

A Modern Thermopolion on Lamb's Conduit Street, WC1.

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This is a geological visit, rather than a walk, to the Spanish restaurant Cigala at 54 Lamb's Conduit Street, located on the corner of Rugby Street in WC1N. Lamb's Conduit Street is named after Mr William Lamb (d. 1577) who made a conduit here to provide water for the City of London. This was removed in the 18th Century and the street today makes for a pleasant stroll, lined with enticing shops, pubs and restaurants. The food at Cigala has much to recommend it and is a destination in its own right. However urban geologists should choose to eat their tapas from the outdoor tables on a Summer evening. This will give an opportunity to view its exterior, clad crazy paving-style in a wide variety of decorative stones, reminiscent of the Roman café-bars called *thermopolia*, known from excavations in Pompeii and Herculaneum, but which would have been a feature of any Roman street. These too were clad with marble offcuts salvaged from other buildings or waste pieces supplied by marble cutters.



Thermopolia in Pompeii showing dolia set in crazy-paved, marble clad counters. The lower image shows the counter front clad primarily in marmor carystium (Cipollino) from the Island of Euboea (Evia) in Greece and marmor Luculleum (Africano) from western Turkey.

Thermopolia served hot and cold food and drink to the many ordinary Romans who did not have kitchens or cooking facilities in their small apartments. Some *thermopolia* operated as takeaways, others as restaurants or taverns. Some establishments even had rooms to rent upstairs. Such edifices are well preserved on the streets of Pompeii and Herculaneum. To the urban geologist though, *thermopolia* offer another kind of feast. Characteristically, the counters are clad in crazy-paved marble revetment, revealing a Empire-wide trade in decorative stones.

Decorative marbles, '*marmor*', became popular in Roman architecture from the 1st Century AD, under the rule of the Emperor Augustus.



Left: Thermopolion counter with slabs of stone including marmor Phrygium or Docimienium (Pavonazetto) in the bottom right corner. This is a marble breccia from Iscehisar, ancient Dokimeion in Turkey; an Egyptian gabbro at the far left; various pieces of marmor Luculleum (Africano) breccia from Teos in Turkey; yellow marmor Numidicum (Giallo Antico) from Chemtou in Tunisia; salmon-pink marmor Chium (Portasanta) from the Greek Island of Chios in the Aegean; pale yellow-pink Breccia Corallina, from Bilecik (ancient Bythnia) in Turkey. The white and grey marbles which could have been derived from Greece, Italy or Turkey. Also present on this counter is marmor Carystium.

At Cigala Spanish restaurant at number 54 Lamb's Conduit Street and back in the 21st Century, the same decorative technique has been employed, using up randomly shaped and sized offcuts of waste marble. The range of materials is much greater, than in the Roman precursors, notably with the inclusion of more granitic rocks and serpentinites. Nevertheless, a few of the stones used would have been familiar to the Romans. The stone varieties I have been able to identify on the façade of Cigala are listed and described here in alphabetical order.

Balmoral: A red, coarse grained, Proterozoic granite from the Vehmaa Batholith, located near Turku, SW Finland. Geologically this is a pyterlite, a variety of rapakivi granite intruded at around 1.5 billion years (Ga) ago containing dark red orthoclase, quartz, plagioclase, biotite and minor hornblende. Balmoral has been quarried since the early 20th Century and is still extracted today.

Baltic Brown: A few slabs of Baltic Brown occur on the façade of Cigala. This is the classic rapakivi granite, with large, round, megacrysts of pale brown orthoclase, often rimmed with a grey green plagioclase in a very dark brown, matrix of smoky quartz, hornblende and biotite. This rock type is known as Wiborgite and comes from several quarries in SE Finland, close to the Russian border. They were intruded at 1.6 – 1.5 Ga, but have only been worked for decorative since the 1970s. Nevertheless they are very popular and have subsequently become a very common sight on the high street.

Belfast Black: A few slabs of very black igneous rock occur on the façade of Cigala. Some, with a 'salt and pepper' colouring of black and white crystals is Rustenburg Bon Accord gabbro from South Africa (see below), however a blacker gabbro composed of black pyroxenes and dark grey plagioclase feldspar is also found. This is another South African stone called Belfast Black, quarried near the town of Belfast (Emakhazeni), east of Pretoria. The gabbros form part of the enormous, 2 billion year old, Bushveld Layered basic intrusion, the largest of its kind in the world.

