

Kiel Member (Berchem Formation)

Unit name: Kiel Member

Hierarchical unit name: Berchem Formation

Type: Member

Code: BcKi

Author(s):

- Compiled by: Louwye Stephen, Adriaens Rieko, Deckers Jef, Everaert Stijn, Vandenberghe Noël, Verhaegen Jasper

- Modification of: De Meuter & Laga (1976)

Alternative names: /

Origin of the name: The origin of the name of the unit is discussed in De Meuter & Laga (1976) and Louwye et al. (2020).

Status: Formal

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Characterizing description

The Kiel Member was originally described as a non-fossiliferous (i.e. decalcified), grey-green medium fine-grained to coarse-grained sand (mode $248 \mu\text{m} \pm 51 \mu\text{m}$), very rich in glauconite, sometimes concentrated in patches, with rare clay streaks and sandstones. The clay content is $2.5 \pm 1.3\%$ and the D90 of the grain size distribution of $404 \pm 108 \mu\text{m}$, making the Kiel Member less clayey and with a larger coarse fraction compared to the underlying Edegem Member and overlying Antwerpen Member (De Meuter & Laga, 1976; Verhaegen, 2020). This facies occurs in the south and central part of the city of Antwerp (De Meuter & Laga, 1976). To the north and east of Antwerp this member becomes fossiliferous (Everaert et al., 2020). Everaert et al. (2020) studied several temporary outcrops of the Kiel Member in Antwerp and could distinguish the fossiliferous Kiel and Antwerpen members by a slight but marked color difference (greyish versus blackish) due to a somewhat lower clay and glauconite content and a coarser sand fraction in the Kiel Member. The glauconite content ranges from 28% to 54% and is on average 38% (Adriaens, 2015). The Kiel Member is characterized by a different ichnofacies, with the almost continuous presence of bioturbation. Everaert et al. (2020) described furthermore in great detail sandstone layers and shell layers (Glycymeris, Cordiopsis, Cyrtodaria), intercalated between several metres of loose grey sand, seemingly devoid of calcareous fossils. In contrast to the Antwerpen Member, the recorded molluscs are worn and very fragile due to heavy decalcification.

Type section, type locality, type borehole, type CPT and/or type geophysical borehole

De Meuter & Laga (1976) mentioned Kiel, suburb of the city of Antwerp, as the type locality. No permanent outcropping type section for the member exists. The lithology of the member was

described in following temporary outcrops in the Antwerpen area (see Figure 0-2 for a synthetic overview):

Antwerpen – Van Rijswijcklaan AV (De Meuter et al., 1976)

Antwerpen – Nachtegalenpark AN (De Meuter et al., 1976)

Berchem – Grote Steenweg AG (De Meuter et al., 1976)

Tweelingenstraat (Everaert et al., 2020)

Argenta (Everaert et al., 2020)

Post X (Everaert et al., 2020)

Description upper boundary

To the north and east, the Kiel Member is unconformably overlain by the Antwerpen Member of the Berchem Formation, locally characterized by load casts in the basal part of the Antwerpen Member. Biostratigraphic analysis with dinoflagellate cysts indicates that the hiatus between the Kiel Member and the Antwerpen Member increases in a northern direction (Everaert et al., 2020; Louwye et al., 2000), and probably corresponds to the Early Miocene Unconformity (EMU) (Munsterman et al., 2019). A sharp boundary between the Kiel and Antwerp members is also continuously found in the CPTs across the city of Antwerp, with higher qc values in the Kiel Member (12-14 MPa) compared to the Antwerpen Member (circa 8 MPa) (Deckers & Everaert, 2022).

Description lower boundary

The member rests on the Edegem Member of the Berchem Formation. Thin layers of coarser sand grains are occasionally present at the base of the unit (De Meuter & Laga, 1976) and a thin pebble layer was observed only in one outcrop (Vandenberghe et al., 1998).

Thickness

Based on the outcrop drawings by De Meuter et al. (1976) and CPTs, the Kiel Member has an approximate thickness of 10 m in the type area.

Occurrence

Deposits coeval with the Kiel Member are recorded in several boreholes north and east of the type area (Antwerp Campine area, Figure 0-2) reaching a thickness of circa 20 m (Louwye et al., 2020).

Regional correlations

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Age

The radiometric dating of glauconites show diverging K-Ar ages (23 to 25.3 Ma; Chattian) and Rb-Sr ages (30 Ma; Rupelian) (Odin et al., 1974; Odin & Kreuzer, 1988, Vandenberghe et al., 2014) indicative of presumed reworking. This is underscored by the grain-size distribution curves (Adriaens, 2015). The Kiel Member holds the dinoflagellate cyst zones *Exochosphaeridium insigne* and *Cousteaudinium aubryae*, inferring a middle to late Burdigalian age (Louwye et al., 2000). An analysis of the dinoflagellate cysts of the Kiel Member by Everaert et al. (2020) indicates a similar age for the deposits, apart from a sample at the very base of a studied outcrop that yielded a deviating age (late Aquitanian) that needs further elucidation.

