



Scoil Dara
Kilcock, Co. Kildare



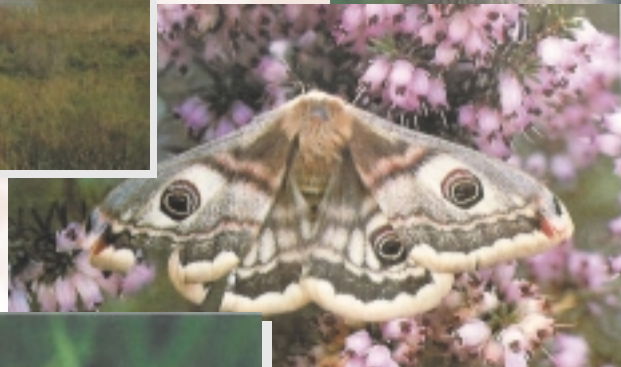
ALDO PAPONE CASE STUDY 2003



The Travel and Tourism
Programme in Ireland

SUSTAINABLE TOURISM

The Wild Beauty of The Irish Bogs



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1 PREFACE

This case study is the result of a presentation made by the students of Scoil Dara, Kilcock for the G.T.T.P. International Student/Teacher Exchange in Frankfurt in November 2003.

In it we introduce our audience to the Irish bog – an example of the last of the great wildernesses of the world.

We invite you to step out of the rat race and into an Irish bog for a holiday you will always treasure in your mind's eye.

We hope to impress upon you that Irish bogs are sustainable as tourist attractions because:

- They contain attractions for a wide variety of types of tourists.
- Bog tourism raises awareness among tourists from Ireland and abroad of their unique value in the Ecosystem of the planet.
- They are a valuable source of employment in areas where other forms of employment are absent.

Hence our title

"The Wild Beauty of the Irish Bogs"



2 WHAT IS SUSTAINABLE TOURISM?

Our understanding of sustainable Tourism is that the Tourist attraction is managed so as not to kill the goose that lays the golden egg.

The alternative is to develop the tourist attraction rapidly for a quick profit. This approach does not involve long-term planning; neither does it incorporate any care for the environment. The result is that large numbers of tourists will be attracted in the initial years but they will degrade the landscape with noise, litter, water and visual pollution. The original attractions of the area are damaged by over-exposure. This has been the case with the Spanish Costas whose tourist numbers have grown from million per year in the 1950's to 62 million per year today. Numbers have now peaked as tourists seek less congested and less polluted destinations elsewhere.

Sustainable tourism involves long-term planning. It means that the landscape has to be loved, respected and cared for if it is to continue to provide locals with a reasonable and ongoing livelihood from tourism. It means that all tourist developments must be in keeping with local culture and local building styles. It involves continuous investment into keeping the attraction in pristine condition. It is not well served by mass tourism. The people of the Swiss Alps have followed this approach since the 19th century. Today the region is as attractive to tourists as it always was and it is self-sustaining.



3 INTRODUCTION

Dia dhiabh a chairde agus fáilte go Portaigh na hÉireann.

We undertook the study of Irish bog land because it is the book which tells the story of the Irish people and the Irish landscape. Every chapter in the evolution of Ireland since the Ice Age is recorded here and is unaltered since the day it was written.

We think it is a story worth telling to ourselves to remind us of our ancient heritage and the richness it contains. It is also a story we want to tell to visitors who come to Ireland because there is no place else in the world where the story of ancient people, ancient animals, ancient vegetation and ancient climates are so perfectly and accurately recorded than here in the simple bog.

We do not invite the mass tourists who flock to the sunspots of the world for an all-over tan. We do invite the discerning tourists who want to break free from the madding crowd into the wilderness of our beautiful land. We invite you to fill your lungs with pure bog air, to feast your eyes on an empty horizon and to open your ears to nature's stillness, broken only by the call of the snipe and the song of the skylark. If you accept our invitation you will discover how

"To see a world in a grain of sand
and a heaven in a wild flower.
Hold infinity in the palm of your hand
And eternity in an hour".

William Blake.



4 A TOURIST TRAIL BACK TO THE DAWN OF HISTORY.



15,000 years ago: The ice age reached its peak.

13,000 years ago: Ireland began to recover from the grip of the retreating ice, which shrank back towards Scandinavia.

