

SHERKIN COMMENT

Issue No. 58

Environmental Quarterly of Sherkin Island Marine Station

2014

Atlantic Salmon – Lost at Sea

Ken Whelan outlines the unprecedented risks facing our wild salmon stocks.

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Máirín de Valéra – An Appreciation

Michael Guiry remembers a remarkable lady who spent much of her working life studying seaweeds.

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The EPA suggests steps to access if a well is at risk.

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Seabirds off the South West Coast of Ireland

Photographs of coastal birds by Robbie Murphy

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CORK

An Ever-changing City

(See page 18)



St. Vincent's Bridge, Cork City
Photograph by Robbie Murphy

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Editorial

Memories Frozen in Time

By Matt Murphy

IN reviewing the book "Atlas of Cork City" (p. 18), I was struck by the chapters on "Weather and Natural Disasters" and "Flooding in the City" and the many hardships weather and natural forces have created for the city over the centuries. The effects of the Little Ice Age must have been harrowing. This was a period of climate change that began in the 1400s and continued until the 1850s, bringing colder winters to part of Europe and to North America. During the height of the Little Ice Age in America, New Yorkers could walk across the harbour from Manhattan to Staten Island. Most of the rivers in Europe, including the Thames, froze as did the Baltic Sea. Cork was badly hit by these freezing conditions and the subsequent shortage of food, caused by the freezing conditions and a reduced growing season. Temperatures reached their lowest in the late 18th century and early 19th century and diseases and starvation claimed over 350,000 lives throughout the country.

It is hard to imagine how hard it must have been for people throughout the country during this time. There was no central heating, housing conditions were appalling in most cases and even clothing would have been nothing like the modern materials we have today to keep us warm. Growing up in Cork City in the 1940s, the climate then was nothing like that of the Little Ice Age. We would have lived a far more comfortable life than those of the 18th and 19th century. Though central heating had yet to become the norm, we still had good housing and did not want for the basic comforts in life. Winters seemed harsher than they do now and snow seemed to come nearly every winter.

Going to school then or indeed out of our house we used to put old socks over our shoes. This helped to stop us sliding all over the place. We regularly watched the doubledecker buses trying to get up Roman Street to the Cathedral, often without success. Frozen pipes were a regular occurrence as we had a lead pipe coming in through a small outhouse and it would freeze at the drop of a hat. The defrosting remedy was warm water from the kettle. In a freezing spell various basins and jugs were automatically filled so as to have some water available. Despite the inconveniences of freezing weather, the great joy would be when snow came and it was so heavy we did not have to go to school.

Interestingly, I recently came across a report by Aidan Murphy from Met Éireann about "Snowfall in Ireland". In it he lists the most outstanding snowfall events in the Ireland in the past two centuries. I was fascinated to read about 1947, when I was eleven years old. He said: "The early months of 1947 saw one of the most persistent cold spell of the century, with snowfalls affecting all parts of the country from late January until mid-March. Although heavier individual snowfalls have been recorded, notably in January 1917, at no other time in the recent past has there been such a period of continuous

cold weather. Following the disastrous harvest of 1946 and the extension of wartime rationing food and fuel, the severe weather caused hardship for many people and disrupted the country's communication and transport facilities for several weeks. By the beginning of February there were reports of skating on frozen ponds and the unrelenting cold continued until the middle of March."

Snow in the early 60s when Eileen and I went to live near Banteer in North Cork presented serious problems for us. I remember having to drive the mountain road to Cork over Nadd in heavy snowfalls. There was little or not traffic on the road then and I can remember praying that I wouldn't skid and end up in a dyke as there would be no one around to get me out. I have a great memory of a cold spell back then. My eldest child, Matty, was born at the end of 1963 and for those of my generation you will remember we used towel nappies. I had left a dozen or so hand-washed nappies on the line overnight, with no idea it was going to freeze. I arrived out next morning and they were all stiff as planks on the line!

Snow became a thing of the past when we moved to Sherkin. The only snow we

saw was in the distance on the mainland. In over 40 years on the island, we have only had a handful of snowfalls that settled on the ground for any length of time. The greatest wish my gang had when they were young was to be able to scrape enough mud-filled snow together to make a snowman. The winter of 2010 fulfilled many childhood dreams, when Sherkin, along with the rest of the country was covered in a blanket of pure white snow. Snow depths of between 10 and 25 cm were recorded at many locations around the country, causing serious disruption for many, but moments of bliss for others. We had 3 inches and enjoyed the novelty.

As Met Éireann continues to record the ordinary and extra-ordinary weather events from snowfall to floods to droughts, it will be interesting to see what picture emerges over time. We have had the Medieval Warm Period and then the Little Ice Age. What age will our grandchildren, great-great grandchildren and great-great grandchildren enter?

Matt Murphy, Sherkin Island Marine Station, Sherkin Island, Co. Cork.

Irish Temperature Extremes

(Records from Met Éireann - updated on July 2013)

Highest air temperature: 33.3°C at Kilkenny Castle on 26th June 1887

Highest air temperature recorded during the 20th Century: 32.5°C at Boora, Co. Offaly on 29th June 1976.

Lowest air temperature: -19.1°C at Markree Castle, Co. Sligo on 16th January 1881.

Lowest air temperature recorded during the 20th century: -18.8°C at Lullymore, Co Kildare on 2nd January 1979.

Lowest grass minimum temperature: -19.6°C at Glasnevin, Dublin on 12th January 1982.

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SANDERLINGS

The Duracell "Sea Mice"



Sanderlings busily foraging on the shore.

By Oscar Merne

FIRST, my title may need a little explanation... The term "sea mice" has been used colloquially to describe a variety of small grey waders, foraging busily on the shore, slightly reminiscent of scuttling *Mus musculus*. The advertisements for Duracell batteries emphasise the high energy and long-lasting virtues of these: two things which seem to fit the Sanderlings, especially when they are hurrying about in the wave-wash zone picking up tiny food items.

In Ireland, in autumn, winter and spring, when the Sanderlings are away from their breeding grounds, most of the birds look almost completely white, though their backs are in fact pale grey. Otherwise, they have medium-length black bills and legs. However, late in the spring and early in the autumn, small numbers of adult birds are seen in their breeding plumage: reddish heads and backs that are a mix of black, brown and reddish feathers that provide them with excellent camouflage when they are sitting on their nests on the high Arctic stony tundra.

Sanderlings, though breeding in the North American and Eurasian very high Arctic have a surprisingly restricted range. They have a strong preference for nesting in sparsely vegetated stony tundra, which is scarce compared with the vast tracts of typical tundra of the circumpolar lands. Also, there simply is not much land extending northwards above 80 degrees towards the Pole. So the entire breeding population of Sanderlings is "squeezed" into part

of the Beaufort Sea coast of north Alaska, the Canadian Arctic Archipelago, the north and NE coast of Greenland, Svalbard (including Spitzbergen), and the islands and adjacent coasts of northern central Siberia, between 75° and 150° E. The most northerly breeding birds are found at 83-84° N, and are among the most northerly breeding species on the planet.

Compared with the seven billion humans now crowded onto our planet, the total Sanderling population is tiny, with an estimated 600,000 individuals. Nevertheless, after the breeding season, all these birds migrate south to spend the non-breeding season (the northern winter) on the coasts of all continents except Antarctica. The breeding birds and their young from NE Canada, north and NE Greenland, Svalbard and the western edge of their Siberian range use the East Atlantic Flyway and winter on the Atlantic coasts of Europe and Africa, from Morocco all the way south to the Cape of Good Hope. A relatively small proportion of the total population of Sanderlings (c.123,000 birds, or c.20%) use this vast area, while the rest of the population occurs on the Atlantic and Pacific coasts of the Americas, as far south as Tierra del Fuego, the Arabian Sea shores of East Africa, the Indian sub-continent, large parts of SE Asia, Australia, and even areas on South Island, New Zealand. Truly, these tiny waders are among the world's greatest globe-trotters!

With its (usually) temperate winter climate, the Atlantic coast of Europe, from Ireland, Britain and Denmark to Iberia, is the most northerly winter-

ing area for Sanderlings, supporting an estimated 34,000 birds. The Irish wintering population has been estimated at up to 3,000 birds, though this might be on the low side as numerous beaches where small flocks might occur are not covered by the Irish Wetland Bird Survey, which concentrates mainly on the larger coastal estuaries and wetlands.

The main Irish sites used by Sanderlings are Tralee Bay and Castlemaine Harbour, Co. Kerry, Dublin Bay and sandy beaches to the north, Lough Foyle, Co. Derry, and Mannin Bay, Co. Galway and Clew Bay, Co. Mayo. All these sites have extensive wave-washed sandy shores, much loved by these little waders.

