Summarised description

Unit name

Burnot Formation

Code

BUR

Status

Formal Formation

Parent unit

None

Child units

Vicht Member, Caillou-qui-Bique Member, Sainval Facies, Hampteau Facies

Characteristic description

Rhythmical alternations of mostly reddish but also mottled and greenish conglomerate, sandstone, siltstone and shale arranged either in cyclic or non-cyclic deposits.

Age

Late Emsian to early Eifelian

Thickness

50 to 500 metres

Area of occurrence

Northern limb of the Dinant Synclinorium from, along its north-eastern flank up to the Xhoris Fault and in the Vesdre area, up to Germany.

Type locality

Discontinuous section along the Burnot River on the western bank of the Meuse River valley.

Alternative names

Poudingue de Burnot, Assise de Burnot

Authors

d'Omalius d'Halloy (1839)

Modified after

Denayer, J. & Mottequin, B., 2024. Lower Devonian lithostratigraphy of Belgium. Geologica Belgica, 27/3-4, 115–154.

Date

23/09/2025

Cite as

Denayer, J. & Mottequin, B., 2025. The Burnot Formation, 23/09/2025. National Commission for Stratigraphy Belgium. https://ncs.naturalsciences.be/lithostratigraphy/Burnot-Formation

Full description

Unit name

Burnot Formation

Code

BUR

Status

Formal Formation

Parent unit

None

Child units

Vicht Member, Caillou-qui-Bique Member, Sainval Facies, Hampteau Facies

Origin of the name

Section on the western flank of the Meuse River valley at Burnot, in front of the Lustin bridge.

Alternative names

Poudingue de Burnot, Assise de Burnot

Authors

d'Omalius d'Halloy (1839, p. 449): *Poudingue de Burnot*

Modified after

Denayer, J. & Mottequin, B., 2024. Lower Devonian lithostratigraphy of Belgium. Geologica Belgica, 27/3-4, 115–154.

Date

23/09/2025

Cite as

Denayer, J. & Mottequin, B., 2025. The Burnot Formation, 23/09/2025. National Commission for Stratigraphy Belgium. https://ncs.naturalsciences.be/lithostratigraphy/Burnot-Formation

Characteristic description

The Formation is typically made of rhythmical alternations of conglomerate, sandstone, siltstone and shale arranged either in cyclic or non-cyclic deposits (Corteel et al., 2004). The cyclic deposits start with conglomerate beds overlying an erosional surface and grading upwards to sandstone, then siltstone and shale. In some cycles, the basal conglomerate is reduced to a few centimetres of coarse-grained sandstone. The sandstone frequently displays oblique bedding or ripple marks and shale clasts. The shaly capping beds display occasional root traces, accumulations of thin plant debris or palaeosols (dolcretes); however, the fine-grained part of the cycle can be entirely missing due to erosion by the subsequent cycle (Corteel et al., 2004). The non-cyclic deposits are composed of gravely sandstone, sandstone and siltstone either coarsening-upward or without trends. Conglomerate and siltstone are proportionally less abundant in these non-cyclic deposits. Parallel and oblique laminations, clasts, erosive surfaces and ripple marks are commonly observed in the sandstone.

The vertical succession of the deposits appears as an alternation of packages up to 10 m thick and 10–30 m thick packages of reddish shale, siltstone and sandstone (Delcambre & Pingot, 2017). The conglomerate and sandstone beds usually form lenses up to tens of metres in thickness. The

conglomerate displays a reddish sandy matrix and centimetre to decimetre-sized pebbles (brown, black or red sandstone and quartzite, whitish quartz, black tourmalinite) that are usually well rounded but poorly sorted (some pebbles are 30 cm large). The sandstone is reddish or brownish and often has coarse-grained horizons of white quartz grains and pebbles. The siltstone and shale are finely micaceous, reddish or greenish or variegated.

In the Meuse River valley, the coarse-grained lithologies are dominant but, eastwards, the fine-grained facies locally form a larger proportion of the Formation. In the Ourthe River valley (Tilff area), the conglomerate is very scarce (Fourmarier, 1910) and the Burnot Formation is largely dominated by cyclic alternations of red sandstone, variegated siltstone and shale, and frequent yellowish dolcretes. These lithologies correspond to the here introduced Sainval Facies.

