**Semantics of the Sea – Stories and Science along the Celtic Seaboard.**

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**Abstract:**

The stories of Noah, Gilgamesh and Atlantis are internationally infamous, telling of lands submerged beneath the sea. Similar stories exist for the European seaboard from Brittany through southern England, Wales, Ireland and parts of Scotland. Today we know that many areas now lost beneath the sea were dry land in the not so distant past, consequently papers purporting to link the geological events associated with flooding these lands and the stories have been written. However, these papers have been written from the perspective of the scientist with little regard for the perspective of the story or from that of the story-teller. In this paper we attempt to redress this inferred normativity by drawing attention to the problematic nature of such an endeavour, developing a discussion about how else one might approach this balance from that opened by fields as diverse as folklore, ethnography and archaeo-astronomy.

Key words: Transgression; flood stories; Cantre’r Gwaelod; narrative; inundation; folk tales; memory; submerged; culture.

1. **Introduction**

*“From the sixth century onward, discourses that claimed to rely on empirical observation were engaged in a lively competition with discourse self-consciously based on traditional narratives.”* (Hopman, 2013)

In the earliest recesses of classical antiquity scholars grappled with the notion that archaic cosmological narratives contained in the epic poems of Homer’s *Iliad* (circa 760-710 BCE, cf. Fagles, 1990) and Hesiod’s *Theogeny* (circa 700 BCE, cf. Caldwell, 1987) may allude to actual geological events and natural features from times then past and present. From the paradoxographer Palaephatus to the philosophy of Plato, Strabo’s geography and on to Pliny the Elder’s natural history these pioneering explorations bore an inherently interdisciplinary perspective. Since then scholars from a plethora of modern schools have followed in their wake (Hooke, 1679; Tyler, 1865; Frazer, 1918) and within the last forty years the diluvial side of this research has expanded to range from studying possible origins for Plato’s Atlantis (Vitaliano, 1968, 2007), to explanations for the creation of oceanic islands (Nunn, 2012 and 2014a). Such stories are familiar throughout the world with those of Noah, Gilgamesh and Atlantis being perhaps the most internationally infamous. On the European seaboard (Figure 1), from Brittany through southern England, Wales, Ireland and parts of Scotland a series of lesser known stories of a similar ilk exist. The inspiration behind these has been much debated but what is now geologically clear is that in many cases the seabed associated with the space these stories purport to describe was dry land until recently and that human beings once occupied ground now submerged beneath the sea (Flemming *et al*., 2014).

Our knowledge of the changes imposed on these once dry lands has been gleaned from careful study of seabed cores and other forms of data and we can now appreciate the impact of major environmental events during the last 13,000 years on these landscapes and the people who once lived in them. For example, the rapid climatic amelioration at the end of the last cold period, sea level rise following ice sheet melting and vegetation change resulting from both human and natural events (Lowe and Walker, 2014) are likely to have been significant in the lives of peoples living through these periods of change. Consequently they may have been spoken of immediately after the event and perhaps immortalised in story form. One common strand among the earth sciences (including archaeology) has been to study the impact of post glacial flooding on early Holocene human populations and this has been debated in many contexts, for example Turney and Brown (2007) speculate on the impact of catastrophic early Holocene sea level rise and the Neolithic transition in Europe. Such an event has allowed workers in the Black Sea (Ryan *et al*., 1997, Ryan and Pitman, 1998) to argue that the post-glacial drowning of the Black Sea was responsible for the foundation of many of the regional traditions. Elsewhere Lambeck (1996) has explored the “flood myth” in the Persian Gulf whilst Nunn (2012, 2014a/b) has extensively studied geo-hazards and ‘geo-myths’ in the Asia-Pacific region. In the British Isles workers such as Ashton (1920) and Cracknell (2005) have examined local narratives and contextualised them within the framework of the known, or speculated, geological history of the region. More recent examples of attempts to link historiography with geological causes have been made in the Severn estuary where Bryant and Haslett (2002, 2007) have examined the documentary and geological evidence for the causes of the 1607 flood event.

Predominantly papers purporting to link geological events and stories have been undertaken from the perspective of the scientist with little regard for the perspective of the story or from that of the story-teller. In this paper we attempt to redress this inferred normativity by drawing attention to the problematic nature of such an endeavour, developing a discussion about how else one might approach this balance from that opened by fields as diverse as folklore (Dundes, 1988; Dégh, 1995), ethnography (Delores, 1995) and archaeo-astronomy (Hamacher and Norris, 2009; Hamacher, 2014). In so doing we provide a summary of some of the new geological data from our shallow seas that document submergence and flooding in parallel with selected versions of the local tales told. We do this by reference in particular to Cardigan Bay wherein resides one version of the Celtic Atlantis; Cantre’r Gwaelod (Figure 2). Finally we attempt to draw some conclusions.

**2.0 Geological and archaeological evidence for inundated landscapes**

In 1913 the geologist Clement Reid published “Submerged Forests” in which he reviewed a series of sites around the British coastline where the former presence of woodland, in an area now occupied by the sea, was evidenced by well-preserved tree stumps emerging through beach sands (Figure 3). From these observations he argued that this was evidence for lowered sea levels in the past and he deduced this implied that there were formerly extensive dry land areas offshore of our coastline that had been flooded as sea levels rose. This deduction, coupled with a basic understanding of the seabed topography in the North Sea and the emerging science associated with understanding the ice ages, allowed him to envisage a large area of dry land once existing in the area (Figure 4) that was flooded in response to melting glacial ice causing global sea level rises. His map subsequently inspired Graham Clark when he was pondering the feasibility of contact between the early Mesolithic peoples of NW Europe and Eastern England (Clark, 1936). Confirmation of a human presence in this landscape was made in 1931 after the fishing boat Colinda discovered a harpoon point embedded within a large block of organic sediment pulled up from the North Sea (Burkitt, 1932).

Despite these early forays into the geology and archaeology of the sea floor for much of the 20th century consideration of these submerged landscapes was minimal because maps of the seabed were imprecise and lacked the detail of equivalent terrestrial maps. Thus despite the fact that geological specialists (see Murray-Wallace and Woodroffe, 2014 for a summary) had been working hard to document and quantify sea level change following the last glacial maximum when global sea levels were approximately 125 to 150m lower than at present due to the extensive nature of the large ice sheets (Yokoyama *et al.*, 2000; Lambeck and Chappell, 2001; Peltier and Fairbanks, 2006) (Figure 5) little was known of the lands they flooded. Global warming resulting in ice sheet shrinkage following the Last Glacial Maximum resulted in the return to the oceans of water previously trapped in the ice and consequently sea levels began to rise. For much of the shallow continental shelf surrounding southern Britain (beyond the area of extensive glaciation), sea levels rose rapidly across a stable landscape. However, in Scotland where glaciation had resulted in crustal subsidence, due to the weight of ice on the landscape, rapid uplift of the crust preceded sea level rise so that much of the shelf area remained dry with little or no flooding (Bradley *et al*., 2011). Consequently beaches formed 12 to 14 thousand years ago are now some 30 to 40m above sealevel. By the late 20th century however, the stage was set for the issue of submerged landscapes to re-emerge thanks to the new frameworks for sea level history coupled with a range of new techniques for investigating the sea bed.

The reclaiming of these landscapes began in 1998 with a series of articles published by Bryony Coles that gave serious consideration to the area of the North Sea she called Doggerland (southern and central North Sea areas, see Figure 1). This was followed by extensive study of 2D and 3D seismic data, some of it released by the oil and gas industry (Gaffney *et al*., 2007, 2009), that demonstrated beyond all doubt that such areas had formerly been occupied by rivers, lakes, marshes and low hills. At the same time commercial exploitation of the seabed for mineral exploitation or by the renewable energy sector (Bicket *et al*., 2014) has resulted in archaeological survey and evaluation of the shallow continental shelf seas. Such work now routinely requires cores to be taken of deposits beneath the seabed (Figure 6A) to recover samples (Figure 6B) for dating and palaeoenvironmental analysis allowing the key environmental changes (including the onset of flooding) to be determined accurately in some locations.

The process of flooding, from a geological perspective, is known as a marine transgression, i.e. when a body of water rises relative to a land surface and the coastline moves onshore to a position of greater elevation (relative to its starting point). The evidence from our shallow seas categorically documents such an event has taken place following ice sheet shrinking around 20,000 years ago (Brooks *et al*., 2008). However, what remain to be ascertained are both the precise timing of the event (for particular parts of this landscape) and the nature of that transgression (i.e. was it rapid and catastrophic or gentle and gradual). The latter is in fact a reflection of the debate that has been on-going in the earth sciences since it was initiated in early 19th century debates between Cuvier (1827) and Lyell (1820, 1832) and since revisited by Ager, 1993). What we are able to do for the British coastal zone is however identify three zones in which different scenarios for flooding might be considered (Figure 1):

1. Lake District through the Scottish mainland to Durham.
2. Durham through East Anglia, Southern England (including the Channel Islands) to the Severn Estuary
3. Cardigan Bay to the Lake District.

These are considered in detail below (Section 4.0), however it should be noted that these regional patterns are a justified simplification and additional factors that may have influenced flooding in some or all of these regions require our consideration:

* A large scale tsunami impacted the North Sea approximately 8200 years ago (Long *et al*. 1989; Dawson *et al.* 1990; Warren 2005, Weninger *et al*., 2008). This event originated from a massive sediment slide into the Norwegian trench where the displaced water propagated a tsunami in a westerly and southerly direction. This impacted on the east coast of Britain from Shetland down to northern England.
* The collapse of the Laurentide Ice Sheet occurred approximately 8200 years ago. This led to the sudden input of large amounts of freshwater into the North Atlantic possibly causing a sudden ‘sea level jump’ (Barber *et al*., 1999; Kendall *et al*, 2008; Hijma and Cohen, 2010).
* Other possible tsunami events (Haslett and Bryant, 2008) such as that in 1014 mentioned in the Anglo-Saxon Chronicles and following the Lisbon earthquake in 1755 will have caused local to regional impacts in coastal areas.

Since approximately 6000 years ago sea level fluctuations have been minor and have only locally impacted coastal palaeo-geographies (albeit perhaps catastrophically for local residents which is a point perhaps of considerable significance in terms of local stories).

Turning to the archaeological evidence the recovery of Mesolithic material from the seabed is common in the eastern parts of the North Sea (Fischer, 1995; Gron and Skaarup, 2004; Nymoen and Skar, 2011; Jöns and Harff, 2014) while that for the Palaeolithic is presently somewhat limited (Tizzard *et al*., 2011). Within the English Channel archaeological material is significantly rarer however two outstanding sites exist. In the Solent, at Bouldner Cliff, Mesolithic archaeology has been recovered at the base of a small submerged cliffline north of the Isle of Wight (Momber 2004, 2011; Momber *et al*., 2011). Across the Channel significantly older Palaeolithic material has been recovered at the foot of a submerged cliffline off the Cotentin Peninsula (Cliquet *et al*., 2011). Notwithstanding these examples, despite a significant investment in survey and evaluation of potential sites in British waters, few sites likely to contain archaeological remains have been discovered. Consequently although our knowledge base for these submerged landscapes has increased significantly in the last decade we are still having trouble placing humans into this landscape.

