

# The history of Irish forests since the Ice Age

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Annual Augustine Henry Memorial Lecture, Royal Dublin Society, March 1995

## Introduction

As you can tell from my accent, I come from Belfast. I was born close to the centre of that great city. Like all little girls who grew up just before the 'Age of Television', I loved to read fairy stories. As I grew older, I devoured the stories of Hans Andersen and the Brothers Grimm. All who love those old tales remember the descriptions of the huge forests into which the principal character would often stray. They were big, dark, forbidding places full of gingerbread houses, giants and all the stuff of European tales and myths.

Even as a small girl living in a big city, I soon recognised that the landscape immortalised in the European stories was very different from the landscapes described in the tales of my native Ireland. When I first read the Irish legends and folktales, I learned that Cuchulainn's chariot was drawn by two wonderful horses across a land which was more plain than forest. Even a little girl could grasp that the landscape of Ireland's best loved stories was different from that of Germany and Scandinavia, because of its lack of trees. Perhaps this realisation does not come to all young people, but it came to a young Belfast girl who was as fond of plants and trees as she was of legends and folktales. Perhaps this would please Augustine Henry. He too was a person with an enthusiasm for plants and a love of folklore (Pim, 1996).

Were there ever great dark forests in Ireland like those in Germany? Some historical accounts from Ireland in the Middle Ages suggest that, in those days, there were very extensive forests of oak in Ireland. It is recounted that these disappeared four hundred years ago when the English destroyed Ireland's oakwoods for good timbers to build the 'wooden walls' of her navy (McCracken, 1971; Hall, 1992). Is this statement true? If so, where did such forests come from, and where do we go for the answers?

Like all those who want to understand the landscape of the past, we could go hunting for fossils. However, if we go to places where the old documents tell that once forests grew, and dig down into the ground, it is most unlikely that we will find any bits of old trees. Nevertheless, our ancient forests have left their fossils in copious amounts, but not usually on the spot where once they grew, and not in a form visible to the naked eye (Jessen, 1949).

To find the true story of Ireland's forests, for indeed we once had sumptuous forests almost from coast to coast, we must first go to the boglands and lake muds of the Irish lowlands and uplands, where vast numbers of minute pollen grains are pickled in the acids of the peats. When the surrounding packaging of peat is destroyed by chemicals in the laboratory, the pollen grains can be seen with a microscope (Mitchell, 1986).

Just as each tree species has a characteristic leaf and bark, it also has a characteristic pollen grain. If we identify the pollen grains of trees contained in any slice of peat from

anywhere in Ireland, we can soon learn which trees were growing near the bog while the peat was developing. Using this science of pollen analysis, or palynology, we can trace our forest history.

It is the bogs and the lake muds which preserve numerous relics of the Irish forest of the past. Some of our lowland boglands are over 12,500 years old. They are made up of peats which grew slowly from that time and contain an unbroken record of preserved tree pollen from those long-past days until the present. In addition, some bogs also contain the bits of wood, bark and needles of the very trees which grew there thousands of years ago.

### **Post-glacial development**

Our story starts in an ancient landscape which shares one feature with the landscape of today – almost no trees. We are back 12,500 years ago, at the end of the last Ice Age. If we could stand on a low hill in the early summer somewhere in the Dublin area and look out over the land, we would see familiar features such as lakes, small streams and rivers with grassy, sedgy meadows full of bright flowers, birds and insects. Perhaps a small herd of Great Irish Deer grazing, but no trees. We would see small patches of low scrubby vegetation such as dwarf willow, dwarf birch and juniper in many places, but certainly nothing the Irish people of today would dignify by calling a tree.

At the end of the last Ice Age, most of Ireland had just been released from great thick sheets of ice. It may be that it was only the southern regions which escaped the ice and these may have been joined to Britain as reduced sea levels exposed tracts of low-lying land now long-lost under the Irish Sea. Botanists believe that if any trees survived in Ireland at this time, it was most likely that they did so in the favoured south. There are those who are sceptical that any trees survived even here.