We have good recent information on the migration of another small wader, the Turnstone (see *Sherkin Comment* No. 50), using data-loggers, but so far only traditional ringing and colour-ringing have been used on Sanderlings, and so there is little detailed information on routes, long-haul migrations, staging areas etc. Sanderlings, at 20-21 cm long with a wing-span of 35-39 cm and weight of 33-110 g, are smaller than Turnstones (26 cm long, wing-span of 50-57 cm and weight 84-190 g), which limits the use of electronic tracking technology at the moment. But miniaturisation (and therefore hardware weight) is advancing apace, and it can only be a short



The Irish wintering population of Sanderlings has been estimated at up to 3,000 birds, though this might be on the low side.

while before it will be safe to use the technology on the smallest waders.

Actually, Sanderlings are not the smallest northern hemisphere waders that migrate all the way to the land limits of the southern hemisphere. The Old World Stints (Little, Temminck's, Red-necked, and Long-toed), and the New World "peeps" (Western, Semipalmated and Least Sandpipers), do so too. So, next time you are flying in a comfortable jet to southern South America, or South Africa, or Australia or New Zealand, as I have done, at 900-1,000 kph, think of the flocks of

tiny waders that routinely make the journey from the high Arctic to these non-breeding areas at the other side of the globe – on their own wings and using their own fat reserves – and have been doing so for thousands of years. Nature is truly awesome!

Oscar Merne retired from Ireland's National Parks & Wildlife Service in January 2004. Before he died in January 2013, Oscar wrote a number of articles for Sherkin Comment to be published in future issues.



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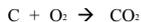
A Beginner's Guide to Ireland's Wild Flowers at €7.50 (plus p&p €1.00)

See page 29 for details

By Anthony Toole

IN a recent incident, two fishermen were found to have died in their boat while it was moored in a harbour in the North of England. The subsequent post-mortem concluded that their deaths were due to poisoning by carbon monoxide fumes emanating from the boat's engine. Unfortunately, incidents like this are far too common, yet many are avoidable.

When any carbon-based fuel, whether coal, oil or natural gas is burned, the main combustion products are carbon dioxide and water.



While carbon dioxide may be responsible for global warming, it is not toxic. Each molecule consists of a single carbon atom combined with two of oxygen. If the supply of oxygen is limited in any way, then there may be insufficient to burn the fuel completely. In this case, the highly toxic carbon monoxide may be formed, in which each carbon atom is combined with only one of oxygen.



In normal respiration, the oxygen breathed into the lungs combines with haemoglobin, the red pigment in the blood, and is carried around the body to where it is needed to burn food and produce energy. If carbon monoxide is breathed in it combines with haemoglobin in the same way as does oxygen, but it is not easily released. The blood gradually fills up with carbon monoxide until it can no longer carry sufficient oxygen. An atmospheric concentration of as little as 1% is enough to replace 50% of the blood's oxygen-carrying capacity, and can cause death within an hour.

Blood that is saturated with carbon monox-

ide turns a brighter red colour, with the result that the first clue to poisoning is an unnaturally pink tint to the victim's flesh. Indeed a chemical test once used to identify the gas involved shaking it with ox blood, presumably obtained from a butcher, and observing the brightening change of colour.

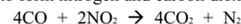
In coal mines throughout the world, explosions are sometimes caused by a build-up of inflammable gases such as methane and hydrogen sulphide, as well as tiny coal dust particles. Because these explosions occur in an environment with a limited supply of air, one of the products in the resulting mixture, referred to by

miners as 'afterdamp', is usually carbon monoxide. This often causes the deaths of miners who have survived the initial explosion, and may indeed be responsible for more deaths than the explosion itself.

Carbon monoxide is likely to be produced in significant quantities if a car engine is run in a closed garage, or a fuel is injected in a poorly ventilated space, such as a caravan with its windows and doors closed. One of the worst cases occurred in Italy, when a train broke down in a tunnel, and more than 500 passengers died of carbon monoxide poisoning.

The build-up of carbon monoxide around

heavy traffic may cause drowsiness in car drivers and thus be responsible for some road accidents. The use of catalytic converters in modern cars minimises this problem by allowing the carbon monoxide to react with nitrogen oxides to form nitrogen and carbon dioxide.



In a solid fuel fire, the presence of carbon monoxide is often indicated by a blue flame at the back of the fire, caused by the gas burning safely to form carbon dioxide. Prior to the introduction of methane (natural gas), domestic gas was made from coal. This coal gas, sometimes referred to as town gas, contained almost 10% carbon monoxide, so that leaks almost invariably proved fatal. From that viewpoint, methane is much safer, being non-toxic, though like coal gas, it may still explode if it comes into contact with a naked flame.

However, methane requires four times the amount of oxygen for complete combustion as does an equivalent volume of coal gas. This means that a room heated by a gas-fired appliance needs to be very well ventilated. Such appliances must also be regularly serviced and maintained to allow efficient burning of the methane. A small, inexpensive carbon monoxide detector placed in a suitable position near an appliance is a good investment that may well save lives. Unfortunately, there will always be cases when these precautions are not met, and this silent, and scarcely detectable killer will kill again.

Anthony Toole, 65, Cheswick Drive, Gosforth, Newcastle upon Tyne, NE3 5DW, U.K. E. anthonytoole@fsmail.net http://myweb.tiscali.co.uk/anthonytoole

CARBON MONOXIDE

The Silent Killer

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Carbon Monoxide
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WASTE MANAGEMENT (PROHIBITION OF WASTE DISPOSAL BY BURNING)
REGULATIONS 2009

"... these Regulations include the prohibition of the disposal of waste by burning and the prevention of environmental pollution by such disposal."

Cork County Council, Environmental Awareness & Research Unit. Tel: 021 4532700
Cork County Council, Waste Enforcement Unit.

BACKYARD BURNING

A number of people still rely on burning as a traditional form of waste management. This is no longer acceptable as it poses a threat to our environment and human health.

The following practices are examples of backyard burning:

- Burning waste in a barrel or exposed heap (bonfire) in a yard or garden
- Burning in a purchased ready made "home incinerator" *
- Burning commercial waste on a business premises or farmyard
- Burning waste on a building site

All of these are illegal under the Waste Management (Prohibition of Waste Disposal by Burning) Regulations 2009.

The above burning activities are also legislated for by the Waste Management Acts 1996 to 2011 and the Air Pollution Act 1987. The Waste Management legislation makes it an offence to:

Dispose of waste in a manner that is likely to cause Environmental Pollution.

Cork County Council (Storage, Presentation and Collection of Household and Commercial Waste) Bye-Laws 2014 require Householders to be able to prove how they dispose of their waste. Provision is made for an on-the-spot fine of €75 for breaches of the Bye-Laws.

The Air Pollution Legislation makes it an offence to:

Cause or permit emissions (including smoke and odours) from your premises in a manner that will cause a nuisance.

People are also advised that the causing of a nuisance may give rise to a civil action against the person causing the nuisance.

Cork County Council has brought successful prosecutions for these activities under the Air Pollution and Waste Management legislation and will continue to do so in the future.

* DIY stores and other suppliers have been informed by Cork County Council that the use of home incinerator units may give rise to air pollution.



ATLANTIC SALMON - *Lost at Sea*

By Ken Whelan

OVER the past two decades or more issues relating to the marine survival of Atlantic salmon have dominated the concerns of fishery managers. During that time the seas in the north-east Atlantic have shifted to a warmer regime that has seen marked changes in the composition and production of plankton and resulted in reduced salmon abundance. Forty to fifty years ago there would have been some 8 million Atlantic salmon at sea but we are now looking at an overall stock of some 3 million fish or less. The drivers of this decline are complex and regardless of the efforts made to reduce harvest levels by nets and rods, to enhance habitat and to protect the salmon's freshwater environment, return rates from the ocean have stayed stubbornly low. This has happened despite the fact that catches of salmon have been greatly curtailed, dropping from around 12,000 tonnes in the 60s to their current levels of 1,500 tonnes.

It is now clear that our seas are changing rapidly and that the impacts of climate change

are cascading down through the marine trophic levels of the world's oceans. The abundance of salmon mustering at sea (so called pre-fishery abundance levels), prior to their arrival in freshwater, has dropped by 66% in the case of southern European grilse and by a staggering 81% for the larger, multi-sea winter salmon. While valiant efforts to eliminate or curtail the major commercial fisheries have doubtless resulted in much improved escapement into freshwater, bolstering spawning stocks, and in some year's rod catches, the overall marine survival of salmon has remained low. Perversely this improvement in adults to the spawning beds has often masked the true story at sea.

The survival of salmon smolts at sea is regulated by a complex and varied array of interacting factors: predation, changes in the marine environment and food availability immediately spring to mind. Continuously monitored index systems, such as the Bush (County Antrim) and Burrishoole (County Mayo), have seen the survival of smolts drop from an average of 15% to less than 10%. In more recent years survival



Photo courtesy: Ken Whelan

Salmon post-smolts heading out to sea.

rates have struggled to reach 8% and at times have dipped to 5%. Losing 95% of a river's output at sea is unprecedented and indicates ocean-wide changes which are impairing the smolts' ability to feed and grow at sea. However, far more subtle synergistic forces may also be at work and changes over time in competition rates for

food with sister species at sea, increases in the incidence of parasite loadings from poorly sited marine aquaculture facilities and the impacts of the marine commercial fisheries doubtless all exact a further toll.