Eastwards, in the Vesdre River valley, the Burnot Formation is reduced to a tongue of conglomerate resting paraconformably on the Pragian rocks and previously named Vicht Formation (Dejonghe et al., 1991) that is here considered as a local member (**Vicht Member**). It consists in metric beds of conglomerate and conglomeratic sandstone containing centimetric to pluricentimetric pebbles of quartz, quartzite, sandstone and occasional tourmalinite with frequent siltstone intercalations. The wine-red colour is dominant but tends to fade away westwards with more and more greenish to greyish intercalations (Dejonghe et al., 1991). The Vicht Member appears as a series of finning-upwards sequences with erosive bases formed by a succession of 10–100 m wide lens-like bodies (Kasig & Neumann-Mahlkau, 1969).

South of the Xhoris Fault, the colour of the conglomerate changes from red to green, greyish-green, yellowish or orange. This chromatic change is paralleled with the increase in bed thickness between the Aisne River and the Ourthe River valleys. In this area, Stainier (1994a) introduced the Hampteau Formation (*Formation de Hampteau*) composed of the Hamoûle and Chaieneu members for the unit named *Poudingue de Wéris* by Gosselet (1873) and Dupont (1885). According to Barchy & Marion (2014), the establishment of a specific formation for the conglomerates observed at Hampteau is superfluous since they consider them to belong to the Burnot Formation. Recent geological mapping demonstrated that the Hamoûle Member is the local expression of the Hierges Formation whereas the Chaieneu Member is only a regional variation of the Burnot Formation. Therefore, it is considered here that the **Hampteau Facies** corresponds to the conglomerate of the Burnot Formation with variegated colours.

West of the Meuse River valley, the top of the Formation contains a massive unit of homogeneous conglomerate with large pebbles. In the Eau d'Heure River and Sambre River valleys, it displays a variegated matrix and was described by Bayet (1894) and Anthoine (1919) who named it as the *poudingue du Bois de Saucy* (Bayet, 1894), *poudingue de Chevesne* (Anthoine, 1919) and *poudingue de Cour-sur-Heure* (Bayet, 1894). Westwards, in the Honnelle River valley, near the French border, the same beds reach 30 m in thickness and the matrix is reddish (Foucher, 1966). This unit corresponds to the **Caillou-qui-Bique Member** re-introduced by Marlière (1970) following Briart & Cornet (in Hanuise, 1882).

Area of occurrence

The Formation is known all along the northern limb of the Dinant Synclinorium from Roisin to Tilff, along its north-eastern flank up to the Xhoris Fault and in the Vesdre area. South of the Xhoris Fault and up to the Ourthe area south of Hotton, the Hampteau Facies develops then fades away westwards (Dupont, 1885). The Vicht Member is known from the Aachen area (Germany) to Fraipont and in the Theux Window. The proportion of conglomerate is variable and tends to decrease towards the north-east, where the Sainval Facies is almost devoid of coarse-grained lithologies. In Fechereux and in the Ry de Mosbeux, the Formation is reduced to a metric bed of conglomerate with quartz pebbles and plant remains (Asselberghs, 1955; Liégeois, 1955). East of Gomzée, the development of the conglomerate increases irregularly. The upper conglomeratic unit (Caillou-qui-Bique Member) tends to individualise west of the Eau d'Heure River valley.

Type locality

The original type locality is a discontinuous section along the Burnot River on the western bank of the Meuse River valley. A good section is located in the latter valley along the road Namur–Dinant at Profondeville, 200 m north of the Lustin bridge and continuing along a path on top of the valley western flank. The top of the Formation can be observed on the eastern side of the Meuse River valley, south of the Lustin bridge, along the road from Lustin to Godinne. Good exposures exist in the Hoyoux River valley, north-east of Marchin, and in the Ourthe River valley north of Tilff (Sainval Facies). The Hampteau Facies are exposed along the Ourthe River, south of Hampteau, and in Roche-à-Frêne in the Aisne River valley. The Caillou-qui-Bique Member crops out in the eponymous locality in the Honnelle River valley, north of Roisin. The Vicht Member crops out in the Vicht River valley south-east of Stolberg in Germany. The section is however discontinuous, and Dejonghe et al. (1991) proposed the section in the Helle River south of Eupen as a parastratotype.

