The Holocene History of the European Vertebrate Fauna Modem Aspects of Research

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Early evidence for wild animals in Ireland

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Abstract

Ireland has a very limited range of vertebrates compared with neighbouring Britain or the European mainland. Few of the native species seem to have survived the last glacial period but appear to have been introduced at different times during the Holocene. Some of the species may have naturally colonised Ireland while the remainder seem to be deliberate human introductions. The earliest evidence for the presence of land mammals, freshwater fish and amphibians are considered using both the archaeological and documentary evidence.

Keywords: Ireland, faunal colonisation, zooarchaeology, mammals, freshwater fish, amphibians.

Zusammenfassung


Schlüsselwörter: Irland, Kolonisierung, Archaoozologie, Saugetiere, Süßwasserfische, Amphibien.

INTRODUCTION

In the middle of the seventh century an Irish monk of unknown name pondered on the mysteries of creation. He considered whether or not the "miracles" which continually occur in the natural world were part of God's process of creation given that this work should have been completed by the seventh day when He took his rest. The monk rejected this hypothesis, however, arguing instead that these were not new acts of creation but simply "unusual developments of the secrets of nature" (Reeves, 1861: 517). The question of the Deluge greatly occupied his mind but the cleric concluded that this was simply an aberration in the daily flowing and ebbing of the tide. In discussing from whence the waters of the Deluge came and to where they retreated, he incidentally makes mention of Ireland. He notes that islands were formed by the action of the sea in separating them from the mainland and concludes that: "This shows that those wild animals which are enclosed within the confines of islands were not brought there by human agency, but, manifestly, were to be found at that separation of the islands from the continent. Who, for example, brought wolves, deer, wild hogs, foxes, badgers, hares and sesquivoī [see below] to Ireland?" (Kenny, 1929: 277).

Fifteen hundred years later we are still trying to answer this question about these and, indeed, other species. We are unsure if certain animals managed to survive the last glaciation as a narrow band of land across the southern part of Ireland was free of ice cover at that time. There are also questions as to whether or not a putative landbridge with Britain allowed a means by which certain species were able to be introduced into the country. Finally, it is known that certain species were humanly introduced to Ireland but we must also consider the possibility that other species too were introduced in this way. The aim of this survey is to investigate the earliest evidence for the presence of Ireland's wild fauna, concentrating on terrestrial mammals, freshwater fish and amphibians, and generally excluding those introductions over the last two centuries. It is not intended to dwell on the issue of the possible presence of a former landbridge to Britain. This question of the existence, location and date of such a feature has recently been thoroughly discussed by Devoy (1995) and Wingfield (1995). It is sufficient to say that no physical evidence exists for such a landbridge and the sea...
Figure 1: Map showing sites mentioned in the text.
Figure 2: Chronology of glacial faunas of Ireland. The dates are expressed with one standard deviation (after Woodman et al., 1997: 146).
Figure 3: Chronology of late glacial and early Holocene faunas in Ireland (after Woodman et al., 1997: 151).
between Ireland and Britain is presently too deep to account for any former landbridge by a simple drop in sea level. The main evidence for any landbridge is circumstantial. It can be suggested that the presence of certain features of Ireland’s fauna and flora have necessitated the former presence of such a line. However, none of the recent contributions to the debate suggest the presence of a land connection, albeit a damp land connection, after about 10,000 BP.

The early evidence for wild animals in Ireland is at best partial. For the Late Glacial and early Holocene we are limited, for the most part, to a small number of cave sites most of which were excavated unsystematically during the last, and earlier part of the present century. Recently, a comprehensive AMS dating programme has been undertaken on this Pleistocene and early Holocene faunal material (Woodman et al., 1997) and this provides a starting point for the present study (Figure 2 and 3).

Our next body of evidence comes from excavated archaeological sites dating between the Mesolithic and medieval times. Much of this material is problematic in that all but the most recent excavations, there can be problems concerning stratification and the possibility of intrusive material and several "early" instances of certain species must now be rejected as unsafe. In addition to this, the number of sites that have been excavated is extremely small especially those representing the prehistoric periods and in most instances these have not produced faunal remains. It is most likely therefore that the range of wild animals that has been noted on prehistoric sites is not fully representative of the species present at that time. Finally, Ireland has a fine body of documentary evidence dating back to the seventh century AD and there are occasional references that contribute to the present subject matter.

**MAMMALS**

**BROWN BEAR (URSUS ARCTOS)**

Brown bear have been recorded at 11,920 ± 85 BP at Kesh Corran caves, Co. Sligo, 10,650 ± 100 BP from a cave deposit at Lough Gur, Co. Limerick, at 8880 ± 90 BP from Derrykeel Bog, Co. Longford, and 8930 ± 80 BP Dunore Bog, Co. Offaly (Woodman et al., 1997: 138,140 and 142), thus suggesting that it survived the Younger Dryas (Nahanagan Stadial) of approximately 11,000-10,000 BP and was a native species present on the arrival of humans in the country.

Archaeological evidence for the species is relatively scarce. There are no Mesolithic incidences of the species but fragments have been noted in Neolithic - Early Bronze contexts at the house Site C and stone circle Site K at Lough Gur, Co. Limerick (van Wijngaarden-Bakker, 1974: 370, 375), and in a secure Early Bronze Age Beaker context at Newgrange, Co. Meath (van Wijngaarden-Bakker, 1986: 91). The presence of the bear at Newgrange, however, is open to question as it consists of a single metacarpal and could have been imported with a skin (ibid.). A wider range of bear bones was present at Lough Gur.