Despite the absence of evidence for human activity within these drowned landscapes this lack of sites is not taken as evidence of absence and certainly has not inhibited debate about the impact of flooding on local populations using this landscape prior to and during inundation. So for example, Coles (1998) has suggested that loss of landscape would have been compensated for in some circumstances by creation of new habitats while Gaffney (2007) sees the same set of changes as likely to be devastating. Leary (2009, 2013) has considered the impact of gradual and catastrophic flooding on peoples in this landscape and concludes that “*climate change can affect people and communities on many different spatial and temporal scales, which produce a wide variety of responses, and that environmental change can benefit individuals as much as disadvantage them”* (Leary 2009, p235). Thus while the impact of flooding on past populations living in these now submerged landscapes remains to be demonstrated it is likely that a variety of responses, physically and psychologically, would characterise these responses to stress and change.

**3.0 Tale Theory**

Since Vitaliano coined the term ‘geo-mythology’ in 1966 (Vitaliano, 1968) geology of this sort has been applied to appraisals of traditional stories as a scientific discipline within its own right. Yet the very terminology upon which its discourse rests is as ontologically problematic as the stories it attempts to cosmologize. Vitaliano self-defined her term to her own purposes; triggering a necessary conversation though presumably not expecting her personal definition to seep into orthodoxy. She stated that it was “*the geological equivalent of euhumerism”* (Vitaliano, 1968). Whilst it isn’t euhumerism per se (for the science is not apotheosistically interpreting narrative content) it does offer a non-deific equivalent in attempting to offer tangible data by which to anchor established, yet inherently intangible, ‘folk’ narratives into a scientific, potentially tangible, context. However, to say as Vitaliano continues, that it seeks to find the “*real geological event underlying a myth or legend*“ is to leave the door open to onslaught from already established debates on the epistemic universality of what constitutes ‘real’ along with questioning what is a ‘myth’ and a ‘legend’ anyway? The solid ground of this definition thus rapidly submerges into contention even before we follow to its culmination and address the concept of converting “*mythology back into history”* for if nothing else, a myth is surely a “*traditional story…concerning the early history of a people”* (O.E.D., 1989)? Thus a known myth has historicity in its own right, leading it to need no conversion.

This dictionary definition of mythology is a generally accepted standard within a greater complexity, yet it is also another slippery slope into nebulous worlds; “*the study of myth is beset by a tangled web of claims and contradictions*” (Piccardi et al: 2007). The mélange of definitions which have bounced interchangeably between the remits of myth and legend has done nothing to assist in the subject’s methodological schemata even within its own sphere (Ellis, 1960). Marc Lombardo attempts a rigorous semiotic untangling in his paper *Myth Defined and Undefined*, eventually purporting that this problem is rather the point of the subject, for

“*given this dilemma of semantic ontology…is it not plausible that when the word ‘myth’ is used…it is largely to signify such an ontological problematic?*” (Lombardo, 2003)

Given that stories are inherently organic and transient creations this statement on the state of an aspect of their definition seems highly, if ironically, applicable; albeit not particularly useful from an academic perspective. So we are left with a discipline the process of which is understood in practice (Sluijis, 2009) but within which the core language utilised is riddled with confusion.

Hence, unlike many previous excursions into story-science discussions, this paper is taking folk narratives as its source rather than myth alone. This is predominantly due to the dominance of such tales along the Celtic seaboard but also because this route offers us a release from the restrictions of these orthodox landmines, for the definition is being taken in this context to include “*sacred narratives”* (Dundes, 1988) via myth, stories *“told as true*” (Halpert, 1971) via legend and “*stories handed down by oral traditions from mouth to ear*” (Dawkins, 1951) via folk tales. It will also include ballads, rhymes, fabulate and literary sources beneath its umbrella as required, in agreement with Tina Paphitis’ doctoral glossary (Paphitis, 2014), which supports her contemporary study in the archaeological side of this area. Therefore, for our purpose, individually precise definitions need not be more explicit.

The British archaeologist Richard MacGillvray Dawkins (1871-1955) extrapolated on this summation of the folktale umbrella above as equally also being a story that began in literary form and travelled thereafter by word of mouth, and vice versa, because essentially “*to the storyteller it makes no difference whence his story comes”* (Dawkins, 1951). Therein lays the rub, for geology disagrees. It is nothing if not etiologically focused. However, just as archaeology can be said to act as a socio-political influence on the present (Tilley, 1989), the present being where the past is created, so too do stories. They perform as knowledge representatives by recreating the past at any telling, each telling responding to the teller and the tolds’ own socio-political agenda, be that innocently or deliberately wielded. The same too can be said of geology as it reconstructs perspectival landscapes, offering explanations for our environment and cognitive appraisals of said environments through figures, data and discourse. The iconography of geological study could therefore be paralleled to the iconography of story-telling, as both can effectively present a proto-world without words. Thus we also have agreements between our factions.

# This is hardly surprising for, as we have seen, they began as the same discipline within antiquarianism (Paphitis, 2013), stemming in textual form in Britain from the medieval period when ecclesiastical interest in natural formations and ‘ancient’ remains became a mode for propaganda and scholarly investigation (Trigger, 2006; Gerrard, 2003). This period is also the one from which we glean our richest narratives along the Celtic seaboard.

Before we commence with examining these narratives in a geological context, let us first consider some caveats in an attempt to

“*avoid making biased, outsider’s judgements instead of presenting the viewpoint of tellers and audiences*” (Dégh, 1996).

The philologist Lubomír Doležel purported that a story-world in a literary context interdigitates with other story-worlds via a triadic relationship of expansion, modification and transposition (Doležel, 1999). The same may also be said of oral traditions and folklore in general, but more problematically so. Expansion changes the direction of attention within a plot. For example, story B may focus upon a minor character in Story A, expanding their narrative role. When this occurs in text it can be possible to track down the order of expansion. However when it occurs in an oral tradition or from deeper into the recesses of time then the chronology becomes obscured even when the expansion may still be identifiable. As these stories pass from mouth-to-ear-to-mouth they are modified by each transition. This modification “*constructs essentially different versions of the proto-world, redesigning its structure and reinventing its story”* Doležel, 206/7). The third relation holds true to the design of this proto-world “*but locates it in a different temporal or spatial setting.*”

# We see this triadic transfictionality occur within our tales of inundation, where a character in one story may have been incidental in the cause of a submergence but then they appear to appear in another flood narrative, which follows an almost identical plot, only with our previous minor actor taking centre stage; and vice versa with a protagonist in one taking a back step in another. The same process can be applied to story names, dates and locations via transposition; the ‘medley’ we will be examining is an excellent example of this. Geologists and archaeologists favour considering such relations as being transmedial, where a story line can become so culturally significant that it is adapted and adopted by all who identify with its characteristics (Ryan, 2013) as that allows for the suggestion that a scientific explanation may be viable.

# Whilst isomorphically schematising in this way is tidy and could reinforce a notion of the ‘Common Celtic’ through interdisciplinary means (and it may, on occasion, be correct) it is dangerous to presume that expansion is always the process in play. From a narratalogical perspective it is equally valid to argue that every telling of a story is a new story, with a new smorgasbord of inspirations feeding in to the telling and thus the notion of a common source becomes incidental, almost nonsensical. Apparent expansion could thus be no more than nominal theft under the guise of poetic licence. Therefore we need to beware that a tale that reflects another tale may be no more than that, a reflection, with no reference to a shared experience (Burkert, 1979).

In a similar manner, we must also be wary of the lure of nativism, again despite its tidiness (Carney, 1955); remembering to see the stories as steeped in the time in which we find them. So for example, narratives pinned on to paper by ecclesiastically influenced pens may have had religious/political modifications, distorting the earlier oral source so as to render any original empirical inspiration invisible. Particularly when a change of language has occurred, thus leaving one open to the vagaries of translation and cultural confusion (Freeth, 1993).

Within oral traditions it is the audience who play the publication role; bouncing a tale back at the teller in an interactive symposium of creation. As folktales are not restricted to text or oration and find expression through theatre, mummery, song and iconography their audience is equally as eclectic. Therefore a tale will vary from ear to ear as much as it will from mouth to mouth. As with geo-archaeology, context is everything.

Part of this problem lies with the process of memory, for the more we tell a story the less it adheres to its original content or context. As Shanks and Abelson argue in their thorough exposition on knowledge representation in stories; memory has a troublesome penchant for losing the original and maintaining the replica (Shanks & Abelson, 1995, p34). They also purport that we don’t actually try to remember, we try to understand, and we understand by telling stories, matching them with stories we already know (indexing), then retelling them and so on and so forth. Much as we are doing in this paper. We learn from the stories of others but only if their stories relate to ones we already know sufficiently to create a bridge of belief but insufficiently enough to cause us to rethink our own story. Then, once we have found a balance that allows for understanding we stop processing the data, leaving behind memory.

*“It is in the story making process that the memory gets formed” (ibid, p27).*

Re-iterations of the same story thus result in a decrease of factual inclusions and a correlating increase in fictional content known psychologically as ‘levelling’ and ‘sharpening’ (Allport & Postman, 1947). One of the reasons we do this is not because we do not care about the original or that the original is proven to be false but because people struggle to process chance information (perhaps such as a sudden flood) and so we transform them into situations/stories with which we are familiar (Langer, 1975). We also add aspects of the new story into what we consider to be the empty slots of an old one (Shanks & Abelson, 1995). Thus what may appear to be a story about the same event can actually be almost-the-same story about a totally different event. As a consequence of this, yes we may be able to theoretically purport that a story. or story-skeleton, could indeed be a memory of an actual event. However it is more likely to be a memory of a plurality of events, a palimpsest of cultural comprehension.

The telling and re-telling of stories in this way creates a knowledge structure within which people formulate expectations for future and current events so as to understand them in normative terms. Therefore the process of story-telling (both personally and perfomatively) does not seek to explain *e*vents, but to understand them, through a process of description.

