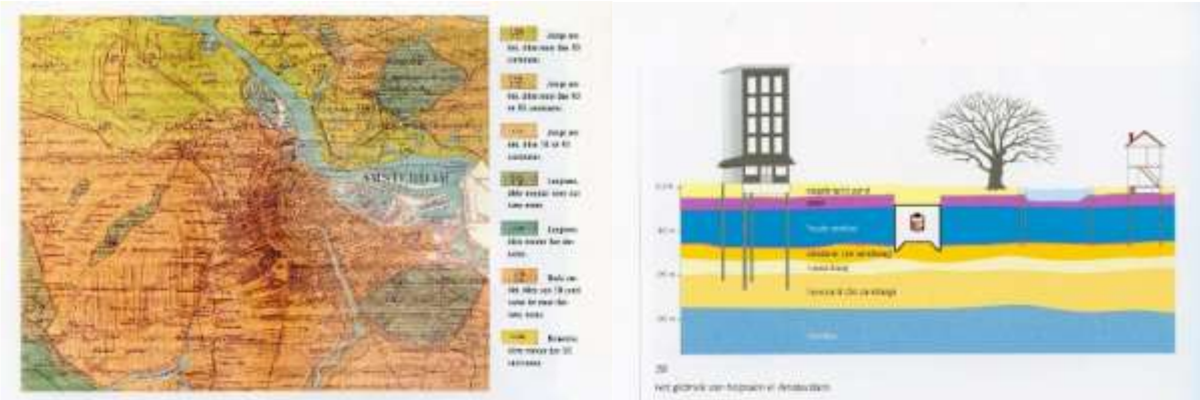
EAGE Field trip 1

Stone walk Rijksmuseum surroundings. Field trip by Drs. C. Wim Dubelaar 17 October 2021

The Evening Stone Walk in Amsterdam will take you along several monuments and statues of natural stone. Starting at the Rijksmuseum we will have a closer look at the mineralogy, the fossil content, the characteristic features and the origin of the different stone types.

Geological setting



Geological map of Amsterdam and schematic cross-section showing the piles for foundation in the upper 35 m of the subsoil (De Gans 2011). Holocene clay and peat cover a Pleistocene fine sand layer. The top of the Pleistocene sand, at about 15 m below the NAP (Dutch Datum level), is a firm foundation level for common houses. Larger blocks of flats are founded with piles on coarser sand layers at larger depths of Pleistocene age.

Building stones of the Netherlands

Most of the shallow subsoil of the Netherlands is composed of Pleistocene and Holocene deposits and local supplies of natural stone suitable for building are rare. Upper Carboniferous sandstones, that outcrop in the Geul valley in the southern part of Limburg province, were used in the past for a limited number of houses in the vicinity of the quarry. Upper Cretaceous Maastricht Limestone and Kunrade Limestone provided the major supply of natural stone in the south of Limburg. Nowadays Maastricht Limestone is excavated in an underground quarry an is used on a very modest scale in Limburg province. The small occurrences of building stones in the Netherlands resulted in a long history in trade of stones, especially limestones from Belgium, and sandstones from Germany.

Building stones from abroad used in Amsterdam

At the plinth of the **Rijksmuseum**, built in the late 19th century (1885), use is made of Carboniferous limestone, quarried in the Ardennes, a mountain ridge in Belgium. The bluestone shows a variety of fossil fragments, among others, crinoids stems, brachiopod shells and several types of corals that lived on the substrate of a shallow, tropical sea. At the façade, made of red bricks, we can distinguish sculptures and ornaments made out of Jurassic crinoid reef limestone. The limestone was quarried in Euville, a village in Lorraine (Northern France). For some sculptures use was made of limestone from underground quarries in the vicinity of Savonnières, a village located south of Verdun in Northern France.

Plinth Rijksmuseum: Carboniferous limestone showing brachiopod shells (photo right). Above the blue limestone occurs cream colored ashlar of Upper Jurassic Euville limestone (photo left)

At the house **Jan Luykenstraat 2 ,** built in the late 19^{th} century use is made of reliefs curved from Lower Cretaceous Obernkirchener Sandstone. Porosity of the Obernkirchener Sandstone varies from 10-15 %. Grainsize 40-200 micrometer The stone has a tight fabric, besides quartz grains and quartz cement some muscovite occurs. Kaolinite flakes are often present in the pores. The sandstone is very durable but prone to salt weathering, that results in skinning and blistering of thin surface laminae. This type of weathering often occurs in buildings that are situated near the North Sea coast.

Obernkirchener Sandstone reliefs. Jan Luykenstraat 2

In the 17th century Lower Cretaceous sandstones were imported from Germany to be used as cladding for the dwellings of rich merchants and burgomasters. The main sandstone quarries were situated in Bentheim, a town near the Dutch border, and in Obernkirchen, a village near Hannover. The stones from Bentheim were transported via the river Vecht to the Zuiderzee and to Amsterdam. The Obernkirchener Sandstone was transported via the river Weser to the North Sea and from there to the Zuiderzee and the port of Amsterdam (Dubelaar 1984, 2014).

Hobbemastraat 9-11 ,an extension of the Parkhotel built in 1930, shows at street level sculptures of Euville crinoid limestone made by J.C. Schultsz. The ornaments of number 11 display the theme: transport through the ages. One can decipher a sailboat, steam engine boat, a camel, knight on horseback, car, train and Zeppelin (Air ship). The other front, number 9, shows five sculptures that are personification of the five then known continents : Europe, America, Asia, Africa and Asia. Stone at the base is a granite from Germany, probably derived from a quarry in the Fichtel Mountains.


Sculpture made of Euville Limestone, Hobbemastraat 9

Pieces of sandstone taken up in a basalt columnar fragment. The basalt possibly originated from a volcanic sill layer.

The kay at **Stadshouders kade** shows a cladding of basalt blocks. Green Olivine minerals and pieces of sandstone, taken up in the volcanic lava flow, can be seen in some of the blocks. Besides massif blocks some porous blocks (basalt lava) can be distinguished. The basalt blocks of Tertiary age probably originate from a quarry near Koblenz, along the Rhine river, in the Eifel region (Germany).

Opposite the kay is the **Holland Casino building.** Columns at the entrance are furbished with a very popular building stone, Larvikite, from Norway. K-feldspar and Plagioclase alternate to give a characteristic lustre on polished surfaces. The stone is derived from the Larvik Batholith Complex, a suite of igneous rocks of Permian age in the Oslo Rift.

Cladding of metamorphic rock and granite boulder in the court

At the **Max Euwe plein** occurs columns cladded with a metamorphic rock from the Alps or another Alpine mountain range. In the court of the former prison building a sculpture of a splitted erratic boulder has been placed. The granite boulder comes from a glacial deposit in the subsoil of the Northern Netherlands.

Hirsch building Leidseplein, built in 1912. Cream to white fluvial sandstone blocks showing even laminated and cross-bedded features. The sandstone most probably derives from a quarry near Medard, a village in Rheinland-Palts (Germany) near the border with France.

Further reading

Dubelaar, W, 1984. Steenrijk Amsterdam. Een geologische stadswandeling, KNNV Hoogwoud, 96 p.

Dubelaar, W, 2014. A Stone Walk in Amsterdam. EAGE Field trip, 7 p.

Gans, W. de, 2011. De bodem onder Amsterdam. TNO-Geologische Dienst Nederland, 69 p.