

## LINKED OPEN OGHAM. HOW TO PUBLISH AND INTERLINK VARIOUS OGHAM DATA?

### 1. INTRODUCTION

𐌛𐌚𐌐 (Ogham) stones (e.g. the Ogham stone CIIC 178 at Coumeenole North, located in the Com Dhíneol Thuaidh Townland, in the Barony of Corkaguiny, County Kerry, near Dunmore Head; IRISH TOWNLANDS 2023), are monoliths with the early medieval primitive Irish Ogham script, mostly erected on the island of Ireland (MURRAY 2010, fig. 1; SCHMIDT *et al.* 2022, fig. 12) and in the western part of Britain between the 4<sup>th</sup> and 9<sup>th</sup> centuries. They are an important source for Archaic or Proto-Irish language and society. The letters of the Ogham alphabet consist of strokes written at different lengths and angles along (often natural) edges of the stones from the bottom left to the top and back down to the right. Names on the stones seem to be dedicated to a person. It remains unclear, however, whether the stones were grave markers, for example, or designated land ownership. Most of the stones are no longer at the original site, which is important for cartographic recording and makes it more difficult to determine their original function (MACALISTER 1945; MACMANUS 1997; BOGDANI *et al.* 2021, 119-127; SCHMIDT, THIERY 2022).

The inscriptions consist of names (nomenclature words) such as CATTU (𐌛𐌚𐌐𐌚𐌚𐌐; engl. battle) and relations (formula words) such as MAQI (𐌛𐌚𐌐𐌚𐌚𐌐; engl. son) to feature kinship or tribal relations. Ogham stones are mentioned in several catalogues such as books, e.g., MACALISTER (1945) known as CIIC, MACMANUS (1997) and O’SULLIVAN, SHEEHAN (1996), online databases, e.g., the Celtic Inscribed Stones Project (CISP) or online repositories, e.g., Ogham in 3D.

The density map in SCHMIDT, THIERY (2022, fig. 12) shows a cluster of Ogham stones on the Dingle and Iveragh peninsulas. The maps by THIERY (2023) also visualise clusters of Ogham stones in the counties of Kerry (153), Cork (92) and Waterford (51), distributed over the baronies Corkaguiny (mainly the Dingle Peninsula; 67), Iveragh and Dunkerron North (mainly the Iveragh Peninsula; 14/25), Magunihy (10) and Trughanacmy (15). A lot of the Ogham stones in this area are also standing in the landscape, so it is worthwhile to make a research trip there. The Linked Open Ogham Data Project was set up in 2019 by the Research Squirrel Engineers Network as a non-institutional funded use case which was also supported by the Wikimedia Germany Open Science Fellows Program in 2020/2021 as “Irish 𐌛𐌚𐌐 Stones in the Wikimedia Universe”. In 2022 an



Fig. 1 – Ogham Stone at Dunmore Head (Irish: An Dún Mór), the westernmost point on the mainland of the island of Ireland (ph. F. Thiery); bottom right: OSM map of Ireland with the encircled Dingle Peninsula (Irish: Corca Dhuibhne) and the NE of the Iveragh Peninsula (Irish: Uíbh Ráthach), ODbL by OpenStreetMap contributors.

Ogham survey (Fig. 1) was done in Ireland by Florian and Peter Thiery, visiting Dublin, Cork, the Iveragh Peninsula and the Dingle Peninsula to record Ogham stones in the field and museums. The project aims at providing and integrating Ogham Data in community (Linked Data) hubs such as Wikidata and Open Street Map (OSM). Since graphs rely on linking statements between entities to form a network, this corpus is especially well-suited to being represented in a graph. This results in the sense of comprehensible and FAIR data in the RDF standard and Linked Open Data (LOD).

## 2. OGHAM DATA AS OPEN SCIENCE

The hybrid Ogham LOD workflow (Fig. 2) is based on the idea of Open Science, Open Software, Open Data, and the FAIR principles to create re-usability and modular IT infrastructure with community standards and commonly used interfaces. The origin data will be digitised and transformed into CSV. In a data-driven approach, data modelling schemes (an Ontology and Wikidata Mapping Scheme) are created to transform the data into RDF