It is unclear when the brown bear becomes extinct in Ireland. There is no zooarchaeological occurrence of the species after the Bronze Age example noted at Newgrange. The absence of faunal evidence from the archaeological record can however, be misleading. Dated instances of bear from Scotland are virtually unknown and they are absent from prehistoric archaeological sites, yet we know from classical writers that Caledonian bears were used as a novel means of capital punishment during the first few centuries AD (Ritchie, 1920: 113). There is a curious Irish ninth century documentary reference to bears being capable of slaughtering young pigs that suggests familiarity with the habits of bears (Kelly, 1997: 190). The absence of other references to the animal, however, in the large body of material dating to that period makes it most likely that the species was extinct by early medieval times.

**RED DEER (CERVUS ELAPHUS)**

The status of the red deer is extremely problematic. It is present in a cave context at Kesh Corran, Co. Sligo, at 11,790 ±120 BP (Woodman et al., 1997: 140). The next closely dated bone is from the base of a peat bog at Stonetown, Co. Longford, which provided a date of 4190 ±65 BP (ibid.: 143). They are present, but play a minor role, in the Beaker settlement at Newgrange, Co. Meath (van Wijngaarden-Bakker, 1986: 22). Red deer bones have also occurred in a small number of Neolithic tombs but not all the contexts for these are sealed. The most secure of these deposits was found in association with a sealed child's cremation in a Court tomb at Aghanaglask, Co. Fermanagh (Davies, 1939: 30 and 37). The red deer, where available, almost invariably formed part of the diet in Mesolithic cultures in North Western Europe.

However, in the two Irish Mesolithic sites that have produced large faunal samples, Lough Boora and Mount...
Sandel, the species is missing (van Wijngaarden-Bakker, 1989). Wild pig is the main species exploited and it is difficult to avoid the conclusion that red deer were absent from the country at this time. Circumstantial evidence also suggests that the red deer was not present at this time as tools associated with the processing of large mammal skins, such as scrapers, are much underrepresented from the Irish flint tool assemblages of the period (Mallory & McNeill, 1991: 16). It is difficult to provide a mechanism by which the red deer became extinct in Ireland after 12,000 BP but perhaps, as in the case of the giant Irish deer, the cold conditions of the Younger Dryas may have lead to its destruction.

It would appear that the red deer was deliberately re-introduced into the country during the Neolithic. A less likely hypothesis is that the animal was re-introduced accidentally or managed to swim to Ireland by its own accord. The deliberate introduction of wild species to areas where they did not previously exist seems to have been a characteristic of prehistoric peoples in the British Isles. The Outer Hebrides and Orkney islands, for example, would have been cleared of their mammalian fauna during the last glaciation. The presence of red deer and pine marten on the Orkneys (McCormick, 1984; McCormick & Buckland, 1997: 87) and the same species as well as the roe deer on the Outer Hebrides can be most satisfactorily explained in the context of deliberate human introduction.

**FALLOW DEER** (*DAMA DAMA*)

The fallow deer is a native of southern Europe and was apparently introduced to Britain during Roman times. A source relating to the reign of the Emperor Gordian I (ca. A.D. 238) states that an exhibition in Rome included “200 stags of the fallow deer (*cervi palmati*) including some from Britain” (Lever, 1977: 160). A small number of fallow deer bones have been found in the Roman levels at portchester Castle (Grant, 1975: 382). By the time of the Domesday Book (1086) some thirty-one fallow deer parks are recorded as being in existence in Britain (Lever, 1977: 160). There is no evidence for the presence of the species being present in Ireland before the thirteenth century. In 1213, it is recorded that the Archbishop of Dublin was being given fallow deer from Coventry in the English midlands, presumably for stocking deer parks in Ireland (Sweetman, 1875: 77).

It is not certain, however, if the animals were brought to Ireland in that instance. The first evidence for their actual presence in Ireland is in 1244 when eighty fallow deer, sixty does and twenty bucks, were stocked in a royal deer park at Glencree, Co. Wicklow (ibid.: 398). That this herd became well established is attested by the fact that the deer from Glencree were given to Eustace Le Poer, in 1296, possibly for his lands in the Carlow area (Le Fanu, 1893: 270). In general these animals remained in deer parks, but some seem to have escaped into the wild for Fynes Moryson (1908: 193) writing in the early decades of the seventeenth century, states that "the Earl of Ormonde, in Munster, and the Earl of Kildare, in Leinster, had each of them a small park enclosed for fallow deer ... they have also about Ophalia and Wexford, and in some parts of Munster, some Fallow deer scattered in the woods". Moryson noted no other sighting of fallow deer in Ireland despite his extensive travels in the country. Although the deer seem to have been reasonably well established in the seventeenth century Richard Boyle, the Great Earl of Cork, found it necessary to import further fallow deer to stock his parks around Lismore, Co. Waterford. In October 1617, he recorded in his diary the importation of forty-six breeding deer from Cokkington in Devonshire, England (Grosart, 1886a: 172).

The arrangement had been made by letter the previous July (Grosart, 1887: 88) but it seems likely that they waited until the bucks had shed their antler before their sea passage was attempted. Boyle seems to have been impatient for the deer to breed, for in May 1618 he imported a further eighteen young doe and twelve young male deer although their place of origin is unclear (Grosart, 1886a: 190). The first doe had produced fawns in the following month (ibid.: 192) and by the summer of 1622 he is culling the deer (Grosart, 1886b, 81). By November 1625 he is sending deer to stock deer parks at Newmarket, Co. Cork, about 50 miles from Lismore (ibid.: 171) and in the following January to Portunna, Co. Galway, which is about 70 miles away (ibid.: 175). In the following June he sends to Portunna a further "five brace of young fawns suckled upon my goats, and the goats along with them to give them milk on the way" (ibid.: 190).