Research over the past decade has, for the first time, given us a clear insight into the migration and distribution patterns of salmon at sea. Migration models have provided us with detailed information on the overall migration routes of young post-smolts from southern Europe, as they move northwards along the shelf edge. Genetic markers for regional salmon stocks and indeed in some cases for individual riverine stocks are currently available. These will allow us to assemble maps of specific salmon migration corridors in the ocean and ensure that these receive the level of protection currently afforded to

other marine based Scientific Areas of Conservation (SACs). The current concept of an SAC for anadromous stocks which ends in saltwater, is obviously flawed, by their very nature such stocks traverses freshwater, estuaries, bays and indeed the high seas. To ensure optimum recruitment to the marine feeding grounds and safe passage for the returning adults, we must do everything we can to shepherd and protect our salmon stocks at sea, particularly the vulnerable post-smolts. Designation of specific Marine Protected Areas for salmon must go hand in hand with our increasing knowledge of their migration corridors.

From a management perspective it is vitally important that every effort is made to boost wild smolt numbers in fresh water. This is the only component of the salmon's complex life history where managers can take direct action to mitigate the losses at sea. To date great progress has been made in improve improving water quality and initiatives to address connectivity though the removal of dams and other fish passage issues are well under way. We have long talked about the impacts from forestry, pollution, aquaculture in the marine and freshwater environments, and perhaps in the past believed that we had the luxury of time to deal with these issues. In the face of what we now know about the unprecedented risks facing our wild salmon stocks taking urgent management is no longer a choice - it is an imperative.

*Ken Whelan is a former Director with the Marine Institute, and is now Research Director with the Atlantic Salmon Trust (www.atlanticsalmontrust.org), an Adjunct Professor in UCD (www.ucd.ie/bioenvscil) and runs his own fisheries and environmental consultancy (www.kenwhelan.info). He is also working on a new film covering the life of salmon at sea, which is due for transmission in early 2015 (www.atlanticsalmonlost-at-sea.net). His recently published book on sea-trout, with Chris McCully: *Nomads of the Tides: Fishing for Irish Sea-trout*, has received excellent reviews and is a must for anybody with an interest in this enigmatic creature - http://www.mediarpress.com/8166-Fishing-Books-Nomads-of-the-Tides_by_McCully-Whelan.html.*

Further reading on salmon at sea: Salmon Summit: <http://www.nasco.int/sas/salmonsummit.htm>
Salsea Merge papers: http://www.nasco.int/sas/salseamerge_documents.htm
Ocean Silver: <http://www.atlanticsalmontrust.org/oceansilver/>
Atlantic salmon at sea: Findings from recent research and their implications for management http://www.nasco.int/pdf/reports_others/Salmon_at_sea.pdf
ICES Journal of Marine Science (2012): International Symposium on Salmon at Sea: Scientific Advances and their Implications for Management. Volume 69, Issue 9, November 2012.



Using a box trawl to sample for salmon at sea off the Norwegian coast.



Photo courtesy: Walli O'Meara, Leigh Marine Institute

Sampling for salmon at sea off the Norwegian coast.



The home of the salmon - late spring ice pack along the West Greenland Coast.



A large, feeding, adult salmon caught off West Greenland.



Image courtesy of NASA

But how 'nigh' is 'nigh'?

By Daphne Pochin Mould

FOR centuries "hot gossellers" at fair grounds have tried to frighten us with the fear of God, the Wrath to come. For centuries, earnest preachers have, in the Scots phrase "dinged the dirt 'oot the pu'pit cushions" in their efforts to do much the same with our old sins, when for a really cleaner world, they would better have given up their coal fires and smoking factory chimneys. For human ignorance, thoughtlessness if

you like, is making a certain end of the extraordinary planet on which we live. Years of careful research have given us the facts we need, rainfall, temperatures, pressures, wind speeds, the life history of storms and of those mighty storms that sweep round the world, building up great waves that surge inland and over little islands. Winds and water are immensely powerful - gentle breeze and soft tipples become like the hammer of Thor, Norse God of thunder, all-powerful. Their results has left our homelands looking like patches of carpet of which all the edges

have been chewed and torn by a huge litter of gigantic puppies. Could we reverse or halt the process by united international action? It would be needed for a long while and people being what they are, I do not see it happening. Consider the present bloody battles around the world and all the killing factions who want to murder men rather than broker peace. How hard was it to get the north and south in Ireland to agree?

Human beings, like birds of prey seem born with a kill or fight instinct. The hero with sword in hand is their inspira-

tion, they love weapons, colourful uniforms, armour and power over armies, gaining territory and more power. These traits are not what friendship and working together are built on.

You will not find Chinese people (or another folk) willing to give up their cars and all the comforts of modern life to let the sun shine on their capital city again. Removing the black ball of smog that lies over it now would allow a pilot to fly in its airport without having an instrument rating on his or her flying licence, so as to land by

instrument read outs alone rather than only see the ground when landed and stepping onto it. As we are making the air dirtier and the sea is getting bigger with melting glaciers and ice sheets, water is evaporating, breeding clouds and rain, rising air and thunder storms. Could we stop it? Perhaps we will with our present short-term greener ways. So our wonderful world of life and beauty and variety, with bird songs and butterflies and bees, will end as a dried ball of hard and variegated rocks spinning on its own round and round the sun. All book learning and art will be gone back to the sun. Some old stone buildings might survive but there will be no one to wonder what they mean or how they came into existence.

We have enough to be going on with the facts and figures about our planet. Rainfall, atmospheric pressures, wind speeds, hurricanes and tornadoes, ice ages and the behaviour of ice. Aviation and flying has made us much more aware of the air and the different currents at various levels ending up at the poles with high speed arctic winds. Some of these wind have recently come lower than usual driving a much faster breeze down on us. Meteorologists and anyone interested can glean much

from this and build theories of global warming, which unhappily seem to be taking place. It looks like there will be more desert and more storms and wind. The seasons will be longer or shorter, upsetting the old regular interlocking patterns of breeding, raising young and sowing and harvest times will all be altered, not necessarily for the better. Our minds do not easily picture a world of racing electric particles, the Higgs Boson colliding and matter and substances being formed or particles whirling in space becoming in the end the rocky skeleton we call Earth.

Humans arrival does not seem very good for the health of the planet. He began with fire, putting black smoke into clear skies, pouring waste into clean waters and having no thought for the future and its needs. Now some of us see sense but I think it is too late to go back. "That's the way the cookie crumbles."

Daphne Desiree Charlotte Pochin Mould died on 29th April 2014, at the age of 93. This was the last of 61 articles that she wrote for Sherkin Comment. Matt will write a piece in the next issue to remember this extraordinary woman.



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Ceratioid Anglerfishes

(Lophiiformes: Ceratioidei)

in Irish Waters

By Declan T. Quigley

NO place on earth can compete with the enormity of physical and biological constraints imposed on life in deep oceanic mid-waters. With temperatures near freezing, the absence of solar radiation, enormous pressures from the weight of water above, and biomass so low that meals are few and far between, it is inconceivable that animals could occupy this vast and forbidding habitat. Yet fishes are there in surprising profusion, having adapted to these extreme limitations in a host of bizarre and unpredictable ways. Few groups, however, are as prolific and spectacular as the deep-sea Ceratioid Anglerfishes.

Ceratioid Anglerfishes (Sub-Order Ceratioidei) belong to a large Order of teleost fishes known as the Lophiiformes (represented by at least 323 living species), nearly all of which share a peculiar and unique mode of feeding characterized by the structure of the dorsal fin spine (illicium) which is situated on the tip of the snout and modified to serve as a luring apparatus (esca) to attract prey. The shape and morphology of the esca is an important feature used in identifying anglerfish species. With at least 160 species (represented by 11 families) currently known worldwide, the Ceratioids constitute by far the most species-rich vertebrate taxon within the bathy-pelagic zone (depths >300m). At least 44 species have been recorded from the NE Atlantic, including 11 from Irish waters (Table 1).

Ceratioid Anglerfishes are exceeding widespread geographically, occurring in deep waters of all major oceans and seas of the world, from high Arctic latitudes to the Southern Ocean. While some species appear to be almost cosmopolitan in distribution, many others appear to have small, restricted vertical and horizontal ranges. Ceratioid anglerfishes are ecologically important due to their relative abundance, high species diversity, and trophic position as top primary carnivores in meso- and bathy-pelagic communities.