The assumption that stories containing geological detail exist in order to *explain* said geology dominates the orthodox field. As if the only purpose a story teller could have in including a geological detail in their tale was in order to explain its origin. As if they had no other means by which to do so, as if an explanation for the physicality was all that mattered, that the natural feature or phenomenon was the unquestionable protagonist. Yet, as we have seen, this is not necessarily the case and whilst it is logical to suppose that “*they must express some social reality*” (Wilson, 1960) it does not follow that stories adhere to either empirical observation or that they even seek to do other than describe an occurrence, or a type of occurrence. As the classicist Walter Burkert asserted, references to empirical evidence can frequently be no more than secondary at best and that focusing upon them can miss the intended meaning, for ultimately

*“there is no denying that tales were associated with phenomena or events…but it is naïve to assume that any tale would arise directly from facts*” (Burkert, Lec.4)

**4.0 A geographical summary of the stories and their geological context**

*“Let me now speak of them, asking pardon for introducing marvellous stories…since I am unwilling to pass them over in silence and in a way to cripple my investigation.”* (Strabo, cf. Patterson, 2013)

**Area 1.** Lake District through the Scottish mainland to Durham.

This area is the largest of our three and appears to contain the smallest body of flood-connected narratives. Geologically the area has been dominated by uplift through much of the last 15000 years (Lambeck, 2005; Bradley *et al*., 2011) in response to ice loss and crustal rebound. Consequently rising sea levels have lagged behind crustal uplift and therefore the area has experienced little or no flooding at a regional scale. This resulted in the coast line remaining close to the present one for much of the Late Pleistocene/early Holocene time when global sea levels were rising until about 6000 years ago when modern datum were established.

Stories of the sea are common here and it could be argued that, from a symbolic perspective, motifs such as glashtyn, mermaids, sea horses, selkies et al (see Thompson, 1966, for all motif indices) represent flooding in its various forms and the sea tales within this region are dominated by stories of such supernatural creatures. They share their narrative space with spectral ships, sacrifice, smugglers, sailors, storms and the ubiquitous shipwrecks (the best known of the latter is, of course, the legend of Alexander Selkirk which is credited as being the inspiration for Daniel Defoe’s Robinson Crusoe). Predominantly though the Scottish ballads, oral tales and superstitions are weighted towards the saints and the supernatural with spiritual mythologies out of which only one prevailing inundation narrative floats free – that of the Cailleach. The Cailleach, meaning “*old woman, hag, crone, nun, or veiled one*” (Sorita and Rankine 2008) appears regularly as the source of water features in the landscape, possibly including that of Lochar Moss under the local name *Gyre Carlin*. According to R.H.Cromek there existed “*from the time of Prince James”* a rhyme stating that the hag Carlin traversed the shore at low tide between the Solway Firth and Locharbriggs by enchanted horseback as part of her coven’s *Hallowmas Rade* (the connection between horses and water is one that we find consistently in all three of our geographies with motif indices B71; B401; F234; E402.2 & G303.7). One day the tide returned unexpectedly, disrupting her gallop, out of pique she struck the waves with her magic stave and rendered the sea banished to leave marshland in its wake forever more.

The non-supernatural elements of this story hold some water for, as the naturalist Robert Chambers comments (Chambers, 1826); artefacts such as boats, iron grapples and anchors were discovered in his time in that very stretch of peat bog during its draining and the process by which they came to be there had been immortalised in the local saying:

*First a wudd, and syne a sea;*

*Now a moss, and aye will be.*

Geologically such a saying might in fact represent a cycle of flooding (or marine transgression) across a woodland followed by a period of marine regression when the sea was replaced by saltmarsh (moss). Evidence from Scotland for just such features are in fact common as evidenced by the presence of raised beaches around the coast line. However, even if such links can be made this cycle may be no more than a local event caused perhaps by a shift in the position of the beach or operation of the tides. The Cailleach’s involvement in this inundation through pre-nineteenth century tradition is questionable as it has since come to light that Cromek’s account was most probably the fictitious work of a poet by the name of Alan Cummingham (Dennis, 1987). What is interesting from our perspective is that whilst the origin of the of the Carlin rhyme is most likely purely fictitious the rhyme itself still exists, the tale is living, as is the couplet concerned with the transition of woodland to moss and thus it still qualifies as a flood tale along the Celitc fringe.

**Area 2.** Durham through East Anglia, Southern England to the Severn Estuary.

Following ice sheet melting marine waters gradually flooded the landscape of the North Sea and English Channel. Whether this was gradual or rapid (perhaps elements of both depending geographical location) is presently unknown. Around 6000 years ago sea levels attained near current elevations (Figure 2.5) and, except where there has been recent extensive erosion, the approximate modern coastline was established. There followed a short period in which the sea retreated (marine regression) and forests grew where once saltmarsh existed between approximately 6000 and 4500 years ago (Long *et al*., 2000). The sea subsequently returned and flooded these forests returning those locations to saltmarsh. Evidence for this phase of marine regression is typically preserved in the estuaries of our major rivers (Devoy, 1977, 1979, 1982; Long *et al*., 2000). Whether extensive forest growth occurred along the open coastlines between the estuaries is difficult to ascertain because significant erosion impacted these areas since the forests were transgressed removing any evidence for their former presence. The proximity to Doggerland is also significant here. The loss of the North Sea lands to the sea might logically be expected to impact on local populations living adjacent to these lands or forced from these lands consequent with sea level rise.

Stories from this area lose the glashtyn and selkies but retain mermaids and smugglers, castles, monsters and lost bells whilst adding in skyships and invasions. A number of well documented tales of this coastline include those of i) Goodwin Sands ii) The Bishop of Coutances iii) The Well of Brading Haven iv) Lyonesse and v) Ker Is.

Goodwin Sands is otherwise known as ‘The Ship Swallower’ due to its reputation for claiming vessels with no respect for their status if they fail to traverse its current-changing sandscape beneath the waters. These sands are sometimes said to be all that remains of the Isle of Lomea, the British Atlantis, which the Romans called *Infera Insular* (Chasing reference - MRB). The geological history of the sands is obscure. Cracknell (2005) summarised the competing lines of evidence showing either that the sands were a remnant of former dry land or that the sands have accumulated as a sandbank complex following flooding of the Straits of Dover by marine waters. The inundation is said by the antiquarian William Lambarde (1536-1601) in ‘A Perambulation of Kent’ to have occurred in the first part of the eleventh century. At this time the Earl of Godwin (who was, curiously, supposed to have been elevated to his earldom through his earlier connections with King Canute, himself of diluvial fame) fell out of favour with Edward the Confessor, to whom he was an advisor. The Earl is recounted to have choked at Winchester (or Windsor) on a morsel of poisoned bread (or just bread) and at once his lands escaped capture by any other noble by sinking beneath the sea. Some versions suggest that this occurred in the great storm of 1099 (Anglo Saxon Chronicle). Or maybe it was 1086. Or 1085. Or even 1014; oral accounts vary but Lambarde asserts that

*“Hector Boethis, the Scottish Historiographer, most plainly writeth, affirming, that (amongst other) this place, being sometime maine land, and of the possession of the Earl Godwine, was then first violently overwhelmed with a light sand, wherewith it not onely remainith covered ever since, but is become withal a most dreafull gulfe, and ship swalower, sometime passable by foote, and sometime laide under water…so it may bee said either sea, or land, or neither of both”* (Lambarde, 1576, p 97)

Let us sail out from the British coast for a moment to the skirts of Jersey, where we can consider the Bishop of Coutances and his Plank. Whilst this story is a familiar one to Jersey islanders it is not so to other shores. In 1682 the historian Jean Poingdestre writes of a “*fabulous tale of the conjunction of Jersey to Normandy*” (Poingdestre, 1889) wherein the Bishop would cross back and forth by manner of a plank, or bridge. He maintains that the locals affirm the crossings to have occurred in the sixth century, which he queries. His queries are met with assertions explaining that until the eighth century the boundary was still shallow but a storm was caused by a priest in La Rocque profaning on hallowed soil, causing divine retribution in the form of a storm which swallowed the marshy plain beneath an engulfing sea. Variant forms of the alleged legend exist, setting it sometimes during a cataclysmic inundation in 700 AD and sometimes two hundred years earlier in the time of St Lo and some four hundred years later amongst the Monks of Mont St. Michel. The local historian Tony Bellows (Bellows, 2014) has taken a different slant to the interpretation, proposing the flood to be no more than a symbol of independence, the traversed plank to be a political allegory for Norman religious authority over Jersey. Geologically we can be confident that the creation of a seaway between Jersey and France was created between 6500 and 7000 BP (Sturt *et al*., 2013) and despite the presence of significant stretches of terrain in the vicinity of the Ecrehous it would have been impossible to cross without sea-going craft from at least the Neolithic period thereby perhaps lending credence to Bellows hypothesis.

The Well of Brading Haven on the Isle of Wight is another curiosity; in this instance because it speaks of a drowned forest of oaks which were discovered surrounding a stone well when an attempt to drain the brackish lake was made in 1622. Although a true submerged forest has not been recorded here Trott and Scaife (2004) have reported that a sequence of organic muds overlain by brackish water sediments do exist at the site; the geology thereby confirming the story of the 1622 drainage attempt. Returning to the tale of the well it suggests that the well was a Druid’s chamber for burning sacrifices. One day the Druids of the “*Cimri*” bound three missionaries in the well but as the pyre took light God intervened and there

“*came a dreadful roaring, like all the storms of the ocean roaring together. The sea came rising in upon them in one mighty wave. Trees and men were hurled to one wild ruin*” - apart from the missionaries, who were floated to safety in the sodden remains of the wicker pyre- “*but the sea never returned again to its deep; and the Hexel ground of Yar…still lies beneath a wide lake*” (Elder, 1839)

Thirty years after the scribing of this missionary triumph the lake was, however, successfully drained in order for a railway line to be built from Bembridge to Brading, but not before a rhyme was offered in 1856 by W.H. Davenport Adams recounting that “*midway in this wood – so they tale they tell – there yawn’d a deep chasm, a haunted well*” (Davenport, 1856). A haunted well lost to a flood was also written of a century earlier (Worlsey, 1781) and then again a hundred years later (Oglander, 1888) and again a hundred years after that (Stone, 1912) and is still talked of today.

Possibly the most widely known of all British inundation narratives is that of a place to which no inundation story actually belongs. The main story for which the land of Lyonesse is attached is that of ‘Tristan and Isolde’ which exists in many varied forms, from many various geographies, with many variations on their names, by many variable voices. As a consequence we shall not enter into debate about the tales’ complexities, instead concentrating upon the inundation that appears in reference to its landscape.

In oral tradition Lyonesse is heralded as having been a broad and bounteous kingdom with one hundred and forty churches and towns between the Isles of Scilly and Cornwall. Geological evidence for flooding former landscapes in this area abound and significant research has been undertaken on the Scilly Isles and at places such as St. Michel’s Mount. The later (carrying the Cornish name *Karrek Loos yn Koos* which has been variously translated to the *Grey Rock in the Wood* or the *Hoar Rock in the Wood* (Pengelly, 1872)is known to be surrounded by submerged forest.The earliest written mention of Lyonesse dates from the thirteenth century (Beroul, 1970) where it is known by the French ‘*Leanois*’ – one of many names attributed to this mysterious land. Thomas Malory’s Le Mortre d’Arthur (the earliest copy of which is *The Winchester Manuscript* held by the British Library (MS 59678 f.35) and believed to date prior to William Caxton’s first public print in 1485) is one of numerous fifteenth century texts in which the kingdom continues to feature but none appear to mention it being beneath the sea until a century later (Camden, 1695), but even then it is not said to directly have been submerged beneath incoming waves. Stories have since appeared of ghostly bells and of a lord called Trevalyan/Vyvyan who was the only survivor, escaping the flood on a foam grey horse. To this day the family’s coat of arms in Penwith portrays a swimming horse and the locals say that a grey horse is still kept saddled in their stables at Trelowarren in case another such calamity should occur.

