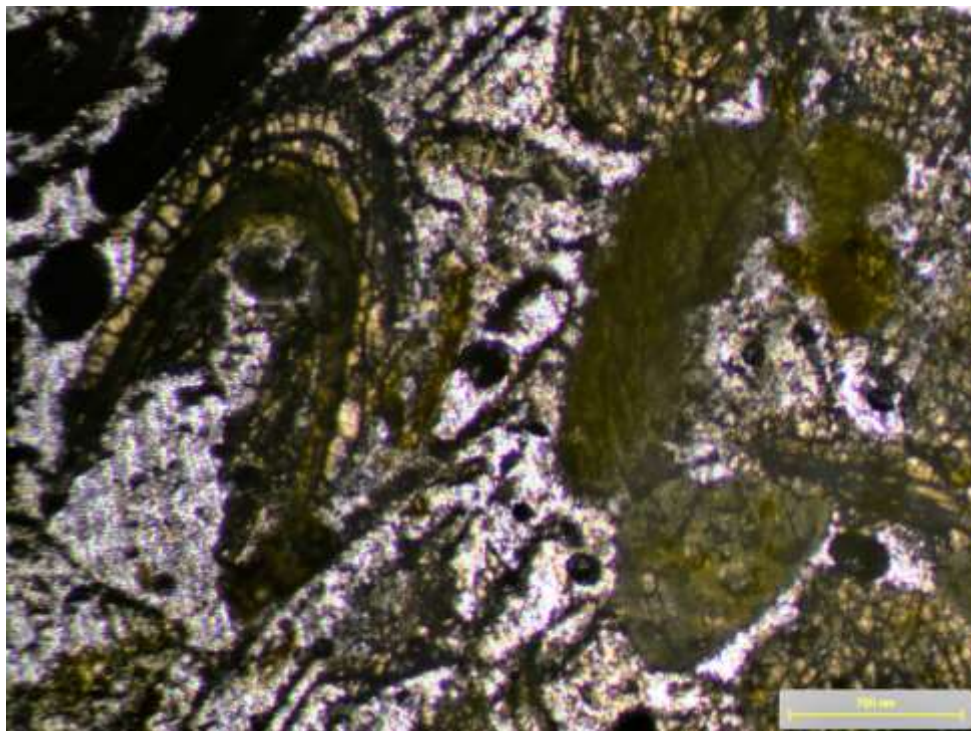
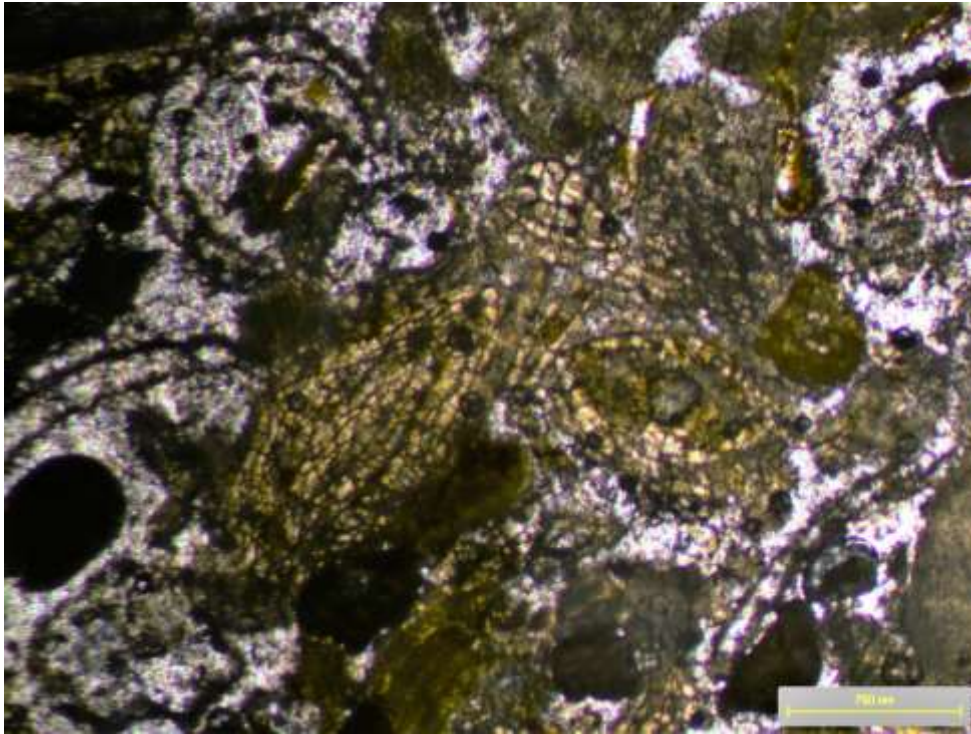


Description: The bulding of a Bank gladded with Yerolakkos limestone quarried from a quarry in Yerolakkos village.



Description: Church under construction with Yerolakkos limestone.

Petrography



Description: Microphotograph of grainstone (biosparite), showing organogenic grain size and very loosely cemented with sparry calcite matrix, resulting in a coarse friable texture.

Source of information: Cyprus Geological Survey Department

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Mineral 1 (%)	Mineral 2 (%)	Mineral 3 (%)	Mineral 4 (%)	Mineral 5 (%)	Mineral 6 (%)	Mineral 7 (%)
Calcite 93%	Dolomite 4%	Chlorite 3%	Quartz 1%	Amorphous quartz trace %	Plagioclase trace %	Glauconite trace %
Mineral 8 (%)	Mineral n (%)					
Plagioclase trace %	Feldspars trace %					

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Physical properties

Apparent density (EN 1936) kg/m ³	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
1370	49,5	-	2	1,4

Real density (EN 1936) kg/m ³	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m ² x s ^{0,5})	Flexural strength under constant moment (EN 13161) MPa
2877	51,8	1001,727	

Frost resistance (EN 12371) R				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, mm ³	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
	38252				

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
		Dry test condition	Wet test condition	
	87	85		

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Chemical properties

Main elements

SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	TiO ₂ (%)	MgO (%)	CaO (%)	Na ₂ O (%)	K ₂ O (%)	MnO (%)	P ₂ O ₅ (%)	SO ₃ (%)	LOI (%)
3	-	3	-	2	92	-				-	

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
114	60,8	1020	21	88,9	45,8	54,7	13,1
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
28,4	0,3	99,2	13,8	0,9	18,8	0,2	0,3
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
9,1	18,4	5,3	0,4	0,03	0,4	9,5	0,97
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
0,043	0,5	0,9	0,05	6,41	0,05	0,4	0,75
Tl (ppm)							
0,16							


REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
25,4	46,9	5,5	18,5	4,3	1,2	5,9	0,7
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		
3,58	0,8	2	0,3	1,6	0,2		