Black Limestones: several slabs of black limestone are found on the Cigala façade, many have been affected by the wind and wet and the once shiny black surface has become dull and grey. A large example,

cross cut by white calcite veins occurs in the middle of the final panel of crazy paving on Rugby Street. The main current producers of black limestone are the Carboniferous strata of Belgium and Ireland. Famous examples include Belge Noir, Bleu Belge, Kilkenny Black and Galway Black. Black limestone forms in an anoxic ocean environment and the colour is imparted by abundant, but finely disseminated particles of carbon, plus or minus iron pyrite, in addition to their main component, calcite. Fossils of crinoids or shells may also be present.



Cigala Restaurant, 54, Lamb's Conduit Street.

Green Serpentinities: A variety of green-coloured serpentinites feature in the cladding at Cigala. Serpentinities are rocks which are primarily composed of the serpentine group of minerals, Lizardite, antigorite and chrysotile and other phases including tremolite, talc and spinel. These form through the metamorphism of mantle-derived ultramafic rocks known as peridotites which were originally composed of olivine and pyroxene. Serpentinities form through a decrease in temperature and pressure and the addition of water as these rocks are uplifted from the hot, dry lower crust and mantle via tectonic processes. Serpentinities may be broadly subdivided into two varieties. Bastite serpentinites contain distinctive blotchy spots, around 5 mm in diameter or silvery or pale green 'bastite'. These are replacements of orthopyroxene by very fine grained, fibrous crystals of talc and tremolite. The other variety are tremolite serpentinites which are fine grained and show the classic snake skin patterning which has given this rock its name. Nevertheless appearance and textures can be extremely variable, even at outcrop scale. Most serpentinites used architecturally are from the Piemontese Zone of the French and Italian Alps, and particularly in the Val d'Aosta and around Genoa. Other possible sources are from Tinos in the Aegean and other regions in Greece and Turkey. Serpentinities are also quarried in Vermont in the USA. Although the varieties seen here have not been identified, they are most probably from Alpine sources.

Grey Limestone Breccia: A weathered, but large slab of a brecciated grey limestone, in a pink-red matrix occurs on the corner of Cigala, just below and left of a large slab of Rosa Porriño granite (see below). The origin of this stone is unknown and the fact that this has weathered poorly does not aid identification. It is possible that it is Carboniferous limestone called Bois Jourdon from Mayenne in Brittany, France.

Indian Brown Granite: A decent-sized slab of Indian Brown Granite can be seen behind the chairs on the Lamb's Conduit Street frontage of Cigala. It is a warm brown, very coarse grained granitic rock and it will equally come as no surprise that it is from India. Actually it is an unusual variety of rock called a charnockite and it comes from the Amaravathi area of Andhra Pradesh. Charnockites are Proterozoic rocks (c. 1.8-1.5 billion years old), now generally believed to be of metamorphic and would have been formed at very high

temperatures and pressures. They are composed of quartz, potassic feldspar and mafic minerals characteristically orthopyroxene and/or hornblende. Charnockites occur in Scandinavia, North America, Canada, South Africa and Australia, but they were first described in India by geologist T. H. Holland in 1900, after he had observed the stone on the mausoleum of Job Charnock at St John's Church in Calcutta. Holland was later able to identify these rocks in the field.



Lamb's Conduit Street façade; a). Baltic Brown, b). Indian Brown Granite, c). Portoro, d). green serpentinite, e). black limestone.

Larvikite: There are several sub-varieties of the rock known as larvikite, which comes from near the town of Larvik in southern Norway. This is another coarse grained, intrusive igneous rock. However it does not contain quartz, therefore it is not a granite. The dominant mineral is the blue-ish feldspar variety oligoclase. This mineral shows the classic iridescence, or more properly, 'schillerescence' of this stone, which makes it so attractive and therefore popular. The Larvik Plutonic Complex was intruded at around 295 Ma in the early Permian. It is associated with the formation of the Oslo Graben at this time and technically the rock is a monzonite. There are several phases of the intrusion producing rocks of similar geochemistry but differing colours. Varieties are named Blue Pearl, Emerald Pearl and Marina Pearl and larvikite is the national stone of Norway. The main stone used here at Cigala is Blue Pearl.

Napoleon Tigré: This hard-wearing and distinctive limestone comes from huge quarries near the village of Hydrequent in the Pas-de-Calais, France. Of Upper Visean, Carboniferous age, this is an algal limestone of the Calcaire Carbonifère formation of the Ferques Inlier. The fossilized algae is clear on most surfaces forming dendritic patterns known as 'pattes d'alouettes' or 'lark's feet'. The algae is *Corydopodium* species. Napoleon Limestone has been quarried since the Roman period and are still actively worked today.

