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Home Lower Paleozoic Devonian Carboniferous Permian/Triassic/Jurassic Cretaceous Paleogene-Neogene Quaternary
News RegWal Alteration units

Arenberg Formation - Accepted 01/2017

Quaternary

[Commission members](#)
[Proposals and discussions](#)
[Lithostratigraphy](#)
[Chronostratigraphy](#)

Arenberg Formation(authors: *F. Bogemans, P. Kiden, W. Huybrechts, B. Notebaert, K. Beerten, T. Lanckacker, G. Rixhon and V. Heyvaert*)

Authors: The Arenberg Formation was introduced by De Smedt (1973). The definition of the formation is extended.

Description: The Arenberg Formation consists of siliciclastic sediments, organic - rich accumulations and tufa deposits often showing a typical depositional sequence. In general, the lowermost part of the formation comprises fine grained siliciclastic sediments, followed by organic – rich clastic and/or peaty deposits. Within the latter unit tufa accumulations are common. These deposits are overlain by predominantly fine siliciclastic deposits which contain peaty or organic horizons, calcium carbonate concentrations and tufa in the lower part. In general the upper part of the stratigraphic sequence is made up of fine clastic sediments devoid of organic material except roots or remnants of the current vegetation. Locally the latter two units are separated by sand deposits, with laminae and beds of sandy clay or peat detritus.

The deposits of the Arenberg Formation form the infill of the fluvial valleys incised during the Late-Weichselian in the Schelde basin.

Although the lowermost part of the valley fills is generally composed of sandy deposits, these are often difficult to differentiate from underlying sandy units and are therefore not incorporated in the Arenberg Formation but in the underlying Eeklo Formation. The Arenberg Formation overlies the fluvial deposits of the Eeklo Formation or aeolian deposits of the Gent Formation or Gembloux Formations. The transition to these underlying units is sharp. Usually the top of the Arenberg Formation is situated at the surface but it may be covered locally by slope deposits or by recent sediments of the Gent Formation or the Vlaanderen Formation.

Stratotype: Alluvial plain of the Dijle River around Werchter.

Area: Schelde basin.

Thickness: from less than 2 m to a maximum of 15 m.

Age: Lateglacial and Holocene.

Remarks: In small upstream tributaries it is recommended to work on the level of “formation” as members cannot be differentiated there. Also, as the boundary between the Arenberg and the Vlaanderen Formation (fluvial versus tidal deposits) is diachronous, an arbitrary geographic boundary is introduced between these two formations.

Wichelen Member

Authors: This contribution.

Description: Grey coloured, mostly fine clastic sediments, dominantly silty in the upstream part of the river systems and clayey in the downstream part. Sand is common in the basal part of this unit as individual lenses, laminae and beds or as part of the silty and clayey deposits. The sand content decreases upward. Fine to very fine vegetation detritus is present but in situ peat accumulations are absent. In general, the Wichelen Member forms the lowermost part of the Arenberg Formation and is overlain by the Rotselaar Member (Fig. 1).

Stratotype: Alluvial plain of the River Schelde near the Bergenmeersen (Wichelen), core 1635 from Bogemans et al. (2009); coordinates X = 3°57'50" and Y = 51° 1'4".

Area: Schelde basin.

Thickness: From a few decimetres to a few meters.

Age: Lateglacial to early Holocene.

Remarks: Where the Rotselaar Member is absent and the sediments of both the Gemelingen and Wichelen Members are

clayey, a distinction between them is difficult or even impossible.

Rotselaar Member

Authors: This contribution.

Description: Brown to black peat (organic matter of vegetal origin) and gyttja with a varying content of clastic sediments. The peat may contain well defined vegetation remains such as wood fragments, fruits, seeds etc. or may be amorphous and structureless. Clastic sediments present in the peat are mostly fine-grained (clay, silt, fine sand) and are either homogeneously distributed within the peat or occur as laminae, beds or lenses. Additionally calcareous tufa and a variable amount of shells and shell fragments may be present.

Stratotype: Alluvial plain of the Dijle near Rotselaar. Lambert 72 coordinates: X= 173300; Y= 181600.

Area: Schelde basin.

Thickness: From decimetres up to a few meters, in extreme cases 11 meters.

Age: Lateglacial to Holocene.