12,000 years ago: Ireland was a great tundra grassland. The melting ice had not yet flooded the areas known today as the North Sea and the Irish Sea. So Ireland was part of Great Britain and Mainland Europe. It was by this land bridge that the Giant Irish Deer travelled to Ireland as did the Mesolithic (early stone age) people.



10,600 years ago: A return to severely cold conditions killed off the Giant Irish Deer.

10,000 years ago: The climate improved. Temperatures were 3° warmer on average than today. The climate was wetter also. The wet climate plus the melting of the remaining ice resulted in the post-glacial landscape of Ireland being very watery. Ireland was covered in shallow lakes the largest of which was the Shannon. The lake covered the whole basin drained today by the Shannon and its tributaries.

The landscape was littered with great hummocks and ridges of boulder clay, sand and gravel, all of which had been dumped by the ice. Drainage was impeded by this glacial debris so the water in the shallow lakes could not drain away.

The lakes were rarely deeper than 3m. Sedimentary material was blown by wind and washed by rivers into these lakes. This is the marl in which the remains of the Giant Irish Deer were trapped underneath the bog. The marl was up to 1m thick.

9,000 years ago: The shallow lakes began to turn into Fens.

8,400 – 9,000 years ago: Mesolithic people had arrived in Co. Offaly.

7,000 years ago: The Fens began to change into raised bog. The climate had become wetter. This suited the growth of sphagnum moss.

5,000 years ago: The cold wet conditions caused bog to grow over the farms of the Neolithic settlers of the Céide Fields.

5 WHAT IS A BOG?

FORMATION OF FEN: (APPROX 2M DEEP)

In postglacial Ireland the landscape was very watery (9,000 – 10,000 years ago). This water could not drain away because of the glacial debris in mounds and ridges scattered throughout the region. Marl accumulated on the lake floors. Water plants began to grow on the shallow lake floors. At first open water plants predominated i.e. water lilies. As the lakes got shallower reeds and rushes took hold. The lake slowly filled in from the outside towards the centre until the lake became shallow enough for a person to walk on it. A post glacial rise in land level or fall in sea level caused the marsh plants to consolidate and build a more solid footing as decaying vegetation accumulated. The marsh gradually became fen dominated by black bog rush, Parnassus grass and common butterwort.

In fens circulating ground water filters all the time through replenishing the supply of nutrients. As the fen grew upwards, the plants could not draw on the nutrient-rich water from below so the fen entered a transition period, where heathers and trees spread across the fen. Sphagnum Moss was the catalyst in changing the fen to raised bog. Once these plants got hold and organic debris accumulated rapidly, the fen grew upwards out of the reach of moving ground water.

Approximately 7,000 years ago conditions became much wetter and cooler, accelerating the growth of raised bog.



FORMATION OF RAISED BOG (7.5 – 13M DEEP)

Raised Bog began to take over from fen peat approximately 7,000 years ago.

The plants which could survive when the fen rose above the level of the nutrient-rich ground water were those, which could survive on rain alone. Conditions changed from alkaline to acid. The only source of nutrition for true bog plants are rainwater and wind-bourne dust.

In the transition period from fen to bog there is "woody fen" peat where the roots, stems and leaves of scots pine, oak, yew and birch display a mosaic of natural regions reflecting the vanishing ecology of the early fen.

As the bogs developed they grew not only upwards but outwards beyond the margins of the original lake basins on to the surrounding mineral soils (limestone glacial drift) where a rich variety of trees grew. Their roots (scots pine, oak, alder, hazel, yew) are still in their original position of growth. The raised bog is dome shaped. Its dominant vegetation, sphagnum moss, is like a great big sponge, sucking up all the water beneath it. Intact bog is over 95% water, more liquid than milk. Eventually the bog swallowed up hummocks and hollows alike, though occasional hillocks of drift did escape as wooded islands surrounded by bog. Some such islands were large i.e. Walshes Island, Lullymore and Lullybeg. Those islands were where some Celtic monastic hermits found refuge between the 5th century and 11th century.



FORMATION OF BLANKET BOG (2.5M DEEP APPROX.)

Blanket Bog is climatic. It develops where summers are cool, humidity is high and there is over 1,250mm of rain, spread throughout the year.

It occurs in the West and on mountains. The word "blanket" means that it follows the shape of the topography. They rarely start in hollows and don't have fen peat at the bottom.