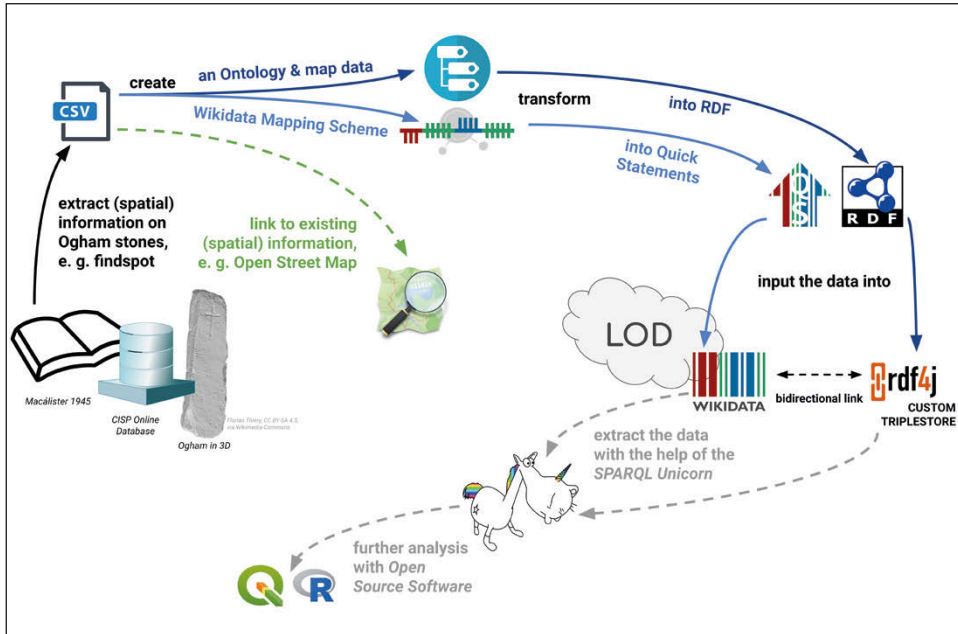


Fig. 2 – The hybrid Linked Open Data Ogham workflow (F. Thiery, T. Homburg, S.C. Schmidt, M. Trognitz, via Wikimedia Commons).

or Quick Statements using Python Scripts to allow iterations. The resulting data is then ready to import into an RDF4J Triplestore and Wikidata. The data is stored and published together with the scripts on GitHub, with a direct connection to Zenodo. With this Open Data and Open Research Software approach, citability and reproducibility by using GitHub and Zenodo with DOIs and CFF File are ensured; in Wikidata, a Project Page is used for documentation.

With the use of open source technologies and community standards such as RDF and Quick Statements, Ogham Data is available in several variants: i) as LOD in RDF in an RDF4J triplestore with a SPARQL endpoint and ii) inside Wikidata with its SPARQL query interface and its APIs. This allows for using the data in research software such as R or the SPARQLing Unicorn QGIS Plugin (SCHMIDT, THIERY 2022). Additionally, lightweight JavaScript Web Applications, aka Little Ogham Minions, are created to showcase the Ogham LOD: iii) a reference viewer (OGHAM LINK 2023a) to find similar catalogue numbers (e.g. O’SULLIVAN, SHEEHAN 1996, 908), and iv) an Ogham lookup tool (OGHAM LINK 2023b) to visualise the findspots on an interactive map.

### 3. OGHAM IN OPEN STREET MAP

Besides the community hub Wikidata, Ogham Stones should also be integrated into Open Street Map (OSM). Due to the high occurrences on the Dingle Peninsula, these stones are particularly suitable for doing so. In the South of Ireland, there are also Ogham stones in museum collections such as the University College Cork (UCC) Stone Corridor. This section provides examples of Ogham stones available “in the wild” in Ireland for visitors to view as cultural heritage. These archaeological artefacts have been partially scanned by the Ogham in 3D Project using 3D documentation techniques with the aid of strip light projection and are available as open 3D data. As mentioned before, the stones serve as an inscription carrier; the inscriptions consist of individual words that follow a formal logic. In OSM, the Ogham stones can be flagged by the tag “historic=ogham\_stone” (B-UNICYCLING, FTHIERYGEO 2023). This enables Ogham stones to have as uniform a structure as possible in OSM. This structure consists of a name, if possible, according to a system of literature, e.g. CIIC, the inscription engraved, Wikipedia articles, Wikidata entities, information on size, material descriptions, source information, as well as information on whether the stone is in its original location or has been moved (e.g. to a museum).

