

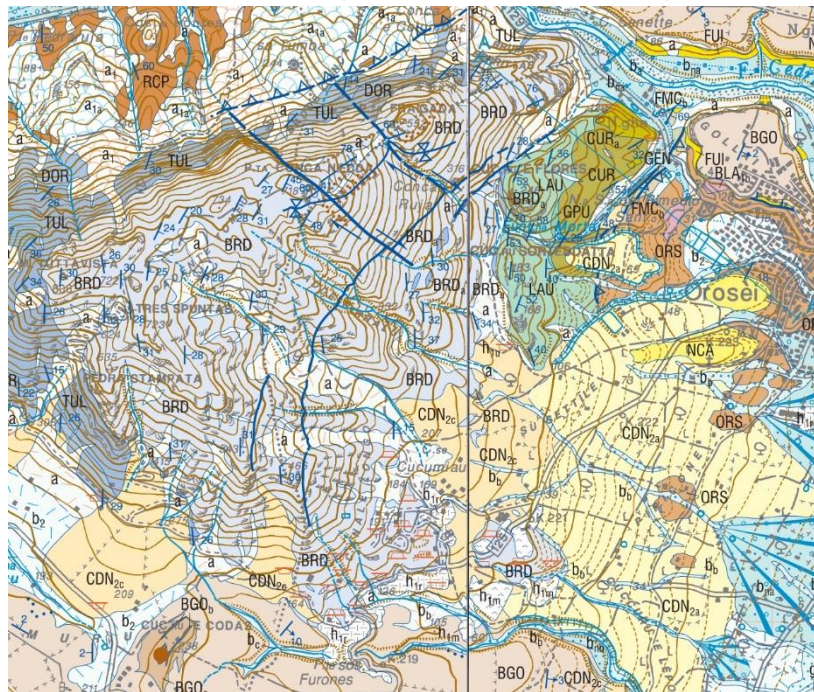
Daino - Marmo di Orosei



Orosei marble, also known commercially as Breccia Sarda, Biancone, Perlato Olimpo, Tigrato d’Oriente, Daino Reale and Daino Imperiale, derives from a carbonic formation dating from the Jurassic-Cretaceous Period present in Monte Tuttavista in Orosei. Characterized by an alternation of layers of calcareous and dolomitic marbles, its coloring ranges from beige to hazelnut-cream and is enriched with darker veins of calcite and laminas of onyx.

Commodity	Lithology	Typical colour	Place of origin			
			Country	Province	Municipality	Village
Commercial limestone	Limestone	Beige	Italy	Nuoro	Orosei	Orosei

Geological setting



scale 1:50,000

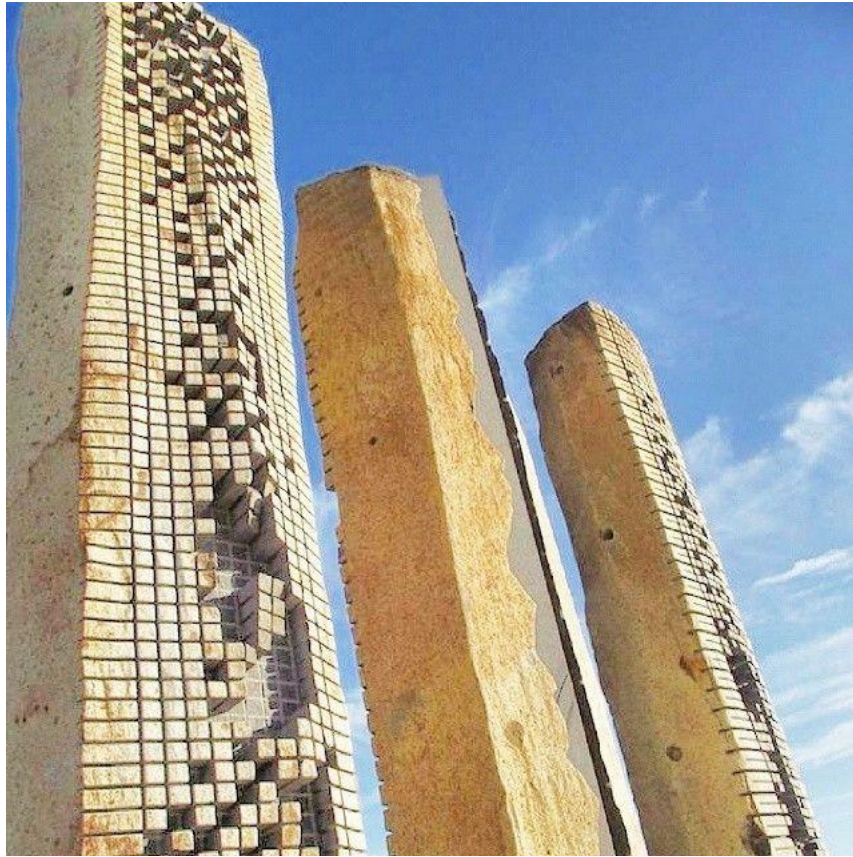
Geology: In this area the Palaeozoic basement outcrops are made by decimetric to metric irregular alternations of quartzitic to micaceous metasandstones, grey-to- whitish quartzites, grey sometimes blackish phyllites, attributed to the Filladi grigie del Gennargentu formation (GEN), ?Cambrian - ?Lower Ordovician in age. This medium grade metamorphic basement is intruded by late-variscan granitoids, represented near this area by the cordierite bearing granodiorites. A Mesozoic succession aged from the Oxfordian and the Upper Cretaceous (Upper Albian - Lower Santonian) outcrops on the eastern side of Mt. Tuttavista. The basal terms of the Mesozoic succession referred to the Batonian-Callovian outcrop in western Mt. Tuttavista. It is mainly represented by bioclastic sandy limestones, levels of marls and whitish marly limestones, calcilutites. Except in the area of Mt. Tuttavista, the area is occupied equally by pliocene-pleistocene basalts with fluvio –lacustrine interbedded terrigenous sediments, in the northern and south-western part, and by quaternary sediments in the central and eastern parts.