Methods applied and source of information: ICP, Geochemical – Chemical Laboratory of Cyprus Geological Survey

Sources of more information

Type of information	Name of provider	URL
This data sheet	Cyprus Geological Survey Department	http://www.moa.gov.cy/moa/gsd
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

Compiled by:	Cyprus Geological Survey Department http://www.moa.gov.cy/moa/gsd	
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Petra Lymphion

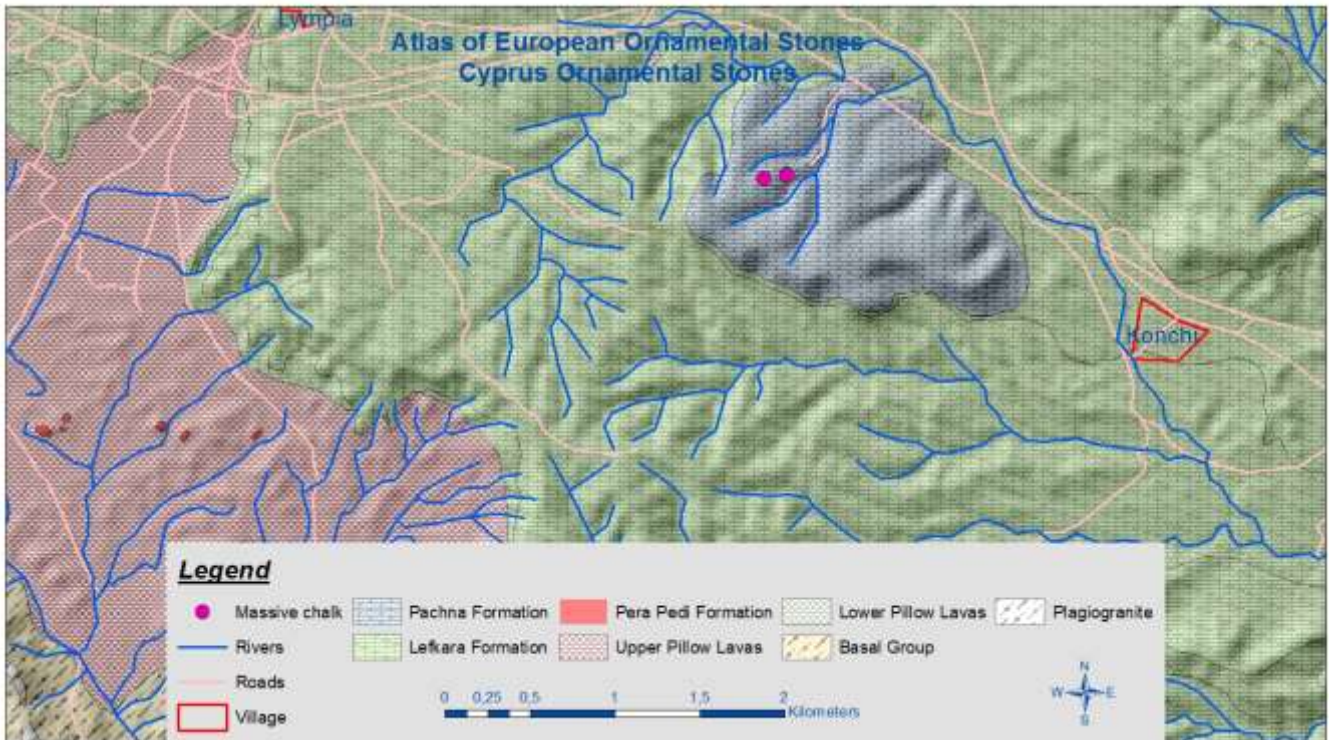


Scale: 2 cm

Short description: Massive chalk

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Commercial limestone	Limestone	Semi-white	Cyprus	Levkosia	Lympia	Lympia

Geological setting



Geology: The Lefkara Formation consists of pelagic marls and white chalks with the presence or absence of chert. These are the oldest sedimentary rocks deposited on the three geotectonic zones of Cyprus.

Production: In 2017, 3750 tons were produced. From 2017 to 2021 there was no production. The quarries area are near Konchi village, located west of Larnaca.

Geological age: Upper Maastrichtian (67 million years) until the end of the Oligocene (22 million years).