This horse is said to have come to shore at Perran, other places in the locale that are linked to tales of the assumed submergence include not only the Scilly Isles themselves but Penzance, Gwennap Head, Perranuthnoe, Sennen Cove, Crantock and St. Michael’s Mount. Locals are oft to maintain that the Anglo Saxon Chronicle states Lyonesse as having been lost during the November flood of 1099, or possibly in 1014. September 28th to be precise, which was curiously the eve of St Michael’s Day, when

“*came the great sea-flood, which spread wide over this land, and ran so far up as it never did before, overwhelming many towns, and an innumerable multitude of people.”* (Anglo Saxon Chronicle)

It has been claimed (Abbott *et al*., 2007) that this event of 1014 might be linked with a tsunami caused by a meteorite strike in the Atlantic. Sadly however, the Chronicle does not say where its multitude of people were, that has been left to the oral tradition to tie together in tales of Merlin and magic.

Parallels have been drawn with Lyonesse to the Breton tale of Ker Ys, which in turn has been tied in to the Welsh Cantre’r Gwaelod. The Breton Ker-Ys/Is (or Ville D’Ys in French) has two popular translations; 1) “The Fortress of the Deep” and 2) ‘the low land/home/stronghold (Denman, Lynne, *pers.comm*. 2014) and is sometimes said to have been deliberately built beneath the waters by Grad/lon, King of Cornouaille, for his beautiful daughter Ahes, or Dahut, that he had at sea with the Northern Witch-Queen, Malgven. In others he built the city so that it only appeared to grow out of the shore, with its precarious liminality controlled by a series of dykes and sluice gates, to allow only the city’s great warships to enter. Only the king had possession of these keys, which he wore about his neck. Others say that the city was built some thousands of years earlier and the encroaching tides had stolen it from the land and so Grad/lon gifted it to his daughter because she loved the sea, to which she would sing and offer promises.

From this first version we have variations on a theme wherein in most Dahut makes a pact with her beloved ocean, or she is a demon in feminine guise, luring menfolk to her chamber and then dashing their spent corpses on the rocks below her window before she moved on to another lover. Or smuggling them into her bedchamber whilst wearing a mask that afterwards suffocated them, where upon a black rider and steed would appear to claim them, sacrificing their bodies in *Trepasses* - The Bay of the Dead. One night she met her match in the devil himself, who tricked her into stealing the keys. He then released the waiting waters who avenged the drowned souls by engulfing Dahut’s tower and land (A1018; F944). Only she and her father survived, riding through the waves on, yes, the back of a grey horse. The horse floundered as the storm took hold and the King saw an apparition of Saint Guenole beseeching him to shed the princess Dahut, telling him of her crime. He did and at once the waves stilled and the sky cleared and the horse, Mor’vach, swam him to land as Dahut dived into her watery kingdom at what has now been known as Toul-Alc’huez for four centuries (Bromwich: 1950) near Douarnenez, where she has remained a mermaid, or ‘morgen’, singing a lament for her sins forever:

*Gweles-te morver’ch, pesketour*

*O kriban en bleo melen aour*

*Dre an heol splann, e’ribl an dour?*

*Gwelous a ris ar morver’ch venn,*

*M’hle c’hlevis o Kannan zoken*

*Klemvannus tonn ha kanaoenn.*

*Didst thou see the sea-maid, fisherman*

*She who combed her tresses, gold*

*As the sun shone by the water’s edge?*

*I saw the pale sea-maid*

*I recall hearing her song*

*In the air, the anguish of lament.*

(Einion, Ioan; pers.comm, 1994)

Literary accounts of this sad tale don’t seem to come into circulation until the sixteenth century (Guyot, 1979) though Grad/lon is immortalised in *Lais de Graelent* by Marie de France in the twelfth century who curiously also wrote *Chevrefoil*, a lais to Tristan (cf. Burgess, 1987). Significantly though, in neither of these tales are the women mentioned by name nor is there any submergence of kingdoms great and fair. That doesn’t appear until 1845 in *Livaden Ger-Is*, a poem by Hersart de la Villemarque in the second edition of his Barzaz Breiz (Villemarque, 1839).

Geologically this part of North West Europe is similar to that of the southern UK in which inundation follows the model previously argued for. Submergence and inundation is well documented in the Golf de Morbihon (Cassen *et al.,* 2011). What is most curious about this second of our geographical compartments is the lack of flood tales for East Anglia, an area almost principally equated today with flooding.

*“Norfolk doesn’t have a Lyonesse or an Ys or a Cantre’r Gwaelod. What it does have is something more humble and more poignant: the memory of sunken villages.” (*Lupton, 2013)

Post-Industrial villages that is. Villages with bells that toll eerily beneath the waves (V115), becoming neighbours with the ghost of Doggerland which the poet Edward MacKay describes as “*a real place which never was”* (MacKay, 2014). Norfolk, home to the oldest human footprints outside Africa (Ashton *et al.,* 2014) and adjacent to the largest body of land submerged in late Prehistory (Leary, 2013) is nonetheless not home to the allegedly oldest of our human tales of submergence and loss, rather, it is home to the youngest.

**Area 3.** Cardigan Bay to the Lake District.

This region is the most complex of the three areas geologically because of the impact of isostatic rebound following deglaciation (Wingfield, 1995; Brooks et al., 2008). Crustal depression enabled the Irish Sea to flood before 12000 B.P. (Wingfield, 1995) although Cardigan Bay remained dry land. As a result of sea level rise and isostatic rebound following deglaciation Wingfield postulates the presence of a dry land bridge between the South East of Ireland and West Wales by 11000 B.P. Over time the position of the landbridge shifted northwards eventually disappearing beneath rising seas around 9600 years ago (however, see Sturt *et al.* (2013) for an alternative view). Marine waters subsequently entered Cardigan Bay and because of its low lying topography long estuaries reached many miles inland (at Borth an estuary existed along the line of the Dyfi when the coastline was still miles to the west). The final rise in sea level resulted in the loss of remaining land in the bay and the establishment of the modern coastal geography. With the attainment of crustal stability the pattern of sea level change subsequently followed that of Area 2 with a short marine regression occurring to allow forest growth in coastal lowlands around the bay (e.g. Borth and Towyn). Marine regression occurred between 4500 and 5500 years ago resulting in a return to brackish environments. It is in this region we find not only Cantre’r Gwaelod but also the saga of Bendigaidfran’s crossing to Ireland along with the local tales of Plant Rhys Ddwfn, Tyno Helig, Rhysyn and the Mermaid and the Salty Welsh Sea.

Of the local folk tales those of Plant Rhys Ddwfn and Bendigaidfran do not directly refer to a flooding event. Rather they refer to ground that is already covered by the Irish Sea. With Bendigaidfran’s crossing to rescue Branwen (Z210) in the Second Branch of Y Mabinogi (predominantly in *The White Book of Rhydderch*, Peniarth MS4, National Library of Wales; circa 1350 and also in *The Red Book of Hergest*, Jesus College, Oxford, MS.111. 726.42. Circa 1400) we find the Irish Sea shallow enough that whilst the host sails he is able to wade across from Harlech to Eire:

*“Bendigaidfran and the host of which we spoke sailed towards Ireland, and in those days the deep water was not wide. He went by wading. There were but two ruvers, the Lli and the Archan were they called, but therafter the deep water grew wider when the deep overflowed the kingdoms.”*

(Jones, 1949)

Could this be that the sea at the time was shallower than it is today? In this context we might refer to Wingfield’s (1995) reconstruction of the flooding history of the Irish Sea postulating a shallow, northward migrating strip of land linking Britain to Ireland. Or is Branwen’s regal brother being alluded to as a giant (Z261) due to his great power and presence, rather than due to literal stature? In which case, his narrated ability to cross unaided could be representing his ability to cross by his own means, without the aid of supporting forces.

The watery landscape featuring in Plant Rhys Ddwfn may be equally allegorical. Here we have a kingdom under the reign of King Rhys the Deep (Rhys, 1901)**,** situated some way out into Cardigan Bay. The dwellers on this isle are said to be like the Phoenicians, traversing the oceans to trade, including with the inhabitants of Cardigan with whom they barter their goods for grain. They sail in to harbour in boats made from trees the pillaged trunks of which landlubbers can spy beneath the waves at low tide. Nobody on land can see from whence they have come, their rich and peaceful land is invisible (F742) unless one stands on a certain patch of herbs on a high bank, after stepping from which one immediately forgets where the herbs were (F235.5), thus protecting the fairy-like inhabitants from invasion (Gwynionydd, 1858). The fields and cities of this land are also seen by ships coming in to land on the Cardigan coast, though no other ships are ever cited.

Could this then perhaps be a story about sea-gypsies, or the Irish? Certainly the locals of Cardigan Bay were none too pleased to encounter the dark haired children of Rhys, putting up the prices of their grain to prevent them from purchasing any food, which would be consistent with a traditional attitude towards the Romany. Or is this an esoteric tale wherein the Welsh fairies, with whom Plant Rhys Ddwfn are now synonymous, live in a parallel reality to ours, symbolised by the sea? Or, is this the bastardisation of a memory from when there was a different type of people living out where the water now rules.

By contrast, both Rhysyn and the Mermaid and The Salty Welsh Sea published recently from the story teller Peter Stevenson (Stevenson, 2014b) speak directly of inundations. In the first of these, taken from the Myra Evans Collection (unpublished) a vindictive mermaid (B81) falls in love with handsome Rhysyn. After initially being curious he eventually decides that he does not return her favours and chooses to marry a local lass from on land instead. The enraged mermaid curses him (B81.13.8), his bride and the wedding’s congregation and they are all swept away in a raging tide, leaving nothing but the bereft walls and the sound of church bells ringing beneath the waves of Carreg Ina.

In The Salty Welsh Sea we find a variant on a popular tale wherein a folk explanation is offered for why the sea is saline (A1115). Stevenson tells us of three brothers, one who ploughs the land, one who ploughs the sea and one, the youngest, who ploughs only his own poor talents as an artist. Furiously fed up of his brother free-loading the eldest gifts him a pig and tells him to ‘go to Blazes’. The lad does, literally, as he is told and in so doing barters successfully for an enchanted handmill (D829) with which he proceeds to magic himself a house and enough riches to sustain his simple ways. In the course of the story both older brothers come across the enchanted house and get their little brother drunk, then tricking him out of his handmill (D830; D861.3), which they do not know how to use, thus bringing calamity upon themselves. The first brother’s calamity comes in the form of a “river of beer” which washes him away amongst mermaids fair, the second brother’s calamity comes in the form of a river of salt which drowns his ship and makes the sea too salty to drink when the youngest brother awakes from his inebriated slumber and seeks refreshment, encountering the flood and disaster that his magic has created. The handmill is lost on the sea bed (D860), where it awaits another brother to find it again one day.