The underlying rock is nutrient-poor (acid rock). The factors which influence their development are:

Rainfall (heavy).

Acid rock (igneous or metamorphic).

Human Influence.

Bogs were absent from the West of Ireland when the first farmers arrived. Clearing of woodland and burning the vegetation encouraged water logging and leaching. This poor land management played a significant part in the spread of blanket bog as it does in its disappearance today. Blanket Bog is divided into two categories:

1. **Lowland Blanket Bog** – below 150m O.D. i.e. lowlands of Galway, Mayo, Kerry, Cork and Donegal.
2. **Upland Blanket Bog** – between 150-300m O.D. i.e. the mountains of Galway, Mayo, Kerry, Cork and Donegal.



6 BOGS AS LIVING MUSEUMS

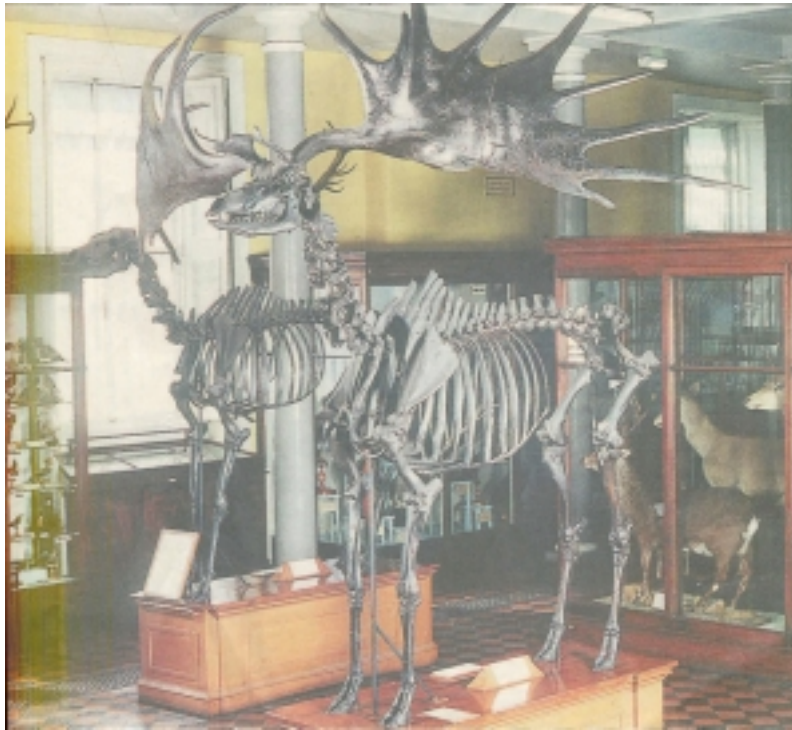
BOGS AS ARCHIVES OF THE PAST

The bog is the most ancient history book. One millimetre of undecayed vegetation falls into its acid anaerobic water each year. That is one page of the history book. That page is imprinted with events of that year. Each of these pages, all 9,000 of them lies in the bog undisturbed since the year it was first put there. When the turf cutter slices down into the peat, he is quite literally turning back the pages of history.



THE GIANT IRISH DEER.

The last Ice Age reached its peak around 15,000 years ago. Ireland began to recover from its grip 13,000 years ago. The climate improved rapidly and plant and animal life began to make its way back into the country, the largest animals using the land bridges, which connected Ireland to Great Britain and mainland Europe. Tundra grasses extended across Ireland in front of the retreating ice. The most wondrous spectacle of the Irish landscape of this time must have been the herds of enormous deer, which wandered the vast grasslands between 12,000 and 10,600 years ago. Enormous is not an exaggeration. These deer were huge in every sense. They were up to 2m in height at the shoulders, but their most amazing endowment were the antlers of the stag, which spanned up to 4m and had a dry weight of as much as 35kg. These were the largest deer which ever lived and, although they roamed most of Europe, the densest populations seem to have been in Ireland. At least this is where most of its fossils have been found. So it is appropriately referred to as the Giant Irish Deer.