About 12,500 years ago, Ireland, like Britain and the rest of Europe, was beginning to warm. The soils recently freed from the ice were colonised by the vanguards of plants advancing from the warmer south. In places such as France and the Iberian Peninsula, trees were already established and were beginning their advance towards Ireland along the low-lying traces of land which may have followed the present coast. All seemed poised for the return of the trees at this last phase of the Ice Age, when suddenly the cold returned. While the massive ice sheets remained absent – for it did not stay cold for eons – the bitter conditions returned for some hundreds of years, and plants which had begun to thrive received a great setback.

By the time the ‘cold snap’ ended, some time before 10,000 years ago, any advances which plants had made in recolonising the Irish landscape were greatly depressed. Some scattered tracts of scrub capable of tolerating alpine conditions remained in a few areas, but these represented a relatively minor feature of the landscape. However, once conditions began to warm – and this time they stayed warm – the first of the proper trees was well on its way to Ireland.

Imagine a landscape with nothing much growing above waist height. In summer, it was well lit for there was little growing to create shade. These are just the conditions which favour invasion by birch. Invasion is not too strong a term, as the pollen record from the start of the warm period, which we now call the post-glacial or Holocene period, shows that the advance of birch was indeed swift.

## Early woodland composition and dynamics

Those who love and are familiar with woodlands and forests appreciate that it is the mixture of trees, low-growing shrubs and leafy plants which give each wood its unique character. It must also have been so in the first Irish woodlands. However, the pollen analytical techniques which give such useful information about the different types of trees do not yield the same quality of information about the lesser members of the forest community. Most of our native trees are pollinated by the wind and so produce vast quantities of pollen during late winter and early spring. Considerable quantities of pollen are carried off into the air and end up dying on the surface of the bog. The lower growing plants such as blackberries, bluebells and primroses have different conditions with which to contend. Many of the later flowering plants are pollinated by insects and produce very much less pollen than the wind pollinated trees. In addition, it is difficult for the pollen of low growing and summer flowering plants to escape from the leafy tree canopy. For these reasons, we know little of the ground flora of these early woodlands.

Even as birch woodland was expanding, other trees were beginning to colonise the early forests. The arrival of hazel and pine altered the character of forests sometime around 9,500 years ago, as reflected in the increasing amount of their pollen in peats which accumulated at that time (Smith and Goddard, 1991). The dynamics of forest cover and composition were in a constant state of flux. The expansion of the first birches altered the composition of the forest soils as they contributed organic material. Hazel and pine grew taller than the birch and cast shade. As a result, the birch forests went into decline and were replaced with woods of hazel and pine, which were later joined by oak and elm.

Even though we see the same trends repeated in the pollen diagrams from lowland sites throughout Ireland at this time, it must not be assumed that the same woodland story was told from coast to coast. Pollen studies have shown that each region had its own particular variation. For example, in the north of Ireland, hazel may have predominated in many lowland areas, with pine dominating the uplands.

The expansion of oak and elm changed the character of the woodlands still further. These great trees cast shade which was unsuitable for the growth of birch which may, by this time, have already been restricted to the forest edge. We can assume that in some places, hazel still dominated the woodlands, whereas in others, it assumed the role of a shrub beneath the oaks and elms. Other species which are poorly represented in the pollen record include members of the family to which the roses and hawthorns belong – the *Rosaceae*. These beautiful trees of the woodland edges are, like the primroses and bluebells, pollinated by insects and, as such, do not produce far-flung pollen which is incorporated in abundance into developing peats. However, even the few grains of blackthorn or hawthorn in the five hundred or so pollen grains which I could identify and count as part of a routine pollen analysis are enough to show that these woods had botanical diversity. Careful analysis reveals the pollen of ivy, honeysuckle, rose, blackberry and many other small trees and shrubs which are components of the native Irish woodland flora.

Trees came into Ireland during the early part of the first millennium of the Holocene era, but not without hindrance. The question of when the Irish Sea was sufficiently well-established to prevent the invasion by further tree species is not the subject of this paper.