North of there, between Conway and Flintshire, near Ormes Head and Penmaenmawr, is believed to lie the lost land of Helig ap Glannawg, who is alleged to have lived in the sixth century. The Halliwell Manuscript, believed to date from around eleven hundred years later, makes the first literary reference to ‘Llys Helig’ which is now the name of a rock formation by Penmaenmawr. The manuscript also calls Helig himself the “*Lord of Cantre’r Gwaelod*”. His daughter, Gwendud, fell in love with a commoner, Tathal, who she was forbidden to marry because he did not wear a golden torc. Tathal went out and killed a lord in order to steal his golden torc, confiding in Gwnedud of his crime. She colluded in burying the body into the sea, during which they heard a ghostly voice curse them, assuring that revenge would one day befall the family. That day eventually came and the court of Helig was flooded overnight and the only survivor was a lonely harper. It is easy to imagine that tale being told by just such a harper, as if he were the one survivor. In some versions however the daughter is not mentioned and the kingdom is flooded due to the cruel actions of Helig towards his people, who survived when he did not**.**

That it is beyond doubt that dry land once extended north of this Welsh coastline is confirmed by the geological evidence from the Llandudno to Rhyl sector of coastline for submerged forests (Stafford, 2013) and these deposits are also known to contain later Prehistoric material (Glen, 1935; Manley, 1989; Smith *et al*., 2002). Offshore Fitch and Gaffney (2009) have also demonstrated that submerged landscapes similar to those of Doggerland are present offshore from this area.

Further north again, the Reverend William Thornber writes in his *History of Blackpool* (Thornber, 1837) that in 1554 the village of S(h)ingleton Thorp, in Cleveleys, Lancashire, was swept clean away from Rossall Point causing the villagers to take refuge in nearby Singleton. This is one of many similar stories along this stretch of coast; but all that is said to remain of this particular hamlet is a cobbled lane leading into the sea, sandwiched between the decaying trunks of a forest. In some versions at low tide can be seen a ‘Penny Stone’ by which the villagers had tethered their horses at their Inn and from which the tale gets its name. Fisherman are said to still fear the ghostly laughter of the Inn’s revellers intermingling with the submerged tolling of church bells.

Area 3’s sea stories end on the Isle of Man, where we find The Moving Island, Port Soderick and The Undersea World of Port Erin. The first two of these speak of Mona being an island whose size and exact location were transient, with sands which rose and fell from the sea, a characteristic so distinctive that the seventeenth century historian William Blundell wrote of it as being symbolised as a ship in the Manx coat of arms:

*“I believe the old Arms of the Isle of Man was a ship – yea, and y’most meet and fitting, first, because, floating in the ocean, it much resembleth a moveable island and an island resembleth a ship fixed there.”*

(Blundell, 1648 – 56)

The third tale speaks of a diver who claimed to have discovered an undersea land of jewels (Waldron, 1731), described as surely being a land once flooded by time? Whilst this is now commonly interpreted as probably being a reference to the submerged coral reef of St Mary’s isle it still offers us an example of possible ‘*myth by observation’* (Tyler, 1865).

**4.1 Cardigan Bay and Borth**

The purpose of this paper began with the focus on the story of Cantre’r Gwaelod and so we return to Cardigan Bay to investigate in further detail both the stories and the geological history of the region. Attempting to understand the structure of the pre-inundation landscape in Cardigan Bay (Figure 1), how and when the landscape flooded and what happened around the coasts of this flooded landscape is complex and at present we lack sufficient evidence to adequately reconstruct the evolution of the bay. However despite this paucity of data there are a number of different sources of information that do exist including bathymetry for the seabed (Figure 7) and isolated cores taken from the seabed that can help create a narrative for flooding.

The bathymetry of the bay is presented in Figure 7. This bathymetry represents the form of the modern sea bed which includes structure inherited from pre-inundation topographic features as well as from processes operating on the seabed since inundation. Consequently we cannot simply treat the bathymetric map as a map of the pre-inundation landscape. However, despite these misgivings the basic topographic shape is likely to broadly reflect the relict landscape of the early Holocene. Thus we can pick out likely valley forms and ‘higher ground’ away from the valleys, significantly we can see the position of the three ‘Sarns’ (Figures 7, inset and 8A). We can subsequently use this topography to plot the likely inundation history of the bay using the sea level curve of Lambeck (1995), i.e. sea level attaining -30m around 9000 years ago, -20m just before 8000 years ago and -10m perhaps around 7500 years ago (Figure 9). This evidence indicates that modern geometry of Cardigan Bay had been established by 7500 B.P. (within the later Mesolithic period) and subsequent sea level rise to 6000 B.P. simply drove the shoreline landwards.

In order to establish direct evidence of inundation cores from the seabed are required to provide material documenting the flooding events. Haynes *et al.* (1977) published a sequence of events inferred from biological material (Foraminifera, ostracods, diatoms and pollen) from a core drilled in the seabed off the Aberaeron coast (Figure 10) where a sequence of deposits recording the flooding event (marine transgression) was present. The core samples indicated that a relatively benign transition from a terrestrial marsh (peats and organic silts) to estuarine mudflats and subsequently marine conditions is documented. A single date of 8740+/-110 B.P. has been recorded from the peat indicating flooding at some time after this. Boreholes from Borth (Prince, 1988; Shi, 1992; Shi and Lamb, 1991) also document the marine transgression and the onset of brackish water conditions in the Dyfi at the lower elevations of about -24m O.D. B.P. As at Aberaeron initial conditions suggest the gradual onset of brackish conditions rather than a catastrophic event causing inundation.

At Borth, following the initial flooding event, a prolonged period of intertidal and sub-tidal conditions prevailed for over two thousand years before a marine regression (Adams and Haynes, 1965; Haynes and Dobson, 1969) is documented by the expansion of extensive peat deposits first reported by Keeping (1878) and Ashton (1920) (Figures 3 and 8B/C). Detailed investigation of the peats has undertaken Godwin (1943; Godwin and Newton, 1938), Moore (1966), Wilks (1979) and Heyworth (1985). Trees in the peat include oaks and pines and have been dated to between 6000 and 4700 years ago (Campbell and Bowen, 1990). Finally a return to brackish water conditions ensued although little is known presently of the flooding scenario at this time however, recent observations at the south end of the beach at Borth (Figure 8B) indicate fluctuating conditions between peat and clay silt deposition at the top of the main peat bed may have characterised a gradual or episodic flooding of the forest. Evidence of human occupation in the peats is rare and ephemeral although clusters of burnt stones have recently been reported from the top of the peat (Figure 8C) while possible brushwood structures have also been revealed but as yet remain unpublished. Sporadically vertebrate remains are reported from the area, most spectacularly the discovery of nearly complete skeleton of an auroch in the late 1960’s (Taylor, 1984), but more commonly footprints of both animals and humans (Figure 11) have been seen. The human prints (Figure 11) vary in size from child to adult and are randomly orientated within this mass of prints. Nothing about the prints indicates direction of movement of people and animals rather that they were ‘milling about’, perhaps around a watering point or space within the submerging forest. Taken together the various lines of evidence enable the projected coastal configurations from the Holocene flooding event to be modelled (Figure 9).

What then is the relationship of this scientific narrative to those of the stories associated with Cantre’r Gwaelod? This latter story first appears in print within a praise poem contained inside *The* *Black Book of Carmarthen* dated to no later than around 1250 A.D. (B.B.C.) The text is entirely in Medieval Welsh, the most prevailing scholarly translation of which by Rachel Bromwich is as follows:

*Stand forth, Seithenhin,*

*And look upon the fury of the sea;*

*It has covered Maes Gwyddneu.*

*Accursed be the maiden*

*Who released it after the feast;*

*The fountain cup-bearer of the raging sea.*

*Accursed be the maid*

*Who let it in after the battle;*

*The fountain cup-bearer of the barren sea.*

*The cry of Margaret from the battlements of the fortress to-dat,*

*Even to God it is uttered;*

*Usual after presumption is utter loss.*

*The cry of Margaret from the battlements of the fortress today;*

*Even to God is its supplication;*

*Usual after presumption is repentance.*

(Bromwich, 1950)

The similarity here to Ker Ys is unsubtle, a point which Bromwich goes on to discuss in detail, along with what she sees as being the questionable notion of the narrative being set in Cardigan Bay, with her confident view being that the original site was in the Northern Kingdoms (Bromwich; p223). She also offers corrections to the characters and explanations for the different literary accounts via translation and reference to other scholarly works such as those of Samuel Rush Meyrick (1783-1848), Sir John Rhys (1891) and Ifor Williams (1942), tying in the Hanes Taliesin and paralleling the poem also to that of Tyno Helig.

That the tale has been absorbed into Ceredigion is unquestionable. The full name for Borth, where the forest has recently shown its wares so dramatically, is *Porth Wyddno yng Ngheredigion* (Rhys, p263) and according to Bromwich (1950), Meyrick is explicit in his geographical referencing; beginning the Lost Lowland from the submarine causeway of Sarn Badrig in the north-west between Harlech and Barmouth (Figure 7), possibly under the very stretch of water where Bendigaidfran is said to have waded, to Cardigan in the south. There are two more causeways nearby; Sarn Bwch by Aberdysini and Sarn Cynvelyn by Aberystwyth (Figure 8A), the latter of which is alleged to end in Caer Wyddno. The observation of these three natural features could perhaps have not unreasonably given rise to the folk notion of there once having been dykes in the region.

Whether or not the flooding events so well documented in the geological record (either the initial inundation of the bay area or the more localised changes associated with the creation and subsequent destruction of the submerged forest at Borth) can be linked to any of the elements of flooding in our stories remains problematic. It is curious that the most prevalent of our tales do not directly speak of a drowned forest, which is surely the most striking of the natural features along this shore? Today the stumps of oak and pine trees can be found exposed on the foreshore (particularly after storms) from not only Borth/Ynyslas (Figure 3), but at many locations along the Welsh coast (Stafford, 2013), are the source of many a fledgling narrative. One such segued through Peter Stevenson’s The Railway Wave, a story which came about during the January storm of 2014. Peter was stood outside Borth station regaling a group of theatre, film and visual art students from Coleg Ceredigion with the wonders of The Lowland Hundred, when a giant wave arose from the sea and soared above his head engulfing the railway station, the students, Peter and his voice. The teenagers left Borth sodden and inspired, their ensuing response to the flooded out flood tale including a short film where each stood as a tree on the shore, disappearing into time with Seithenin and Mererid (Baudey, 2014). Thus we see how a narrative can morph and ricochet into new interpretations, being born and reborn autonomously. In this tale of a tale’s creation the carcasses of trees went from an incidental to a primary role, whereas with The Penny Stone they exist as an epilogue, an archaeological support to the assertions made and so from this we see how one type of natural feature can take many roles within different narratives.