Ceratioid Anglerfishes differ remarkably from their bottom-living Lophiiform relatives (e.g. the commercially important Anglerfish or Monkfish *Lophius piscatorius* & *L. budegassa*) by having an extreme sexual dimorphism and a unique mode of reproduction in which the males are dwarfed. For example, the free-living adult males of some Linophryniids measure

only 6-10 mm (SL) and represent one of the world's smallest mature vertebrates. Mature males attach themselves, either temporarily or permanently, to the bodies of relatively gigantic females. For example, in the Kroyer's Deep-Sea Anglerfish (*Cerattias holboellii*), females may be more than 60 times the length and about half a million times as heavy as the males. The males lack the luring apparatus, and in most species they are equipped with large well-developed eyes and huge nostrils which are apparently used for homing in on a female-emitted, species-specific chemical attractant. The normal jaw teeth of males are lost during metamorphosis but are replaced by a set of pincer-like denticles at the anterior tips of the jaws for grasping and holding fast to a prospective mate. In some species, attachment is followed by fusion of epidermal and dermal tissues and eventually by an apparent connection of the circulatory systems so that the male becomes permanently dependent on the female for blood-transported nutrients (the male effectively becomes a sexual parasite), while the host female becomes a kind of self-fertilizing hermaphrodite. In some species, as many as 8 males may be attached to a single female. The physiological mechanisms (endocrinological and immunological) that allow for sexual parasitism could have significant biomedical importance (Pietsch, 2009).

Kroyer's Deep-Sea Anglerfish (*Cerattias holboellii*)

Kroyer's Deep-Sea Anglerfish is found, albeit sparsely, in all oceans except the Mediterranean Sea. Although only three specimens (2 females & 1 unattached male) have been reported from Irish waters (from depths of 1000-1400 m off SW coast & Porcupine Bank), the species has been frequently recorded from depths <500 m in Icelandic waters. It is the largest of the Ceratioids and the only species known to exceed 100 cm (TL). The largest recorded female, measuring 125 cm (TL) was taken in Icelandic waters. The largest known free-living and parasitic males measured 1.3 and 11.8 mm (SL) respectively (Quigley *et al.*, 2005).

Triplewart Sea-Devil (*Cryptosaras cosei*)

The Triplewart Sea-Devil is found world-

wide in all oceans except the Mediterranean Sea. Although there is only one record (an adult female) from Irish waters (at a depth of c.180 m on the Porcupine Bank), larvae, free-living males and adult females have frequently been reported throughout the NE Atlantic, particularly from Icelandic waters, and is generally considered to be one of the most common Ceratioid Anglerfish. The maximum length (TL) of females, free-living males and parasitic males is 44.0, 1.05 and 7.3 cm respectively (Quigley & Flannery, 1995).

Atlantic Football Fish (*Himantolophus groenlandicus*)

The Atlantic Football Fish is widely distributed throughout the NE, NW and SE Atlantic and possibly in the W Indian Ocean. However, the species has not been recorded from either the Mediterranean Sea or SW Atlantic. Although only two specimens (both adult females) have been reported from Irish waters (off W & SW coast), adult females have been frequently recorded from Icelandic waters, often from relatively shallow depths (30-300 m). The maximum length (SL) attained by females and males, which are non-parasitic, is c. 61.0 cm and 4.0 cm respectively (Quigley & Flannery, 1997).

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Kroyer's Deepsea Anglerfish (*Cerattias holboellii*)
[Photo Declan Quigley]



Triplewart Sea-Devil (*Cryptosaras cosei*)
[Photo Hans Ho]



Atlantic Football-Fish (*Himantolophus groenlandicus*) [Photo Declan Quigley]



Can-Opener Smoothdream (*Chaenophryne longiceps*) [Photo Andrey Dolgov]



Humpback Anglerfish (*Melanocetus johnsonii*)
[Photo Hans Ho]

Table 1. Deep-Water Ceratioid Anglerfishes recorded from Irish EEZ Waters

Family	Common Name	Species	Reference
Ceratiidae (Warty Sea Devils)	Kroyer's Deep-Sea Anglerfish	<i>Cerattias holboellii</i> Kroyer, 1845	Quigley <i>et al.</i> (2005)
	Triplewart Sea-Devil	<i>Cryptosaras cosei</i> Gill, 1883	Quigley & Flannery (1995)
Himantolophidae (Football Fishes)	Atlantic Football Fish	<i>Himantolophus groenlandicus</i> Reinhardt, 1837	Quigley & Flannery (1997)
	Shirohosh-chouchin-ankou (Japanese)	<i>Himantolophus albinare</i> Maul, 1961	Pietsch (2009)
Melanocetidae (Black Sea Devils)	Humpback Anglerfish	<i>Melanocetus johnsonii</i> Guenther, 1864	Pietsch (2009)
	Oneirodidae (Dreamers)	Can-Opener Smoothdream	<i>Chaenophryne longiceps</i> Regan, 1925
Bladsnudet Mareangler (Danish)		<i>Phyllorhynchus microactis</i> Pietsch, 1969	Pietsch (2009)
	none	<i>Phyllorhynchus balushkini</i> Pietsch, 2004	Pietsch (2009)
	Bulbous Dreamer	<i>Oneirodes eschrichtii</i> Lutken, 1871	Pietsch (2009)
	Lyoshyrna (Icelandic)	<i>Oneirodes carlsbergi</i> (Regan & Trewavas, 1932)	Pietsch (2009)
Linophryniidae (Left-Vent Sea Devils)	Surtla (Icelandic)	<i>Linophryne lucifer</i> Collett, 1886	Pietsch (2009)



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ECO ECHOES

The Environmental Legacy of the War in Vietnam

By Walter Mugdan¹

July, 2014

THE Vietnam War casts a long shadow: in Asia, of course, but in America as well. The human toll was frightful — over a million Vietnamese dead, along with 50,000 Americans, and millions more wounded physically and emotionally.

The war also left a bitter chemical legacy in the bodies of civilians and combatants alike. Much of the combat took place in densely forested terrain, so the South Vietnamese military asked its American ally to employ herbicide warfare — chemical defoliants — to clear the jungle canopy and expose the enemy soldiers hidden below. The herbicide of choice was Agent Orange, so named because it was shipped in orange-striped drums. It was a mixture of two other herbicides with the obscure chemical names 2,4-D and 2,4,5-T. And it was contaminated with an extraordinarily toxic waste byproduct known as TCDD, a species of dioxin. Dioxins are among the most hazardous compounds known, and TCDD is one of the worst of the dioxins.



Agent Orange, so named because it was shipped in orange-striped drums, left a bitter chemical legacy.

The South Vietnamese and U.S. were not the first to use Agent Orange in a military conflict. That distinction lies with the British, who used the defoliant during the 1950s in the so-called Malayan Emergency, an anti-colonialist uprising. But American use of the herbicide was far more extensive. From 1961 to 1971 the U.S. sprayed nearly 20 million gallons of the poisonous stuff over large swaths of Vietnam. Vietnam estimates nearly 5 million people were exposed to Agent Orange, killing nearly half a million and resulting in half a million children born with birth defects including cleft palate and other physical and mental disabilities. Women experienced elevated rates of miscarriages and stillbirths; and during the 1970s many were found to have high levels of dioxin in their breast milk. The Vietnam Red Cross estimates that a million people have health problems related to Agent Orange. While some of these estimates may be high, there can be no dispute that the toll was terrible indeed.

American soldiers were also exposed to the poison. Like their Vietnamese counterparts, U.S. veterans have experienced increased rates of cancer, and nerve, respiratory and other disorders.

The dioxin that contaminated Agent Orange

is believed to be responsible for this harvest of disease and disability. It fouled the land where Agent Orange was sprayed, and often the land near the factories where it was concocted. Nine companies made Agent Orange for the U.S. government. One of these, the Diamond Alkali Company, had a factory located in the heart of Newark, New Jersey, on the banks of the Passaic River. This river has a long and storied history — it is arguably the birthplace of North America's Industrial Revolution. By the 20th Century scores of factories lined its shores, particularly in the lower reaches near where it empties into Newark Bay (part of the Port of New York and New Jersey). The factories brought prosperity, but left behind a wide range of toxic wastes.

Housekeeping at these factories was generally abysmal by today's standards. The Passaic River, like so many other water bodies around the world, was used as an open sewer for the disposal of both industrial and human wastes. The Diamond Alkali factory was probably no worse in this regard than numerous others, but its chief waste product — dioxin — was very much worse. For most hazardous chemicals the U.S. Environmental Protection Agency (EPA) identifies levels of concern in terms of "parts per million" or "parts per billion." For dioxin, levels of concern are expressed in "parts per trillion" (PPT). One PPT is very small indeed: it is equivalent to a single second in time during a period of 30,000 years.

Agent Orange was never sold commercially — it was used exclusively for military purposes, and in the U.S. those uses ended by 1971. But dioxin, like many other toxic chemicals, can linger for centuries in the earth and in the sediments beneath the waterways into which the poison was dumped. That's what happened in the Passaic River.

Dioxin and many of the other contaminants in the Passaic adhere mostly to the fine particles of silt that constitute the mud on the river bottom. The Lower Passaic River is tidal, so contaminants that entered the river at certain spots didn't just flow downstream, but also moved upstream on each incoming tide.

For humans, the health risks come primarily from eating fish and crabs caught in the river; these carry a dangerous burden of dioxin, PCBs, mercury, and other toxins. A surprisingly large number of people consume such fish and crabs, despite Health Department warnings against eating *anything* caught there.