Fossil Giant Deer have been recovered from the lake marls all over Ireland but one place which has yielded more than any other single locality is the small bog of Ballybetagh in South County Dublin. Thirty giant deer skeletons were found here during a Famine relief scheme in the 1840's when a channel was being dug across the bog. By the end of the century, Ballybetagh had yielded 120 skeletons. Strangely, all belonged to old male animals. There were no females or young. It would appear that the giant deer had similar habits to many living deer today. Males and females congregated together only during the rutting season in the autumn. During winter the stags gathered along sheltered valleys and around lakes while the females and young were out in more open country.

The massive antlers were used for display and to determine social rank among the stags. In spite of their size it appears likely that they were also used in combat.

Having to grow a new set of antlers each year made enormous demands on the animal's resources. The antlers grew at a rate of several inches per day. This could only be done in spring and summer when there was an abundant supply of food. The fawns were born in spring. This gave them plenty of time to build up their strength for the winter. Only the male deer had to carry the burden of the antlers. The female deer was a more graceful animal without the neck muscles needed to hold up the antlered head.

All the Giant Deer remains have come from the lake marls underlying the raised bog. Between 10,600 and 10,000 years ago there was a brief return to intensely cold conditions. It is now believed that the deer which had congregated at the edge of Ballybetagh Lake had died of weakness and hunger. They were unable to survive the rigours of the deteriorating climate. We know they died in winter from the poor condition of their antlers, which were shed each winter. Most of the Giant Irish Deer skeletons are in the National Museum of Ireland today. Tourists visit the National Museum each day to experience the wonder of the Giant Irish Deer for themselves.

POLLEN EVIDENCE

Pollen grains of flowers, cone-bearing plants, fern spores, mosses and fungi are wrapped in a chemical, which resists decay. So every bog contains samples of the spores and pollen grains, which fell on its surface every year throughout its build-up, giving a detailed record of the plants, which grew, on its surface and in its vicinity.

The name of this game is "pollen analysis". It is played by collecting peat samples from known depths. Using strong chemicals, the humified peat is dissolved away leaving the tough grains and spores which, after concentration in a sort of scientific spin-dryer called a centrifuge, are stained, identified and counted.



Pollen analysis of the lake and peat deposits found below, around and above the Giant Irish Deer tell us that the deer fed on lush grass laced with arctic and alpine plants, sedges, docks, sorrels and the leaves of small willows and junipers. There were no large trees around. All these plants arrived before the deer; their light seeds carried by the wind or by birds. From 10,000 years ago the climate improved and trees dominated the landscape for several millennia. This is also known from the pollen spores they yielded up to the bogs. When the Mesolithic people camped at Lough Boora, Co. Offaly between 8,400 and 9,000 years ago, the pollen evidence reveals that temperatures were 5° warmer than today. It was a wet climate so the vegetation of the time consisted of thickly wooded lowlands of oak, elm and alder in the lowlands with pine on the higher ground. These are the trees whose trunks and roots were later swallowed up by the growing bog.

When the Neolithic farmers of the Céide Fields abandoned their farms around 5,000 years ago it was because the climate had become colder and wetter. Climate deterioration is recorded in the disappearance of tree pollens. The cold damp conditions continued. The growth of peat accelerated, swallowing up the fields of the Céide farmers and burying the roots of the great forests, which had covered the landscape since the Ice Age.

EARLY STONE AGE PEOPLE (MESOLITHIC)

Boora bog, Co. Offaly is part of the largest area of raised bog in the midlands. In the mid 1950's a small lake in the middle of the bog was drained to facilitate cutting by Bord Na Móna. By the mid 1970's the fen peat at the eastern edge of the drained lake was starting to erode. As it did, a ridge of cobbles began to appear. It was called the stony corner where geese gathered in winter. Joe Craven, a fieldworker with Bord Na Móna became suspicious. He informed Dúchas. It was identified as a storm beach at the edge of a great lake that covered the area after the Ice Age. Near Crancreagh Bridge, 8km to the west, a single wave eroded mushroom stone marks the position of what must have been the North Western edge of the lake. All this tells us what the landscape looked like after the ice age.