Squirrel Stone #178 (Q106680850) is part of the Coumeenoole North/Dunmore Head Ogham Site (Q85395557) as part of the Com Dhíneol Thuaidh Townlands in the Barony of Corkaguiny, County of Kerry (Fig. 3, left). The Ogham stone also has other identifiers: CIIC 178 (MACALISTER 1945, 170) and CISP~COUME/1. The stone stands on the picturesque coast of Ireland near Dunmore Head (An Dún Mór), the westernmost point on the mainland of the island of Ireland. On its discovery, Macalister writes: «This stone was lying prostrate on the summit of the promontory called Dunmore Head, when discovered by the Cork antiquaries Windele, Abell, and Horgan, in 1838; and was re-erected in the following year by a local priest, Rev. J. Casey» (MACALISTER 1945, 170). The stone bears the inscription ERC MAQI MAQI-ERCIAS MU DOVINIA. This contains names and so-called “formula words”: MAQI and MU. MAQI is the most frequently found formula word and can be translated as “son” (MACMANUS 1997, §6.27, 119). MU, according to MACALISTER (1945), is apparently an abbreviation for MAQI MUCOI (MACMANUS 1997, 171). MUCOI is another formula word meaning “túath”, tribe (MACMANUS 1997, §6.27, 119-120), so X MAQI MUCOI Y can be translated as X son of the tribe Y (MACMANUS 1997, §6.27 119-120). According to the CISP entry, the names (possibly of persons) ERC, MAQI-ERCIAS and DOVINIA can be read in the inscription. ERC refers



Fig. 3 – Left: Ogham Stone CIIC 178 at Coumeenole North / Dunmore Head (Irish: An Dún Mór); right: Ogham Stone CIIC 187 at Kilmalkedar Church (Irish: Cill Maoilchéadair) (ph. F. Thiery); bottom: OSM maps, ODbL by OpenStreetMap contributors.

to a short name (MACMANUS 1997, §6.2, 101-102) with a reference to the divine (MACMANUS 1997, §6.5, 103), en. ~heaven. MAQI-ERCIAŠ refers to a category of names that use MAQI- as a prefix (MACMANUS 1997, §6.14, 108-109).

This name can also be observed on stone #125 (CIIC 125, CIS-P~ROVMO/2, Q106680787), as part of the Rooves More Ogham Site (Q85394017) in the townland of the same name in the Barony of East Muskerry, in the County of Cork. This Ogham stone bears the inscription MAQI-ERCIAŠ MAQI VALAMNI, translated roughly MAQI-ERCIAŠ son of VALAMNI. DOVINIA is a compound name of prefix and noun (MACMANUS 1997, §6.9, 105). This also occurs on stone #175 (CIIC 175, CIS-P~BRHAM/1, Q106680846) found at the Burnham East Ogham Site, with the townland of the same name in the Barony of Corkaguiny, in the County of Kerry. This Ogham stone bears the inscription MAQQI-ERCCIAŠ MAQQI MUCOI DOVINIA, translated roughly MAQQI-ERCCIAŠ son of the tribe DOVINIA. The inscription ERC MAQI MAQI-ERCIAŠ MU DOVINIA could thus be translated as ERC son of MAQI-ERCIAŠ son of



the tribe DOVINIA (according to O3D: of Erc son of Mac-Erce descendant? of Duibne). Since DOVINIA is mentioned as a tribe on both #178 and #175, there could be a connection here. The same applies to MAQI-ERCIAS, which can be read on #178 and #125; moreover, #175 shows the name MAQI-ERCCIAS. Here, however, it is not possible to confirm that it is the same entity. The Ogham Stone #178 has many identifiers on the web and is also available on OSM as node 5145413640.

Squirrel Stone #187 (Q106680860) is part of the Kilmalkedar Ogham Site (Q85395528) as part of the townland of the same name in Barony Corkaguiny, County Kerry (Fig. 3, right). The Ogham stone also has other identifiers: CIIC 187 (MACALISTER 1945, 181) and CISP~KMKDR/3. The Ogham stone stands in a graveyard outside the entrance to the ruined Romanesque church of Kilmalkedar (Irish: Cill Maoilchéadair). The ruin also contains an Alphabet Stone inscribed with DNI (*domini*) and the Latin alphabet in uncial script, which was carved around 550-600 AD (CORCA DHUIBHNE 3D 2023). The Ogham stone is characterised in particular by the fact that it has a cube-shaped pierced hole in the upper part (MACALISTER 1945, 181). The stone bears the inscription ANM MAILE-INBIR MACI BROCANN. This can be divided into formula words and names. The inscription bears the formula word ANM and MACI. MACI can be seen as a variant of MAQI. ANM can be translated as “name” (MACMANUS 1997, §6.27, 118) to indicate that it is the name of a person. The inscription also bears the names MAILE-INBIR and BROCANN, which are not recorded on any other known Ogham Stone (according to the CISP database). The inscription ANM MAILE-INBIR MACI BROCANN could therefore be translated as the name MAILE-INBIR son of BROCANN (O3D: name/inscription of Máel-Inbher son of Broccán). The Ogham Stone #187 has many identifiers on the web and is also available in OSM as node 9110402648.