Production: On the southern and eastern slopes of Mt. Tuttavista there are 15 quarries, all located at short distances from each other, where the Mesozoic limestones of the Monte Bàrdia formation are cultivated for ornamental use. which, once cut and polished, are sold under the (commercially correct though geologically improper) name 'marble'.The deposit extends for about 300 ha with an average thickness of about 560 m.: today, after about 30 years of mining, only 6% of the current reserves in sight has been exploited and only 35 ha are involved in the cultivation of quarries.

From a commodity point of view, ornamental stone products, in the different varieties related to differences in texture (Perlato, Nuvolato, Venato, Breccia etc.) and color (light beige, dark, sometimes pinkish), are used all over the world and exported to all continents for use both in interiors and in the external cladding of buildings, in urban works and street furniture, in the creation of sculptures and works of art.

Geological age: Upper Jurassic (Upper Tithonian) Lower Cretaceous (Lower Valanginian)
Geological unit: “Monte Bàrdia” Formation

Application, use and heritage



The "sound stones" of P. Sciola. The artist models his monoliths (not only the marble of Orosei) through cuts, incisions and grooves of different length, width and distribution, and then plays them with his bare hands or with a plectrum, also made of stone. He says about this rock: *"This is a Biancone of Orosei. Its origin is calcareous, it was formed in the sea, practically it is fossilized water. The sound it emits is liquid, reminiscent of the sounds we hear when we are underwater, and it differs from the marbles of the rest of Italy because Sardinia is a more ancient land. Among the most ancient in Europe".*

Petrography

Description

Source of information:

Mineral composition

Calcite(%)	Fe-Mn hydroxydes (%)	Fe-Mn oxydes (%)	Hydrated silicates(%)	Cyclosilicates (%)		
5	AM	AM	AM	AM		

MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Source of information:

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
2.673	1,20	0,4	188	12

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
		1,411	

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	
9,2	48	193	48	

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: -) %
-0,01			

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, cm ³ / 50cm ²	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm
17,2					

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		
Smooth				

Source of information: I materiali lapidei della Sardegna, Sardegna Ricerche

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 (%)	CO ₂ (%)	H ₂ O (%)
0,2	0,54	<0,01	0,03	0,39	52,77	<0,01	<0,01	<0,01	0,03	0,10		42,5	3,5

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	Geological Survey of Italy -ISPRA	https://www.isprambiente.gov.it/en/services/cartography/geological-and-geothematic-maps/geological-map-at-a-scale-1-to-50000
Non-commercial directory	Geological Science Department - University Roma Tre, Italithos 2000	http://www.italithos.uniroma3.it/
Commercial directory		https://www.sardegnamarmi.com/marmo-di-oroisei/
Scientific publication	Memorie Descrittive della Carta Geologica d'Italia, ISPRA-Geological Survey of Italy	https://www.isprambiente.gov.it/it/pubblicazioni/periodici-tecnici/memorie-descrittive-della-carta-geologica-ditalia/la-geologia-di-roma-dal-centro-storico-alla
Other publication		

Compiled by:	Geological survey of Italy – ISPRA website http://portalesgi.isprambiente.it/	 
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