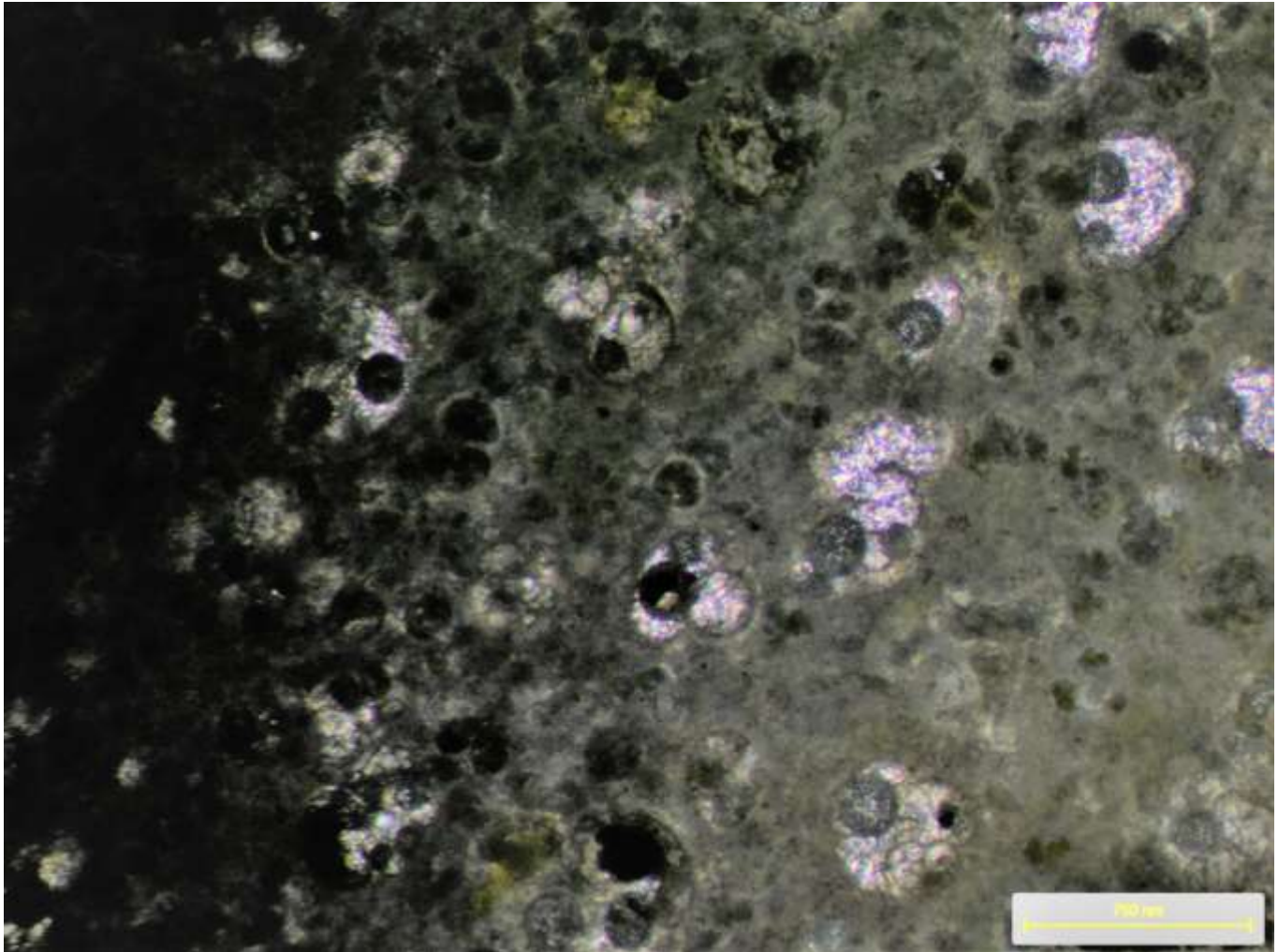
Geological unit: Lefkara Formation

Application, use and heritage



Description: House clad with processed massive chalks.

Petrography



Description: Globigerina-type foraminifera with intrapores in a calcitic matrix.

Source of information: Cyprus Geological Survey Department

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Quartz (%)					
100	Trace					

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Physical properties

Apparent density (EN 1936) kg/m³	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
1535	42,8	-	30	6,0

Real density (EN 1936) kg/m³	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m² x s^{0,5})	Flexural strength under constant moment (EN 13161) MPa
2716	43	140,523	

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	
R				

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, mm ³	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
	19609		10.66	650	

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
	82	89		

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Chemical properties

Main elements

SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	TiO ₂ (%)	MgO (%)	CaO (%)	Na ₂ O (%)	K ₂ O (%)	MnO (%)	P ₂ O ₅ (%)	SO ₃ (%)	LOI (%)
4	1	-	-	-	92						

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
10	12,7	104	3,2	6,8	18	15	1,7
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
800	0,17	681	1,7	0,2	2,6	0,04	0,4
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
1,7	3,9	0,3	0,12	0,03		1,9	0,07
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
0,016	2	0,01	0,05	0,7	0,05	0,9	0,22
Tl (ppm)							
0,02							


REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
3	4,19	0,6	2,36	0,7	0,05	0,7	0,05
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		
0,55	0,1	0,4	0,05	0,4	0,05		

Methods applied and source of information: ICP, Geochemical – Chemical Laboratory of Cyprus Geological Survey Department.

Sources of more information

Type of information	Name of provider	URL
This data sheet	Cyprus Geological Survey Department	http://www.moa.gov.cy/moa/gsd
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

Compiled by:	Cyprus Geological Survey Department http://www.moa.gov.cy/moa/gsd	
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Miscellaneous dimension stones

Klimara Agias Annas

Petra Agias Annas

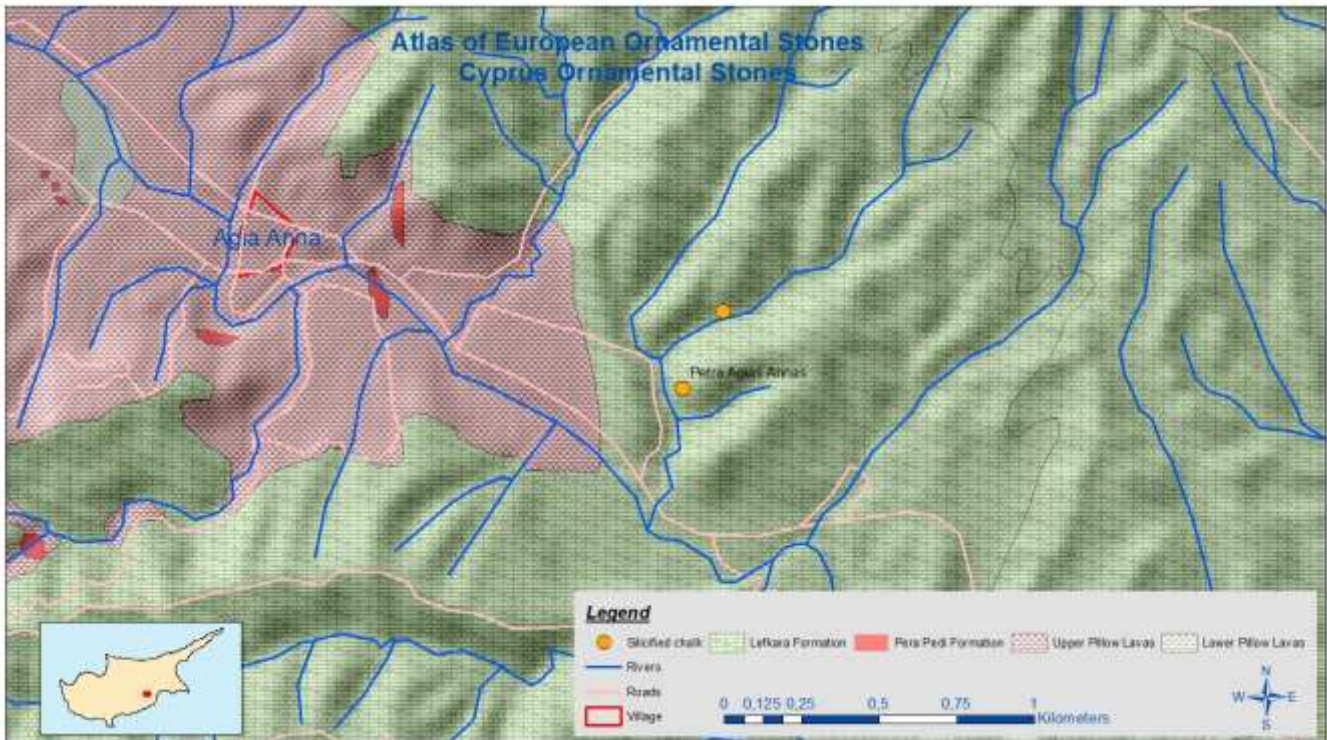


Scale: 2.3 cm

Short description: Silicified chalk

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Miscellaneous dimension stones	Chert (Silicified chalk)	Light-grey to dark-grey	Cyprus	Larnaka	Agia Anna	Agia Anna

Geological setting



Geology: The Lefkara Formation consists of pelagic marls and white chalks with the presence or absence of chert. These are the oldest sedimentary rocks deposited on the three geotectonic zones of Cyprus.