Nevertheless, the sea was a great barrier to the vanguard of the warm-loving trees coming in from warmer Europe behind the oaks and elms. There are trees native to southern Britain which are not elements of the Irish tree flora. The warm-loving lime, beech and hornbeam did not get as far as Ireland, possibly due to the sea and other physical barriers.

If one likes to think of Irish people living in harmony with their environment, then this is the time when it is most likely to have happened. We have some evidence of people coming to Ireland about 9,000 years ago. It is difficult to know just when they came, as the evidence they left behind is scant. The impact which our earliest ancestors had on the landscape is minimal, even though they used the native plants as a source of food. As the pollen record demonstrates that hazel was abundant at that time, we simplistically assume that hazel nuts were an important food source. Only further archaeological investigations will yield fresh evidence of the importance of hazel in the diet of Mesolithic people.

There is an interesting phenomenon in pollen diagrams from peats which developed about 7,000 years ago. Suddenly we see a dramatic increase in the amount of pollen of alder in pollen diagrams from Ireland and throughout Europe. Alder is a tree which favours wet conditions, and today one of its commonest habitats is on the margins of lakes. Could it be that this increase in alder pollen marks an increasing number of alder trees, which in turn, indicates that the climate 7,000 years ago was getting wetter? There is a certain amount of supporting evidence for this premise, but equally, another suite of evidence implies that alders colonised the damp soils around lakes when their levels fell as a result of the climate becoming drier! Over the last fifteen years, there has been an upsurge in interest in the use of changing vegetation patterns as indicators of past climatic changes. The example of the expansion of alder shows the complex relationship between vegetation and climate.

### **Early human influence**

The first significant impact of people which we can detect through the pollen record from Ireland dates to about 5,500 years ago. In every 500 to 1,000 pollen grains which the pollen analyst identifies and counts, there may be one or two pollen grains which look like those of grasses but which are much bigger. These pollen grains belong to primitive wheat, and provide us with the first pollen evidence for arable farming. Later, the amount of wheat pollen increases and is joined by other indicators of increasing arable activity, such as oats, barley, flax, and all their attendant weeds.

Coupled with the first pollen evidence for farming is the first evidence for people managing the landscape. With the first of the cereal pollen grains came a reduction in the amount of tree pollen in peats growing at that time. People were cutting down trees with polished axes to make clearings to encourage the spread of grass for their cattle. We may not consider our Neolithic ancestors as being 'environmentally friendly'!

At this time, the tree which seems to have suffered the most is the elm. In the early years of palaeobotanical research, it was thought that this reduction in elm pollen values, seen throughout Europe, was brought about by the Neolithic people cutting off the young branches to fodder cattle, as young elm foliage is both sweet and nutritious. A recent botanical ravage has shed new light on this issue. Palaeoecologists now think that elm pollen values may have been greatly depressed by a prehistoric infection of Dutch Elm

Disease. However, until we find elm wood radiocarbon-dated to the period around 5,000 years ago and containing the remains of the disease vector, the beetle *Scolytus scolytus*, we cannot be certain. It is however a good example of the continual revision of our views on ancient woods and their dynamics.

Throughout the later Neolithic, Bronze and Iron Ages, the overall trend was a reduction of land under forest. Forested land survived in many places throughout the thousands of years spanned by prehistory and the early historical period, primarily where the terrain was rough or soils were too difficult to cultivate. In other places, land was cleared for agriculture and worked until it was exhausted. It was then abandoned and in many places the trees came back, but not always. In some areas, nutrient depletion and major soil changes favoured the growth of blanket peat over the regeneration of woodland. Extensive pollen studies in the uplands have shown that huge areas of Connemara, the Mourne and the Antrim Plateau were once forested. Today, they are covered by blanket peats without a tree to be seen for miles. In spite of these details and extensive investigations, the link between tree-felling in prehistory and the development of blanket peat is still not fully understood. Nevertheless, we now know that people partly caused deforestation and the subsequent development of the blanket peats which are such a feature of today's Irish uplands.

