

The Toggle & Indigenous Iron Age Glass Production in Ireland

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The study of beads in archaeological contexts is a significant part of the reconstruction of material culture, used for tracing trade contacts, and in the study of ornament as a visual language (Cohn 1959: 77). As portable pieces that can be sourced and serve as stylistic, temporal, and social markers, beads reflect larger patterns of interaction and communication during periods characterized by significant change and increasing mobility. In the Irish Iron Age, the systematic study of artifact types has begun to clarify dating and questions of cultural contact. Glass objects, most commonly in the form of beads, are one such marker. Beads appear in multiple archaeological contexts across the island throughout this time period and have only been summarily discussed (e.g. Guido 1978; Henderson 1988b; B. Raftery 1972).

The information presented here is part of my master's thesis in which I synthesized all evidence for Irish Iron Age glass to examine the characteristics, variability, and distribution of glass on the island. This article will discuss the archaeological evidence regarding indigenous glass production in Ireland during the Iron Age. Particular emphasis will be placed upon the glass toggle, a form that is likely unique to the island and indicative of glass production here.

The Iron Age of Ireland has long been a topic of much contention for Celtic archaeologists. Most of the archaeological evidence is ambiguous and fragmentary. Many artifacts are non-diagnostic, and the metal objects in particular are indistinguishable from pieces of Late Bronze Age or Early Christian date, making dating chronologies difficult (B. Raftery 1994). In addition, many of the sites were explored in the first half of the twentieth century, and suffer from unsystematic methods of excavation, a lack of formal and/or published record keeping, and poor museum storage practices. It is often difficult to compare this material to more recently excavated finds, leaving the Irish Iron Age record in a rather incomplete state.

However, since the 1970s interest in trying to make some sense of the Irish Iron Age has been on the rise. Various authors have compiled the available information for this period and have synthesized what is known (Harbison 1988; O'Brien 1992; 2003; McGarry 2005; B. Raftery 1972; 1981; 1994). There has also been archaeological cooperation between the Republic and Northern Ireland. The Republican Heritage Council's Standing Committee on Archaeology and the Royal Irish Academy's Committee both have representation from Northern Ireland. Similarly, the Northern Ireland Historic Monuments Council has members from the Republic (Doyle 2008: 24). Recently, there has also been a movement towards compiling unpublished site information, making it more accessible for researchers (Becker et al. 2008; Heritage Council 2007: 14). Archaeological databases have been generated by

the National Roads Authority (NRA), the Heritage Council in the Republic of Ireland (HC), and the Northern Ireland Environment Agency (NIEA): these provide information on sites of all types, from the 1970s to the present day (NRA 2009; HC 2009; NIEA 2009). Several of these online databases are still in progress, but those already completed have cleared the way for new efforts at compiling and synthesizing the scattered lines of research for this period.

One such avenue is the study of glass objects, which appear in multiple archaeological contexts across the island throughout the Iron Age. Glass items, particularly beads, had been summarily covered by a number of authors, but had never been examined in a full and comprehensive manner with regard to the Irish Iron Age (Guido 1978; Henderson 1988a; B. Raftery 1972). Through the compilation of a database of all glass of likely Iron Age date, a preliminary set of observations can be developed regarding the use of this material as a proxy for contact with the British Isles and the Continent and as evidence for the organization of glass production. Through an examination of the glass evidence, questions regarding indigenous glass production in Ireland can be explored, such as: Are any glass bead shapes or decoration styles unique to Ireland? What is the evidence for glass working or glass making?

Iron Age Glass Production in Europe

Evidence for indigenous production can appear archaeologically in a number of forms, the most obvious of which are the production centers themselves. Such sites contain evidence for glass heating kilns or fire pits, glass working tools, such as metal rods or crucibles, raw glass blocks, glass slag, large amounts of glass fragments (to be reused), or completed glass objects. Melted glass could occur on some or all of these artifacts. Any combination of the above forms of evidence would indicate the presence of glass working, which is defined as the softening of ready-made glass to form artifacts (Henderson 2000: 144). To identify the presence of glass making (the actual formation of the glass from raw materials) at a site, stockpiles of raw materials and partially formed glass compounds like frit (see glass production below) is required (Henderson 1982, 1989c, 1991). It should be noted that most of these forms of evidence for industrial production are not common, even at major sites in prehistoric Europe. Completed glass pieces and fragments in copious amounts are the most common form of production evidence, though crucibles and semi-fused raw materials also have a high likelihood for survival. Actual physical remains of workshop centers are extremely rare (Henderson 1982: 42, 1991: 116).