Age

Up to now, no biostratigraphic element allows to date the Burnot Formation, especially in the stratotypic area (Stainier, 1994b). A late Emsian to early Eifelian age was inferred only through the age of the overlying and underlying formations. The top of the underlying Wépion Formation belongs to the upper Emsian FD Zone (Steemans et al., 2002) and the base of the overlying Rivière Formation yielded conodonts characteristic of the Eifelian *partitus* Zone (Bultynck, 1991). In Hampteau, some fine-grained beds of the Hampteau Facies yielded miospores indicative of the Pro–Vel zones suggesting an Eifelian age (Lessuise et al., 1979; Stainier, 1994a). In the Heusy section, shales intercalated within conglomerate beds and above it both yielded palynological assemblages indicative of the Lem Zone, i.e. earliest Givetian (Hance et al., 1992, 1996). In Eupen and Goé, the shaly beds, within and above the conglomerate of the Vicht Member yielded a palynological assemblage devoid of the spore *Geminopsora lemurata*, and therefore is referred to the 'pre-Lem' AD Biozone, i.e. latest Eifelian in age (Hance et al., 1996).

Thickness

More than 500 m thick in the type section (Stainier, 1994b); the Formation thickness decreases eastwards: 350 m in the Hoyoux River valley (Mottequin et al., 2021), 240 m in the Amblève River valley (Asselberghs, 1946; Marion et al., in press), 250 m in the Aisne River valley, only 45 m north of the Xhoris Fault (Marion & Barchy, in press, b). In the Vesdre area, the Vicht Member reaches 80 m in Pepinster, and decreases to less than 5 m west of Verviers (Laloux et al., 1996), 2 m in the Theux Window (Marion et al., in press) and only 1.6 m in the Soumagne borehole (Graulich, 1977). In the western part of the Dinant Synclinorium, the thickness also varies considerably: 300 m in the Eau d'Heure River valley (Delcambre & Pingot, 2000), 200 m in the Honnelle River valley (Hennebert & Delaby, in press), including 30 m for the Caillou-qui-Bique Member (Foucher, 1966).

Lower boundary

The base of the Burnot Formation is defined by the first reddish (*lie-de-vin*-coloured in the literature) conglomerate bed overlying the greenish sandstone of the Wépion Formation.

Upper boundary

Last bed of red conglomerate, overlain by the first shaly or sandy bed of the overlying formations (Rivière Formation or Pepinster Formation).

Regional correlations

South of the Pepinster Fault, where the Burnot Formation is developed, the conglomeratic beds of supposed Emsian age were mapped under this name (e.g. Bellière, 2015; Marion & Barchy, in press, b; Marion et al., in press) but north of it, the Emsian is supposedly absent, the conglomeratic beds resting directly on the Pragian sandstones were mapped as the Vicht Formation (e.g. Laloux et al., 1996). The difference between both lithostratigraphic units is mostly the age: supposed Emsian for

the Burnot Formation, Eifelian–Givetian for the Vicht Formation, regarded here as a member of the former (see above). However, in the Ourthe River valley (Hampteau), the conglomerate is Eifelian (Stainier, 1994a). Therefore, the Burnot Formation should be considered as post-Emsian in the north-eastern part of the Dinant Synclinorium. As a consequence of this age getting younger north-eastwards, the Burnot Formation passes in continuity to the Vicht Conglomerate. Knowing that the conglomeratic facies are extremely diachronous, it is more reasonable to consider the Vicht Member as a younger extension of the Burnot Formation towards the east and north. The Vicht Member is also known from the Aachen area (Germany) and named *Vichter-Konglomerat*.