Production: In 2018, 1200 tons were produced. The quarries area is near Agia Anna village, located west of Larnaca.

Geological age: Upper Maastrichtian (67 million years) until the end of the Oligocene (22 million years).

Geological unit: Lefkara Formation

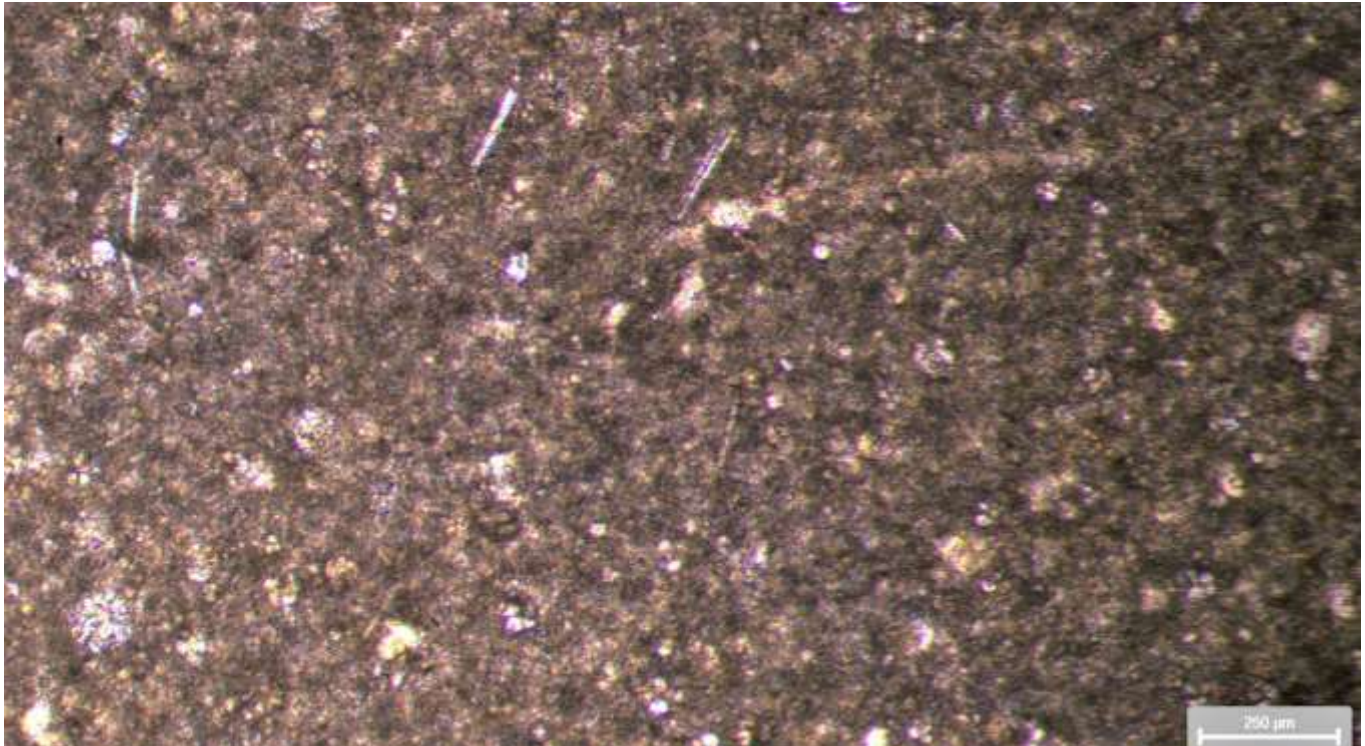
Application, use and heritage



Description: House clad with silicified chalks

Petrography

Photomicrograph, t



Description: Microphotograph of silicified chinks, showing organogenic sediments including fragments of microfossils and sparry calcite and quartz.

Source of information: Cyprus Geological Survey Department

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calsite (%)	Quartz (%)	Cristobalite (%)	Montmorillonite (%)	Palygorskite (%)		
39,8	25,8	24,4	5	5		

Source of information: Chemical Laboratory of Cyprus Geological Survey Department.

Physical properties

Apparent density (EN 1936) kg/m ³	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2,45	12,41	7,01	74	

Real density (EN 1936) kg/m ³	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m ² x s ^{0,5})	Flexural strength under constant moment (EN 13161) MPa
2,57	18,047		

Frost resistance (EN 12371) R				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, mm ³	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
		Dry test condition	Wet test condition	
	-	-		

Source of information: Engineering geology and industrial mineral laboratory of Cyprus Geological Survey Department.

Chemical properties

Main elements

SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	TiO ₂ (%)	MgO (%)	CaO (%)	Na ₂ O (%)	K ₂ O (%)	MnO (%)	P ₂ O ₅ (%)	SO ₃ (%)	LOI (%)
84,7	< 0,35	<0,41	<538,5	nd	18,36	0,78	0,78	0,09	nd		

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
10	12,7	104	3,2	49400	529100	199200	1,7
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
543	0,17	681	1,7	0,2	2,6	0,04	0,4
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
1	3,9	0,3	0,12	0,03	0,05	1,9	0,07
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
0,016	2	0,01	0,05	0,89	0,05	0,9	0,22
Tl (ppm)							
0,05							


REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
3	4,19	0,6	2,36	0,7	0,05	0,7	0,05
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		
0,55	0,1	0,4	0,05	0,4	0,05		

Methods applied and source of information: ICP, Geochemical – Chemical Laboratory of Cyprus Geological Survey

Sources of more information

Type of information	Name of provider	URL
This data sheet	Cyprus Geological Survey Department	http://www.moa.gov.cy/moa/gsd
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

Compiled by:	Cyprus Geological Survey Department http://www.moa.gov.cy/moa/gsd	
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Gypsomarmaro

