

The red crinoidal limestone of Baelen (late Upper Devonian), a particular historical building stone with an unusual depositional setting, global geological importance and local use

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The “Marbre rouge à crinoïdes de Baelen” is a local ornamental stone from the Limbourg area (Vesdre valley, Eastern Belgium), quarried at least since the 16th century. Some of its varieties strongly resemble the Frasnian (Upper Devonian) Belgian red “marbles”, whereas others are diagnostic for the Baelen Marble. It represents a local member of the Upper Famennian (late Upper Devonian) Souverain-Pré Formation and it is only known from the Vesdre Synclinorium, although time-equivalent small crinoidal limestone accumulations and possibly analogous facies have locally been reported from the Dinant Synclinorium (Hamoir area and Lesse Valley). This deposit is rather unique as it represents probably the only known carbonate mud mound complex worldwide at this particular stratigraphical level. Individual mounds reached a thickness of at least 100m and a width over 500m. They correspond to a worldwide transgressive pulse or highstand system tract during the Late *Palmatolepis marginifera* Chron: a remarkable carbonate episode interrupting the siliciclastic Condroz Sandstone Group. Detailed petrographical and micropaleontological analysis point to unusual sedimentary and paleo-ecological conditions. In contrast with Frasnian mounds, corals and stromatopores are totally absent here. Carbonate microfacies comprise (crypt)-algal bindstones, stromatactis-bearing spiculitic mudstones and microbialites, frequently interrupted by lenticular crinoidal-foraminiferal grainstones. Mixed carbonate-siliciclastics, strongly affected by pressure solution, mark the transition with underlying and overlying sandstones. Macrofaunas comprise crinoids, hexactinellid sponges, brachiopods (e.g. small-sized spiriferids and productids) and orthoceratids. Microfaunas include dasycladacean algae, problematics, plurilocular foraminifera and ostracodes. Transitional facies between the peri-mound nodular limestones and the mound-core facies have now been described for the first time. The location of the mounds most probably coincides with that of former deep-seated extensional faults. The carbonate production might well have been related to cold-water hydrocarbon seeps (still unproven). The earliest record of quarrying is from the 16th century (Limbourg). The last active quarry (Les Forges, Baelen) closed in 1940. It has been used for both building and ornamental purposes in historical buildings mostly within a short radius of the production sites. Two varieties exist: a massive grey-pink stromatactis-bearing fine-grained limestone (mound core = marble quality) and a grey to red-stained argillaceous crinoidal limestone with numerous crinoid ossicles. The latter frequently encloses pale-grey, densely packed coarse crinoidal limestone lenses. The best examples of its usage can still be admired in the medieval town of Limbourg. Nice examples of marble-type quality are kept within the Chapel of the Home Saint Joseph (Baelen-Les Forges). It became most popular at the beginning of the 20th century, mainly for decorating art nouveau houses. One of the most famous buildings where it has been used as an ornamental stone, is the Antwerp town hall. The oldest original underground quarry from which it has been quarried (1560-1563), is still preserved in the Hors-les-Portes area, just outside Limbourg.