What was startling was the discovery on a promontory jutting into the ancient lake of the remains of 14 hearths. The charcoal from the hearths gave radiocarbon dates between 8,400 and 9,000 before present, establishing the presence of human communities at the heart of Ireland in the early Mesolithic. Around the hearths were 400 blades of chert and flint, chert scrapers, polished stone axes, the remains of meals i.e. burnt bones of deer, pigs, hares, birds, fish and hazel shells. The discovery pushed the date of the colonisation of the Irish Midlands back more than 3 millennia to 500 years after the Ice Age. People came before the bogs in Ireland. Wooden artefacts of the time preserved in bogs include an alder wooden shield found in 1934 at the bottom of a raised bog in Cloonlara, Co. Mayo. Before this discovery, it had been believed that the Mesolithic settlers had been confined to the East and North East coast i.e. Co. Antrim. The Lough Boora and Cloonlara finds tell us that they did penetrate the country. 10,000 Tourists each year visit Lough Boora Parkland, which apart from the Mesolithic Campsite is an excellent example of a cutaway bog, which is regenerating very successfully.

LATE STONE AGE PEOPLE (NEOLITHIC) I.E. THE CÉIDE FIELDS.

Céide Fields was a farming countryside of homes scattered throughout the landscape, surrounded by their garden walls, very similar to the Irish landscape today. The great difference is that this landscape was lived in and worked 5,000 years ago and not since then.

It has been preserved, undisturbed for 5,000 years by 4m of blanket bog.

The simplicity of the fields conceals the fact that here is the most extensive Stone Age monument in the world. It is also the oldest enclosed landscape in Europe, covering an area of more than 1,000 hectares of ordinary farmland trapped in time by the growth of the bog.

The main feature of this site is the simple stone walls, which make up field boundaries. Turf cutting for a few generations has been like a free archaeological excavation, which, by removing the bog, has exposed again the land surface, which has been buried all that time. It is not the stone walls themselves, which are of interest but the evidence they provide of a thriving farming community. This settlement is exactly as it was 5,000 years ago. Not a stone has been touched. Contrast this with anywhere else in Europe, where land has continued in use by farming communities over the millennia. Even though individual monuments from the Stone Age do

survive elsewhere they sit today in a modern landscape with no possibility of knowing what the landscape was like at the time.

Céide Fields is a countryside of regular rectangular fields almost certainly for cattle, though some smaller fields have been found where wheat and barley were grown. The main plan of the Céide Fields shows that the fields were laid out in two sets of parallel field boundaries with some of the walls running for almost 2km.



Perhaps the most interesting way to get the meaning of what we have in this landscape is to step down from the present bog level to where the Stone Age land surface was. Each step represents a thousand years. Each step takes you on to a level, which is made up of plants, which grew a thousand years earlier than the plants in the step above.

The first step leaves you standing on plants, which grew here about 1,000 years ago when the Vikings held sway from Scandinavia to the Black Sea and as far South as the West Coast of Africa.

The second step brings you to stand on the plants, which grew at the time of Christ when the Roman Empire was at its height.

The third step leaves you standing on the plants of 1,000 B.C. when the celtic warriors were coming to power in Europe, north of the Alps. South of the Alps at this time Rome and Athens were little Mediterranean villages.

A fourth step brings you on to the vegetation of 2,000 B.C. Metal working had just been introduced into Ireland. It had been discovered that beer could be made from barley.

The final step brings you on to the mineral soil beside an ordinary stone wall. Except this is no ordinary wall. The field it surrounds was already deserted and the bog had already grown up half the lower step before the Pyramids were built in Egypt.

An oval enclosure with low stone walls was excavated in the mid 1980's. Some domestic materials were discovered including bits of broken pottery vessels, some flint objects and arrowheads. Because the pottery is similar to that found in Stone Age tombs elsewhere in Europe, we know that these people were part of the great community of early European farmers. The most interesting find was the cutting part of a plough. The plough would have been made of wood and would have been drawn by cattle as the horse had not yet been brought to Ireland.

Within the enclosure a number of postholes suggest that a single round house about 6 metres in diameter was constructed inside. This could have accommodated no more than a single family. A radiocarbon date for the hearth indicates that the family lived here a few centuries before 3000 B.C.

The oval enclosure compares in no way with the average stone fort of later Celtic times. The fact that the inhabitants of Céide Fields had no defensive walls is the most eloquent monument to the society of that time. This family dwelling was part of a community which must have numbered hundreds at Céide Fields alone. This sizeable community lived in peaceful conditions. Otherwise, individual families could not have lived in this dispersed pattern scattered throughout the landscape without the semblance of protection to defend themselves. The conclusion must be that the family was under no threat from any of their neighbours living in any other enclosure scattered throughout the Céide Fields. What a lesson this is for modern Ireland where every home must be alarm protected. We believe from our research that Céide Fields offers huge potential for tourist development. We anticipate that within 10 years, it will be second only to Newgrange as a destination for heritage tourists.