The similarities between this area’s stories is unsubtle, especially those of Cantre’r Gwaelod and Ker-Ys/Caer Is; both even being translatable to the same meaning. Add more than a passing nod towards Lyonesse’s ‘Tristan and Isolde’ and the mention of Sennin/Seithenin Cove in Cornwall then add the parallels between Helig and Gwyddneu’s daughters in relation to victim disposal and the question of how and why it all inter-relates seems unavoidable; to the extent that Bromwich purports that in each of this medley the post-Roman element is surely significant, for

“*it was to representatives drawn from among the famous legendary heroes of the sixth century, the period assigned to the beginning of their national traditions, that medieval cyfarwyddiaid attached the legends of the great inundations.”* (Bromwich, 1950. 241)

Legends, tales, mythologies which morph in and out of each other’s narratives into a palimpsest of shape shifting variations; chasing their tails is worthy of a paper in its own right. What it serves to offer us here is a perfect example of a movable flood via the organic process of bardism at its chaotic and creative best.

**5.0 Conclusion**

The focus of this paper has been to place known and emerging geological evidence for the timing and nature of flooding along the shallow coastal shelf areas around Great Britain and Ireland alongside a consideration of a summary of localised flood related folk tales. The relationship between these two disparate sources of landscape information does, however, remain opaque. In part, this reflects the fundamental way in which the narratives of science and story-telling are developed and understood, both within and between these fields. At the core of this disparity lays their temporal and spatial perspectives, their manners of transmission and what each type of tellers considers to be a priority, for essentially science describes the evidence and stories describe the experience.

Taking an orthodox etiological approach we can nonetheless postulate that there are links between what is known geologically and the stories cited, synthesizing them into the following key factors:

* There is clear evidence for flooding of the shallow continental shelf in the geological record during the last 15,000 years.
* The process of flooding varied from slow inundation through gradual rise of water levels following melting ice or rapidly with tsunami events/storm surges.
* There were occasional times at which relative sea levels fell and allowed forests to grow in areas previously occupied by sea.
* The geological history of the crustal uplift of the British Isles means that the impact of rising water levels will have varied around our coasts.
* Local topographic change can have had major impact on the trajectory and scale of a flood event.

Consequently a series of geo-archaeological hypothesis can be developed based on the premise that major events (catastrophic in most cases) known about today (flooding, volcanic activity, changing local topographies) may have been perceived by people in the past as a disaster under certain sets of circumstances, or as an observable event worthy of note, inspiration or incidental inclusion in narrative form. Thus the many instances of flooding in our Area 3 ‘medley’ may be paralleled in the geological record by the flooding events throughout the Holocene that have been described around much of the British coastline (with the notable exception of Scotland and Anglia). Alternatively, they could be purely allegorical, or ecclesiastical propaganda or even localised adaptions of Genesis 7, the latter being particularly caution-inducing due to the petrified forest of Cardigan Bay being known colloquially as “Noah’s trees”.

In addition to these catastrophic flooding events we find a different type of sea change in Bendigaidfran’s crossing in the Mabinogi. The described passage from Wales to Ireland could be an allusion to a shallower than present partial-crossing, something peculiarly paralleled by Wingfield’s model for forebulge retreat northwards through the Irish sea during the late glacial/early Holocene (Wingfield, 1995). Alternatively, it could be a creative response to the presence of Sarn Badrig, in that unlike normal men a (political/physical) giant would surely have been able to (metaphorically/literally) walk upon such a causeway and thus wade through the waves? In the same vein, tales such as that of the Goodwin Sands and The Movable Island could be linked to shifting sandbanks well documented in the geological record.

It is also imperative to consider the alleged timing of the documented flooding events. These range from the final Upper Palaeolithic through to the ‘recent’ past for the recovery of global sea levels following deglaciation. These gradual inundation events (sea level rise) probably ceased by the Bronze Age; by contrast sudden flooding (tsunami/storm surge) events have occurred intermittently through the Holocene (e.g. Storegga Slide Tsunami or the Lisbon Tsunami) and continued on an intermittent basis ever since. Consequently, if any of these stories can be tracked backwards to an inception event then a wide range of ages should be expected for its’ occurrence, possibly including all of them as being simultaneously represented. This would fit with Doležel’s triadic pattern – flooding event X inspires story X1. Centuries afterwards flooding event Y occurs, reinforcing and adapting story X1 into story Y1; and so on and so forth. Leading us to postulate that what we may have in our present story collection may indeed be the reverberations of stories past, amended and appended as much by the repeating presence of similar geological occurrences in the experience of the narrators as by the process of narrating in and of itself.

Finally, then let us return to Borth and the human footprints it remembers from four thousand years ago; where we find evidence for sheep/goat, cattle and pig preserved on the same sediments as our child’s prints, sealed beneath a thin layer of silt that represents inundation of the forest. Our child’s small, bare, feet would have stood amongst decaying, drowning, trees and creeping water where once there had been dry land. Perhaps he or she had known that land, the living oak and pine, a thriving habitat stolen suddenly by catastrophic waves. Perhaps the cluster of larger human footprints nearby mark the gathering of their family, a people surveying sudden devastation or perhaps there was a graduation of loss relayed through generations. Geologically we can posit a time frame of ten to fifty years for this submergence, thus either way we can assert that our child bore witness to the transformation, inheriting a landscape made frail in its liminality.

So what would he or she have made of this experience, what story would they have been told to comprehend the change; in words, sounds, actions or pictures? How did they represent this knowledge to themselves, what did they pass on of it to others as memory formed and what echoes may we be hearing of this in our stories today? As we too stand amongst the rotting land and sound of the encroaching sea, facing westwards into the flood.

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**Bibliography:**

Abbott, D. H., W. B. Masse, L.H. Burckle, D. Breger, and P. Gerard-Little, 2007. Burckle abyssal impact crater: Did this impact produce a global deluge?. 179-190. In: St. P. Papmarinopoulous (ed.) *The Atlantis Hypothesis: Searching for a Lost Land*. Heliotopos Publications.

Adams, T. and Haynes, J. 1965. Foraminifera in Holocene marsh cycles at Borth, Cardiganshire (Wales). *Paleontology 8*, 27-38.

Ager, D. 1993. *The New Catastrophism.* Cambridge University Press: Cambridge.

Allport, G. W. and Postman, L. 1947. *The Psychology of Rumor*. Oxford, England; Henry Holt.

*Anglo-Saxon Chronicle*, A Collaborative Edition. 1986. Bately, J.M., Boydell and Brewer, (eds.)

Ashton N, Lewis SG, De Groote I, Duffy SM, Bates M, *et al*. 2014. Hominin Footprints from Early Pleistocene Deposits at Happisburgh, UK. *PLoS ONE 9(2)*: e88329. doi:10.1371/journal.pone.0088329

Ashton, W. 1920. *The evolution of a coastline: Barrow to Aberystwyth*. Stanford: London.

Bailey, G.N. 2014. New Developments in Submerged Prehistoric Archaeology: An Overview. 291-300. In: Evans, A., Flatman, J. and Flemming, N. (eds.) *Prehistoric archaeology on the continental shelf. A global review*. Springer.

Barber, D.C., Dyke, A., Hillaire-Marcel, C., Jennings, A.E., Andrews, J.T., Kerwin, M.W., Bilodeau, G., McNeely, R., Southon, J., Morehead, M.D., Gagnon, J.M., 1999. Forcing of the cold event of 8,200 years ago by catastrophic drainage of Laurentide lakes. *Nature 400*, 344-348.

Bates, M.R., Nayling, N, Bates, C.R., Dawson, S., Huws, D. and Wickham-Jones, C. 2012. A Multi-disciplinary Approach to the Archaeological Investigation of a Bedrock-Dominated Shallow-Marine Landscape: an example from the Bay of Firth, Orkney, UK.*International Journal of Nautical Archaeology 42, 24-43*.

Baudey, J. 2014. Project: *Cantre’re Gwaelod.* Coleg Ceredigion Theatre, Film & Visual Media BTEC 2, 2014.

Bellows, Tony. Accessed from <http://members.societe-ersiaise.org/whitsco/form1.htm> on 4/10/14.

Beroul: *The Romance of Tristan.* 1970. Introduction and Translation by Alan S. Fedrick. London and New York, Penguin.

Bicket, A., Firth, A., Tizzard, L. and Benjamin, J. 2014. Heritage Management and Submerged Prehistory in the United Kingdom. 213-232. In: Evans, A., Flatman, J. and Flemming, N. (eds.) *Prehistoric archaeology on the continental shelf. A global review*. Springer.

*Black Book of Carmarthen*. 53b – 541. National Library of Wales.

Blundell, W. 1648-56. *A History of the Isle of Man*, Vol II, Ch 5.

Bostock, John (ed). 1856. Pliny (the Elder). *Naturalis Historia.* Publisher H.G.Bohn.

Bradley, S.L., Milne, G.A., Shennan, I. and Edwards, R. 2011. An improved Glacial Isostatic Adjustment model for the British Isles. *Journal of Quaternary Science 26*, 541-552.

Bromwich, R. 1950. Cantre’r Gawelod and Ker-Is. In *The Early Cultures of North-West Europe.* 217-241. Dickens, B. and Fox, C. (eds). Cambridge University Press: Cambridge.

Brooks, A.J., Bradley, S.L., Edwards, R.J., Milne, G.A., Horton, B. and Shennan, I. 2008. Postglacial relative sea-level observations from Ireland and their role in glacial rebound modelling. *Journal of Quaternary Science 23*, 175-192.

Burgess, G.S. 1987. *The Lais of Marie de France: text and context.* Manchester University Press.

Burkert, W. 1979. *Structure and History in Greek Mythology and Ritual*. Sather Classical Lectures. Berkeley. University of California Press.

Burkitt, M.C. 1932. A Maglemose Harpoon dredged up recently from the North Sea. *Man, 138.*

Caldwell, Richard S. 1987. *Hesiod’s Theogeny*. Newburyport, Mass: Focus Information Group.

Camden, W. *Britannia*. 1695 (Latin 1586). Translated by Edward Gibson with Additions and Improvements. London.

Campbell, S. and Bowen, D.Q. 1990. *Geological Conservation Review: Quaternary of Wales*. Nature Conservancy Council.

Cassen, J. Baltzer, A, Lorin, A., Fournier, J. and Sellier, D. 2011. Submarine Neolithic Stone Rows near Carnac (Morbihan), France: preliminary results from acoustic and underwater survey.

Carney, J. P. 1955. *Studies in Irish Literature and History*. Dublin Institute for Advanced Studies: Dublin.

Chambers, R. 1826. *Popular Rhymes of Scotland*, Edinburgh & London.

Clark, J.G.D. 1936. *The Mesolithic settlement of Northern Europe. A study of the food-gathering peoples of Northern Europe during the early Post-Glacial Period.* Greenwood Press: New York.