In the 1960s, when Diamond Alkali was producing Agent Orange, the Passaic River was much deeper than its "natural" state. For decades it had been dredged to accommodate commercial navigation. But by the 1970s — just when the ongoing discharge of dioxin from the Diamond Alkali factory was ending — the dredging of the river also came to an end. This was due both to a decline in commercial shipping and later, when the contamination was recognized, the vastly increased cost of getting rid of the toxic mud.

Once maintenance dredging ended the Passaic River filled up again; by the late 1990s it had returned to its "natural" depth. The new sediments that came in were cleaner than the



The Passaic River flowing through Newark, New Jersey, U.S.A.

heavily contaminated mud near the bottom of the former shipping channel, but they were by no means *clean*. Today, the sediments near the surface have an average dioxin concentration of around 400 PPT — far above the 10 PPT that EPA estimates would result in tolerable levels of contaminants in the fish and crabs. The sediments 10 to 12 feet deeper, at the bottom of the former shipping channel, are much "hotter" with up to a *million parts per trillion* of dioxin! Fortunately, these deep sediments are effectively "sequestered." That means their toxic load can't get into the food chain. Only the top six inches of sediments are in the "bioactive" zone — that's where the worms and crustaceans live that become the food for the larger creatures like fish and crabs, which themselves become food for animals like herons, ospreys and humans.

In April, 2014 the U.S. EPA proposed a cleanup plan for the lower eight miles of the Passaic River. The proposal calls for removal of 4.3 million cubic yards of toxic sediment — one of the largest environmental dredging projects in the world, with an estimated price tag of \$1.7 billion, the most expensive such cleanup ever proposed. Under what's known as the "Superfund" law in the U.S., the costs of this

cleanup will be borne by the companies who created the problem, or their corporate descendants. For example, the Diamond Alkali Company was sold to another company which was later sold to another company and still later to yet another company, and so on. Today, five or six corporate generations later, it is the Occidental Chemical Company that bears legal responsibility, despite the passage of more than forty years since its predecessor ceased making Agent Orange and thoughtlessly dumping dioxin in the river. EPA expects to finalize its cleanup decision in 2015; the work itself will take another decade or more.

The ecological echoes from the manufacture and spraying of Agent Orange continue to reverberate harshly across the years — primarily in Vietnam, of course; but also in America where the foul poison was concocted.

¹ Walter Mugdan is Director of the Division of Emergency & Remedial Response, U.S. Environmental Protection Agency, Region 2, New York City, New York, U.S.A. Any opinions expressed in this article are his own, and do not necessarily reflect the views of the U.S. EPA.




Attention Householders

THE HOUSEHOLD FOOD WASTE & BIO-WASTE REGULATIONS 2013
oblige you to segregate your food waste
(place food waste into a dedicated bin and ensure that it is not mixed with other waste).

Once segregated you may either:

1. Subject the food waste to a home composting process **or**
2. Bring the food to an authorised facility for treatment **or**
3. Provide it for collection by an authorised waste collector.

You may not deposit food waste in the residual waste collection

All waste collectors, collecting household waste are legally obliged to provide a separate food waste collection service or 'Brown Bin' for their customers.

Please contact your waste contractor/service provider to help you comply with this law.

Enforcement Officers will be visiting your area* to ensure compliance with these Regulations.

* These regulations are in place in Cork City since 1st July 2013 and Cork County (Mallow, Cobh, Middleton, Ballincollig and Carrigaline) since 1st July 2014.



By Michael Guiry

MÁIRÍN DE VALÉRA, who died unexpectedly at her home 30 years ago, was the elder daughter of Éamon and Sinéad de Valéra. Although she claimed to have been born the night *Titanic* sank, she was actually born on April 12, 1912, three days before, but it was an irresistible story.

She was educated by the Loreto Sisters at Loreto College on St Stephen's Green and at University College Dublin where she graduated in 1939 with a first-class B.Sc. After winning a Travelling Studentship of the NUI - then, as now, a great honour - she went to the University of Leeds in 1936-37 to do research on embryogenesis in Gymnosperms. In 1937, she decided to move to the University of Lund in Sweden to work with the eminent phycologist Harald Kylin (1879-1949). This decision was made, it appears, after she had started to collect seaweeds in the wonderfully biodiverse Galway Bay, particularly the Aran Islands, then *terra incognita*, probably as it was largely avoided by the cognoscenti being mostly populated by native Irish speakers.

Harald Kylin (pronounced "Che-leen") was a very formal and formidable professor of the old style and was probably quite terrifying to a young female student from Ireland. She met and worked with other luminaries of the phycological world at the time, including Egil Baardseth (who came to Ireland in the late 1940s to study the regrowth of *Ascophyllum* after harvesting at her invitation), Carl Bliding (pronounced "Blee-ding" who worked on the knotty problem of speciation in *Ulva* and *Enteromorpha* species, still with us today), Tore Levring (an able taxonomist of world status), George "Frickie" Papenfuss (a much-loved South African and later Professor at the University of California at Berkeley) and Savante Suneson (a world-class coralline expert).

Máirín remained in Lund until shortly before the outbreak of World War II in 1939. It is said that she was collected from Sweden by a British destroyer as the London government was concerned that the daughter of the *Taoiseach* of what was then a Commonwealth country might become caught up in the developing conflict. I asked Máirín about this once and was met with a political lack of any response.

On her return to Ireland she was appointed Assistant in the Department of Natural History at University College Galway, as it then was. She began to teach courses in Botany at all levels to science and medical students, not alone in English but also in Irish, a very time-consuming, if rewarding, effort. Facilities were poor and money was short during the war and in the post-war period, and opportunities for research were largely confined to visiting shores using pedal-power. Máirín and her students thought nothing of cycling many miles to shores, often in all weathers with thoroughly unsuitable clothing.

In 1942, she published a description of the occurrence of gametophytes of adventive red seaweed *Asparagopsis armata* in Galway Bay. In a sort of "Ripley's Believe-it-or-not" this alga was described by William Henry Harvey (1811-1866, a Limerick man and Professor of Botany at TCD from 1855-1866) from Rottnest Island in Western Australia in 1855 and the species was introduced into Europe, probably by shipping. The filamentous sporophytes were known from Britain but the larger and very short-lived gametophytes were unknown until Máirín discovered them. In 1947, she was appointed to a Lectureship in Botany after obtaining a PhD from the National University of Ireland in 1945 for her published work and a thesis entitled "Observations on the Gelidiales of the West and South coast of Ireland" submit-

Máirín de Valéra

An Appreciation

ted on 14 October 1944 and which, uniquely in my experience, included some dried herbarium specimens of *Gelidium* to illustrate her points. *Gelidium* and other red algae were of considerable interest during the war as sources of seaweed colloids such as agar and carrageenan, the supply of which was cut off by the conflict.

In 1958, the Third International Seaweed Symposium was held in Galway and Máirín wrote up her bicycle-acquired knowledge of the seaweeds of Galway Bay in an enigmatically-entitled "Topographical Guide to the



Máirín rowing a boat in Sweden, probably 1938.

Seaweed of Galway Bay," sadly impossible to obtain nowadays. The Symposium was considered a major event in Ireland as the nascent seaweed industry needed modernisation and expansion. The "Organising Committee" included Máirín, Colm Ó hEochá (later President of UCG and chairman of the New Ireland Forum), T. Dillon and P. Ó Colla of the Department of Chemistry and P. Ó Céidigh, then an Assistant in the Department of Natural History.

One of the attendees at the meeting was Tore Levring, mentioned above, and his newly acquired wife. Because "hostel" accommodation was arranged at *Coláiste Éinde*, an all-male boarding school, courtesy of "His Lordship, the Bishop of Galway", Levring and his wife could not share a room, which unfortunately hit some of the more unsavoury "rags" of the time and caused some amusement internationally that the Bishop of Galway would not permit newly weds to sleep together.

The Seaweed Symposium was the culmination of considerable efforts at UCG to help with the development of the seaweed industry, which was a major contributor to the economy of the west of Ireland at the time. The story is told that in the 1950s Máirín was approached by a man on a shore in Galway Bay who asked who she was what she was doing. Telling him that she was de Valéra and that she was collecting seaweed, the man looked horrified and asked if "that was the best your father could do for you?"

In 1962, after the retirement of the Professor of Natural History, Thomas Dinan in 1960, the university extinguished the Chair of Natural History and two academic departments of Botany and Zoology were founded, to which Máirín de Valéra and Pádraig Ó Céidigh were appointed the inaugural professors. Máirín held the post of Professor of Botany until her retirement in 1977. The two new departments moved to a new building named Áras de Brún for a former polymath President of UCG, Monsignor Pádraig de Brún (1889

-1960), in the mid-1960s, which was opened by her father, and Máirín most generously occupied the top floor as "Poor Pádraig would never be able to climb the stairs."

No more than Kylin, Máirín developed a reputation for being very formidable and many academics, male and female, at UCG and nationally developed a very healthy (and proper) respect for her. Phycology in Britain and Ireland in the 1950s and 1960s was dominated by similar strong female personalities such as Mary ("Mamie") Parke (Plymouth MBA), Elsie ("Bunny") Burrows (University of Liverpool), Kathleen Drew-Baker (University of Manchester), and Irène Manton (University of Birmingham). These ladies - all referred to as "Dr" or "Prof." - could put the fear of God into any mere mortal, not to mind a mere man, and Máirín could do the same if she were of a mind to. But like her British counterparts, a more generous and kindly soul you could not find if she decided that you deserved something.