The archaeological evidence confirms the documentary evidence in that no fallow deer remains have been retrieved from a pre-Norman context. The earliest evidence for their presence are thirteenth and fourteenth century contexts in Norman castles such as Ferns and Ferrycarraig, Co. Wexford (McCormick,
forthcoming; Whelan, 1979: 245), and Trim, Co. Meath (McCormick & Murray, forthcoming), and in similarly dated urban sites such as Waterford (McCormick, 1997: 837). At the latter site, one skull and antler fragment had holes drilled through it suggesting that it had been mounted as a hunting trophy.

**ROE DEER (CAPREOLUS CAPREOLUS)**

Roe deer were introduced from Perthshire, Scotland to Lisadell, Co. Sligo, in the 1870s and survived in that area for about fifty years (Whitehead, 1993: 299). There is no evidence that they were ever present in Ireland prior to this. A shed antler of the species, however was found in a mid-twelfth century dump deposit in the ditch of the Waterford town defences (McCormick, 1997: 836-837). The deposit also included a large quantity of red deer antler fragments representing industrial waste from craftworking. The presence of the roe deer piece suggests that deer antler was being imported from abroad as a raw material for industrial usage, presumably from Britain. MacGregor (1985: 36-37) has already suggested that there was long distance trade in such material during medieval times on the basis of data from Lund and Birka in northern Germany.

**WILD PIG (SUS SCROFA)**

The earliest evidence of wild pig in Ireland is during the Mesolithic where they are found at Mount Sandal from contexts dating to about 9200-8500 BP (van Wijngaarden-Bakker, 1989). In addition to this, remains from a cave at Kilgreany, Co. Waterford, produced a radiocarbon date of 8340 ± 110 BP (Woodman et al., 1997: 141). It appears sporadically on archaeological sites (McCormick, 1988b: 182-183). The latest incidence of its presence is in a 13th - 14th century context at Trim Castle, Co. Meath (McCormick & Murray, forthcoming). The date of its extinction is unclear and there is also the possibility that literary references to wild pig may represent feral stock. Philip O’Sullivan-Beare’s unpublished work written about 1620 (National Library of Ireland MS 2759-2762: O’Donnell, 1960) differentiates between domesticated and wild pig. Of the former, which he refers to as *sus* or, in Irish *muic*, he states "there are very fat pigs especially in the woods where they are fed on acorns". This reflects the pig husbandry practices as outlined by the legal texts dating to nearly one thousand years beforehand and not to wild pig.

The early laws indicate that having been born in spring, the young pigs were reared in the farm-yard until the beginning of August from whence they were brought to the woods for fattening (Kelly, 1997: 81-82). O’Sullivan also refers to wild pig (*muic fhian*), of which he states that they are feared by unarmed persons when provoked. It would seem that the widescale decimation of woodland during the seventeenth century led to the extinction of the animal (Mitchell & Ryan, 1997: 322-323).

**WOLF (CANIS LUPUS)**

The wolf is present at the end of the Late Glacial period in Ireland as is evidence at Kesh Corran, Co. Sligo, at 11,150 ± 90 BP (Woodman *et al.*, 1997: 140) and was finally hunted to extinction in the eighteenth century (Fairley, 1975: 183-187). There are numerous literary references to the presence of the animal from the early medieval period (ca. 6th - 12th century AD) onwards. During the early medieval period they are generally mentioned in the context of being a danger to livestock (Kelly, 1997: 186-187) while in the Norman period they occur more in the context of taxation for their skins, e.g. in Waterford in 1243 (Sweetman, 1875: 389), although references are fairly rare compared with the hides of other wild animals such as fox, otter, hare and rabbit. An annalistic reference for the year 1420 mentions that "many persons were killed by wolves that year" and Kelly (1997: 187) is almost certainly correct when he suggests that this was probably due to rabies. O’Sullivan-Beare mentions that their hides are "praiseworthy" and also records that if a person ate their flesh they lost their hair.

The identification of wolf remains from archaeological sites is problematic because of the difficulty of differentiating between their bones and those of dog. In an exhaustive examination of the canid remains from the Early Bronze age levels at Newgrange, however, van Wijngaarden-Bakker (1974: 340-345) precluded the presence of wolf but positively identified its presence in a Late Neolithic/Early Bronze age context at Lough Gur, Co. Limerick (ibid.: 370). Canine remains were found at the Mesolithic site at Lough Boora, Co. Offaly (van Wijngaarden-Bakker, 1989: 127). These, however, were calcified and the fact that domesticated dogs are known elsewhere at this date precluded definite identification.
There are few references to the presence of the wolf in archaeological assemblages; those that are found are often couched in uncertainty. Stelfox (1942: 72) refers to some large canine bones from Ballinderry II, Co. Westmeath, that may be of a "small wolf" but the only definite remains of the wolf known to the writer are from a medieval thirteenth century context at Ferrycarraig, Co. Wexford (McCormick, forthcoming). In that instance, an extremely large calcaneus, an astragalus and metatarsals were present with knife marks suggesting that the animal had been skinned.

**Fox (VULPES VULPES)**

The Arctic fox (*Alopex lagopus*) is recorded in Ireland at 19,950 ± 250 at Castlepook, Co. Cork, during the late glacial period (Woodman *et al.*, 1997: 135) but it probably became extinct when conditions became warmer after 13,000 BP. There is no evidence for the presence of fox in Ireland in the period before the arrival of humans. Fox bones are relatively easily to discern from those of dog and the earliest evidence for the animal comes from a sealed waterlogged Late Bronze Age context at Haughey's Fort, Co. Armagh (McCormick, 1991: 27). Fox bones are present in the Wedge tomb at Lough Gur, Co. Limerick, but the context of these bones are problematic (see badger discussion below).