BOGWOOD

The bog surface was sometimes dry enough for tree growth. These trees were overwhelmed when conditions became wetter once more. These buried forests are evidence of climate change in the past.

The woods were dominated by pine but oak birch, alder, willow, yew, hazel and ash also occur. Bog yew was so plentiful in Contiglas, Co. Laois that farmers used it for making gate posts and

roof timbers from the 16th century to the 20th century.

Several generations, perhaps 500 – 1000 years, of growth can often be seen on top of each other. The roots are spread out, indicating waterlogged conditions. Trees vary from 30 – 300 years in age. One yew from Contiglas was over 400 years old when the bog entombed it.

Dendrocronology is the study of tree rings. The tree ring calendar is so accurate for bog oak that it is possible to say when a particular bog oak was alive and growing (absolute dating). The oak tree ring calendar now spans a period of 7,500 years, providing an invaluable tool for archaeologists and climatologists. The detective work of Prof. Mike Baillie, Queens University, Belfast suggests that years of restricted growth may have been caused by veils of volcanic dust in the atmosphere. The origin of this volcanic dust has been traced to Iceland. This dust is preserved in the peat as tiny slivers of volcanic glass. A study of bog pines by Tony McNally South East of Edenderry showed that that particular forest had existed for at least 500 yrs. Radiocarbon dating placed it between 2,500 and 1,800 BC. All the trees of that forest died when the water table rose and waterlogged their roots. This occurred around 2,800-1,500 BC when the climate of Northern Europe became wetter. Dendrocronology is the most accurate science in the study of past climate changes.

Bogwood was highly valued by our Irish ancestors from the 16th century to 20th century when timber could be got nowhere outside the landlord estates. The growing bog had engulfed the ancient forests, which had once covered the land. The bog had seasoned and preserved it. It was prized for its beauty and durability. It was used as roof timbers in the cottages of the poor and also in churches. It was shredded to make ropes. Bog yew was particularly prized for making furniture. It was similar to rosewood but superior to it in its beauty, colour and firmness. Bogwood was also used to make kitchen vessels, butter churns and feeding troughs.



The method used to find tree trunks in intact bogs in the past is fascinating. People would search for areas wherever early morning dew, frost or snow disappeared first. A long metal probe was then used to confirm the presence of the timber.

The ebony colour of bog oak distinguishes it from pine. It is due to the combination of the gallic acid in the wood with the iron held in solution in the water of the bog. A real black dye is thus produced. Pine and yew present only a light fawn to brown colour, simply because they contain less gallic acid.

All bogwood, being saturated with iron from the bog water, is perfectly preserved. The presence of iron increases the weight of the wood and converts it to a kind of stone. When the timbers are first brought to the surface from the airless depths of the bog, they are pliable. It is essential that carving is undertaken immediately because when full petrification takes place, the wood becomes steel-hard. Irish bog oak has therefore been compared to Whitby jet which is more polishable but more easily chipped than the Irish bog oak. Celtic roots studio, near Athlone is a bogwood workshop worth visiting. It is visited by 25,000 tourists each year and that number is growing.

BOG BUTTER

One of the most widespread archaeological objects found in bogs is butter because the bog was the nearest functional equivalent to a refrigerator in early Ireland.

In order to preserve butter, 5% or more salt was added to it. If salt was scarce or unaffordable, the cold anaerobic antiseptic peat offered an alternative way to preserve butter through autumn and winter (when milk supplies were low). The butter was wrapped in cloth or skin containers, in baskets made from wicker, in wooden casks made from a single piece of wood or in barrels made of staves.

Butter was buried in bogs until the end of the 17th century, reflecting the fact that milk and milk products were the main food of the Gaelic Irish until the collapse of the Gaelic order around this time.



Bog butter deteriorates in appearance and flavour with time as the fat in the butter is altered by microbial action. It is a hard yellowish – white substance. Hygiene being of a different nature in those days, it usually contains plenty of cow's hairs. Bog butter was offered for sale in Tralee as late as 1853.

Traditionally, butter was thrown into bogs as votive offerings even up to modern times.