I first met her in 1970 when she walked into the laboratory in which I was working as a student in the Honan Biological Institute (now sadly demolished) at University College Cork. At this time, it should be recalled, she was the daughter of the generally much-revered President of Ireland. At first she seemed very distant and aloof, but when I eventually had the presence of mind to show her some herbarium material of seaweeds from Bantry Bay that I could not identify, she positively lit up with enthusiasm and information. Shortly after, I visited Galway and she ordered a car and driver to take us to Black Head in the Burren. I think that this was the car used by undertakers at funerals for the family to follow the hearse, but it was most appropriate to our dignified purpose of collecting small and beautiful seaweeds from the wave-beaten rocks of Co. Clare.

She and Pádraig Ó Céidigh (known to generations of students at UCG as "Paddy Keady" even though he is reputed to have changed both of his birth names to the Irish versions by deep-poll) were responsible for the establishment of UCG as a centre for marine science at a time when there was little or no support for any kind of science in Ireland. An tOllamh Ó Céidigh developed a laboratory at Carna around a small Congested Districts Board fisherman's hut and, with the aid of funding from regional funds (seemingly provided by Charles Haughey) and money from Galway County Development, build a state-of-the-art aquaculture facility there. Perhaps not to be outdone, Clare County Development Board funded a small laboratory at Finavarra, Co. Clare, right in the centre of what we now know to be the most seaweed biodiverse 10-km square grid in Ireland or Britain with at least 420 species of seaweed, most of which were discovered by Máirín and catalogued by her in a seminal paper in 1979 (*Proceedings of the Royal Irish Academy* 79B: 259-269).

Máirín also worked on two of the most difficult and downright perverse genera of red algae, *Laurencia* and *Gelidium*. Both of these are very species-rich genera, without the aid of our present-day tools such as DNA sequencing, it was well-nigh impossible to make sense of either, such was the range of variation and morphological overlap between different species growing in the same habitats. While with hindsight one might think that she would have

chosen something a little easier taxonomically, it was a worthy challenge for somebody of Máirín's abilities, and the species of both genera are very important ecologically in the rocky intertidal of the west and south-west of Ireland.

Máirín retired in 1977 and had plans to complete her work on seaweeds when the burden and teaching and administration had been taken from her. Sadly, this was not to be and she died unexpectedly in 1984. It was nice that she at least lived to see my publication in 1982 of the genus *Devaleraea* with three species in the colder waters of the North Atlantic, Arctic and North Pacific. It would have given her a good

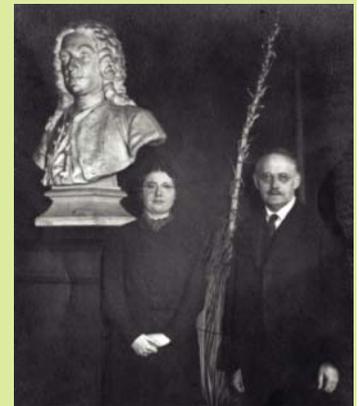


Máirín gathering information from a seaweed collector, unknown date, possibly 1950s.

laugh to hear Japanese attempts to pronounce it.

Máirín published 23 papers, on all of which she was the "senior" author. This seems a small number by present-day standards but was a remarkable achievement given the circumstances of her life with heavy teaching loads and administrative duties all during her long career.

Finally, a brief postscript. One of Máirín's great friends was Monsignor Pádraig de Brún (1889-1960), President of UCG from 1945-1959. My grandfather, Michael Mary Guiry



Máirín with Harald Kylin. There is a bust of Linnaeus on the left and a fossil horsetail on the right, Lund, Sweden 1938.

(1887-1963) of Peppardstown House near Fethard, Co. Tipperary, was a boarder at Rockwell College, Co. Tipperary, and shared a classroom with Pádraig de Brún's brother Michael Brown (1887-1971), who later became Master-General of the Dominican Order (1955-1962) and a member of the College of Cardinals. Éamonn De Valéra taught mathematics at Rockwell College in 1903. My grand-uncle on my mother's side, Edmund Garde, O.P., was Cardinal Brown's assistant for many years. Thus are small circles complete.

Ar dheis Dé go raibh a h-anam dilis.

Michael Guiry, Professor Emeritus of Botany, AlgaeBase, Ryan Institute, NUI Galway, University Rd, Galway, LTD-59-7SN, Ireland.

Institutional investors demand cleaner policies on climate change

By Alex Kirby

WHO does more to try to tackle climate change: governments or business? A question as general as that probably deserves a dusty answer. But there are growing signs that business - economic movers and shakers, industrialists and also investors - are ready to act. All they're waiting for, in many cases, is a lead by the politicians.

Some evidence for this emerged in late October at the negotiations in Brussels on the European Union's new climate and energy policy. These were always likely to be difficult. The 28 members span a wide range of opportunities, ambitions - and ideologies.

The European Commission's 2030 policy framework on climate and energy they were there to discuss had two key elements:

- A binding agreement to cut overall EU CO₂ emissions by 40% over 1990 levels by 2030.
- Achieving savings of at least 30% in energy efficiency across the EU, also by 2030.

Other elements included a bigger role for renewables, the reform of the EU's Emissions Trading System, and the phasing out of subsidies for the European coal industry - a particular concern for Poland, dependent on coal for around 90% of its electricity and employing 100,000 people in the industry.

The policy, in the long term, is ambitious:

transforming the continent's energy system and its economy by decarbonising them. The plan is to cut the bloc's greenhouse emissions by between 80% and 90% by 2050.

Despite the reservations of several governments, business leaders - and scientists, who argued the plan offered too little, too late to be a realistic response to the planet's growing climatic instability - many of Europe's biggest corporations, frustrated by frequent changes in policy and by political interference, urged governments to act more robustly.

An open letter by nearly 60 leading EU businesses and organisations said: "We remain increasingly concerned at the costs, risks and impacts associated with delayed action on climate change on our markets, supply chains, resources costs, and upon society as a whole."

The signatories, who together employ 4.5 million people, include Tesco, Unilever, Coca-Cola, and Shell. (Shell does seem to like to run with the hare but hunt with the hounds on climate change. It acknowledges the scientists' case that the issue is serious and urgent, acknowledges that a global agreement is needed, but says it will continue to sell oil anyway.)

In the event the EU agreed a target of reducing greenhouse gases by "at least" 40% by 2030 (compared with 1990), and of increasing the share of renewable energy and energy efficiency by 27%.

One of the signatories of the open letter was the Climate Group, a non-profit organisation



which works for a low-carbon future. After the Brussels decision the Group's CEO, Mark Kenber, described parts of the agreement as "disappointing".

He said: "With a 27% renewable energy target by 2030, Europe set the bar too low to convince investors to move away from fossil fuels and switch to a low carbon economy. The 27% target for energy efficiency improvements, which is only 'indicative', doesn't send the right signal and won't convince businesses to make a step change in energy efficiency investment."

"The business community was hoping for consistency from policymakers. They don't have that yet."

Stephanie Pfeifer, Chief Executive of the Institutional Investors Group on Climate Change, which represents over 85 of Europe's largest investors worth €7.5 trillion, welcomed the outcome of the meeting as "an important first step to restoring investor confidence in the EU's vision for a low-carbon energy future." She added:

"Plans for reform of the Emissions Trading Scheme have been long-awaited and the establishment of a reserve mechanism which can support a strong carbon price is a welcome move. "However, investors would like more clarity on how the reserve mechanism will bring about a meaningful carbon price over the long-term."

The verdict from the Climate Markets & Investment Association, a climate trade body, was pithy: "OK for today, but investors need more clarity". Welcoming the agreement as "a landmark achievement", it added: "...we feel that the EU could do more to promote a low-carbon economy, today, driving innovation and ensuring sustainable modes of employment and economic growth."

"We feel that a stronger target now would

keep Europe on a climate-resilient pathway target that will allow it to achieve the promised minimum target of an 80% reduction by 2050."

So the verdict from business, and from the increasingly vocal investor lobby, could perhaps be summed up as "so far so good, but we need more - and fast." And there's the rub: how long do governments have to make the switch the scientists say is needed, while still keeping the lights on? The United Kingdom is already feeling a frisson of unease at the possibility of power cuts this winter, brought on by an assortment of problems with its nuclear power stations, a string of fires at some of its thermal plants, and the fact that EU regulations have meant the decommissioning of others.

There is a strong argument (even if Shell seems not to have grasped it yet) which says that most oil and gas reserves will be unburnable "frozen assets" when the world finally agrees effective and enforceable greenhouse emissions cuts. So, the argument runs, investors should get out of fossil fuels as fast as they can.