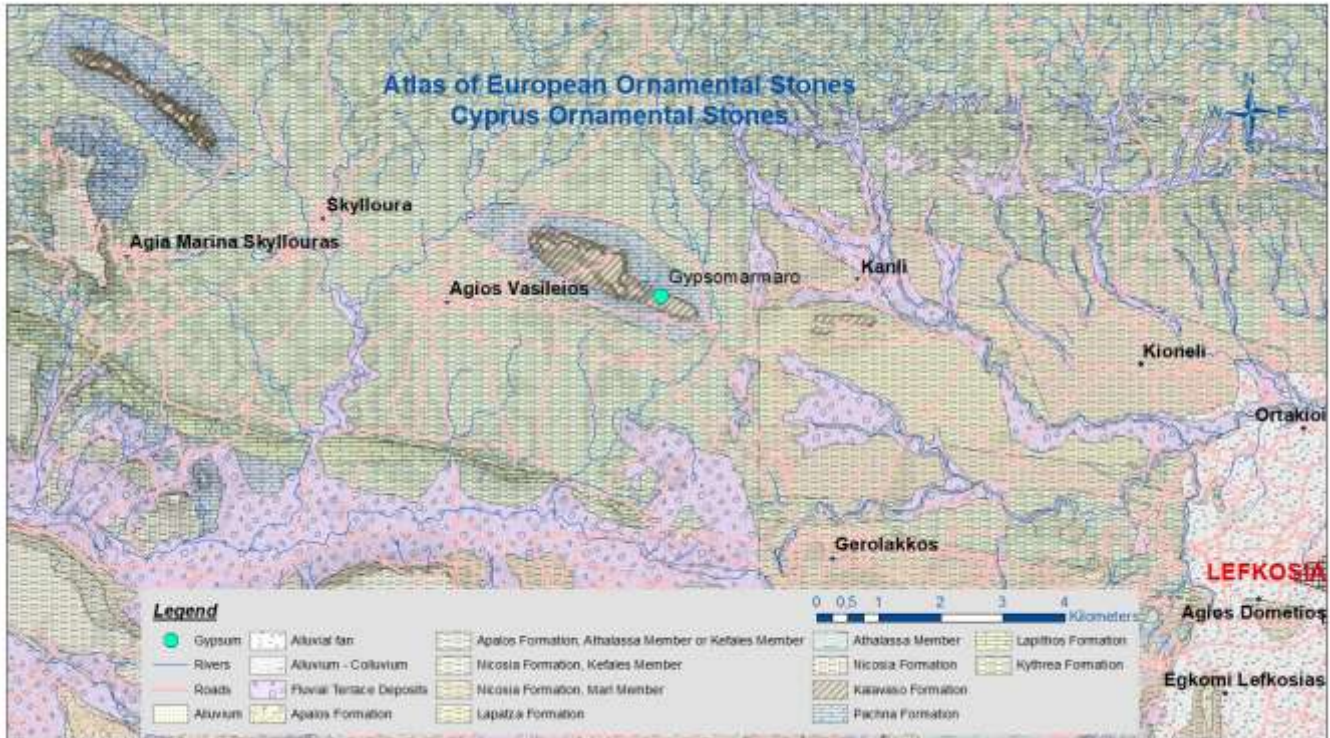
Petra Kanli



Short description: Gypsum

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Gypsum (Laminated) miscellaneous dimension stones	Gypsum	Light-grey to dark grey	Cyprus	Nicosia	Kanli	Kanli

Geological setting



Geology: The Kalavassos Formation consists of gypsum and gypsum marls that appear around the Troodos mountain range. The gypsum deposits, also known as evaporites, cover large areas especially east of the Limassol Forest, but their lateral continuity was interrupted as a result of tectonic events and erosion.

Production: Gypsum quarried from a quarry in Kanli village

Geological age: Messinia (Upper Miocene) / 7-5 million years ago

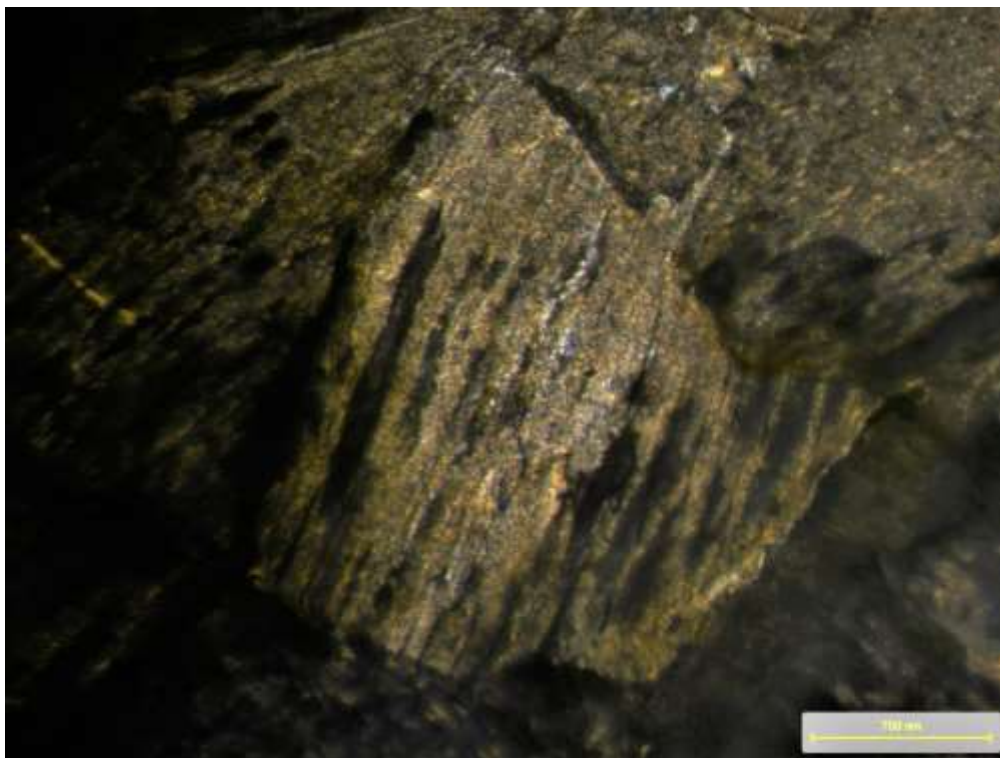
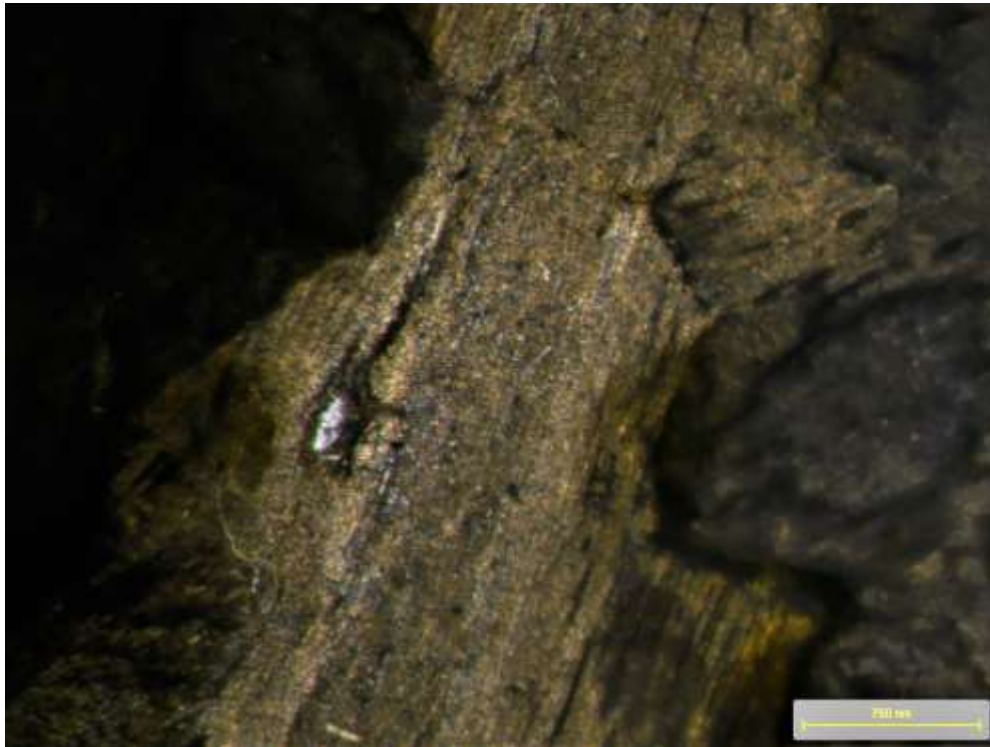
Geological unit: Kalavassos Formation