Norwegian Rose Marble: This beautiful pink marble is from Furuli & Løvgavlen Quarries, near Fauske, in northern Norway. It's a metamorphosed Precambrian conglomerate which has undergone deformation in two mountain-building events or orogenies, the Proterozoic Svecco-Fennian Orogeny and the Lower Palaeozoic Caledonian Orogeny. The quarries were opened in the 1880s and are still in production. There is a slab of Norwegian Rose on the windowsill on the Rugby Street elevation of Cigala.

Perlato: Several slabs of the cream-coloured Sicilian limestone Perlato can be found on the façade of Cigala. This is a brecciated limestone which is made distinctive by the presence of brown-coloured fossil shell fragments and stylolites concentrating yellow-brown iron oxides. Lower Cretaceous in age, this limestone formed eroding reefs on a continental slope. It was later transported to its current position at Custonaci in western Sicily as part of the Alpine Panormide Nappes. The stylolites are evidence of this rock being slightly squashed; they are in fact anticracks, and their zig-zag morphology at a fine scale is the result of small scale

dissolution under pressure of the limestone. The quarries (of which there are many in the Custonaci area) have been worked since the mid 20th Century and have become very popular as kitchen and bathroom fittings as well as architectural cladding.



Rugby Street façade; a). Belfast Black, b). Rustenburg Bon Accord, c). green serpentinite, d). Napoleon, e). Rosa Portogallo.

Portoro: Portoro limestone has distinctive yellow markings on a black limestone. It takes a high polish, but does not stand up well to exterior use, and the samples on Cigala have lost their lustre. The colour of the black limestone is imparted by carbon (graphite) and the veins are of iron oxide hydroxide goethite-stained calcite. Portoro has been worked since the 16th Century from Isola Palmeria just off the coast of La Spezia peninsula in Liguria, NW Italy. Geologically it is part of the same formation of the Carrara Marbles, but represents a non-metamorphosed section of these Alpine Tuscan Napes. The stone is now mostly worked out, and only small scale quarrying takes place today.

Red Limestone: Several samples of red limestones are to be found. Like black limestones, these may be difficult to provenance. The red colour is imparted by the red iron oxide hematite, recently shown to have been concentrated in the sediments by bacteria (Mamet & Preat, 2005). Red limestones are quarried today in around Verona, Italy. This is the famous Jurassic ammonitico rosso facies which actually can be traced along the Alpine mountain chain from Spain through Italy, Austria, Hungary to Greece, all locations where it is also quarried. Typically this is a nodular limestone, often with ammonite fossils. Devonian red limestones were and occasionally still are quarried in Belgium and France. A slab of orange-red limestone, high up on the Lamb's Conduit Street façade of Cigala, with blotchy white veins and markings is probably the variety Languedoc or Rosso Francia, quarried in the Montagne Noir region of south central France.

Rosa Porriño: The Porriño Batholith is one of the most-quarried granites in Europe. Situated on the Spanish-Portuguese border, west of Pontevedra, it is a earliest Permian (288 Ma) granite, intruded as part of the Upper Palaeozoic Variscan mountain building phase. It contains abundant pink orthoclase feldspar which give it its name. Also present are white plagioclase, biotite, and grey-brown, translucent quartz. Rosa Porriño (or Rosa Porrinho) has been quarried on both sides of the border and over thirty companies are registered to quarry this granite. Slabs of Rosa Porriño can be seen on the Rugby Street façade of Cigala, right on the corner with Lamb's Conduit Street.

Rosa Portogallo: A wide varieties of marbles are quarried around the towns of Estremoz, Borba and Vila Viçosa in the Alentejo region of Portugal. The marbles are exposed around the Estremoz Anticline. They are Ordovician limestones which underwent metamorphism to transform them to marbles in the Devonian.

Most prized are the pink marbles, sometimes with streaky, black and dark green veins and blotches. The pink marbles occur as lenses in units of white marbles. The colour is imparted by finely disseminated particles of the red iron-oxide hematite. The darker markings are serpentine-group minerals. The Estremoz marbles have been quarried since the Roman period and have been identified in many archaeological sites in Roman Lusitania. Now they are popular for bathroom décor, but are also spectacularly used to clad buildings. Several slabs of the salmon pink variety with black serpentine-rich veins are common on the façade of Cigala.