Professor Chris Rapley, a highly respected environmental thinker, is a former director of the British Antarctic Survey and of the Science Museum in London. He thinks the argument is more complex. Criticising a campaign by Greenpeace against Shell's plans to drill for oil in the Arctic, he said recently: "It is all too easy to demonise the oil companies, but demanding this kind of disengagement is just too simplistic. It's also hypocritical because we wouldn't be able to live the lives we take for granted without the supply of energy these companies provide us."

Alex Kirby is a founder editor of the Climate News Network.

www.climateactionnetwork.net

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CONSERVING OUR EEL STOCKS

By Ciaran Byrne

AROUND for millions of years and with the first evidence of being fished to eat almost 5,000 years before the birth of Christ, Greek philosophers wrote about them, Egyptians worshipped them (sort of), Romans over indulged in them, they were the food of kings and indeed some suffered from eating too many of them. They were a staple food of indigenous peoples living anywhere within reach of water, rivers, lakes or estuaries. They were part of the staple diet of the monastic societies in early Christian Ireland and many of the oldest eel fishing weirs are associated with such religious sites. Thus the eel is a creature which is imbedded in our culture since time immemorial.

Despite this the European eel (*Anguilla anguilla*) is still a somewhat elusive species, the exact location of their breeding ground is unknown, and only relatively recently did we get a good understanding of the migration paths of the juvenile stage the leptocephalus, which by all accounts migrates passively across the Atlantic ocean with the prevailing currents. Thus it is not a huge surprise to learn that they are a panmictic European stock which means, unlike salmon which return to spawn in their natal river and where the stocks in neighbouring rivers can be genetically distinct, the eel stock from northern Morocco right up to Northern Norway are genetically identical. In zoological terms they are a catadromous species, which means they complete much of their life in freshwater but migrate to sea, the Sargasso Sea, to breed. Again the opposite of our equally iconic salmon species which are anadromous, and complete a portion of their life cycle in seawater before returning to freshwater to breed. You can in certain circumstance have the two species crossing each other in the rivers and estuaries in Ireland, with the eel migrating out to sea as a silver eel, and the salmon migrating into freshwater as a late returning grilse or salmon.

We know, unsurprisingly, that the growth rate of eels is very much related to the external environment and that the growth rates of eels in the warmer Mediterranean countries is considerably higher than that of eels in the colder Nordic countries thus the age

at migration of an eel from Morocco is considerably younger than its Scandinavian counterpart. Even in Ireland there is evidence of differential growth rates of eel populations with the eels in some of our shallower more productive, limestone lakes demonstrating considerably higher growth rates than eels found in the acidic upland oligotrophic lakes of Connemara.

However the news is not good for eel populations throughout Europe. There has been a collapse of the population and this is evidenced by the significant reduction in the amount of juvenile eels returning to our shores from the Sargasso Sea. In 2008 it was estimated that this reduction in juveniles was in the order of 95% of historic levels. So significant was the collapse the EU introduced a regulation (Council Regulation No 1100/2007) to put in place measures for the recovery of the stock of eels. Put simply the significance of a regulation is that the EU prescribes the measures required, as against a directive which is transposed into national law and the country has some say on how the targets contained in the directive could be met. In the case of eels the regulation required member states to put in place an eel management plan by the 1st of July 2009 the objective of which is "to reduce anthropogenic mortalities so as to permit with high probability the escapement to the sea of at least 40% of the silver eel biomass relative to the best estimate of escapement that would have existed if no anthropogenic influences had impacted the stock". What this means is that the plan will require 4kg of eels to escape (40%) for every 10kg which would have escaped if people didn't kill or stop any migrating and the number of juveniles coming into the water was as high as it ever was. It is not a 40% reduction in catch, or in the fishery, nor is it that we need to let only 40% of our silver eels escape.

Following a series of public consultation and stakeholder meetings four main management measures were adopted for the Irish eel management plan and they are; a cessation of the commercial eel fishery and closure of the market; mitigation of the impact of hydropower, including a comprehensive trap and transport plan to be funded by the ESB; ensure upstream migration of juvenile eel at barriers;



Eel Management in Ireland.

improvement of water quality.

A huge amount of work has been done on the research and management side to ensure Ireland adheres to the targets in the management plans and the reports to date can be seen on the Inland Fisheries Ireland website (www.fisheriesireland.ie). The eel management plans are reviewed on a rolling three year cycle and Ireland's plan was first reviewed in 2012 and will be reviewed again in 2015. While there has been some slight improvement in the return of juveniles in the last two years the overall percent-

ages are tiny, it is estimated that recruitment has increased from 5 to 10% of historic levels however this still leaves a very 'big hill to climb'. The exact size of this hill is best described in the context of the eels lifecycle. Juvenile eels which came into our system will migrate as silver eels at approximately 20 years old (ranging from 5 to 25+). Thus juvenile eels which came into Irish rivers and lakes in 1994 when Jack's Army were in full swing at the World Cup in the USA will migrate as silver eels this year, however since that time there has been a

90-95% reduction in the number of juveniles coming into our systems. Thus given the time lag of 20 years there is every possibility that silver eel migration will fall off the edge of a cliff and mirror the catastrophic reduction in juvenile numbers.

However I remain optimistic, while we await the current International Council for the Exploration of the Sea (ICES) advice on the status of eel stocks, and this is not likely to be good, we have to keep improving our understanding of the science and

reviewing the effectiveness of the management plans if the eel is to have any chance of surviving into the future. All countries within the distribution range of the eel must work together to conserve our eel stock until there is a sustained increase in both recruitment and the adult stock.

*Dr Ciaran Byrne, Chief Executive Officer, Inland Fisheries Ireland, Swords Business Campus, Swords, Co. Dublin, Ireland.
www.fisheriesireland.ie*



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Chincha Islands Guano to Cork

By Edward Walsh

GUANO is defined by the Oxford English Dictionary as “the excrement of sea birds, found especially on islands of South America and used as manure.” The word derives from the Andean indigenous language Quecha – huana ‘dung.’ Guano was a very effective fertiliser due to its exceptionally high content of nitrogen, phosphate and potassium.

After gaining its independence from Spain in 1824 Peru experienced a boom as a result of the demand for guano as a fertiliser. From 1840 up to 1870 Peru enjoyed an extended period of economic growth which came to be known as the Guano Age. The boom ended when Guano was replaced by Nitrate as the preferred fertilised and Chile seized Peruvian deposits in the 1879-1884 War of the Pacific.

The Chincha Islands are a group of three small islands some 13 miles off the south west coast of Peru, relatively near the town of Pisco. They had large guano deposits and from 1841 onwards the islands were the centre of frenetic activity centred on exporting guano. Guano became important and there was a scramble world-wide to find deposits. In an arid climate amid the dust and the stench, digging out guano was a dangerous job – it had to be done by hand. Slaves, Chinese coolies, convicts and others laboured in stifling heat while as many as a dozen ships often waited offshore for their turn to



Chincha Islands

In the mid 1800s, the Chincha Islands, Peru, were a centre of frenetic activity centred on exporting guano.

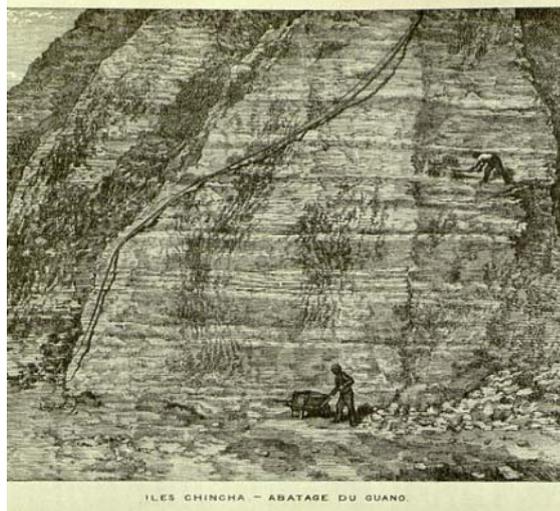
be loaded. Guano had become big business underlining the old saying “where there’s muck, there’s brass” – it was the best natural fertiliser known to man. By the mid 19th century there were a number of guano importers in Cork.

Thomas Havers (1810-1870) was the eldest son of Thomas Havers and Dorothy, née Charlton a prominent Catholic family of Thelveton Hall, Norfolk. He worked for a London firm of Ricketts, Boucher & Co. before joining the Falkland Islands Company and by 1851 was acting company secretary. In 1854 he was appointed colonial manager and arrived in Stanley in May of that year to manage the business on the islands. A little over a year later Havers married the family gov-

erness Mary Clare Coppinger. She was a member of the well-known East Cork family involved in the corn and malt trade with residences in Middleton.

A perusal of the Falkland Islands Company letter books shows Havers to be a prolific letter writer. After a visit to Montevideo and Buenos Aires he arrived back in Stanley in late July 1858 and replied to a despatch from London by letter of 7 August when he advised the board of directors “Since I left only three vessels have looked in here.... The Morning Star from Callao with Guano for Cork arrived the 9th and left 13th Feby – they only took water and beef...”