Foxes are included in the list of wild animals in Ireland drawn up by the seventh century monk quoted at the beginning of this paper and Kelly (1997: 125 and 130) notes that they were kept as pets during the early medieval period. The possibility that the fox might have been a human introduction is supported by the fact that fox bones have been found on Scottish and Irish islands where they are now extinct and where they are extremely unlikely to have been postglacial relicts. They have been found in an Early Bronze age context on Islay in Scotland (Harman, 1983: 344) and in a late Bronze Age context on Dun Aonghasa, on the Arran islands in Ireland (McCormick, unpublished).

**BADGER (MELES MELES)**

An early Irish law tract dating to the seventh or eighth century not only notes the presence of badger but also refers to salted badger meat thus implying that the animal was hunted for its flesh. Philip O'Sullivan-Beare in the early seventeenth century also notes that its flesh was not "unpleasant" to eat while Rutty (1772: 291) states that "the flesh, when roasted, is good food, like pig's flesh, and makes a good ham". The latter writer also states that the fat of badger was used for medicinal purposes (ibid.). The occasional eating of badger is recorded in Scandinavia and northern Europe in the recent past and recipes suggested that the joints should be cut like venison and cured in the following way "salt them two to three days and send them to smoke-curing, this takes three days" (Weitmeyer, 1984: 22). The implications of these references is that in early times badger was formerly regarded as a valuable food animal. Commentary on the early Irish laws indicated that the animal was also sometimes kept as a pet, and one of their bites was equated with that of a pig for purposes of legal compensation (Kelly, 1997: 131). Their presence during the early medieval period has also been demonstrated by the bones retrieved from, amongst others, the crannog excavations at Ballinderry I and II, Co. Westmeath (Roche & Stelfox, 1936: 232; Stelfox, 1942: 72), the stone fort at Cahercommaun, Co. Clare (Stelfox & Roche, 1938), and the Scandinavian levels in tenth-eleventh century Dublin (McCormick, 1987b).

The bones of badger are totally absent from the Late Glacial and early Holocene record. The earliest record of the animal is from a Wedge tomb at Lough Gur, Co. Limerick, of probable Early Bronze age date (Ó'Riordain & Ó hlceadha, 1955: 47). The find is, however, problematic as its exact locations is not described and the observation that "animal bones were found in all areas of the excavation" (ibid.) casts doubt on its stratigraphical integrity. Animal bones were found within the two chambers of the tomb, within the double wall of the tomb and in the monument's immediate vicinity. In all instances the human bones seemed to have been in association with Beaker pottery. There is a probability that the bones are therefore of Bronze Age date but the excavators noted that at least some of the monument had been disturbed prior to excavation. The only other possible prehistoric incidence of the badger is from the Bronze Age levels at Ballinderry II, Co. Westmeath (Stelfox, 1942: 72), but the possibility of contamination from the early medieval levels on the site places a question mark over the age of these remains. Contamination between different levels on crannog sites has been demonstrated at Moynagh, Co. Meath, where a bovine radius, thought to have been from a sealed Mesolithic level, produced a radiocarbon date of 1660 ± 70 BP (Woodman *et al.*, 1997: 142).
PINE MARTEN (MARTES MARTES)

The early documentary evidence makes it clear that the pine marten was present during the early medieval period (ca. 6th - 12th century AD) and, indeed, they were sometimes kept as a pet (Kelly, 1997: 124). The early Irish term for the pine marten was "tagan" and seventh and eighth century law texts have difficulty in knowing whether or not it should be classified as a cat or a "tree dog" (ibid.: 130). Geraldus Cambrensis, writing in the late twelfth century, notes that "martens are very common in the woods" (O'Meara, 1982: 48). It is clear that they were exploited for their skin during later medieval times, as evidenced by a taxation grant to the city of Waterford in 1234 (Sweetman, 1875: 316), and the numerous references to the taxation of "cat" skins may also refer to the same species. The presence of a small number of marten bones in tenth century Scandinavian Dublin also probably reflects their exploitation for skins (McCormick 1987a: 152). Pine marten remains have also been found in an early medieval rural context at Ballinderry II crannog, Co. Meath (Stelfox, 1942: 73), and Cahercommaun, Co. Clare (Stelfox & Roche, 1938: 75).

Having established that the pine marten was present during the early medieval period, the question now arises as to whether it was a post glacial native of the country or whether it was deliberately introduced by humans. Its presence during the Bronze Age is evidenced at Kilgreany Cave, Co. Tipperary, where a tooth produced a date of 2780 ± 55 BP and Foley Cave, Co. Cork, with a date of 2555 ± 50 BP (Woodman et al., 1997: 138 and 141). There is, at present, no earlier evidence for the presence of the species in Ireland. Two alternatives are therefore possible. Firstly, it may be a native post-glacial species that survived the short, intensely cold Younger Dryas of about 11,000-10,000 BP, or they arrived via some landbridge soon after this. Secondly, it may have been introduced by prehistoric people to the country at a date presently unknown.

OTTER (Lutra lutra)

Otter bones have been found on several early medieval sites such as Moynagh crannog and the Viking levels in Dublin (McCormick, 1987a) and also at Lagore and Ballinderry crannogs (Hencken, 1950: 225; Stelfox, 1942: 72). In contemporary texts it is noted as being hunted and also as being kept for a pet (Kelly, 1997: 130 and 282).

The otter can also be eaten as a standard 19th century German cookbook provides several recipes (Davidis 1844, 325-326).

The earliest evidence for the presence of the otter is from an Early Bronze Age coastal site at False Bay, Co. Galway. They were found in a context that has been dated to 2094-1880 BC at two standard deviations (E. Murray, pers. comm.). The only other known prehistoric incidence of an otter bone is supposed to be from the Late Bronze Age levels at Ballinderry (Stelfox, 1942) but as in the case of the badger bone from the same deposit it may be a contamination from later medieval levels.