Specialized industrial activities including glass production can manifest themselves in a number of ways in the archaeological record. These include a high degree of specialization, a large scale of production, evidence for technological overlap and potential sharing of knowledge between artisans, and the extent to which the evidence for production is related to site type or other regional factors such as raw material availability (Henderson 1991: 104). In Iron Age Europe the scale of glass production ranges from small settlements to hillforts (fortified settlements) and major *oppida* (large fortified urban settlements). In continental Europe, production centers appear to have begun as

small industrial village sites such as Aulnat and Gergovie in central France between the sixth and third centuries BC (Collis 1984a: 78). At Aulnat, evidence for various forms of craft production such as bone-working, coral-working, multiple forms of metal working (including coin minting) and glass working have been found. The industrial situation has been described as a “partially-dispersed, rurally-embedded focus”, which contrasts with the later, more focused production of the enclosed *oppida* (see below), with evidence of large-scale production (Bintliff 1984: 194). Late Iron Age society from the third century BC onwards showed increasingly urban characteristics, particularly in the area stretching from Hungary to western France, known as the *oppida* zone. These major production centers, like that of Manching in Germany, demonstrated large-scale manufacture, trade, and industrial centralization (Collis 1984a: 180). They made and worked not only glass, but a variety of other materials, sometimes in the hundreds of thousands of pieces, including metals, coins, amber working, and ceramics. There appear to have been two levels of production within some of the *oppida*, the mass-production of functional artifacts and the smaller-scale specialized production of decorated objects (Collis 1984a; Henderson 1991: 110-111, 115-118).

In Britain, production centers are generally smaller in size. The *oppida* appear later than on the Continent and do not produce such large-scale evidence for a range of industries found there (Henderson 1991: 111). The exception is Hengistbury Head, which, while more a trade site than a production center, exhibits a wide range of industries including metal, shale, and glass working (Cunliffe 1987). Large-scale intensive production evidence in Britain is found more often at small settlements than large *oppida*. Gussage-all-Saints, Dorset (Wainwright and Spratling 1973) (an industrial hamlet) and Meare in Somerset (Orme et al. 1981) (a slightly larger industrial village) are known for their large-scale iron and bronze working (Gussage in particular), lead and glass working, as well as pottery production (Meare). Other small sites in Britain appear to have specialized in the production of a single material. Iron working sites in particular were the most common form of specialized production sites in Northumberland and the Tyne-Tees Lowlands (Henderson 1991: 112). This is not to say that larger sites such as the hillforts of Maiden Castle or Danebury did not yield evidence of industrial production (they were particularly known for metal working) but that the scale of production was never as extensive as that found at the smaller settlement sites (Henderson 1991: 115). This pattern of more extensive industrial evidence at smaller settlements rather than larger hillforts suggests that the more elaborate glass pieces were more likely made at these smaller centers, which were the most specialized (Henderson 1991: 115).

The organization of glass production is another factor to consider in the examination of production centers. It is likely that once any form of industrial production reached a certain level of intensification and size, a hierarchy of some form developed within the ranks of the artisans and possibly between the artisans and the elite individuals of the region. The lack of information in this area makes it difficult to determine how much autonomy artisans had with

regard to elites and each other. The degree of this independence would partly determine an artisan's level of mobility and whether they serviced a region, a group of settlements or tribes, or a single site. The more mobile the artisans, the more likely the physical locations of production within each site were temporary or multi-purpose, and therefore harder to identify archaeologically because of their limited time frame of use (Henderson 1991: 118). Arguments for and against cases of artisan mobility vary depending on the specific industry involved and the location of the site in relation to raw material availability. A general lack of available materials could severely limit mobility. The degree of specialization of artisans also needs to be considered. At larger *oppida* there was likely enough work to support full-time attached specialists (Henderson 1991: 118-119). But away from these large-scale sites, in Britain and Ireland (where very little is known about industrial production during the Iron Age) one artisan may have needed to be proficient in more than one production form (e.g. iron and glass working) because the demand in one industry was not enough to make a living year round. This could again be affected by the status of the artisan and if he/she was involved in the manufacture of prestige as opposed to utilitarian items for higher status individuals (Henderson 1991: 119). However, the term "prestige item" is harder to use with regards to glass, which is not utilitarian in any form. It is possible that it was considered a prestige item in places where it is rare, such as Ireland. However, there is no blanket model of industrial organization and the role of artisans that can be applied to glass working across Europe. In Ireland there may not have been any distinction in levels of production in any industry, because of the significantly smaller scale it may have been practiced on (Henderson 1991: 120).