Cliquet, D., Coutard, S., Clet, M., Allix, J., Tessier, B., Lelong, F., Baltzer, A., Mear, Y,. Poizot, Patrick Auguste, E., Alix, P., Olive, J., & Guesnon, J., 2011. The Middle Palaeolithic Underwater Site of La Mondrée, Normandy, France, in J. Benjamin, C. Bonsall, C. Pickard, and A. Fischer (eds), *Submerged Prehistory*, 111 – 128, Oxford: Oxbow Books.

Coles, B.J. 1998. Doggerland: a speculative survey. *Proceedings of the Prehistoric Society* 64, 45–81.

Coles, B.J. 1999: Doggerland’s loss and the Neolithic. 51-57. In Coles, B.J., Coles, J. and .Schon Jorgensen, M. (eds.), *Bog Bodies, Sacred Sites and Wetland Archaeology* (Exeter, WARP Occasional Paper 12).

Coles, B.J. 2000. Doggerland: the cultural dynamics of a shifting coastline. In Pye, K. and Allen, S.R.L. (eds.), *Coastal and Estuarine Environments: Sedimentology, Geomorphology and Geoarchaeology* (London, Geological Society Special Publication 175), 393–401.

Cracknell, B.E. 2005. “*Outrageous Waves”. Global warming and coastal change in Britain through Two Thousand Years*. Philmore: Chichester.

Cromek, R.H. 1810. *Remains of Nithdale & Galloway Song*, London, Cadell & Davies.

Cuvier, G. 1827. *Essay on the Theory of the Earth*. Blackwell and Cadell: Edinburgh and London.

Davenport, W.H. 1856. *History,* *Topography, and Antiquities of the Isle of Wight*.

Dawkins, R.M. 1951. The Meaning of Folktales*. Folklore 62*, 417 – 429.

Dawson, A., Smith, D. and Long, D. 1990. Evidence for a Tsunami from a Mesolithic Site in Inverness, Scotland. *Journal of Archaeological Science 17*, 509–12.

Dégh, Linda. 1995. *Narratives in Society: A Performer-Centred Study of Narration*. Helsinki: Academia Scientarum Fennica.

Dégh, Linda. 1996. ‘What is a Belief Legend*?”* in *Folklore 107*.

Deloria, Vine. 1995. *Red Earth, White Lies: Native Americans and the Myth of Scientific Fact.* Fulcrum Publishing.

Dennis, M. 1987*.* Cromek, Cunningham, and Remains of Nithdale and Galloway Song: A Case of Literary Duplicity. *Studies in Bibliography 40*, 175 – 186

Devoy, R.J.N. 1977. Flandrian sea-level changes in the Thames Estuary and the implications for land subsidence in England and Wales. *Nature 220*,712–715.

Devoy, R.J.N. 1979. Flandrian sea-level changes and vegetational history of the Lower Thames Estuary. *Philosophical Transactions of the Royal Society of London B285*, 355–407.

Devoy, R.J.N. 1982. Analysis of the geological evidence for Holocene sea level movements in Southeast England.*Proceedings of the Geologists' Association 93*, 65–90.

Doležel, L. 1999. *Heterocosmica: Fiction and Possible Worlds*. Baltimore: John Hopkins University Press.

Dundes, A. 1988. *The Flood Myth.* Berkeley: University of California

Elder, A. 1839. *Tales and Legends of the Isle of Wight*. London.

Ellis, B. 1960. The Roots of Perspectives on Contemporary Legend*.* In: *The 1960 Rhodes-Livingstone Institute Conference*, The Myth in Modern Africa.

Fagles, R. (ed). 1990. *Homer, The Iliad.* New York: Penguin Books.

Fischer, A., 1995. An entrance to the Mesolithic World Below the Ocean. 371-384. In: A. Fischer (ed.), *Man and Sea in the Mesolithic*. Oxford: Oxbow Books.

Fitch, S. and Gaffney, V. 2009. *West Coast Palaeolandscpaes survey project*. VISTA Center report.

Flemming, N.C., Çağatay, M.N., Chiocci, F.L., Galanidou, N., Jöns, H., Lericolais, G., Misssiaen, T., Moore, F., Rosentau, A., Sakellariou, D., Skar, B., Stevenson, A and Weerts, H. 2014 *Land Beneath the waves: submerged landscapes and sea level change. A joint geoscience-humanities strategy for European Continental Shelf Prehistoric Research.*  Chu, N.C. and McDonough, N. (eds.) *Positon Paper 21 of the European Marine Board*. Osetend, Belgium. 171pp.

Frazer, J.G. 1918. *Folklore in the Old Testament*: Studies in Comparative Religion, Legend and Law. Vol 1. London.

Freet, S.J. 1993. *On the Problems of Translation in the Investigation of the Lake NCOs Disaster* in Journal of Volcanology and Geothermal Research, 54.

Gaffney, V., Thomson, K. and Fitch, S., 2007. *Mapping Doggerland*. Oxford: Archaeopress.

Gaffney, V., Fitch, S. and Smith, D., 2009. *Europe’s Lost World, the rediscovery of Doggerland*. York: CBA Research Report 160.

Gerrard, C. 2003. *Medieval Archaeology: Understanding Traditions and Contemporary Approaches.* London. Routledge.

Glenn, T.A. 1935 Distribution of Graig Lwyd axe and its assocaiated cultures. *Archaeologia Cambrensis* 189-218.

Godwin, H. 1943. Coastal peats beds of the British Isles and North Sea. *Journal of Ecology 31*, 199-247.

Godwin, H. and Newton, L. 1938. The submerged forest at Borth and Ynyslas, Cardiganshire. *New Phytologist 37*, 333-344.

Gregory, A. 2008. *Plato. Timeaus and Critias*. Oxford: OUP.

Gron O. & Skaarup, J., 2004. Submerged Stone Age Coastal Zones in Denmark: investigation strategies and results. 53-56. In: N. C. Flemming (ed.), *Submarine prehistoric archaeology of the North Sea*, Council for British Archeology: Research Report 141.

Guyot, C. 1979. Translated by Deidre Cavanagh. *The Legend of Ys*. Amherst, University of Massuchessets Press.

Gwynionydd, aka Williams, B. ‘Y Brython’ Volume 1. 1858.

Halpert, H. 1971. Defi*nition and Variation in Folk Legend.* In American Folk Legend: A Symposium, ed. Wayland. D. Hand. Berkeley and Los Angeles, University of California Press.

Hamacher, D. W., Norris, R. P. 2009. Australian Aborginal Geomythology: Eyewitness Accounts of Cosmic Impacts? *Archaeoastronomy 22*, 60-93.

Hamacher, D. 2014. More accounts of Meteoritic Events in the Oral Traditions of Indigenous Australians. *Archaeoastronomy 25*.

Haynes, J.R. and Dobson, M. 1969. Physiography, foraminifera and sedimentation in the Dyfi Estuary, Wales*. Geological Journal 6*, 217-256.

Haynes, J.R., Kiteley, R.J., Whatley, R.C. and Wilks, P.J. 1977 Microfaunas, microfloras and the environmental stratigraphy of the Late Glacial and Holocene in Cardigan Bay. *Geological Journal 12*, 129 – 158.

Hesiod. Caldwell, Richard S. 1987. *Hesiod’s Theogony.* Newburyport, Mass: Focus Information Group.

Hijma, M.P., Cohen, K.M., 2010. Timing and magnitude of the sea-level jump preluding the 8200 yr event. *Geology 38*, 275-278.

Hooke, R. 1679. *Lectiones Cutlerianae, or, A Collection of Lectures: Physical, Mechanical, Geographical & Astronomical: made before the Royal Socity on several occasions at Gresham College: to which are added divers miscellaneous discourses.* London. Printed for John Martyn.

Hopman, M. G. 2013. *Scylla, Myth, Metaphor and Paradox*. Cambridge University Press.

Jones, G. and Jones, T. *The Mabinogian.* 4th Rev. Ed. 1993. London Everyman.

Jones, H. L. (ed) 1917-1932. *Strabo. Geograpica* (The Loeb Classical Library. No 241. Vol. VII. London: William Heinemann Ltd

Jöns, H. and Harff, J. 2014. Geoarchaeological Research Strategies in the Baltic Sea

Area: Environmental Changes, Shoreline-Displacement and Settlement Strategies. 173-192. In: Evans, A., Flatman, J. and Flemming, N. (eds.) *Prehistoric archaeology on the continental shelf. A global review*. Springer.

Keeping, W. 1878. Geology of Aberystwyth. *Geological Magazine* 5: 532-547.

Kendall, R.A., Mitrovica, J.X., Milne, G.A., Törnqvist, T.E., Li, Y., 2008. The sea-level

fingerprint of the 8.2 ka climate event. *Geology 36*, 423-426.

Langer, Ellen. 1975. The illusion of Control. *The Journal of Personality and Social Psychology 32*, 311-328.

Lambeck, K. 1995. Late Devensian and Holocene shorelines of the British Isles and the North sea from models of glacio-hydro-isostatic rebound. *Journal of the Geological Society of London 152*, 437-448.

Lambeck, K. 1996. Shoreline reconstructions for the Persian Gulf since the last glacial maximum. *Earth and Planetary Science Letters 142*, 43-57.

Lambeck, K. and Chappell, J. 2001. Sea level changes through the Last Glacial Cycle. *Science 292*, 679-686.

*Le Barzaz Breizh.* Tresor de la literature orale de la Bretagne.Ed. Delloye.

Leary, J. 2009. Perceptions of and responses to the Holocene flooding of the North Sea Lowlands. *Oxford Journal of Archaeology 28*, 227–237.

Leary, J. 2013. *Northsealand. A study of the effects, perceptions of and responses to Mesolithic sea-level rise in the southern North Sea and Channel/Manche.* Unpublished PhD thesis. University of Manchester.

Lombarde, W 1576. *A Perambulation of Kent.* London.

Lombardo, M. 2003. Myth Defined and Undefined. *Applied Semiotics 13*.

Long, A.J., Scaife, R.G. and Edwards, R.J. 2000. Stratigraphic architecture, relative sea level and models of estuary development in southern England: New data from Southampton Water. 253-280. In: Pye, K. and Allen, J.R.L. (eds.) *Coastal and estuary environments: sedimentology, geomorphology and geoarchaeology.* Geological Society Special Publication 175. Geological Society of London: London.

Long, D., Smith, D.E. and Dawson, A.G. 1989: A Holocene Tsunami Deposit in Eastern Scotland. *Journal of Quaternary Science 4*, 61–6.

Lyell, C. 1830. *Principles of Geology. Vol. I*. 1st edition. John Murray: London.

Lyell, C. 1833. *Principles of Geology. Vol. II.* 1st edition. John Murray: London.

Malory, T. Sir. *Le Mortre D’Arthur*. A Norton Critical edition. Ed. Shephard, Stephen H.A. New York. W.W. Norton. Rev. Ed. 2004

Mayor, A. 2004. *Geomythology* in Encyclopaedia of Geology, ed Richard Selley, Robin Cocks and Ian Palmer.