STOAT (Mustela mustela)

Animals as small as the stoat are usually overlooked during excavation and as a consequence are generally absent from the archaeological record. Its presence at the early medieval ringfort at Uishneach (Scharff, 1928: 124) is almost certainly due to later contamination. The presence of a "ferret" from an unspecified location at the Carraig Aille I or II, Co. Limerick, must also be treated as questionable (O'Riordain, 1949: 102). Their presence at this time is, however, attested by the fact that the bite of a pet stoat is equated with that of a domesticated cat for purposes of legal compensation as set out in early Irish law (Kelly, 1997: 130). A documentary source dating to 1213 refers to a gift of "two ermine" indicating a trade in their skins during the later medieval period (Sweetman, 1875: 75).

There is no evidence for the weasel in Ireland although the stoat was often referred to by that name. Philip O'Sullivan-Beare refers to the "weasel" but the Latin term he uses, "muster", indicates that it is a stoat that is being referred to.

Interestingly he states that there are two types of "mustela" present - "there are two species of these in Ireland: some almost yellow travel through the fields and woods; some of chestnut colour wander even into houses". The same seventeenth century source also records the presence of the ferret in Ireland. This is a domesticated form of the polecat that was first tamed in the classical world and was present in Britain by the thirteenth century (Lever, 1977).

There is no late glacial evidence for the presence of stoat but it is present during the Younger Dryas in Killavullen Cave, Co. Cork, at 10,680 ± 110 BP (Woodman et al., 1997: 141) and its presence during the early Holocene is demonstrated at Kilgreany Cave, Co.
Kilkenny (9980 ± 90 BP), and Kesh Corran, Co. Sligo (7650 ± 130 BP) (ibid.: 140-141). As a species whose range presently extends to sub-Arctic regions it seems possible that it is a late glacial survival as the Killavullan Cave example precluded human introduction.

**WILD CAT (FELIS SILVESTRIS)**

The wild cat is not known from any late glacial or prehuman early Holocene context. It first appears in the Mesolithic site at Lough Boora, Co. Offaly (van Wijngaarden-Bakker, 1989: 127), and disappears from the archaeological record at the end of the Bronze Age. It is not mentioned by Giraldus Cambrensis during the twelfth century and is missing from the earlier legal records implying that it became extinct during the Late Bronze age or Iron Age. Possible late evidence for their survival is in the context of Norman period references to taxes on cat skins, e.g. a murage taxation to help build the town wall in Kilkenny in 1306 refers to the taxing of the skins of hares, rabbits, foxes, cats and squirrels (Sweetman, 1886: 158). It seems likely, however, that this refers to the pelts of domesticated cats. Taxation of 1/2 d per one hundred skins is similar to that of kids, lambs, foxes, hares, rabbits and squirrels, all of which would have been commonly available. In addition there is ample zooarchaeological evidence for the exploitation of domesticated cats for their skins (McCormick, 1988a, 1988b, 1997: 834-836). There is also a documentary reference to "two skins of mountain cats", presumably wild cats, being imported into Ireland in 1172 which suggests that their pelts were not available within the country (Sweetman, 1875: 5). Philip O'Sullivan Beare mentions the presence of the wild cat in Ireland in passing but it seems likely that this refers to feral cats. The problem of differentiating between feral and wild cats is a vexed one and at the beginning of the present century there was considerable argument within the pages of The Irish Naturalist on the subject. While some argued that the wild cat was still actually present in Ireland, Warren (1905: 136) convincingly responded that "there is no doubt that the domestic cat when wild for several generations grows to an abnormal size and strength... I have myself trapped, and even shot, old male specimens that were nearly twice the size and weight of the house cat and one that was of the wild colour and markings, only for his pointed tail, might easily have been mistaken for a true Felis catus".

In addition to its Mesolithic presence at Lough Boora, Co. Westmeath, the wild cat is also present in Late Neolithic/Early Bronze Age contexts at Newgrange, Co. Meath, and Lough Gur, Co. Limerick (van Wijngaarden-Bakker, 1974: 349-353). The latest reliable instance is in a sealed Late Bronze Age context at Chancelorland, Co. Tipperary (Kelly, 1997: 121). Hencken (1942: 73) states that cat bones were present in the Late Bronze Age deposits at Ballinderry II crannog, but also notes that "they appear to have belonged to [a] small active breed of domestic cat". Since it is most likely that the domesticated cat was only introduced in the Roman period or later, it is likely that the Ballinderry specimens represent contamination from the later early medieval levels on the site. The "wild-cat" ulna from the ring fort at Uishneach (Scharff, 1928: 24) can also be regarded as being an uncertain identification and of questionable date. It is, however, difficult to provide an explanation for its disappearance in a country so rich in woodland as Ireland in the period between the Late Bronze and the early medieval period.

**HEDGEHOG (ERINACEUS EUROPAEUS)**

There is no mention of hedgehog in early medieval Irish literature and Giraldus Cambrensis writing in about 1188 notes that they are absent from Ireland (O'Meara, 1982: 49). Its presence in an early medieval settlement at Uishneach, Co. Westmeath, must be regarded as a later intrusion and, indeed, the report states of the hedgehog bones, along with those of fox, rabbit, stoat and frog, that "none of them may really be very old" (Scharff, 1928: 124). In addition to this, the species has not been noted in a late glacial or early Holocene context.