The glass artifacts themselves provide evidence of indigenous manufacturing. The presence of unique glass forms, shapes, colors, or decorations not found in any other region in the time period in question would indicate some form of glass working. Chemical analysis of the pieces could also reveal signatures of unique chemicals used (to form glass or simply as newly added colorants to raw glass) only within the specified region (Henderson 1989c, 1991; B. Raftery 1984).

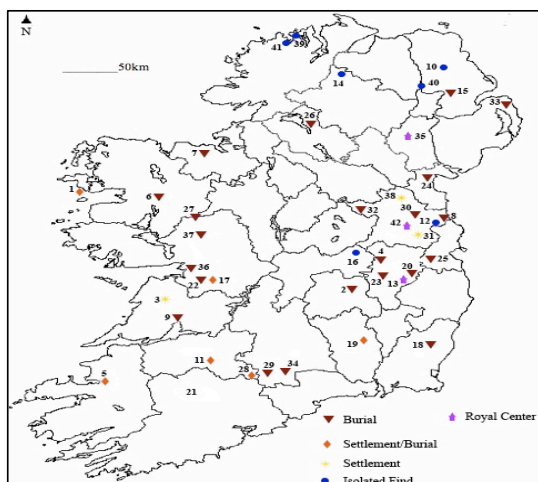


Figure 1: Distribution of Iron Age Glass Sites in Ireland

Object Type	Number	Percentage
Beads and Fragments	1282	92%
Unidentified Glass Fragment	44	3%
Bracelets and Fragments	27	2%
Toggles	21	2%
Ring	1	<1%
Other (Objects Associated with Glass)	14	1%
Total	1388	100%

Table 1: Total Number and Type of Glass Forms

formerly known as the Department of Environment), and Down County Museum (Downpatrick, Northern Ireland), was examined in July of 2008 and January of 2009. A total of 42 sites with glass and 29 unprovenienced glass finds were recorded, for a total of 1388 glass artifacts. Beads and bead fragments were the largest category, with a total of 1282, followed by unidentified glass fragments (44 pieces), bracelets and their fragments (26 pieces), toggles (21 pieces), and other material associated with glass working and making (namely crucible fragments and vitreous materials-14 pieces).

Toggles

Toggles are glass forms similar to beads, but not perforated, although this form is found in other parts of the world with perforations. These glass pieces are shaped like a dumb-bell or two spherical balls cinched in the middle (Beck 1973: 40). Toggles or dumb-bells are called beads or non-beads by different authors (Beck 1973: 40; Edwards 1990: 94; Francis 1989: 43) and the terms are used interchangeably in Irish archaeology. When perforated, “toggle” refers to a long bead with a perforation through the short axis (Francis 1989: 43).

Glass toggles are considered a predominantly Irish Iron Age and Early Christian form, but two also appear in Britain at an Iron Age site on the Isle of Man (Gelling 1958: 94-95). A few toggles date to the Early Christian occupations of Lagore (no. 1471) and Ballinderry 2 (no. 251) (Hencken 1950: 141; Warner and Meighan 1981: 54). The terminology used to describe these pieces has only recently involved the word toggle, to distinguish these pieces from beads, which are by definition perforated (Warner and Meighan 1981: 54). Many publications before the 1990s (and some after) used the term “dumb-bell bead” for this object type, even though there is no evidence that they were used in the same fashion as beads (Johnston 2007: 121). The context of the finds at Lough Crew, Grannagh, and Kiltierney tentatively date the origin of this glass

Methods

Published documents that mention glass finds at Irish sites of known or presumed Iron Age date were collected and recorded in the initial phase of the project (Table 1; Figure 1). Unpublished material from the National Archives of Ireland (Dublin), National Museum of Ireland (Dublin), Ulster Museum (Belfast, Northern Ireland), the Northern Ireland Environment Agency (Belfast, Northern Ireland-

form to between the first century BC and the first century AD (B. Raftery 1984: 202). Bone versions of this object type also appear during the Iron Age, such as the piece from Cremation 18, Tumulus 8 at Carrowjames, Co. Mayo (J. Raftery 1940-1: 70-1).