MacKay, E. 2014. [www.edwardmackay.com/doggerland/html](http://www.edwardmackay.com/doggerland/html)

Manley, J. 1989. Rhyl and coastal evolution. *Flintshire Historical Journal 32*, 181-189.

Momber, G., 2004, The Inundated Landscapes of the western Solent, in N. C. Flemming (ed.), *Submarine prehistoric archaeology of the North Sea*, 37-42, Council for British Archeology: Research Report 141.

Momber, G., 2011. Submerged Landscape Excavations in the Solent, Southern Britain: climate change and cultural development, in J. Benjamin, C. Bonsall, C. Pickard and A. Fischer (eds), *Submerged Prehistory*, 85 – 98, Oxford: Oxbow Books.

Momber, G., Tomalin, D., Scaife, R., Satchell, J. and Gillespie, J. 2011. Mesolithic Occupation at Bouldnor Cliff and the Submergerd Prehistoric Landscapes of the Solent. CBA Research Report.

Momber, G. 2014. Submerged Archaeology and Cultural Responses to Climatic Amelioration 193-212. In: Evans, A., Flatman, J. and Flemming, N. (eds.) *Prehistoric archaeology on the continental shelf. A global review*. Springer.

Murray-Wallace, C.V. and Woodruffe, C.D. 2014. *Quaternary Sea-Level Changes. A Global perspective.* Cambridge University press: Cambridge.

Nunn, P.D. 2012. Of Giant Fish and Shaken Islands: Geological interpretations of euhemeristic myths concerning underwater eruptions and abrupt island movements in the Pacific islands. *Australian Folklore 27*, 27-36.

Nunn, P.D. 2014a. Lashed by sharks, pelted by demons, drowned for apostasy: the value of myths that explain geohazards in the Asia-Pacific region. *Asian Geographer 31,* 59-82.

Nunn, P.D. 2014b. Geohazards and myths: ancient memories of rapid coastal change in the Asia-Pacific region and their value to future adaption. *Geoscience Letters 1:3.*

Nymoen, P. and Skar, B., 2011. The Unappreciated Cultural Landscape: indications of submerged Mesolithic settlement along the Norwegian southern coast. 38-54. In: Benjamin, J. Bonsall, C., Pickard, C. and Fischer, A. (eds), *Submerged Prehistory*, 38 – 54, Oxford: Oxbow Books.

Oxford English Dictionary; 1989.

Oglander, J. Sir. 1888. *The Oglander Memoirs*. London.

Paphitis, T. 2013. Have You Come to Take the King Away? : A Survey of Archaeology and Folklore in Context. *Papers from the Institute of Archaeology 23*.

Paphitis, T. 2014. *The Place of Folklore in Archaeological Landscapes: Narratives and Identity in Medieval to Modern Britain*. Unpublished Doctoral Thesis, University College London.

Patterson, L.E. 2013. *Geographers as Mythographers: The Case of Strabo*. In *Writing Myth: Mythography and the Ancient World*. Eds. Stephen M. Trzascoma and R.Scott Smith. Leuven; Dudley, MA: Peeters Publishers

Peltier, W.R. and Fairbanks, R.G. 2006. Global glacial ice volume and Last Glacial Maximum duration from an extended Barbados sea level record. *Quaternary Science Reviews 25*, 3322-3337.

Pengelly, W. 1872. The Insulation of St. Michael’s Mount, Cornwall. *Journal of the Royal Institution of Cornwall 13,* 1-26.

Piccardi, L. & Masse, W.B. (eds) 2007. *Myth and Geology.* Geological Society, London, Special Publications, 273, 9-28

Poingdestre, J. 1889. *Caesarea or A Discourse of the Island of Jersey*, ed. William Nicolle, St Helier.

Prince, H.E. 1988. *Late Glacial and Post-Glacial sea-level movements in N. Wales.* Unpublished PhD thesis, University of Wales, Aberystwyth.

Read, D. 1987. M. Cromek, Cunningham, and “Remains of Nithdale and Galloway Song”: A Case of Literary Duplicity*’. Studies in Bibliography 40*, 175 – 186.

Reid, C. 1913. *Submerged forests*. Cambridge University Press: Cambridge.

Rhys, J. 1891. *Studies in the* *Arthurian Legend.* Oxford. Clarendon Press.

Rhys, J. 1901. *Celtic Folklore: Welsh and Manx*. Oxford [England], Clarendon Press.

Ryan, M-L. 2013. *Transmedial Storytelling and Transfinctionality.* Poetics Today.

Ryman, W., Pitman, W.C., Major, C.O*. et al*. 1997. An Abrupt Drowning of the Black Sea Shelf. *Marine Geology 138*, 119-126.

Ryan, W. and Pitman, W. 1998. *Noah’s flood: the new scientific discoveries about the event that changed history.* Simon and Schuster. New York.

Schank, Roger C. & Abelson, Robert P. 1995. Knowledge and Memory: The Real Story. 1-85. In: Robert S.Wyer, Jr (ed) *Knowledge and Memory: The Real Story.* Hillsdale, NJ. Lawrence Erlbaum Associates.

Shi, A. 1992. *Late Quaternary stratigraphy and recent sedimentation in the Dyfi estuary, Wales.* Unpublished PhD thesis. University College of Wales, Aberystwyth.

Shi, Z. and Lamb, H.F. 1991. Post-glacial sedimentary evolution of a microtidal estuary, Dyfi Estuary, west Wales, U.K. *Sedimentary Geology 73*, 227-246.

Sluijis, Van der, M.A.. 2009. *Book review of Piccardi, L. and Masse, W.B. (eds) 2007*. Myth and Geology. Geological Society Special Publication 273. London. The Geological Society. Myth and Symbol 5 (2). 58-74.

Smith, G., Davidson, A. and Kenney, J. 2002. *North Wales Intertidal Peat Survey 2001-2002. (G1679:30-33)*. Gwynedd Archaeological Trust. Report 450.

Sorita, d’E & Rankine, D. 2008. *Visions of the Cailleach,* London: Avalonia, 12.

Stafford, E. 2013. *A study of the submerged forests and intertidal peats of Wales.* Unpublished MA Dissertation. University of Wales Trinity Saint David.

Stern, J. (ed). 1996. Palaphaetus. On Unbelievable Tales. Wauconsa, III. Bolchazy-Carducci.

Stevenson, P. 2014b. *Ceredigion Folk Tales*. The History Press

Stone, P.G. 1912. *Legends and Leys of the Isle of Wight*. London.

Sturt, F. Garriw, D. and Bradley, S. 2013. New models for North West European Holocene palaeogeography and inundation. *Journal of Archaeological Science 40*, 3963-3976.

Taylor, J.A. 1984. A pictorial reconstruction of the lower Dyfi Estuary in 6,700 BP. *Nature in Wales 3*, 107-108.

Thomas, W.J. 2013. *The Welsh Fairy Book.* Courier Dover Publications.

Thompson, S. 1966. *Motif-Index of Folk-Literature: A Classification of Narrative Elements in Folktales, Ballads, Myths, Fables, Mediaeval Romances, Exempla, Fabliaux, Jest-Books and Local Legends.* Bloomington: Indian University Press. Revised Ed.6

Thornber, W. 1837. *The History of Blackpool and its Neighbourhood*. Blackpool Press, 1985.

Tilley, C. 1985. *Archaeology as Sociopolitical Action in the Present.* In: Pinksy, V. and Wylie, A. (eds.) *Critical Conditions in Contemporary Archaeology*. Cambridge University Press.

Tizzard, L., Baggaley, P. A. and Firth, A. J., 2011. Seafloor Prehistory: Investigating palaeolandsurfaces with Palaeolithic remains from the southern North Sea, in J. Benjamin, C. Bonsall, C. Pickard and A. Fischer (eds), *Submerged Prehistory*, 65 – 74, Oxford: Oxbow Books.

Trigger, B. G. 2006. *A History of Archaeological Thought.* Cambridge University Press.

Trott, K. and Scaife, R. 2004. *Construction and replacement bridges and access causeway at Brading Marshes, Brading, IOW*. KTAS report No. 68.

Tyler, E.B. 1865. *Researches into the Early History of Mankind*. London, rpt. University of Chicago Press, 1964.

Villemarque, H. de la. 1839. *Barzaz Breiz, Chants Populaires de la Bretagne*, Libraire Academique, perrin, Paris. 1963. (identical to the 1867 edition)

Vitaliano, D.B. 1968. The impact of geologic events on history and legend with special reference to Atlantis. *Journal of the Folklore Institute 5,* 5-30.

Vitaliano, D. 1973. *Legends of the Earth: Their Geologic Origins*. Bloomington: Indiana University Press.

Vitaliano, D.B. 1997. Geomythology: geological origins of myths and legends. 1-7. In Piccardi, L. and Masse, W.B. (eds) *Myth and Geology.* Geological Society of London. Special Publications 273. Geological Society of London: London.

Waldron, G. 1726. *A Description of the Isle of Man.* Douglas, 1865.

Walker, M., Johnsen, S. Rasmussen, S.O., Popp, T., Steffansen, J.P., Gibbard, P., Hoek, W., Lowe, J., Andrews, J., Bjorck, S., Cwynar, L.C., Hughen, K., Kershaw, P., Kromer, B., Litt, T., Lowe, D.J., Nakawaga, T., Newnham, R., and Scwander, J. 2009. Formal definition and dating of the GSSP (Global Stratotype Section and Point) for the base of the Holocene using the Greenland NGRIP ice core, and selected auxiliary records. *Journal of Quaternary Science 24*, 3 – 17.

Ward, I., Larcombe, P. and Lillie, M. 2006. The Dating of Doggerland – Post-Glacial Geochronology of the Southern North Sea. Environmental Archaeology 11(2), 207–18

Warren, G. 2005. *Mesolithic Lives in Scotland* (Stroud).

Westley, K., Bell, T., Plets, R. and Quinn, R., 2011. Investigating Submerged Archaeological Landscapes: a research strategy illustrated with case studies from Ireland and Newfoundland, Canada, in J. Benjamin, C. Bonsall, C. Pickard and A. Fischer (eds), *Submerged Prehistory*, 129 – 144, Oxford: Oxbow Books.

Wilks, P.J. 1979. Mid-Holocene sea-level and sedimentation interactions in the Dovey Estuary area, Wales. *Palaeogeography, Palaeoclimatology and Palaeoecology 26*, 17-36.

Williams, I. 1942*. Lectures on Early Welsh Poetry*. Dublin Institute for Advanced Studies.

Wingfield, R.T.R. 1995. A model of sea-levels in the Irish and Celtic seas during the end-Pleistocene to Holocene transition. 209-242. In: Preece, R.C. (ed.) *Island Britain: a Quaternary perspective*. Geological Society Special Publication 96. Geological Society of London; London.

Worsley, R, Sir. 1781. *History of the Isle of Wight*. London.

Yokoyama, Y., Lambeck, K., DeDeckker, P. *et al*. 2000. Timing of the Last Glacial Maximum from observed sea-level minima. *Nature 406*, 713-716.

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