It is difficult to avoid the conclusion that the hedgehog was a late introduction to Ireland. The earliest archaeological evidence for the presence of the species in Ireland is in thirteenth and early fourteenth century contexts in the medieval town of Waterford (McCormick, 1997: 837) and in the contemporary rural settlement at Kilferagh, Co. Tipperary (McCormick, 1987b: 99). It seems therefore that the hedgehog is an Anglo-Norman period introduction to Ireland. The reasons for this are obscure. Fairley (1975: 25) notes that the Romans used their spiny coats for hackling wool and wool carding and that in Britain the eating of hedgehogs is recorded in the fifteenth century, so it may have been introduced for economic reasons.
PYGMY SHREW (SOREX MINUTUS)

The pygmy shrew, because of its wide distribution is generally regarded as native to Ireland despite its absence from early Holocene deposits. Only recently have they been noted in archaeological sites the most secure deposit being a pit containing cremated human bone within a megalithic tomb at Ballycarty, Co. Kerry (M. McCarthy, pers. comm.). This deposit is as yet undated but is presumably of prehistoric date. Some pygmy shrew remains were also found in a midden deposit within an early medieval monastic cell at High Island, Co. Galway, but this may be intrusive. (M. McCarthy, pers. comm.). The earliest probable documentary reference known to the writer seems to be in O'Sullivan's early seventeenth century work in which he describes a "smallest mouse" which is betrayed by its "hiss".

RED SQUIRREL (SCIURUS VULGARIS)

Thompson (1945) has convincingly argued that sesquivoli in the list of the seventh century list of Irish mammals presented at the beginning of this paper refers to the squirrel. As the grey squirrel (Sciurus carolinensis) was only introduced into Ireland in 1911 (Fairley, 1975: 32) it can be assumed that it is the red squirrel that is being referred to in that early source. The species is virtually absent from the archaeological record with the earliest known example being from the Scandinavian levels in Dublin which date to the tenth and eleventh century (McCormick, 1987a). The commentaries on early medieval legal documents indicate that they were kept as pets (Kelly, 1997: 130). Giraldus omits them from the list of mammals present in the country but their presence during the Medieval period is evidenced, for instance, by references to their hides being taxed, e.g. in Waterford in 1234 (Sweetman, 1875: 36). It is not known from Late Glacial or early Holocene contexts.

WOOD MOUSE (APODEMUS SYLVATICUS) AND HOUSE MOUSE (MUS MUSCULUS)

The presence of mice remains in archaeological contexts is problematic as they are generally of an intrusive nature. It is only in waterlogged contexts that mice remains can be assumed to date from the context in which they are found as mice will generally not burrow into waterlogged soils. There is no evidence of mice in late glacial Ireland, but recently wood mice were found in a waterlogged context at Newland's Cross, Co. Dublin, that were dated to 7600 ± 500 BP (Preece, et al. 1986) and also in waterlogged Middle to Late Bronze Age deposits at Chancellorsland, Co. Tipperary (M. McCarthy, pers. comm.). Wood mice remains were also found in a burial deposit in a megalithic tomb at Ballycarty, Co. Kerry (ibid.), but the context is less secure.

Because of the small size of the bones it is not surprising that there is little evidence of their presence in the archaeological record. Some wood mouse bones were noted in a pit in an early medieval ringfort at Marlinstown, Co. Westmeath (V. Butler, unpublished), and there is ample evidence for the presence of mice in general in contemporary documentary sources. They show that mice were a general pest in the barn, mill and drying-house (Kelly, 1997: 243). Its seems likely that these were house mice but a reference in the Annals of the Four Masters for the year 988 mentions "Mice eating all the cornfields in some territories in Ireland" which is more likely a reference to the wood mouse (ibid.: 236). The legal tracts make it clear that the "main function of the cat was... to keep its owner's house and grain-store free of mice" (ibid.: 122). If Giraldus Cambrensis is to believed Ireland was over-endowed with mice. He states "Mice are infinite in number and consume much more grain than anywhere else, as well as eating garments even though they be locked up carefully" (O'Meara, 1982: 49). O'Sullivan-Beare, in referring to "Irish mice" (as opposed to the French mouse, i.e. the rat) also notes that they tended to gnaw clothes, along with cheese and grain. Indirect evidence for mice in an early medieval context comes from Deerpark Farms, Co. Antrim. Waterlogged deposits contained the remains of the rodent flea Nosopsyllus fasciatus (Kenwood, forthcoming). It is most likely that these represent the presence of mice rather than rat (see below).

BLACK RAT (RATTUS RATTUS)

The black rat is found on many Irish sites from the thirteenth century onwards. Unfortunately there is always a probability that rat bones, because of the animal's burrowing habits, are intrusions in deposits. A 13th - 14th century find from a sealed context at Kilferagh, Co. Kilkenny (McCormick, 1987b: 99-100), seems pretty se-
cure and indicates that the animals had penetrated inland and were not simply confined to coastal ports. The bones were found in a com drying kiln reflecting the animal’s exploitation of human’s habitats.

Rats have been found in pre-Norman contexts in England. At York, for instance, rats are recorded in both Roman and Viking period levels (Rackham, 1979; O’Connor, 1989: 190). They have not yet been found in pre-Norman contexts in Ireland and their absence from the record in the extensively excavated tenth and eleventh century levels in Scandinavian Dublin suggests that their absence in Ireland is real rather than apparent. The rat bones from an early medieval context at Rathmullen, Co. Down, are problematical (Lynn, 1982: 154). They were found in a raised rath that was susceptible to rabbit burrowing and the rat bones would need to undergo radiocarbon analysis before their early date could be accepted. At present it would seem best if this early incidence of the rat was rejected. The earliest closely datable rat remains are from a mid-twelfth century context in the coastal port of Waterford (McCormick, 1997: 837).