The corner of Rugby Street & Lamb's Conduit Street; a). Rosa Porriño, b). Rosa Sardo Ghiandone, c). Blue Pearl Larvikite, d). Balmoral, e). Rosso Levanto, f). grey limestone breccia, g). Rustenburg Bon Accord.

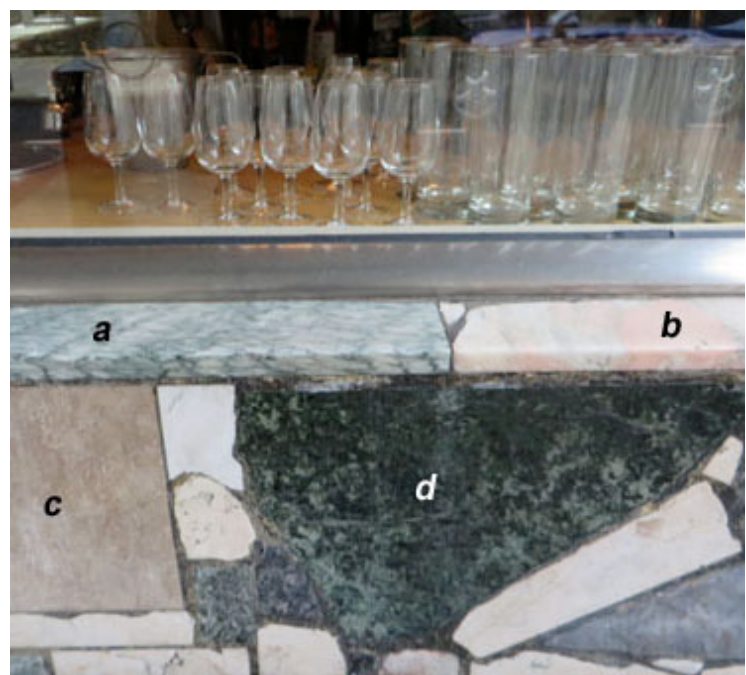
Rosa Sardo Ghiandone: A slab of Rosa Sardo Ghiandone, also known as Sardinian Beige Granite, is situated above a slab of Rosa Porriño on the Rugby Street corner with Lamb's Conduit Street. This granite is a bit older than that of the Rosa Porriño granite but related to the same mountain building episode. It is about 310 million years old. It is distinctive for the pink, slightly blotchy phenocrysts of pink

orthoclase feldspar, in a medium grained matrix of white plagioclase, quartz and black biotite. It comes from quarries around the 'granite town' of Arzachena in northern Sardinia.

Rosso Levanto: There are many varieties of serpentinites on the façade of Cigala but most are green in colour. One variety is purplish red bastite serpentinite, sometimes cross-cut with green veins. This is very probably a variety called Rosso di Levanto which is quarried near the village of Bonassola in the Levanto region of Liguria in Italy. Like the green serpentinites (above) this was a slice of ocean crust emplaced on the European continent during the closure of the Tethys Ocean in the Cretaceous. The colour is imparted by hematite.

