Ulster White Limestone Formation, Cretaceous, Northern Ireland

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Ulster White Limestone Formation

Lithostratigraphical divisions of the Late Cretaceous in Northern Ireland. (P947942)

Bio- and lithostratigraphy of the Ulster White Limestone Formation. (P947944)
Fossils 6–10 Late Cretaceous (late Santonian-early Maastrichtian) fossils from the Ulster White Limestone Formation:
Crinoids: 6 Uintacrinus socialis (x 4), 9 Marsupites testudinarius (x 0.2)
Belemnites:
7 Belemnitella mucronata (x 0.6), 8 Gonioteuthis sp. (x 0.6), 10 Belemnella lanceolata (x 0.6), 11 Belemnella occidentalis (x 0.6) (P948081)
Simplified geological map of northeast Northern Ireland highlighting the distribution of Cretaceous rocks and in particular of the Ulster White Limestone Formation. (P947855)

Distribution of the main depositional areas of the Ulster White Limestone Formation. (P947856)
Schematic reconstruction of the spatial relations of the members of the Ulster White Limestone Formation (4). (P947858)

Distribution of Jurassic rocks at White Park Bay in north Co. Antrim (5). (P947853)

Tilted (rotational landslip) blocks of the Ulster White Limestone Formation. The nearest block shows the contact between the Galboly Chalk Member at the base and the Marsupites testudinarius-bearing Cloghastucan Chalk Member with the Oweynamuck Flint Band (OFB). The Inoceramus-rich Creggan Chalk Member occurs at the top of the block. West side of White Park Bay, 7 km east of the Giant’s Causeway, Co. Antrim. (P948012)
Paramoudra in the Ballymagarry Chalk Member of the Ulster White Limestone Formation. Clarehill quarry [J 154 603], 500 m southeast of Moira, Co. Down. (P948013)

Post-Larry Bane Chalk members of the Ulster White Limestone Formation. At the base of the face large flints characterise the Ballymagarry Chalk Member. The Long Gilbert Flint Band (LGFB) marks the contact with the succeeding Tanderagee Chalk Member. The slight overhang near the top of the face is the contact with the Port Calliagh Chalk Member. Long Gilbert quarry [C 888 407], south face of west quarry, 3 km east of Portrush, Co. Antrim. (P948014)

The Ulster White Limestone Formation (P947942) is a coccolith-foraminiferal micrite with flints and is divided into fourteen members (P947944). It ranges in age from the late Santonian Uintacrinus socialis Biozone (P948081) Fossil 6 to the early Maastrichtian Belemnella occidentalis Biozone. Although the full succession is never exposed at one locality, individual members are recognisable across the outcrop based on flint type, the presence and spacing of distinctive flint bands and the characteristics of individual beds or groups of beds [1]. Wind-weathered sections on the east and north coast of Co. Antrim are key reference sections and exhibit the characteristic sedimentary structures and faunas.

The composite thickness of all the members at their type sections is approximately 133 m with a maximum of 120 m of chalk exposed between Ballycastle and Portrush (P947855). This section, which is typical of the succession in the Rathlin basin, is similar to that in the Larne-Lough Neagh
basin (P947856), demonstrating that the thickness and lateral continuity of individual beds is consistent over the entire chalk outcrop. The same succession in north Co. Down is 30 m thick and only 25 m on the Londonderry shelf. Sedimentation on shelf areas commenced in mid- to late Campanian times. The older biostratigraphical subdivisions of the chalk were based on the definition of strata that were either, "earlier than the zone of Belemnitella mucronata" (P948081) Fossil 7 or, "in the zone of Belemnitella mucronata" [2]. The base of the Belemnitella mucronata Biozone coincides with the upper limit of Goniotethis (P948081) Fossil 8 and occurs at the level of the prominent Whitehead Flint Band. In north Co. Antrim, this occurs in one bed of the Boheeshane Chalk Member (P947944), 3.66 m below the prominent erosion surface at the base of the Larry Bane Chalk Member. All sections are divided thus into pre-Larry Bane Chalk, Larry Bane Chalk Member and post-Larry Bane Chalk [4].

**Pre-Larry Bane Chalk White Limestone**

The distribution of these five members (P947944) mirrors the configuration of the late Santonian to early Campanian depositional basin. They attain a maximum thickness of 26 m at Glenarm, but thin rapidly elsewhere due to variations in base levels and are absent on the Dalradian Highland Border Ridge and in north Co. Down, south of the Lagan Valley (P947856). In the Larne-Lough Neagh basin, minor axes of uplift influenced the amount of pre-Cretaceous erosion, Cretaceous sedimentation and the depth of erosion in the early Palaeogene prior to the extrusion of the basalt lavas. The location of the Carnlough, Larne and Knockagh axes (P947856) is defined by thickness variations in the Galboly, Cloghastucan and Creggan Chalk members (P947858). All five members are exposed at Whitepark Bay (P947853).