The absence of any mention of the rat in early legal sources would also support the hypothesis that they were absent from the country at this time. The earliest documentary reference to rats is in the writings of Giraldus Cambrensis (ca. 1180) when he records that "larger mice that are commonly called rats" ate the books of the Bishop of Ferns (O’Meara, 1982: 81). The brown rat (Rattus norvegicus) arrived in Ireland in about 1722 (Fairley, 1975: 27). In the Irish language the rat is referred to as luch francach or "French mouse" which may refer to the fact that its presence was initially associated with the coming of the French speaking Normans during the twelfth century. The earliest known use of the term is, however, in 1475 in Fingin O’Mahony’s Irish translation of "The Buke of John Maundeville" (Stokes, 1899).

The brown rat (Rattus norvegicus) is an early eighteenth century introduction with Rutty (1772, 281) stating of Co. Dublin that "it first begun to infest these parts in 1722". A statement in a National Museum of Ireland catalogue on material from Viking and medieval Dublin that rats "which included both the brown and black species" were present must be regarded as erroneous (Anonymous, 1973: 13).

**IRISH HARE (LEPUS TIMIDUS HIBERNICUS)**

The Irish hare was present at the end of the Late Glacial with bones from Kesh Corran, Co. Sligo, being dated to 12,190 ± 130 BP (Woodman et al., 1997: 140). It could have survived the cold Younger Dryas period and is present on the early Mesolithic site at Mount Sandal, Co. Derry (van Wijngaarden-Bakker, 1989). After this it occasionally appears on sites of all periods and with the exception of the red deer, is generally the most commonly encountered wild species on pre-Norman archaeological sites presumably because it was exploited for its meat.

**RABBIT (ORYCTOLAGUS CUNICULUS)**

The rabbit was introduced to Ireland by the Normans purely for economic purposes. It is common on archaeological sites from the thirteenth century onwards. In Waterford, where excavations produced a large number of well dated deposits, the earliest archaeological evidence for their presence is in the mid-thirteenth century (McCormick, 1997: 827). The earliest documentary evidence is, however, somewhat earlier with rabbit warrens being established on Lambay island, Co. Dublin, by 1191 (McNeill, 1950: 79). There was a massive trade in the export of rabbit pelts during the medieval and post-medieval period.

**MOLE (TALPA EUROPAEA)**

There is no evidence that the mole ever existed in Ireland. Recently, however, the remains of the Hystrichopsylla talpae flea have been found in waterlogged deposits in Deerpark Farms, Co. Antrim (Kenwood, forthcoming). Presently this flea is specific to the mole. As it is unlikely that the mole, even if present in Ireland, would have chosen to live in waterlogged deposits, it is more likely that the parasite arrived on the site in a piece of imported moleskin or moleskin clothing. Alternatively, the flea may formerly have had a greater species range than today.
FISH

It is unlikely in the extreme that any of Ireland's present stenohaline fish species, i.e. the so-called freshwater "coarse" fish, could have survived the last glaciation (Wilson, 1986: 53). With the separation of Ireland from Britain and the Continent the recolonization of the country's inland waterways by freshwater species became impossible. The only species that survived were species that seemed to have become trapped such as the Arctic charr (Salvelinus alpinus), a subspecies of the salmonid family, or landlocked sea fish such as the goureen (Alosa fallax killarniensis), which is limited to Lough Leane, Killarney, Co. Kerry, and the more widely distributed pollan (Coregonus autumnalis pollan). It is probable that these are the fish that Giraldus Cambrensis describes as being found in Ireland but not elsewhere. "There is one kind larger and more round than the trout. It has firm white flesh, and is pleasing to the taste. It is very like the tynal [grayling], except that its head is larger. There is another kind very like the sea-herring in shape, size, colour and taste. A third kind is in every detail like the trout, except that it has no spots" (O'Meara, 1982: 38). It seems that these are pollan, goureen and charr respectively, although it should be noted that the charr has spots.

Other fish that could have recolonised the freshwater systems of Ireland were those that migrate from the sea such as lampreys, eels, salmon and trout and once again Giraldus Cambrensis confirms their presence in the country when he states: "The rivers, however, and the lakes are rich in fish peculiar to themselves, and especially in fish of three kinds, namely, salmon, trout, and mud eels. The Shannon abounds in sea-lampreys (ibid.: 37). Fish remains are rarely found on pre-Norman Irish sites but the presence of eels and salmonids has been found at Mesolithic Mount Sandal and Lough Boora (van Wijngaarden-Bakker, 1989).

It seems likely that all the other fresh-water fish in Ireland are post-Norman introductions and Giraldus Cambrensis notes that "pike, perch, roach, gardon [chub?], and gudgeon, [m]innow, loach, bullhead, verones?" are absent from Ireland (O'Meara, 1982: 38). Recently, pike bones have been identified in a late 13th - early 14th century sample at Trim Castle, Co. Meath (Hamilton-Dyer, forthcoming). The earliest documentary evidence for their presence is in the late fifteenth century when it is noted that they were being exported, presumably in a salted state, to England (Longfield, 1929: 49).

There is no evidence to support the introduction of any other freshwater species before the seventeenth century when Richard Boyle, already mentioned in the context of the importation of fallow deer, records the importation of tench (Tinea tinea) and carp (Cyprinus carpio) from Amsterdam in January 1626 (Grosart, 1886b: 207) to stock his ponds near Lismore although many of the fish died en route to Ireland. Bream and roach seem also to have been present by the seventeenth century although their date of introduction is unknown. Went (1950: 123), however, notes that in Ireland the term "roach" was generally applied to rudd (Seardinius erythrophthalmus L.). Roderic O'Flaherty writing of west Connaught in 1685 records that "roach" were present in the rivers (Hardiman, 1846: 11). He notes, however, that "there were never pike or bream as yet engendered in all this country, nor adjacent parts of Mayo or Galway counties" (ibid.) The clear inference from this is that bream were present elsewhere in the country. The fact that the bream (Abrimis brama) and roach are not listed in Philip O'Sullivan-Beare's Irish list of fishes of about 1620 implies that the ruddroach were relatively recent introductions to the country. Indeed, the only genuine freshwater fish listed by O'Sullivan-Beare is the pike.