References

Anthoine, R., 1919. Observations sur le bord nord du bassin de Dinant entre les méridiens d'Acoz et de Binche. Annales de la Société géologique de Belgique, 42/1, M3–M88.

Asselberghs, E., 1946. L'Éodévonien de l'Ardenne et des régions voisines. Mémoires de l'Institut géologique de l'Université de Louvain, 14, 1–598.

Asselberghs, E., 1955. La grauwacke de Rouillon (Couvinien) du bord oriental du bassin de Dinant. Mémoires de l'Institut géologique de l'Université de Louvain, 19, 177–221.

Barchy, L. & Marion, J.-M., 2014. Carte géologique de Wallonie : Aye – Marche-en-Famenne 54/7-8. 1/25 000. Service public de Wallonie, Direction générale de l'Agriculture, Ressources naturelles et Environnement, Namur, and its explanatory booklet, 90 p.

Bayet, L., 1894. Étude sur les étages dévoniens de la bande nord du Bassin méridional dans l'Entre-Sambre-et-Meuse (première note). Annales de la Société géologique de Belgique, 22, Mémoires, 129–161.

Bellière, J., 2015. Carte géologique de Wallonie : Tavier – Esneux 49/1-2 et 6. 1/25 000. Service public de Wallonie, Direction générale de l'Agriculture, des Ressources naturelles et de l'Environnement, Namur, and its explanatory booklet, 67 p.

Bultynck, P., 1991a. RIV Formation de Rivière. In Bultynck, P. et al., Les formations du Dévonien moyen de la Belgique. Mémoires pour servir à l'Explication des Cartes géologiques et minières de la Belgique, 30, 65–71.

Corteel, C., Van den Haute, P. & Verniers, J., 2004. New sedimentological and petrographical observations on the Devonian Burnot Formation in the Belgian Rhenohercynian Basin. Geologica Belgica, 7/1-2, 41–53.

Dejonghe, L., Hance, L. & Steemans, P., 1991. VIC – Formation de Vicht. In Bultynck, P. et al., Les formations du Dévonien moyen de la Belgique. Mémoires pour servir à l'Explication des Cartes géologiques et minières de la Belgique, 30, 87–91.

Delcambre, B. & Pingot, J.-L., 2000. Carte géologique de Wallonie : Gozée – Nalinnes 52/3-4. 1/25 000., Service public de Wallonie, Direction générale des Ressources naturelles et de l'Environnement, Namur, and its explanatory booklet, 106 p.

Delcambre, B. & Pingot, J.-L., 2017. Carte géologique de Wallonie : Malonne – Naninne 47/7-8. 1/25 000. Service public de Wallonie, Direction générale de l'Agriculture, des Ressources naturelles et de l'Environnement, Namur, and its explanatory booklet, 130 p.

d'Omalius d'Halloy, J.J., 1839. Éléments de Géologie, ou seconde partie des éléments d'inorganomie particulière, 3e édition. Pitois-Levrault et Cie, Paris, F.G. Levrault, Strasbourg, 759 p.

Dupont, E. 1885. Note sur le dévonien inférieur de la Belgique : Le poudingue de Wéris et sa transformation au sud-est de Marche-en-Famenne. Bulletin de l'Académie royale des Sciences, des Lettres et des Beaux-Arts de Belgique, 3e série, 10/8, 208–231.

Foucher, J.-C., 1966. Contribution à l'étude pétrographique du poudingue du «Caillou-qui-Bique» et des formations connexes (Roisin, Belgique). Annales de la Société géologique du Nord, 85, 65–68.

Fourmarier, P., 1910. Le Coblencien au sud de Liége. Annales de la Société géologique de Belgique, 37, M135–M144.

Gosselet, J., 1873. Le système du Poudingue de Burnot. Annales des Sciences géologiques, 4/7, 1–32.

Graulich, J.-M., 1977. Le sondage de Soumagne. Service géologique de Belgique, Professional Papers, 1977/2, 1–55.

Hance, L., Dejonghe, L. & Steemans, P., 1992. Stratigraphie du Dévonien inférieur dans le Massif de la Vesdre (Belgique). Annales de la Société géologique de Belgique, 115/1, 119–134.