There is evidence for the fortunes of the forests of the past preserved in Ireland's bogs other than pollen grains. Many cutover bogs yield tree stumps. This is intriguing because trees do not grow on wet boglands today. Here we have excellent evidence for an environment which no longer exists in Ireland. Research on these ancient oaks and pines shows that oaks grew on some bogs from about 5,000 to about 2,000 years ago. Bog hydrology and nutrient status at that time allowed these trees to grow well. Bogs are however ecosystems which are constantly changing, and today no bog supports the growth of oaks. Pines grew on bogs even before the earliest oaks. However, as pines dislike growing with their roots submerged in water, they may have survived best where the early bogs dried out from time to time. Dated bog pine and oak timbers are good proxy records of past hydrological and climatic change. Research in these palaeoenvironmental disciplines is continuing.

### Later human influence

There is no specific time when the changes which lead to the relatively treeless landscape of today began. The pollen record shows that in some places, trees may have disappeared thousands of years ago. In others, such as Killarney and the Lower Bann valley, written evidence from the early seventeenth century states the existence of extensive oak forests. These woods are cherished in folk memory as the last of the great Irish woodlands which never heard the sound of the axe. These are the woods said to have been decimated for ship-building timbers for the Elizabethan and Jacobean Navy.

Pollen evidence from lowland bogs within the areas of forests indicated on early seventeenth century maps is at odds with the documentary record, both in the Lower Bann valley and in Killarney. The most recently published research at the northern sites, not far from Augustine Henry's birthplace of Draperstown, shows that there was widespread woodland depletion in the ninth century, and that, after agriculture went into decline in the

eleventh century, there was some regeneration of woodland (Hall *et al.*, 1993). This too was removed over a period of centuries with final eradication of the remaining scrub during the eighteenth century. Indeed, there is nothing in the pollen evidence for the Lower Bann valley region to suggest either widespread oak woodland in the sixteenth or seventeenth centuries or its wholesale removal between 1600 and 1650. This area was gradually cleared of trees over the last one thousand years, first by the Gael and then by the Planter – something which Augustine Henry would have deplored.

## Conclusion

Henry was a man who looked to the innovative for a solution to difficulty. He was interested from his earliest days of forestry training in Nancy in the particular problems of establishing woodlands on peats. We know that he was a man with a love of botanical diversity and I suspect that the great tracts of conifer forest which make large patches of sombre green on our mountainsides today may not have been entirely to his liking. The current research into mixed plantings of native hardwoods and exotic conifers may have met with his approval as they support the diversity of life which gave him so much pleasure. His work continues to inspire all who learn of this industrious, scholarly man with a love of “innocent gaiety”.

Henry himself summed up so much of that which enriches any life intimately associated with woodlands and forests, past or present, in distant places or here at home in our island which remains “a botanical province as yet undivided”, when he said, “A forest is the finest thing in the world”.

## REFERENCES

- Hall, V.A. 1992. The woodlands of the Lower Bann valley in the seventeenth century. *Ulster Folk-life*, 38, 1-11.
- Hall, V.A., Pilcher, J.R. and McCormac, F.G. 1993. Tephra dated lowland landscape history of the north of Ireland, AD 750-1150. *New Phytologist*, 125, 193-202.
- Jessen, K. 1949. Studies of the late Quaternary deposits and flora history of Ireland. In: *Proceedings of the Royal Irish Academy*, 85-290.
- McCracken, E. 1971. The Irish woods since Tudor times, distribution and exploitation. Newton Abbot.
- Mitchell, F. 1986. *Shell Guide to Reading the Irish Landscape*. Country House, Dublin.
- Pim, S. 1996. The wood and the trees. A biography of Augustine Henry. MacDonald, London.
- Smith, A.G. and Goddard, I.C. 1991. A 12,500 year record of the vegetational history at Sluggan Bog, Co. Antrim, N. Ireland. *New Phytologist*, 118, 167-187.