Application, use and heritage



Description: Internal floor covered with gypsum (gypsomarmara)

Petrography



Description: Gypsum (medium to coarse prismatic and mosaic gypsum)

Source of information: Cyprus Geological Survey Department

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Gypsum (%)						
100						

Source of information: Chemical Laboratory of Cyprus Geological Survey Department.

Physical properties

Apparent density (EN 1936) kg/m ³	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2229	3,1	-	41	12,2

Real density (EN 1936) kg/m ³	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m ² x s ^{0,5})	Flexural strength under constant moment (EN 13161) MPa
n/a	n/a	3,865	

Frost resistance (EN 12371) R				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, mm ³	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
	15974				

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		
	84	57		

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Chemical properties

Main elements

SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	TiO ₂ (%)	MgO (%)	CaO (%)	Na ₂ O (%)	K ₂ O (%)	MnO (%)	P ₂ O ₅ (%)	SO ₃ (%)	LOI (%)
1	< 0,35	< 0,41	< 0,09	nd	34,59	nd	0,52	0,04	0		

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
				< 5,31	5,05	< 9,78	
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							


REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information: Geochemical – Chemical Laboratory of Cyprus Geological Survey

Sources of more information

Type of information	Name of provider	URL
This data sheet	Cyprus Geological Survey Department	http://www.moa.gov.cy/moa/gsd
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

Compiled by:	Cyprus Geological Survey Department http://www.moa.gov.cy/moa/gsd	
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Gypsomarmaro

Petra Aradippou

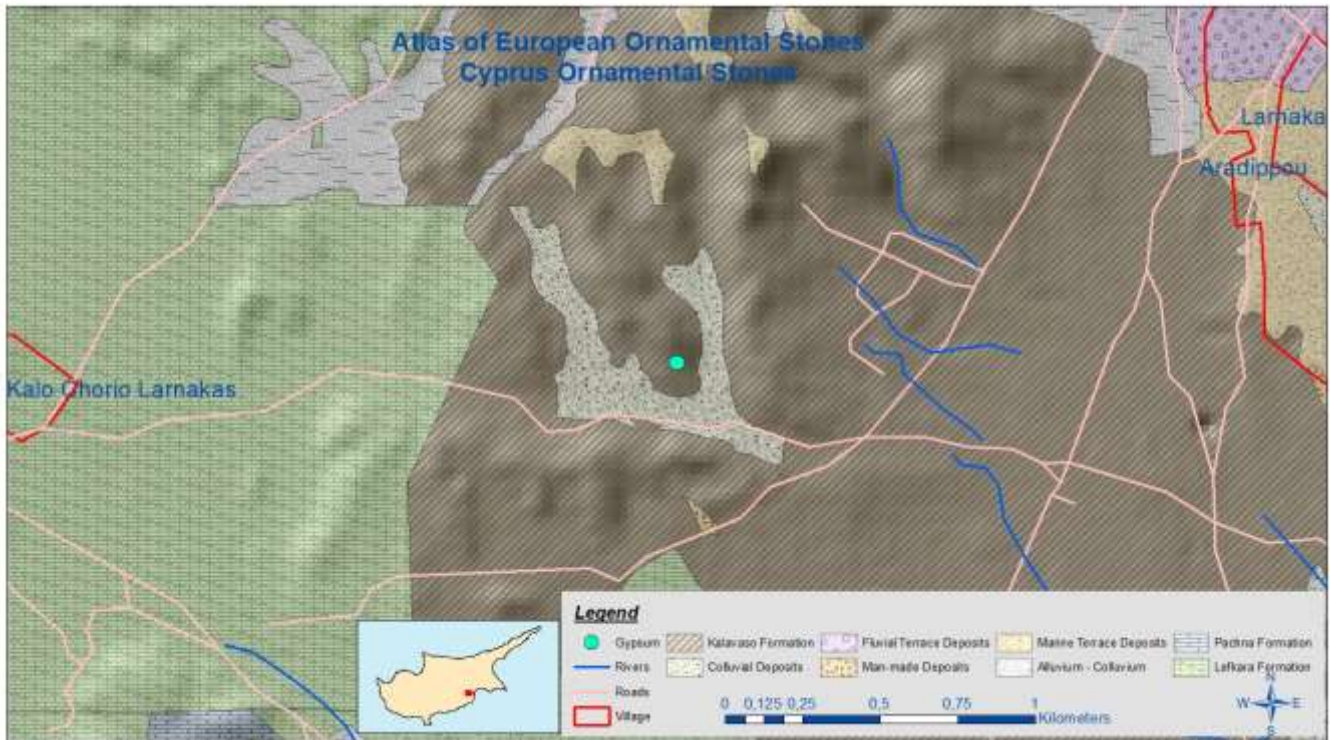


Scale: 3.4 cm

Short description: Gypsum

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Gypsum (Laminated) miscellaneous dimension stones	Gypsum	Light-grey to dark grey	Cyprus	Larnaca	Aradippou	Aradippou

Geological setting



Geology: The Kalavassos Formation consists of gypsum and gypsum marls that appear around the Troodos mountain range. The gypsum deposits, also known as evaporites, cover large areas especially east of the Limassol Forest, but their lateral continuity was interrupted as a result of tectonic events and erosion.