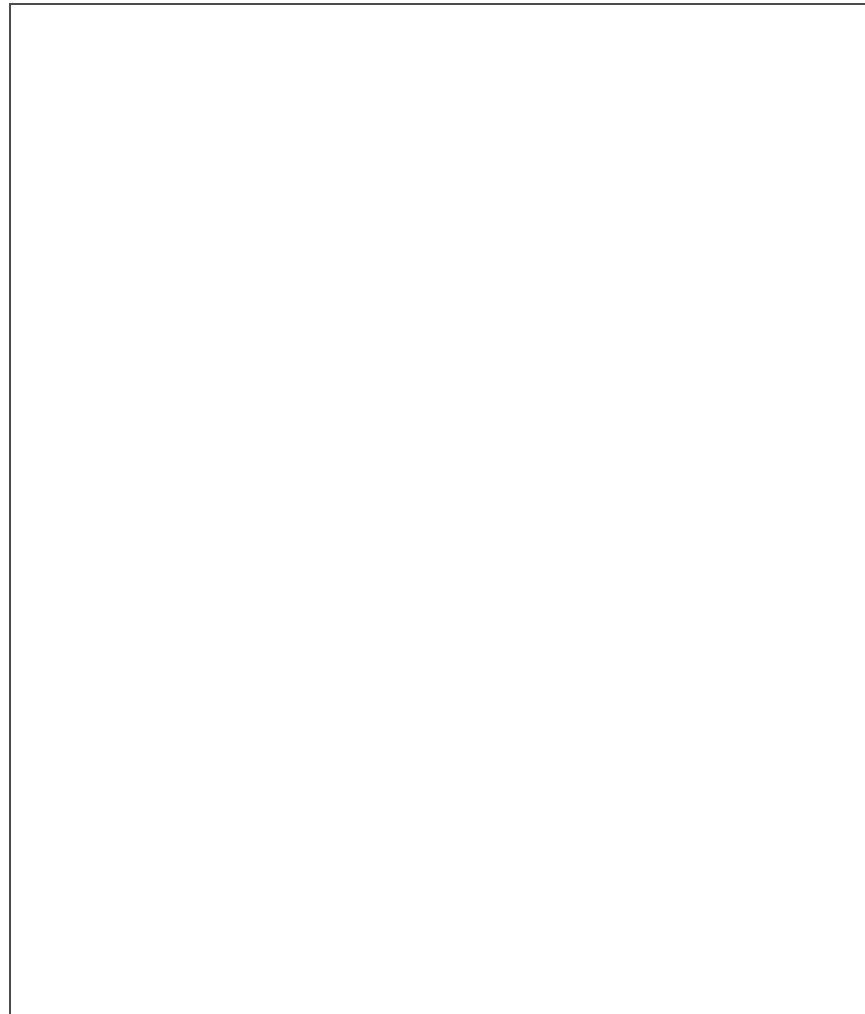


Figure 1: Stratigraphic profiles of the Arenberg Formation in respectively the downstream part (Temse) and upstream part (St. Paulus) of the Schelde basin.

Remarks: The Rotselaar Bed was introduced by De Smedt (1973) for the eutrophic peat layers in the Holocene floodplains but herein is extended to all types of peat including meso- and oligotropic peat. Because of the importance of this unit the Rotselaar Bed is promoted to member status. In the stratigraphical classification of Gullentops et al. (2001) this unit was incorporated in the Korbeek-Dijle Member, together with deposits now attributed to the Gemelingen Member.

Gemelingen Member

Authors: This contribution.

Description: Green, blue to grey clayey to silty deposits. Organic or peaty horizons are often present, especially in the lower parts. The unit contains vivianite and calcium carbonates. The clay deposits are generally homogeneous and massively bedded. Occasionally they contain sandy and/or silty intercalations with a limited vertical and horizontal distribution. These intercalations are more widespread in the upstream part. The sediments of this member often are soft

and less consolidated than those of the overlying St. Paulus Member. Horizons with a crumbly structure are observed in the upper part.

The stratification of the silty deposits is massive or varies from diffuse horizontal lamination to small scale ripple bedding. The following major facies types are observed:

- Irregular composite sets of clayey and sandy laminae
- Lenticular sandy intercalations often with vegetation remains, wood fragments and/or freshwater molluscs.