Squirrel Stone #242 (Q106680977) is part of the Parkavonear Ogham Site (Q85396972) as part of the townland of the same name in Barony Maguihy, County Kerry (Fig. 4, left). The Ogham Stone has other identifiers: CIIC 242 (MACALISTER 1945, 237) and CISP~PARAR/1. The ruins of a church, or cathedral, Aghadoe (Irish: Achadh Deo), stand in this townland. The original location of the Ogham Stone was to the Southwest of the church. Today, the Ogham Stone is located on the top of the southern wall of the choir of church between a crucifixion plaque to the E and an architectural fragment to the W. The stone bears the inscription BRRUANANN, which describes a name (transliteration according to O3D: “of Brénainn” or “of Brénán”) that is not otherwise recorded in the CISP database. The Ogham Stone #242 has many identifiers on the web and is also available in OSM as node 10040757680.



Fig. 4 – Left: Ogham Stone CIIC 242 at Aghadoe Church (Irish: Achadh Deo); right: Ogham Stones CIIC 141 and 142 at Aglish Burial Ground (ph. F. Thiery), bottom: OSM maps, ODbL by OpenStreetMap contributors.

Squirrel Stones #141 (Q106680806) and #142 (Q106680808) are part of the Aglish Ogham Site as part of the Aglish Townland in the Barony of Corkaguiny, County of Kerry (Fig. 4, right). The Ogham stones have other identifiers: CIIC 141 (MACALISTER 1945, 137-138), CISP~AGLIS/1 (MACALISTER 1945, 138-139) and CISP~AGLIS/2. #141 «bears a Maltese cross within a circle, beneath which is a spear or arrow-like motif flanked on either side by a swastika» (CUPPAGE, BENNETT 1986, 258) and the inscription MAQI MAQ[I-...O]GGODIKA described with OSM node 10041491619. #142 is hidden in the graveyard, and contains the inscription --]CELI AVI VU[D!--- that can be transcribed to [--] the client of the descendant of Vu[--] and can be described with OSM node 10041927343.

The Stone Corridor (Fig. 5, bottom left) at University College Cork (UCC, Fig. 5, top left) contains 28 Ogham stones, which are available to the public. One is Squirrel Stone #86 (Q106680741) with the UCC ID 18. This was originally part (number 11) of the Ballyknock Ogham Site, which



Fig. 5 – Top left: University College Cork (UCC); left middle and right: UCC Stone Corridor and Ogham Stone 86 / UCC 18, Ogham Stones owned by UCC, located at  $51^{\circ}53'37.3''\text{N } 8^{\circ}29'32.1''\text{W}$  (ph. F. Thiery).

contains 15 Ogham stones (<http://lod.ogham.link/data/OS40000031>) in the Barony of Kinatalloon, County Cork. The Ogham Stone has other identifiers: CIIC 86 (MACALISTER 1945, 86) and CISP~BAKNK/5, as well as OSM node 10560404607. This Ogham Stone carries the inscription CLIUCOANAS MAQI MAQI-TRENI. The first name is unusual but could stand for CUNA (hound), Old Irish cú. The last name is well-known as Mac-Tréoin, the second part being like Old Irish trén (strongmen, warrior). Looking at the CISP database, the name “maqitreni” is also mentioned on CLMOR/1 (CIIC 15, Clonmore, Ireland) as “Maqi--Treni” but also on Ogham stones located in Wales on TCSTL/1 (CIIC 341, Wales, Llywell, SN 8700 2900, GB) as, “Maqitreni” and on CILGN/1 (CIIC 428, Wales, Cilgerran, SN 1096 4305 GB) as “Maqi-Treni” which leads to the idea that persons named after a “trén” do not only appear on the Irish Island.



#### 4. OUTLOOK

Nevertheless, this concept and architecture cause problems in IT sustainability and hosting of resources for all non-institutional funded projects. The data can be maintained by archaeologists or Citizen Scientists GitHub Pull Requests (PRs) and Wikidata edits and is connected via bidirectional links between LOD and Wikidata. But how can we solve the IT challenges? In the Ogham case, we try to use the “Squirrel Power” and the Research Squirrel Engineers Network to create a community of enthusiasts and looking forward.

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## ABSTRACT

The Linked Open Ogham Data Project was set up in 2019 by the Research Squirrel Engineers Network and supported by the Wikimedia Germany Open Science Fellows Program in 2020/2021. In 2022 an Ogham survey was done in Ireland to record Ogham stones in the field and museums. The project aims at providing and integrating Ogham Data in community hubs such as Wikidata and Open Street Map (OSM). This paper shows a hybrid Ogham LOD workflow, based on the idea of Open Science, Open Software, Open Data and the FAIR principles to create re-usability and modular IT infrastructure with community standards and commonly-used interfaces. Furthermore, the paper shows examples of Ogham stones from the Dingle and Iveragh Peninsulas in OSM and gives a deeper insight into the inscriptions and mentioned Ogham-specific formula words and names.