Dataset

Data in this LIS are part of the [DOV-Neogene data collection](#), including links to the GSB-collection data sheets.

Subset of the lower and middle Miocene: <https://www.dov.vlaanderen.be/data/opdracht/2020-022192>

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Annexes

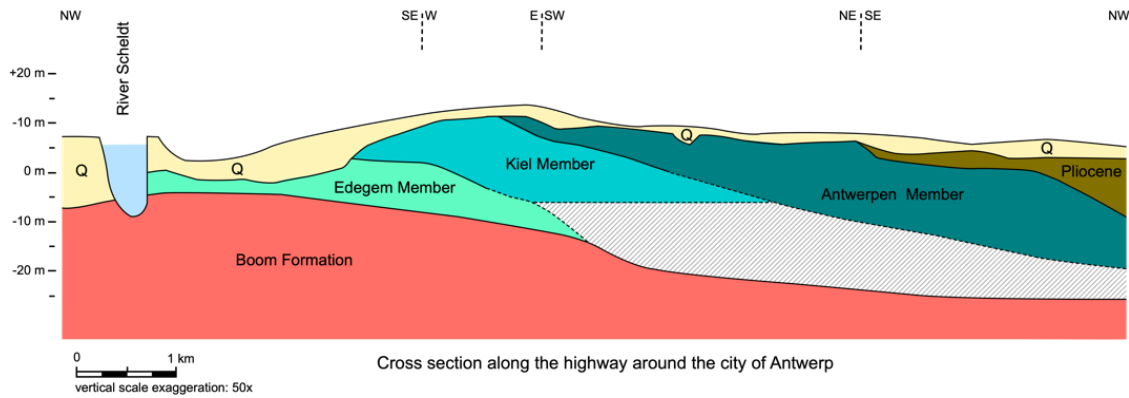


Figure 0-1 Geological cross-section of the Berchem Formation in the type area. See Louwye et al. (2020) for more information.

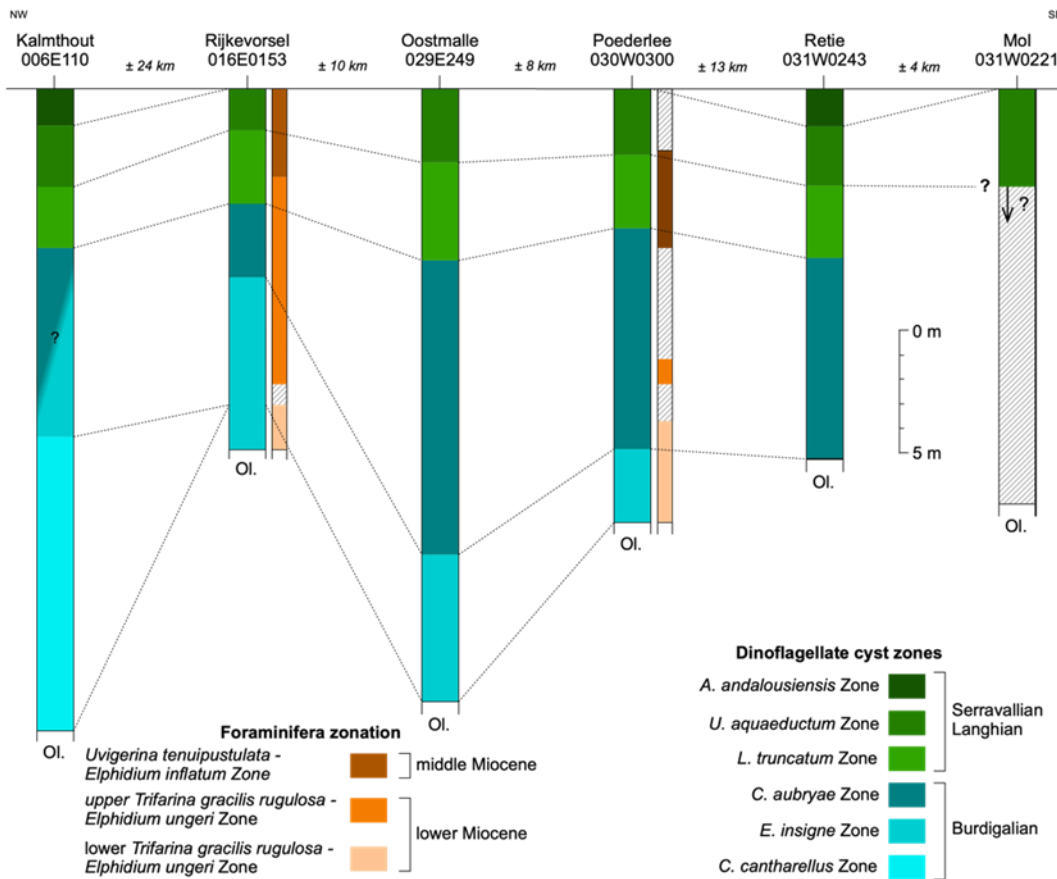


Figure 0-2: Distribution of lower and middle Miocene deposits in the Antwerp Campine area. See Louwye et al. (2020) for more information