Toggle colors ranged primarily from dark blue translucent and light green translucent to dark amber translucent. However, three examples had a mix of colors in their matrix. Two from Dùn Ailinne, were of a swirled mixture of dark blue translucent and light blue opaque colors. Another from Kiltierney is a dark blue translucent mixed with a dark amber opaque color (Figure 2). This color mixing within the body of the glass is only found in one other instance, in a short barrel disc bead, also from Kiltierney, a light translucent green mixed with a light opaque amber with stratified eye decorations. Another example from Dùn Ailinne represents one of the only well contextualized pieces of red opaque glass from the Iron Age on the island (as others did not appear until the Early Christian period) (Hughes 1985: 43; Johnston 2007: 120-121).



Figure 2: Multi-Colored Toggle, Dùn Ailinne E79:2755 (Jordan 2009: 94)



Figure 3: Multi-Color Toggle, Dùn Ailinne E79:840 (Jordan 2009: 94)

There is significant variability in form. Some toggles were shaped like two spheres melted together while others are longer and more phallic in shape (Figure 3). The lone toggle example from Knowth, Burial 20 (no. 594) is unique for its more cylindrical shape with flat ends and a groove wrapped around the center, which might indicate that it was suspended; neither feature is found in any other toggle (Eogan 1974: 80-87). Beck calls this form a dumb-bell (without perforation) in the family of unperforated button beads while toggles in general are classed separately because they do not have any kind of engraved groove. The toggle form found at Knowth is also known to appear in amber (1973: 39-41). There has not been much discussion as to what toggles might have been used for or how they might have differed from beads. The location of the Knowth find, around the neck of a skeleton, suggests that this type was used as a pendant. Perforated toggles and un-perforated dumb-bells are known from outside the Celtic Iron Age world with string tied around them, possibly to form necklaces (Beck 1973: 40-41). Another suggestion was made by Monica Hughes in her unpublished paper regarding the glass of Dùn Ailinne. Two of the more elongated toggles appeared to her to be manufacturing debris in the form of the ends of rods. Some of the Dùn Ailinne pieces have a small twisted projection at one end, which Hughes interprets as having been snapped off while the glass was still soft. The narrowed waist around the center of the toggles is interpreted as the result of the way the piece was held during this process, using forceps or



Figure 4: Spherical Toggles, Lough Crew E7:1644
(Jordan 2009: 96)

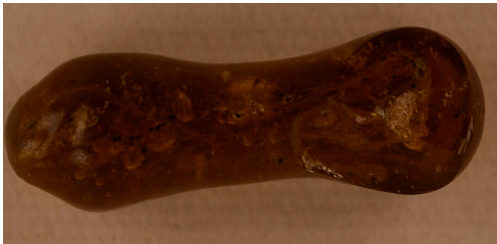


Figure 5: Phallic Toggle, Dùn Ailinne E79:1070
(Jordan 2009: 96)

metal tongs that constricted the middle. Variations in form would also reflect the different shapes and sizes of implements used. Hughes suggests that toggles are the leftover ends of glass rods too short to be used further for bead production (1985:41). However, the only other evidence of glass production at Dùn Ailinne is a few unidentified glass fragments and a piece of slag with fragments of unaltered silica (Johnston 2007: 122). If these toggles were debris, it is still possible they were put to some use, especially since they are also found directly relating to skeletons in burial contexts at Knowth. Less elongated and more carefully formed spherical toggles without twisted projections on either end (though they could have been sanded off) are more

likely to reflect deliberately made pieces, especially since these forms also appear in bone. However, it can be speculated that the development of this form on the island was independent of other parts of the world and perhaps had its origins in the use of leftover glass debris.

Irish Indigenous Production

While high concentrations of glass found in continental *oppidum* production centers illustrate the scale of European glass consumption and support the idea that enough glass was being produced to export it to the farthest reaches of the continent, this does not mean that local production was not occurring as well. The earliest glass products of the Iron Age in Ireland were likely imported from the Continent and served as templates for indigenous development of this industry. Glass cannot be dated to the Iron Age in Britain and Ireland before 500 BC (Guido 1978: 19-25). Most glass finds that can be assigned to the Iron Age are dated between approximately 200 BC and 100 AD. By this time glass production centers on the Continent were thriving and imports could have reached the British and Irish islands (Guido 1978: 19-41). The reduced number, variety, and complexity of the glass that is found in Ireland and to some extent in Britain in the Iron Age may indicate that local communities were making or working glass into their own shapes instead of importing completed products. While comprehensive glass studies and extensive regional glass comparisons on the Continent are rare, preliminary studies indicate that the decorations, colors,