Sedimentation commenced simultaneously in both the Larne-Lough Neagh and Rathlin basins. In the former basin, in east Co. Antrim, the Cloghfin Sponge Beds Member (P947944), which rests on the Hibernian Greensands Formation, includes reworked glauconite grains and is characterised by abundant hexactinellid sponge pseudomorphs. By comparison, in the Rathlin basin, the Hibernian Greensands Formation is absent and the member is glauconite-free. The four succeeding members contain comminuted Inoceramus shell debris. Flint occurs in three forms. In the Galboly Chalk Member flint forms bands, which are reliable lithostratigraphical markers, it occurs as secondary silicification of burrow fills in the Cloghastucan Chalk Member and as randomly distributed nodules in the Creggan Chalk Member. The Cloghastucan Chalk Member contains the brachials and calyx plates of the zonal index crinoid Marsupites testudinarius (P948081) Fossil 9.

In the pre-Larry Bane Chalk, the prominent Oweynamuck Flint Band (P948012) and Whitehead Flint Band occur immediately below the top of the Cloghastucan Chalk Member and Boheeshane Chalk Member respectively. Transitory breaks in chalk sedimentation are recognised by the development of hardgrounds, which are deeply burrowed, disconformable, glauconitised erosion surfaces with green-coated chalk pebbles and rolled and phosphatised fossils. In shallower water, depositional breaks are associated with stromatolitic biostromal surfaces (top Creggan Chalk Member). The contact between the Creggan Chalk and Boheeshane Chalk members is a disconformity representing the late Offaster pilula-earliest Goniotethis quadrata biozones.

**Larry Bane Chalk Member**

Ubiquitous and prominent minor disconformities bracket the two beds of the Larry Bane Chalk Member (P947944), in which the upper bed is twice the thickness of the lower bed. Large specimens of Belemnitella sp. are common.
Post-Larry Bane Chalk White Limestone

The maximum thickness of these eight members (P947944) is over 85 m in north Co. Antrim although nowhere is the succession continuously exposed. The Ballintoy Chalk Member consists of two beds, the lower one being twice the thickness of the upper bed of the preceding Larry Bane Chalk Member. The upper bed, which forms the rock platform at Ballintoy Harbour (P947855) [D 039 455] and crops out on the foreshore at Waterloo [D 410 033] near Larne, contains specimens up to 1m across of the ammonite Pachydiscus. At its top, the Altachule Breccia (bed) consists of 0.35 m of wavy-bedded and slump chalk containing pellet-like lumps of indurated chalk and angular chips of fragmented flint. This breccia is recognised on Rathlin Island and in the Belfast area and probably formed by the churning of semi-consolidated sediment during violent weather conditions.

The four remaining chalk members referred to the *Belemnitella mucronata* Biozone are distinguished by the development of hardgrounds and pebble beds and especially by flint morphology. In the Garron Chalk Member the flints are particularly large and define flint circles. The Ballymagarry Chalk Member contains the largest flints in the Irish Cretaceous termed paramoudra, which are barrel-shaped, and lie vertically across bedding planes (P948013). These are best developed where the Ballymagarry Chalk Member overlies the Southern Uplands-Down-Longford Terrane and are exposed in Clarehill quarry [J 154 603] near Moira (P947855). Both the Glenarm Chalk and Portrush Chalk members contain prominent hardgrounds with a concentration of green, glauconitised chalk pebbles. In the former, the North Antrim Hardgrounds are only developed in the Rathlin basin and consist of two horizons approximately 0.5 m apart. The eponymous South Antrim Hardgrounds in the Portrush Chalk Member (P947944) consist of several levels of glauconitised chalk pebbles.

Maastrichtian chalk (P947944) is confined to the Rathlin basin, the Londonderry shelf and the Lagan Valley and north Co. Down (P947856). In north Co. Antrim the Long Gilbert Flint Band marks the base of the Tanderagee Chalk Member and of the Maastrichtian Stage (P948014). However, this flint band is a local development and is replaced elsewhere by a prominent bedding plane with no flint. Although the Tanderagee Chalk Member contains brachiopods and echinoids of Maastrichtian aspect, it has not yielded the zonal taxon Belemnella. The Port Calliagh Chalk and Ballycastle Chalk members contain the Maastrichtian zonal belemnites *Belemnella lanceolata* (P948081) Fossil 10 and *Belemnella occidentalis* (P948081) Fossil 11 respectively and are exposed on rock platforms and low cliffs at Port Calliagh (P947855) [D 112 420].

References


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