Hance, L., Dejonghe, L., Fairon-Demaret, M. & Steemans, P., 1996. La Formation de Pépinster dans le Synclinorium de Verviers, entre Pépinster et Eupen (Belgique) – Contexte structural et stratigraphique. Annales de la Société géologique de Belgique, 117/1 (pro 1994), 75–93.

Hanuise, E., 1882. Compte-rendu de l'excursion de la Société géologique de Belgique aux environs de Mons les 3, 4 et 5 septembre 1882. Annales de la Société géologique de Belgique, 9, Bulletin, 161–172, 188–216.

Hennebert, M. & Delaby, S., in press. Carte géologique de Wallonie : Roisin–Erquennes 51/1-2. 1/25000. Service public de Wallonie, Agriculture, Ressources naturelles et Environnement, Namur, and its explanatory booklet.

Kasig, W. & Neumann-Mahlkau, P., 1969. Die Entwicklung des Eifeliums in Old-Red-Fazies zur Riff-Fazies im Givetium und Unteren Frasnium am Nordrand des Hohen Venns (Belgien-Deutschland). Geologische Mitteilungen, 8, 327–388.

Laloux, M., Dejonghe, L., Ghysel, P. & Hance, L., 1996. Carte géologique de Wallonie : Fléron – Verviers 42/7-8. 1/25 000. Ministère de la Région wallonne, Direction générale des Ressources naturelles et de l'Environnement, Namur, and its explanatory booklet, 150 p.

Lessuise, A., Streel, M. & Vanguestaine, M., 1979. Observations palynologiques dans le Couvinien (Emsien terminal et Eifelien) du bord oriental du Synclinorium de Dinant, Belgique. Annales de la Société géologique de Belgique, 102/1, 325–355

Liégeois, R., 1955. Le Mésodévonien du Massif de la Vesdre. Unpublished complementary Master Thesis in geological engineering, Université de Liège, Liège, 94 p.

Marion, J.-M. & Barchy, L. in press. Carte géologique de Wallonie : Hamoir – Ferrières 49/5-6. 1/25 000. Service public de Wallonie, Agriculture, Ressources naturelles et Environnement, Namur, and its explanatory booklet.

Marion, J.-M., Geukens, F., Lamberty, P. & Mottequin, B., in press. Carte géologique de Wallonie : Louveigné – Spa 49/3-4. 1/25 000. Service public de Wallonie, Agriculture, Ressources naturelles et Environnement, Namur, and its explanatory booklet.

Marlière, R., 1970. Carte géologique de la Belgique à l'échelle 1/25.000. Texte explicatif de la feuille Roisin-Erquennes (n° 161). Bruxelles, 30 p.

Mottequin, B., Marion, J.-M. & Delcambre, B., 2021. Carte géologique de Wallonie : Huy – Nandrin 48/3-4. 1/25 000. Service Public de Wallonie, Agriculture, Ressources naturelles et Environnement, Namur, and its explanatory booklet, 115 p.

Stainier, P., 1994a. HAM - Formation de Hampteau. In Godefroid, J. et al., Les formations du Dévonien inférieur du Massif de la Vesdre, de la Fenêtre de Theux et du Synclinorium de Dinant (Belgique, France). Mémoires pour servir à l'Explication des Cartes géologiques et minières de la Belgique, 38, 91–96.

Stainier, P., 1994b. BUR - Formation de Burnot. In Godefroid, J. et al., Les formations du Dévonien inférieur du Massif de la Vesdre, de la Fenêtre de Theux et du Synclinorium de Dinant (Belgique, France). Mémoires pour servir à l'Explication des Cartes géologiques et minières de la Belgique, 38, 133–138.

Steemans, P., Vanguestaine, M. & Gerrienne, P., 2002. Palaeozoic Palynology in the Third Millennium: new directions in acritarch, chitinozoan and miospore research. Geology, Palaeobotany and Palynology of the North-eastern part of the Ardenne, Belgium. Excursion guide-book, September, 9th, 2002. Commission Internationale de Microflore du Paléozoïque, Liège, 19 p.