and shapes found in the Irish Iron Age beads are generally comparable to those on the Continent, though rarely as elaborate or complex and sometimes put together in different combinations (Guido 1978; Jordan 2009; Venclovà 1990: 145). The two ring beads from Denhamstown and Hawhill (both with opaque yellow and a light clear or yellow translucent whirl decoration), for example, have no exact parallels to date in Britain or the Continent though they fall into the Continental Celtic whirl category (Guido 1978: 57-59). However, it is possible that different glass forms were used in local Continental contexts (the more elaborate ones) than those that were exported to Ireland and Britain (more simple forms). The simple, undecorated beads may have been preferred for some specific decorative purpose or the Continental Celts may have preferred to save their more elaborate forms for themselves. This phenomenon is known in other archaeological contexts such as the early American fur trade industry in which simpler glass beads were specifically exchanged with Native Americans who preferred them as a replacement for porcupine quills and other small items they used for intricate embroidery (Ewers 1972: 9-12). However, elaborate beads are not confined to particular sites on the Continent, but are found in most regions, though types could vary. The ram's head bead, for example, is found throughout Slovenia (Križ 2003; Wells 1981), while elaborate face beads from Phoenicia are also known to have been imported into the eastern Celtic zones (Karwowski 2005: 167). The production of glass in Ireland seems then to conform to the introduction of La Tène art, technology and artifact types to the island. Glass, like La Tène metalworking, appears to represent an introduced technology that was then adapted to become a wholly Irish manifestation (B. Raftery 1984: 335). Until more comprehensive glass studies are conducted on the Continent, which include standardized categorizations of forms and chemical analysis, neither possibility can be excluded. Currently there is not enough evidence to suggest that glass was being made using local raw materials in either Ireland or Britain, but this has yet to be confirmed by chemical analysis (Henderson 1989b, c).

The evidence for glass production centers in Ireland is scant and inconclusive. No sites appear to be candidates for production centers based solely on the few crucible fragments, lost "glass molds", and unidentified slag pieces found to date, none of which have been chemically tested to determine the pyrotechnic activity with which they were associated. It is possible that, like the glass production centers in Britain (Henderson 1991), those in Ireland were located not at hillforts or royal centers (which are easier to locate on the landscape today), but at smaller sites outside larger population areas, making them more difficult for archaeologists to find and identify. The amount of Iron Age glass found in Ireland at this point does not suggest the existence of any kind of major production center like the *oppida* of continental Europe and the lack of evidence in the periods preceding or following the Iron Age also supports the notion that glass production occurred at smaller sites (Henderson 1988a, 1991, 2000; Jordan 2009). Travelling artisans using temporary or multi-purpose workshops would also explain the lack of glass production evidence (Henderson 1991). Here too the small amounts of glass found in Ireland and the size of the island itself indicate that it would be feasible for a few itinerant

artisans to travel the county fulfilling the glass (and possibly other pyrotechnic) needs of those who could pay for their services. At this time, no blanket organizational template can be applied to the scant evidence in Ireland and the possibility of multiple practices contributing to glass production here cannot be excluded.

Toggles offer the best evidence for an indigenous glass form in Ireland. No glass forms of this type are known anywhere else in the Celtic or Roman world during the Iron Age, except for the few finds on the Isle of Man, which were likely brought there from Ireland (Gelling 1958). The variety of contexts in which they appear (settlements, burials, and royal centers), and the appearance of this shape in bone and amber, suggest that these are not simply glass production debris or mistakes, but a legitimate local glass form (B. Raftery 1984: 202; Jordan 2009). Though they only make up 1.5% of the total glass finds in Ireland, they account for a large amount of the non-bead glass recovered (7.7% of the total glass finds) (Jordan 2009). Chemical analysis of this glass form could reveal unique compositional signatures that might help to identify the origin of the material and likely locations of production centers. One could certainly determine whether the Irish toggles and those few known in Britain were from the same source.

Future Research

To better understand how glass was being used in Ireland, chemical analysis would be the most useful avenue to pursue. The better our understanding of the compositions associated with certain colors, how these compositions are distributed, and the possible raw material sources for ancient glass based on its composition, the more archaeologists will be able to define the time periods and origins of these pieces as well as the patterns of geographic distribution across Europe (Henderson 1982: 33-60; Lynn et al. 1997: 83-100). The Irish glass toggles may have indigenous chemical compositional signatures that could point the way to identifying raw materials sources on the island. If some indigenous forms were being made in Ireland using imported glass, the origin of this glass could still be identified.

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