Production: Gypsum quarried from a quarry in Aradippou village

Geological age: Messinia (Upper Miocene) / 7-5 million years ago

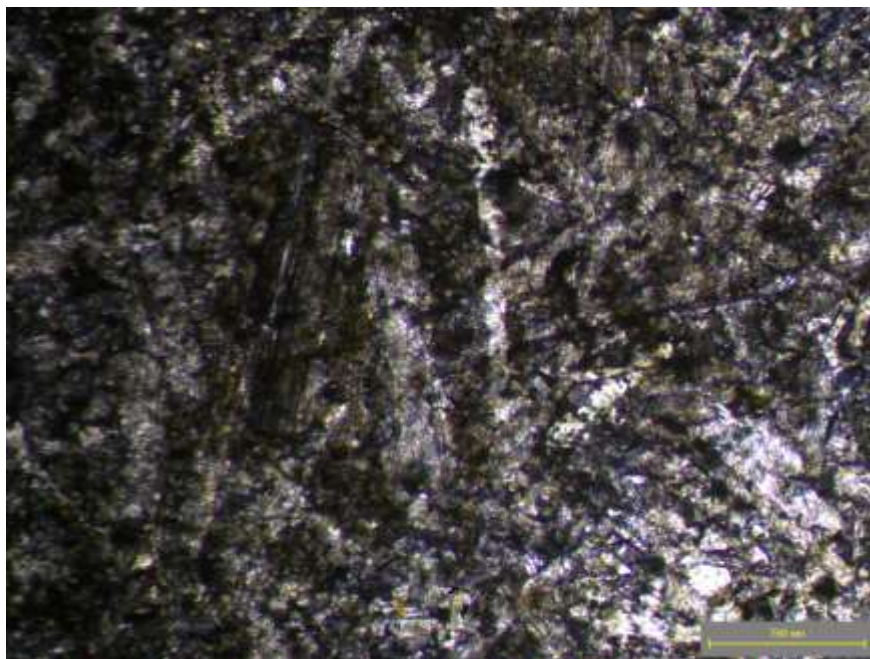
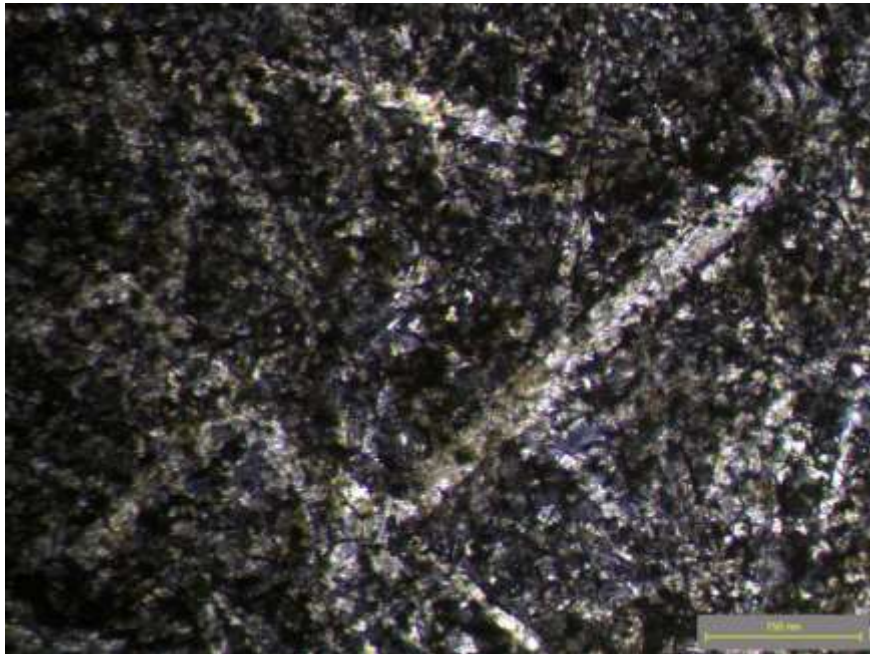
Geological unit: Kalavassos Formation

Application, use and heritage



Description: Gypsum (gypsomarmaro) cutting / extraction site

Petrography



Description: Gypsum crystals

Source of information: Cyprus Geological Survey Department

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Gypsum (%)						
100						

Source of information: Chemical Laboratory of Cyprus Geological Survey Department.

Physical properties

Apparent density (EN 1936) kg/m ³	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa

Real density (EN 1936) kg/m ³	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m ² x s ^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371) R				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, mm ³	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
		Dry test condition	Wet test condition	

Source of information:

Chemical properties

Main elements

SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	TiO ₂ (%)	MgO (%)	CaO (%)	Na ₂ O (%)	K ₂ O (%)	MnO (%)	P ₂ O ₅ (%)	SO ₃ (%)	LOI (%)

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							


REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information:

Sources of more information

Type of information	Name of provider	URL
This data sheet	Cyprus Geological Survey Department	http://www.moa.gov.cy/moa/gsd
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

Compiled by:	Cyprus Geological Survey Department http://www.moa.gov.cy/moa/gsd	
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Commercial Basalt

Petra Troodos



Scale: 1,84: 1

Short description: Sheeted dykes (diabase), basalt mainly of doleritic composition

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
Basalt	diabase	Grey to dark grey	Cyprus	Lefkosia	Farmakas	Farmakas

Geological setting



Geology: Sheeted dykes (diabase), mainly of doleritic composition

The **sheeted dyke complex (diabase)** was formed 92 Ma by the solidification of the magma in the channels, through which it intruded from the magma chambers at the bottom of the oceanic crust, feeding at the same time the submarine extrusion of lava on the seafloor. This continuous process resulted in the creation of a series of parallel dykes made up of up to 100% dykes, which in-fill the empty space created by the divergence of the tectonic plates. The sheeted dyke complex outcrops nearly everywhere across the Troodos Mountain range, forming an elliptical ring, which surrounds the plutonic rocks of Mount Olympus and is surrounded by the extrusive rocks. The intrusive rocks are fine- to medium- crystalline, have a basaltic to doleritic composition with northwest to southeast direction, and are almost vertical, apart from regions affected by later tectonism phases.

Production: In 2020, 308 tons were produced, quarried from a quarry located north of Farmakas village.

Geological age: 92 Ma

Geological unit: Sheeted dykes (diabase)

Application, use and heritage



Description: House clad with diabase and other igneous rocks.



Description: Paving with Petra Troodous (diabase) - Holy Monastery of Panagia Sfalantziotissas located north of Limassol.



Description: Construction of wall with diabase and other igneous pebbles and cobbles.