Bream and rudd/roach were well established in Ulster by the middle of the eighteenth century as Harris (1744: 151) records them as being present in some County Down lakes. It is perhaps significant that pike were present in a much greater number of the county's lakes, suggesting that the bream and rudd/roach were relative newcomers. Perch (Perea fluviatilus) seem to have been introduced in the middle of the eighteenth century if Arthur Young is to be believed. Writing in the last decade of the eighteenth century he notes that "it is extraordinary that the perch should appear in all the lakes of Ireland and in the Shannon at the same time which was about seventeen years ago" (Hutton, 1892: 200). The introduction of the true roach (Rutilus rutilus) seems only to have occurred at the end of the last century. Went (1950: 123) has shown that roach and dace (Leueiseus leuciseus) were accidentally introduced while being used for livebait for the catching of pike in the Munster Blackwater in 1889.

The loach (Nemaehelis barbatulus) is widely distributed in Irish waters (Went, 1946: 253) but its date of introduction is unknown. The fact that an Irish word
for a "sluggard" (lóiste), which seems to be derived from the English term "loach", is in use in the seventeenth century might suggest that the fish was present in Ireland by that time (O'Rahilly, 1913). Other freshwater fish that occur in Ireland, but for which we have little historical information, are the smelt (Osmerus eperlanus), the gudgeon (Gobio gobio), the minnow (Phoxinus phoxinus) and the two sticklebacks (Gasterosteus aculeatus and Pygosteus pungitus) (Went, 1946).

**AMPHIBIANS AND REPTILES**

Geraldus Cambrensis states that there were no "toads or frogs" in Ireland (O'Meara, 1982: 50). He seems to have believed that the land was poisonous for them and quoted as proof of this, a story of a frog that was imported to Waterford but died immediately on touching the ground. O'Sullivan-Beare too does not include them in his early seventeenth century list of Irish animals. The only three species of amphibians in Ireland are the common newt (Triturus vulgaris), the common frog (Rana temporaria) and the natterjack toad (Bufo calamita). Although amphibian bones have occasionally been found on archaeological sites and in cave deposits, in no instance has it been demonstrated that the remains are of an early date. We are therefore dependent on literary sources for information concerning their early presence.

The natterjack toad is very localised in Ireland being present only in a limited area in the south west of the country. The earliest reference to the animal is at the beginning of the nineteenth century (Greeson & 0' Dubhda, 1974) and its limited distribution suggests that it is a relatively modern introduction. If one is to accept the word of Giraldus Cambrensis and O'Sullivan-Beare, the common frog must have been introduced after the first quarter of the seventeenth century. It is quite possible that the frogs of Ireland all emerged from some imported frog spawn placed in a ditch in Trinity College, Dublin in about 1696. The context is as follows. A planned natural history of Ireland by Dr Gerald Boate which remained incomplete upon his death in 1649 was revived by Sir Thomas Molyneux, Professor of Medicine at Trinity College, at the end of that century. He selected a Dr. Gwithers to undertake the quadruped section of the work. Gwithers, on finding no evidence for the frog in Ireland, apparently rectified the situation by importing the said frog spawn from England to Dublin from whence the resultant frogs and their descendents colonised the remainder of the country (Kane, 1893: 95-96; Scharff, 1893: 1).

Bell (1849: 92) quotes the eighteenth century Brindsley Sheridan as stating that Dr Gwithers originally "brought over with him a parcel of frogs from England to Ireland in order to propagate the species in that Kingdom, and threw them into the ditches of the University park but they all perished whereupon he sent to England for some jars of frog spawn, which he threw in the ditches, by which means the species of frog was propagated in that Kingdom". Stewart's (1819: 504) allusion to the presence of a frog in County Waterford in 1630 is apparently a misreading of the works of Colgan who was, in fact, discussing the same short lived frog mentioned in the work of Giraldus Cambrensis.

The newt is generally regarded to be a native but the literary sources are silent. The status of the lizard is also unknown, but Giraldus Cambrensis, in the late twelfth century states that lizards were present (O'Meara, 1982: 50) and O'Sullivan Beare mentions it in his later animal list. Interestingly, there are no known references to the creatures in the early medieval documentary sources.

**SUMMARY AND CONCLUSION**

Ireland has a much more limited range of mammals and fish than neighbouring Britain. There has been a tendency to use the model of the landbridge to account for the presence of many of these species but it is just as likely that humans deliberately introduced many, or most of them to the country. Early people probably captured and tamed animals on a fairly regular basis which would easily facilitate their transport. In Ireland, the early legal documentary sources indicate that such unlikely candidates as fox, wolf, deer, otter, squirrel, stoat, pine marten, badger and wild pig were tamed (Kelly, 1997: 130-131). The Irish evidence for the transportation of captured and tamed wild animals includes a Barbary ape from north Africa brought to Navan, Co. Armagh, in the fourth or fifth century BC (Raftery, 1997) and a camel given by the king of Scotland to Muirchertach Ua Briain in 1105 AD (Kelly, 1997: 124). The presence of a Scottish bear in ancient Rome attests the ability of transporting even the most ferocious animals over long sea journeys. The early presence of pine martens, red deer, and badgers on remote Scottish Islands provides proof of the sea transportation of such animals in prehistoric times (Mulville, in press).
Fish, too, can be easily transported as was demonstrated in the transportation of carp and tench from Amsterdam to Ireland in the early seventeenth century. In short, the colonisation of Ireland by these animals does not necessarily necessitate the presence of a land bridge as a means of introduction.

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