As late as the 1940's, butter was always thrown into the bog lake at Bella, Co. Mayo as thanksgiving for the cure of a horse or a cow.

BOG BODIES

We are aware of the ritual dimension of the Bronze Age hoards found in bogs. There is clear evidence of another type of ritual associated with bogs. Bog bodies are the most fascinating of the archaeological objects found in bogs. Approximately 80 bodies have been found in Irish bogs in the past 2_ centuries, most of them in raised bogs.

Some are the remains of people who died of natural causes and were buried in the bog. Others were murdered and hidden in the bog to avoid discovery. But a small number were people who suffered ritual execution in the Iron Age, a practice know across Europe in Celtic times but much better documented elsewhere i.e. in Denmark where Tollund Man and many other victims have won immortality in the modern Hall of Fame.

One of the oldest such bodies in Ireland, and also the first properly documented account of a bog body, was the body of a woman found in 1781 at the bottom of Drumkeragh bog, Co. Down. There was a large stone at each end of the skeleton, which was accompanied by numerous garments whose quality suggested a woman of high rank.

Another female body aged 25-35 was found by turf cutters in 1978 under 1 metre of blanket bog at Meenybradden, Inver, Co. Donegal. Radiocarbon dating indicates a date between 1050 AD and 1410 AD. There is no evidence of the cause of death.

The earliest skeletal remains date from the Neolithic period and come from Castleblakeney, East Galway, **namely the Gallagher man**. He was uncovered under 10 feet of peat by the O'Kelly family while they were cutting turf in 1821. The O'Kelly family used to resurrect him for a small fee for any visitors who came to see him and then re-bury him. News of this spread to Dublin so scientists and reporters from the national newspapers went to see him. The newspapers reported "a body with handsome features and a foreign aspect, dressed in a light cloak which covered his body to his knees. He had black hair and was bearded. His flesh appeared fresh and, apart from a hole in his stomach, he was perfectly preserved. He was around six feet tall". He was removed to the National Museum where for 100 years they thought he was a medieval man. But time brings knowledge. Recent technology has revealed that Gallagher Man had met a grisly end, ritually strangled, similar to Tollund Man in Denmark. He has been radiocarbon dated and given a CAT scan to see if his body will give up more of its secrets.

It appears Gallagher Man was naked except for his cloak that he had broken the law and was slain and his body left staked to the ground so his soul could not break free. His hair had been cropped and his clothes removed as part of the public execution. Public executions, than and now, have their own ritual.

Gallagher man is visited by tourists each day in Ireland's National Museum. He is still earning his keep as he did with the O'Kelly family.



TOGHERS

In the centuries after 1000 BC, Ireland was becoming a focus of interest to bands of aggressive iron-using Celtic warriors.

At the same time as the Celtic language of the Iron Age warriors was replacing the languages of the Bronze Age, the climate began to become wetter. Sphagnum became dominant on raised bogs and grew more rapidly.

The Celts were equally good farmers as they were warriors. They needed to provide communication between their farmsteads and distant fields, perhaps between settlements separated by bog. They did this by laying down tree trunks side by side across the bog surface to make tracks called toghers. All of these toghers were sooner or later abandoned to the bog and several millennia of sphagnum accumulated over them, preserving them in almost their original condition. Their discovery puts us in touch with every day lives of the past in a way few other aspects of archaeology do so poignantly.

There are over 60 toghers in the Corlea complex. The toghers in Corlea range in date from the 4th millennium BC to the 6th century AD. More than 1000 toghers exist in Ireland but the Corlea toghers are the most impressive. The oak trees used to make them were felled 148BC. They consist of close-fitting split oak sleepers, 3-4 m long and up to 60cm wide, supported on pairs of long straight runners. The sleepers were mortised and pegged down with hazel, birch or oak pegs. Part of it ran from the west to an island in the bog. Another part of it ran from the South East to the same island. What keeps the timbers of the toghers together is the water they contain. To excavate part of the Corlea track and relocate it in Corlea Exhibition Centre, the water had to be replaced by a liquid wax. It was soaked in a warm wax solution for seven months to achieve this. It was then brought to Portsmouth, England and freeze-dried. This stabilised the internal structure of the timbers and enabled them to be placed in the exhibition centre in the exact position in which they lay beneath the peat.