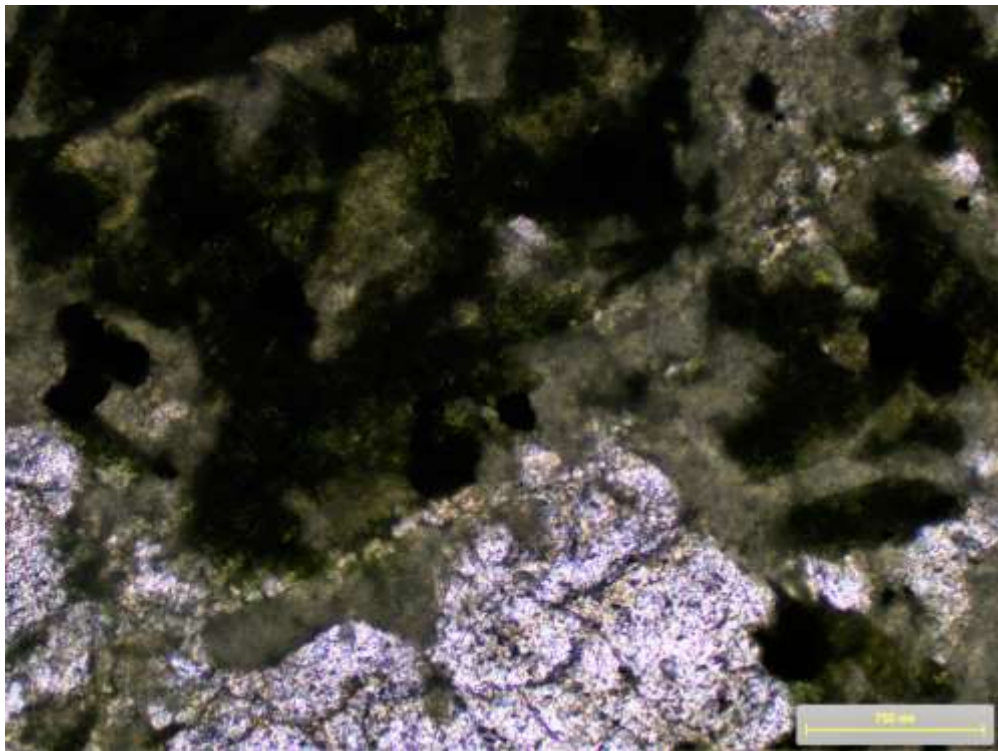
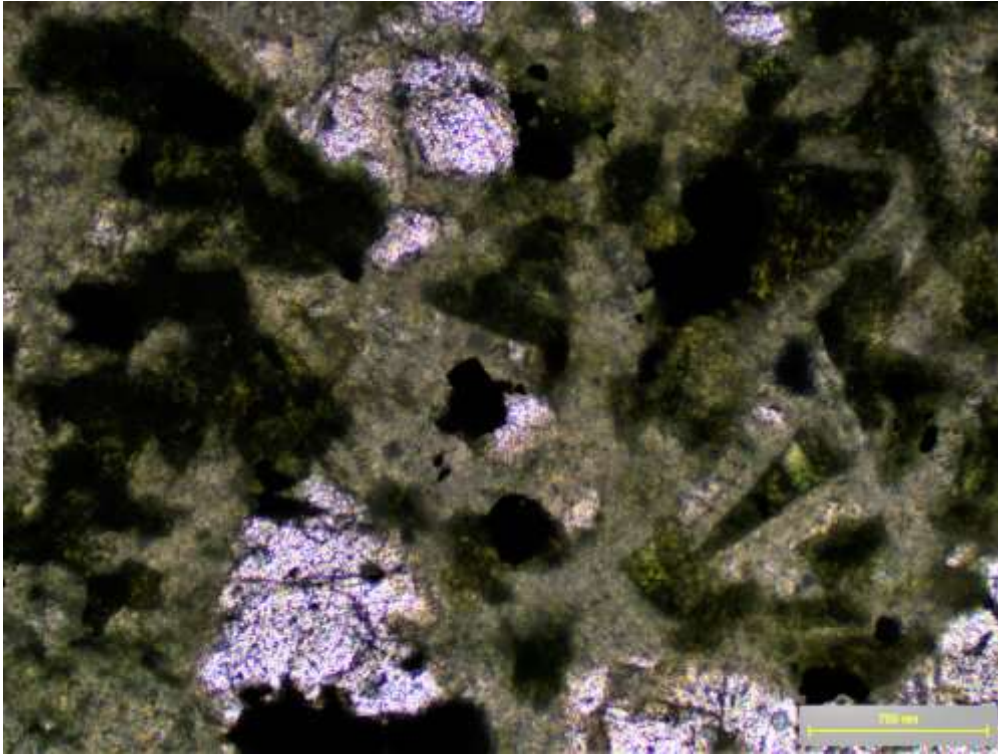


Description: Description: House clad with diabase and other igneous rocks.



Description: Paving in Protaras with a combination of Petra Troodous (diabase) and Mitsero reef limestone.

Petrography



Description: Microphotograph of Diabase, consisted with plagioclase, Clino -pyroxenes, amphiboles, chlorite, and Quartz. As accessory minerals contain epidote and magnetite.

Source of information: Cyprus Geological Survey Department

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Quartz (%)	Clino - pyroxenes (%)	Epidote (%)	Anorthite (%)	Albite (%)	Chlorite (%)	Actinolite (%)
8	6	2	15	35	26	7
Magnetite (%)						
1						

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Physical properties

Apparent density (EN 1936) kg/m ³	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa
2622	3,4	-	167	23,3

Real density (EN 1936) kg/m ³	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m ² x s ^{0,5})	Flexural strength under constant moment (EN 13161) MPa
2890	9,3	1,611	

Frost resistance (EN 12371) R				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, mm ³	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
	n/a				

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
		Dry test condition	Wet test condition	
	n/a	n/a		

Source of information: The research project "Characterization of structural and decorative stones used in Cyprus", which was approved and funded by the Research Promotion Foundation. The contractor was a Mosaic and Marble Industry Association with partners for the research work of the Department of Geological Survey, the University of Cyprus (Department of Civil and Environmental Engineering) and the Institute of Geological and Mining Research of Greece.

Chemical properties

Main elements

SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	TiO ₂ (%)	MgO (%)	CaO (%)	Na ₂ O (%)	K ₂ O (%)	MnO (%)	P ₂ O ₅ (%)	SO ₃ (%)	LOI (%)
55	11	14	2	7	5	5				-	

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
260	18,6	1230	27,3	10	120	25	1
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
300	0,04	10,6	1,6	0,3	1,3	0,05	0,1
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
22	15,5	0,7	0,05	0,03	0,05	13,7	0,47
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
3	0,5	0,19	0,5	10,5	0,1	0,5	0,1
Tl (ppm)							
0,01							


REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
2,8	7,37	0,9	4,41	1,5	0,7	2,8	0,4
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		
2,93	0,6	1,8	0,3	1,5	0,2		

Methods applied and source of information: ICP, Geochemical – Chemical Laboratory of Cyprus Geological Survey

Sources of more information

Type of information	Name of provider	URL
This data sheet	Cyprus Geological survey	http://www.moa.gov.cy/moa/gsd/
Non-commercial directory		
Commercial directory		
Scientific publication		
Other publication		

Compiled by:	Cyprus Geological survey http://www.moa.gov.cy/moa/gsd/	
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