National Commission for Stratigraphy Belgium

Lower Paleozoic

Commission members
Proposals and discussion
Lithostratigraphy
Chronostratigraphy

2.1.4 Jodoigne Formation - JOD

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Authors: Dumont (1847); Malaise (1873, 1883, 1911); Fourmarier (1920). Formally defined by: de la Vallée Poussin (1931); modified by: Herbosch et al. (2008); Herbosch et al., Jodoigne-Jauche map, submitted; Herbosch, 2009 (herein).

Description: four different lithostratigraphic units can be distinguished (Herbosch et al., 2008):

- the Maka unit consists of an alternation of massive, pale-grey to grey quartzite and pyritic black shale, the latter with intercalated pale-grey centimetric sandstone beds. The quartzitic zones, in which bedding is difficult to observe, have a thickness of several tens of meters and are well exposed, whereas the intercalated black slate are rarely exposed. Outcrops occur between the camping of La Ramée to the S and the church of Jauchelette to the N, on both sides of the Grande Gette.

- the Orbais unit consists of well stratified, decimetric beds of grey to blue-grey quartzitic sandstone to quartzite. In between these quartzites an alternation of pyritic black slate and thin pale-grey sandstone occurs. The quartzite is never more than about 10 m thick and show clear bedding-parallel or occasionally oblique lamination. One of the most characteristic features is the common occurrence of sandstone containing black shale fragments, the amount of which is very variable (< 1 to 40%). This unit occur from Orbais in the S to Mont-au-Pont to the N, only along the E-side of the Grande Gette River.

- the Jodoigne-Souveraine unit contains black massive quartzite in which bedding is difficult to observe. It contains also black slate and grey quartzite but exposure are very scarce. This unit occurs between the old railway station of Jodoigne-Souveraine (now private property) and the surrounding of the chapel of "Notre-Dame du Perpétuel Secours" and to the E in the castle park.

- the Jodoigne unit of the Jodoigne Formation contains meter- to decimetre-thick zones of black slate, often with millimetric to centimetric siltstone beds, alternating with zones consisting of rhythmic, mostly decimetric sequences of sandstone, siltstone and black slate. The slate and thin siltstone beds are black and pyrite-bearing; the sandstone may be grey, black or yellow-grey. The yellow-grey sandstone variety was observed in two large temporary excavations in the eastern part of the town of Jodoigne. Structural observations in several outcrops of this unit point to the abundance of slump folds (Debacker et al., 2006).The depositional environment is interpreted as a fairly deep, anoxic basin with pelagic, hemipelagic and distal to less distal turbidite deposits. This unit crops out on both side of the Grande Gette, from the southern suburbs of the old town to the surroundings of the Bordia castle in the N of the town.

None of the contact between the four units has been observed. Moreover, observational gaps of several hundred meters exist between the Maka unit and the Orbais unit, and between the latter and Jodoigne-Souveraine unit. Likely these gaps coincide with the presence of black slate-dominated sequences. Between the outcrops of the Jodoigne-Souveraine unit and the Jodoigne unit, an apparent observational gap of 2 km occurs. Also this gap likely coincides with the presence of black slate-dominated sequence considering the particularly flat topography of the Grande Gette valley. A bore core from within this zone contains a cm to dm, rhythmic alternation of grey sandstone, siltstone and black slate of turbiditic nature, very similar to the Jodoigne unit.

Stratotype: not yet defined; type area in the Grande Gette valley from Jodoigne to the north and Glimes to the south. Outcrops of the Maka Unit at Jauchelette in front of the church and along the Rue du Maka (x 183,44 y 152,76). For the Orbais Unit near a small brook at Orbais (x 183,62 y 153,72). For the Jodoigne Unit along Rue du Grand Moulin (W bank of the Grande Gette) at Jodoigne (x 185,05 y 157,52). Also below the W wall of the town hall of Jodoigne (E side of the Grande Gette).

Area: outcrop area in the Brabant Massif: Jodoigne - Glimes area (Grande Gette River). In a few boreholes from Leuven area (Herbosch et al., 2008) and perhaps also in the Hoesselt and Martenslinde boreholes (Dusar & Langenaeker, 1992).

Thickness: difficult to estimate because of the tectonic complexity, the outcrop discontinuity and the presence of several large observational gaps. Estimated at more than 4 km (Herbosch et al., 2008).

Age: no macro- or microfossils are observed. Several ages have been suggested, primarily based on lithological similarities with other formations (Mousty Formation, Ardennes Revin Group) or overall geometrical position. Basically, two main

opinions exist. One group of researchers (Dumont, 1848; Malaise, 1900; Kaisin, 1919; de la Vallée Poussin, 1931; Raynaud, 1952; Mortelmans, 1955, 1977; Lecompte, 1957 & Verniers et al., 2001) considers the Jodoigne Formation older than the Blanmont Formation. The main argument for this hypothesis is the relative outcrop position with respect to other formation within the Brabant Massif. However, as pointed out by Michot (1980), the outcrops of the Jodoigne Formation are situated "on the northern limb of the Brabant Anticlinorium" and therefore should be younger than the Blanmont Formation.

The second opinion, in which the Jodoigne Formation is considered as Middle to Upper Cambrian, is favoured by Malaise (1911), Fourmarier (1921), Legrand (1968), Michot (1980), Vanguestaine (1992) and De Vos et al. (1993). However, as pointed out by Raynaud (1952), if this were the case, than the magnetite bearing Tubize Formation should be present between Blanmont and Tubize formations in the Grande Gette outcrop area. A magnetic field survey of Raynaud (1952) did not show magnetic anomalies between both formations, leading him to favour the first hypothesis.

Recently, on the basis of detailed mapping, lithological and sedimentological observation, structural field work, combined with an evaluation of existing biostratigraphic data, Herbosch et al. (2008) suggest that this formation belongs to the Middle Cambrian, possibly extending into the lower Upper Cambrian. An important argument is found in the Leuven borehole (89E01), dated with acritarchs and correlated to the lower part of Middle Cambrian (Vanguestaine, 1973ms; 1992 fig. 8). This borehole and also the Heverlee borehole (89E363) show a typical turbiditic facies allowing to attribute these two boreholes to the Jodoigne Formation rather than to the Mousty Formation, to which they were attributed earlier (e.g. De Vos et al., 1993).

In the new global Cambrian stratigraphy (Peng & Babcock in Gradstein et al., 2008) this interval corresponds rather well with the Series 3. According to this latter authors the «Series 3 is an expanded version of typical regional variants of «Middle» Cambrian, with its base close to the traditional «Lower-Middle» Cambrian boundary» (op. cit. p. 40).

Remarks: magnetite and garnet were never observed. The Jodoigne unit was mined for roofing slates. Synonyms: "roches noires, phyllades et quartzites de Jodoigne" (Malaise, 1883); "roches noires de Jodoigne" (Raynaud, 1952); "Assise de Jodoigne" (de la Vallée Poussin, 1931).