The Gemelingen Member usually overlies the Rotselaar Member and is nearly always covered by the St. Paulus Member. The transition to both members may be gradual. Where the Rotselaar Member is not present, the Gemelingen Member can overlie any older fluvial unit. In some parts of the Schelde basin, mostly in the downstream reaches, this member is absent or poorly developed and can be hard to differentiate from the St. Paulus Member (Fig. 1).

Stratotype: Alluvial plain of the Mark river, Gemelingen (Galmaarden), Lambert coordinates: x=120 758; y=160 234 (Huybrechts, 1985).

Area: Schelde basin.

Thickness: 10 cm to several meters.

Age: Holocene.

Remarks: In the stratigraphical classification of Gullentops et al. (2001) the deposits now attributed to the Gemelingen Member were incorporated in the Korbeek-Dijle Member.

Weert Member

Authors: This contribution.

Description:

Mainly fine to medium fine sand, sometimes coarse sand with fine gravel, with laminae and beds on mm to dm scale consisting of sandy clay or peat detritus, which increase in thickness and frequency in an upward direction and pass gradually into sand-clay bedding and eventually into clay or sandy clay with sand laminae. In most cases, the deposits contain small plant and mollusc fragments. The colour of the sand varies from brown to grey brown above the ground water level to grey, brownish grey or blue grey below, while the clay laminae are brown to grey brown. This unit occurs on the convex inner bank of middle to late Holocene river meanders, in an erosive position relative to older units (e.g. the peat of the Rotselaar Member). Where the meander belt has migrated laterally since the formation of this unit, the relation with the (contemporary) river channel may be unclear. Sediments of the Weert Member are overlain by the floodplain deposits of the St. Paulus Member (Fig. 1) and may also be covered by fresh or brackish water tidal deposits of the Vlaanderen Formation. The deposits are interpreted as late Holocene lateral accretion and channel deposits.

Stratotype: Floodplain of the River Schelde near Weert, Bornem, Lambert-coordinates: x= 137650, y= 199075.

Area: Schelde basin.

Thickness: The unit reaches a maximum thickness of 5 to 6 m in the type area. This may vary according to the size of the river and the position within the river basin.

Age: Late Holocene.

Remarks:

- First described by Kiden (1983: 'kronkelwaardafzettingen van de Oude Schelde'; 1985, 1989: 'point bar deposits'; 1991, Fig. 12.6: 'Subatlantic lateral accretion deposits'). These deposits (and the landforms associated with them) previously have been interpreted incorrectly as natural levee deposits (Snacken, 1964; Mijs et al., 1983).
- Outside of the type area in a similar setting, lateral accretion deposits have been observed between Wetteren and Dendermonde in the lower River Schelde valley (Bogemans et al., 2012), in a temporary excavation in the River Dender floodplain (Vandenberghe, 1977) and in the floodplains of the Dijle catchment (Notebaert et al., 2011).

St. Paulus Member

Authors: This contribution.

Description: Yellow, brown and grey clayey, silty or sandy deposits. The lower parts of the member are generally more clayey, but may be sandy if the underlying deposit is sand.

The deposits are predominantly massively bedded; sedimentary structures and intercalations are generally absent. Gley features are common as well as Fe/Mn concentrations or stains, especially in the upper part. Calcium carbonate concretions and vivianite are absent.

Typically, the St. Paulus Member forms the uppermost layer of the Holocene floodplain deposits. In parts of the valleys the St. Paulus Member may overlie fluvial but also non-fluvial sediments of pre-Holocene age (Fig. 1). The lower boundary of the member can be distinct or more gradual as is the case where it overlies the Gemelingen Member.

The present day floodplain topography is very often the result of the deposition of this unit. The grain size characteristics of the member are strongly related to the present-day river and its position within the floodplain. The deposits are more sandy near the river and on the natural levee if present, and more clayey in the floodplain depressions. This is the result of overbank flooding processes, with overtopping of the riverbanks and differential sediment sorting.

The St. Paulus Member is well developed in the loess belt of Central Belgium but less so in the northerly sandy regions of

Belgium.

Stratotype: Alluvial plain of the Mark river, Galmaarden, Lambert coordinates: x=119056 to 119954; y=159530 to 160388 (Huybrechts, W., 1985).

Area: Schelde basin.

Thickness: 0.5 to 4 meter

Age: Late Holocene.

Remarks: The silty deposits of this member were formerly defined by De Smedt (1973) as the Rotspoel Member.

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