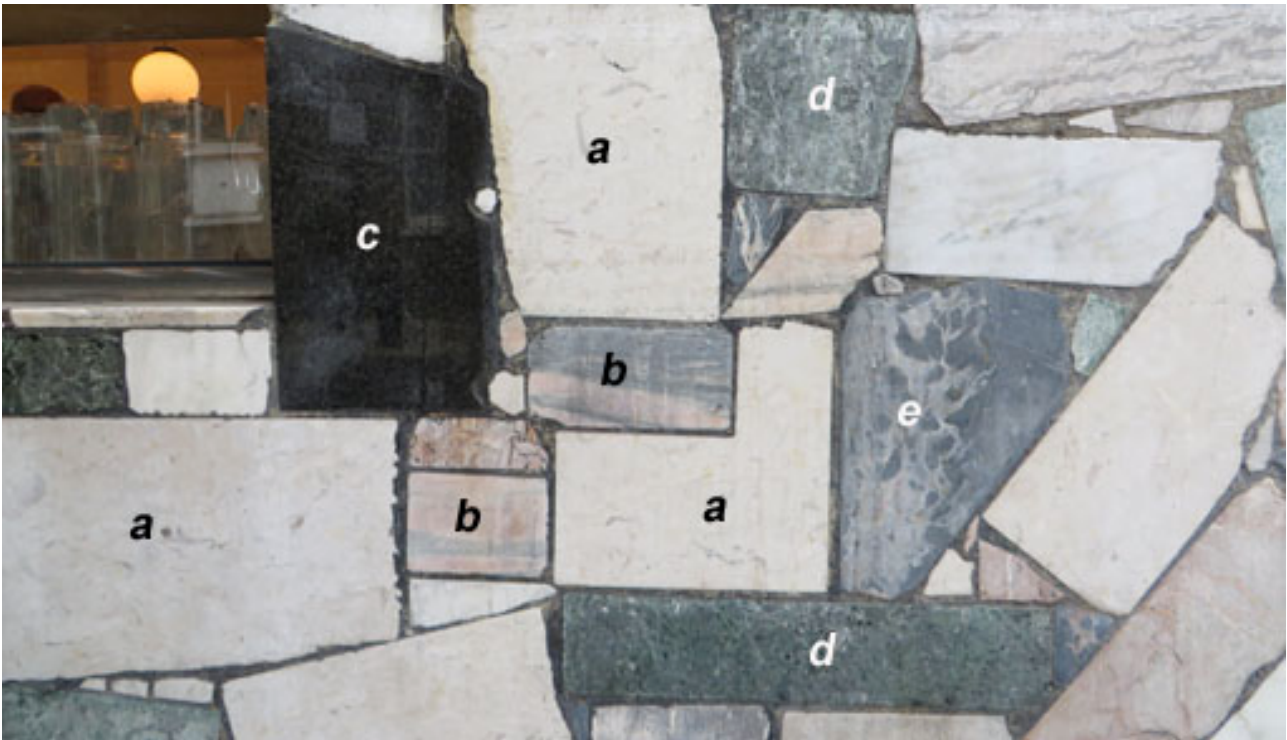
Rugby Street façade; a). Vert d'Estours, b). Norwegian Rose Marble, c). Napoleon, d). green bastite serpentinite.

Rustenburg Bon Accord: Like Belfast Black, Rustenburg Bon Accord is another gabbro from the Bushveld Complex of South Africa. Close inspection shows it to be a medium grained gabbro, with crystals about the size of grains of rice, of black pyroxene and paler plagioclase feldspars. This granite is quarried west of Pretoria, near the town of Rustenburg. The gabbro is a by-product of the platinum mining industry. The World's largest platinum deposit occurs in a layer called the Merensky Reef, which underlies the Rustenburg gabbros. The global use of



this is a building stone makes good use of what would otherwise be a waste product. The stone is also marketed as Nero Impala.

Vert D'Estours: A series of nodular limestones, probably of fairly deep marine origin were deposited in what is now the Pyrenées mountain chain during the Late Devonian. Subsequently weakly metamorphosed and deformed into a series of upright folds, these strata have produced a range of building stones along strike. The variety Vert D'Estours, from Estours Quarry, near Seix in the French Pyrenées is composed of calcite and chlorite, the latter mineral imparting the green colour. The strong foliation observed is an axial planar cleavage, associated with the fold structures. *There is a slab of Vert d'Estours on the windowsill on the Rugby Street façade of Cigala.*



Rugby Street façade; a). Perlato, b). Rosa Portogallo, c). Rustenburg Bon Accord, d).green serpentinite, e). Portoro.

White Marbles: There are a number of white, or white with pale grey streaks, marble slabs on the façade of Cigala and these are notoriously difficult to provenance. In fact, researchers studying classical marble sculpture and architecture often need to resort to expensive geochemical techniques to link marble artefacts to their source, and even this method is not always conclusive. To attempt to identify white marbles by eye is almost always a fool's game. The most important sources of white marbles are the Carrara region of Italy, the Drama area of northern Greece and various locations in Turkey. White marbles are also produced in Vermont in the USA, Rajasthan in India and Norway, as well as many other locations worldwide. The slabs seen here could come from anywhere!



Mystery Stone: Finally there is a mysterious stone with an unusual texture, situated two thirds of the way up on the large panel of the Rugby Street frontage of Cigala (see image left). It's a roughly triangular shaped slab, composed of a grey stone with irregular-shaped nodules. I have no idea what it is! Unfortunately it is too high up to even guess at its composition. Please do contact me (email below) if you recognise this stone from somewhere else or if you know what it is.

References and Further Reading

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Menus, booking and contact details and the location of Cigala Restaurant can be found here:

<http://www.cigala.co.uk>



Rugby Street façade of Cigala.

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