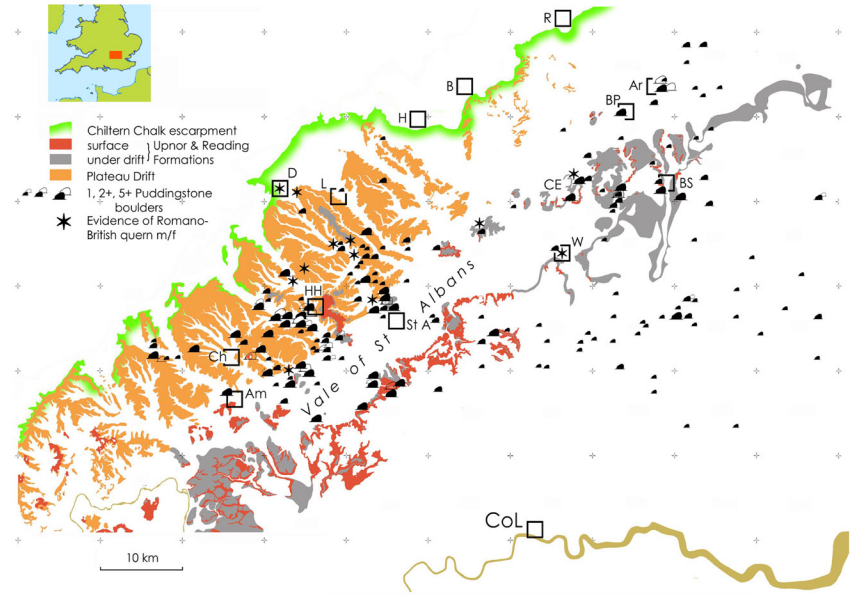
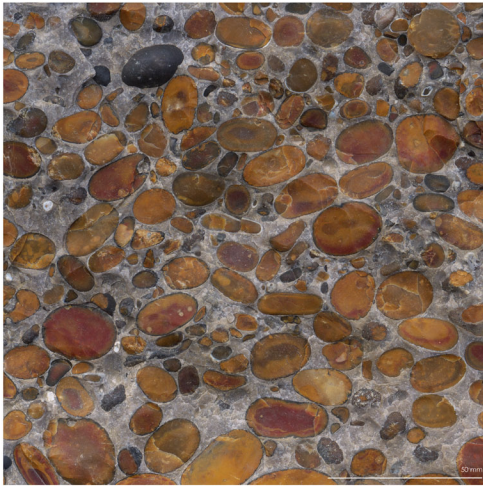
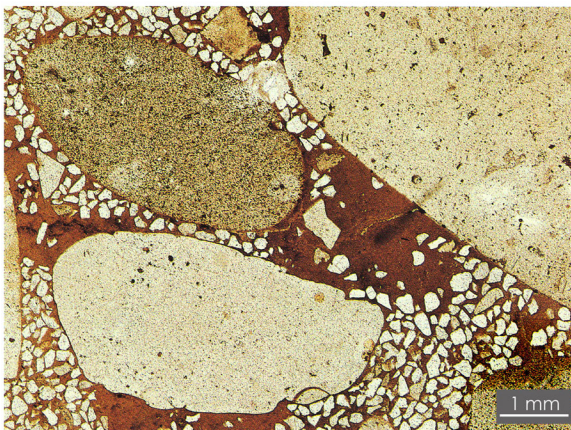


# HERTFORDSHIRE PUDDINGSTONE

Hertfordshire Puddingstone is both the county's geological claim to fame, and a most interesting rock. It is an intensely hard mass of flint pebbles (fossil beach shingle), cemented by a plain grey sandstone - actually sarsen. Famously the rock will break through clasts and cement alike, if hit hard enough.



It is found mainly in Hertfordshire with further sources in east Buckinghamshire and to a lesser extent West Essex. Most of it has derived from glacially disturbed Tertiary deposits on the Chilterns ('Plateau Drift') and has been moved from its source either by ice or by man. Much has been taken, mainly in the Roman period, so that Hertfordshire Puddingstone is actually an uncommon rock today - but where it does occur it cannot be missed, and since it is resistant to frost and other agents of weathering it is virtually indestructible.

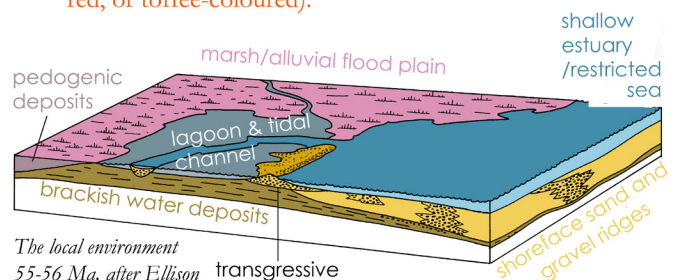


One clue as to the process of silicretisation comes from the age of the beds in which we think the rock was formed - between 55 and 56 Ma. That was the time of the 'Palaeocene/Eocene Thermal Maximum' or PETM, a period of hot climate caused by high CO<sub>2</sub> concentrations. Heat would have helped the chemical processes involved, and may also account for the grey-black surfaces of most of the flint pebbles in Puddingstone (inside they are grey, red, or toffee-coloured).

The rock typically contains about 97% silica and has no pores at all - probably the key to its strength. It is one of the hardest of all sedimentary rocks. It was formed in two stages, of which the second is more controversial:

a) the rapid erosion of the uplifted Chalk in the early Palaeocene generated vast numbers of flint cobbles and pebbles which washed into the proto-North Sea. They were smoothly rounded in ovoid or kidney-shapes, and characteristically battered by wave action. When they were mainly 10-20 mm in length the process of wear slowed down, and the pebbles were deposited as shingle beaches or off-shore shoals characteristic of the late Palaeocene Upnor Formation (56 million years ago [Ma]).

b) During the succeeding hundreds of thousands of years the beach was uplifted, and it is thought from modern examples that the formation of Hertfordshire Puddingstone as a hard rock took place on land, through the percolation of silica-rich water just below the ground surface. Sand was deposited between the pebbles but it too was infilled by crystalline silica to make a nearly pure silica rock, a 'silcrete'. There is growing evidence that the process occurred during a hiatus in deposition at the base of the early Eocene Reading Formation (55.6 Ma), before the deposition of extensive freshwater clays, but why Puddingstone was formed in some pebble deposits and not others is difficult to tell. It has very rarely been seen in situ in Britain, but similar deposits can be seen in Normandy, well south of the Pleistocene ice.



The local environment 55-56 Ma, after Ellison et al, Geology of London

Concretions in an old gravel pit at Saint-Saëns, Normandy