This comment is particularly interesting as there is an entry in Slaters’ Directory of Ireland 1856 for merchant ship owners in Middleton named Thomas, Stephen and Richard Coppinger who it seems imported phosphor-guano probably from Chile or Peru. Cork guano importers included J. & A. Carroll, Leitrim Street, selling “put Peruvian guano” (Cork Examiner 22 February 1856); A. Bremner, Lapp’s Island Guano Stores “has on sale Peruvian, Bolivian and Chilean Guano, pure as imported” and Davies Brothers, Guano & Seed Stores, Penrose Quay “beg to inform customers that they will keep no Guano but Peruvian” (Cork Examiner 19 April 1856) while Wm. Marsh & Son Auctioneer, 70 South Mall had a “weekly auction of Peruvian Guano” (Cork Examiner 6 June 1856). Glimpses of the guano trade can be seen in the shipping



Mining guano on the Chincha Islands.

movements as reported at Cobh (or Queenstown as it then was) in the Cork Examiner – arrived 3 April 1856 Ingre, Patagonia, orders, guano; Lady Franklin, Rio de Janeiro, orders, guano; arrived 19 May 1856 Basileia, orders, guano; sailed 19 May 1856 Dunrobin Castle, London, guano. On 2 July 1856 the newspaper noted 1793 bags of guano in the list of June imports. Interestingly Henry and Coghlan’s General Director of Cork for 1867 lists seven guano merchants in the town of Bandon.

There is a discrepancy between Havers and Lloyds List, for while Havers notes that the Morning Star sailed for Cork from Stanley in the Falkland Islands, Lloyds List of 17 February 1858 states that the vessel under the command of Captain Purnell left Callao on 2 January for the Chincha Islands and sailed from there for England on 6 January. Lloyds Register describes the Morning Star, as a wooden full-rigged ship, 1534 tons, built 1854 at St John, New Brunswick by F. & J. Ruddock for the

Alexander Line. Liverpool home port.

By 1881 there were signs that the so called ‘Guano Age’ was coming to a close – its demise was not far off. For the previous 40 years guano was not just important to Peru’s economy – it was the dominant factor in the country’s commercial, business and financial dealings. Guano was the most vital commodity in the country’s trade. Crucially it was saltpetre from the Atacama Desert (ironically not far from the guano producing areas) which would replace guano as a fertilizer. So by the time the Peruvian Government took control of guano extraction in 1909 it was an industry dependant on guano production by millions of sea birds. The industry collapsed due to the combined pressure of overfishing and the development of industrial nitrogen and ammonia based artificial fertilisers. Today guano is in great demand by organic farmers.

Edward Walsh,
jeogwalsh@hotmail.com



Dubliner Cheesy Chicken and Spinach Sweet Potatoes

Serves 4

Ingredients:

- 3 sweet potatoes, washed
- 1 tsp cumin
- 2 chicken fillets
- 1 tsp chilli flakes
- 4 tbsp olive oil
- Salt and black pepper
- Juice from 1 lime
- 150g frozen spinach, thawed
- 4 garlic cloves, crushed
- 120g Dubliner Vintage Cheese, grated

Method:

1. Preheat the oven to 180°C/160°C/gas mark 4.
2. Prick each sweet potato a few times with a fork. Place them on a baking tray and bake for an hour, or until tender. When ready, cut them in half and allow to cool.
3. When the potatoes are halfway through cooking, place the chicken fillets in a baking dish. Rub them with olive oil and season with salt and pepper. Add them to the oven for 30 minutes or until fully cooked, then use two forks to shred them. Cover with tin foil and set aside.
4. In a small bowl, combine the olive oil, lime juice, garlic, cumin, chilli flakes, salt and pepper. Set aside.
5. Put the spinach in a strainer and use clean hands to squeeze out all the excess water.
6. Turn the oven up to 200°C/180°C/gas mark 6. Use a spoon to scoop out the flesh of the sweet potatoes, leaving a 1cm layer intact so that the skins keep their shape.
7. In a bowl, mix the spinach, chicken, the lime and garlic oil and two-thirds of the Dubliner Cheese. Stuff the sweet potato skins with the chicken mixture. Top them with the remaining Dubliner Cheese and bake for 15 minutes or until the cheese has melted and the skins are hot and crisp. Serve with a green salad.




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Printers of Ireland's Hidden Depths



Image courtesy of Tony Toole

Preserving a Rare Habitat

Peat bog on Great Moor, Northumberland, UK.

By Anthony Toole

THE British Isles are very lucky to contain one of the rarest habitats in the world, yet to many of us who live here, it may appear so common that we take it for granted and are perhaps largely unaware of its global importance. In fact we have only recently realised just how significant is this environment, and are now taking steps to restore some of what we have attempted to destroy in the past.

Two walks I did recently in Northumberland illustrate, in their contrasting ways, both the problem and its possible solution.

I left the car a few kilometres south of the Scottish border, near a high point of the Pennine Way long-distance footpath. The first sound to greet me was the call of a curlew. The footpath led across boggy ground through which channels drained the frothy, peat-brown water into a tributary of a nearby river. I leapt over several of these and continued up the slope through the bleached stalks of burned heather and past patches where the burnings of a previous year were now replaced by a carpet, a few inches thick, of new growth.

Over the first rise, a pair of golden plovers watched my progress from a distance of twenty metres.

I parted from the Pennine Way, moved up to a wire fence and followed it to a gate that gave access to the summit of the moor, beyond which the ground sloped away gently toward Otterburn and the upper reaches of Redesdale. The hum of occasional traffic on the road, which ran just over a kilometre away, did little to drown the skylark song and curlew call. Even a passing helicopter, on its way to the Otterburn military range, could not block the notes of a meadow pipit that rose almost out of sight above the moor, before parachuting back to the ground on widespread wings.

I returned to the gate, then cut across toward where I would re-join the Pennine Way. It was on this crossing that I became aware of the problem.

The ground was still sodden, because of the recent rains, but the water trickled inexorably into numerous parallel channels, or grips, that had been dug to drain the peat, in an attempt to turn the land to agricultural or forestry use. Indeed, the hillside to the west of the footpath held a scattering of scrawny pines. None

was more than a few feet tall, and most were dead, the leftovers of a failed experiment in silviculture. The problem lay in the drainage of the bogs.

Peat bogs began to form as the glaciers retreated at the end of the last Ice Age, more than eleven thousand years ago. They comprise about 3% of the world's surface area, mostly in the northern hemisphere. The main agents of peat formation are the sphagnum mosses, which thrive only in a wet environment. They have the capacity to hold onto vast volumes of water and create cold, acidic, airless conditions in which dead vegetation becomes trapped and slowly decomposes. As new growth occurs on the surface, the organic matter is buried and compressed into layers that thicken at a rate of a millimetre each year. In the thousands of years during which the Northumbrian peat has been deposited, the resulting blanket bogs have grown to a depth of up to ten metres, and are therefore a vast store of carbon. Though perhaps 90% of Britain's peat bogs have been destroyed, it is estimated that those that remain hold more carbon than all of the forests of Britain and France combined.

If this peat were allowed to dry, it would crack and oxidise, releasing carbon dioxide into the air, thus contributing to climate change. It is crucial, therefore, that we preserve what remains and allow it to develop, to help offset some of the causes of global warming.

Peat has other functions. It soaks rainwater like a sponge and releases it steadily, maintaining the flow of rivers during dry spells and helping prevent floods when rainfall is high. It filters and clarifies the water, and so improves its quality.

It also provides a rich habitat for wildlife. In addition to heathers, there are bog cotton, marsh saxifrage, cranberries, bilberries, bog asphodel and the insect-eating sundew and butterwort. Birds include lapwing, snipe, wheatear, red and black grouse, buzzards and merlin. Pools provide homes for pond skaters and water beetles, and hunting grounds for dragonflies.

As I crossed the slope toward the trig point, I spotted two lizards at different places, despite the fact that this was the wettest section of the walk. At the summit, I looked over into the surrounding valleys, which emphasised that this upland was merely a tiny island of bog, rising above a sea of cultivation.

I moved off downhill toward the car, which stood no more than a couple of kilometres away. As I approached it, I crossed the ravine of Hareshaw Burn, which rushed with the water gathered from the drainage grips. Once more, I was accompanied by the call of a curlew.

A few days later, I set off from a point on the eastern edge of Kielder Forest, some five kilometres north of Hadrian's Roman wall. Again I followed part of the Pennine Way footpath, through the conifers, then over a stretch of open moorland and into more forest. A signpost at a junction of paths pointed me toward Bellcrag Flow.

This is one of the Border Mires, a set of more than fifty small peat bogs scattered throughout what is claimed to



Lapwing.



Bog asphodel.



Sundew and sphagnum moss.

be the largest man-made forest in northern Europe. Like many of the other mires, Bellcrag Flow has developed from a shallow lake formed after the last Ice Age, and is as natural an environment as can be found in Britain. During the 1980s, some peat was cut here, but was found unsuitable for horticultural use and the extraction ceased.

In order to restore the bog, the drainage grips have been blocked using peat and piles made of re-cycled plastic. Trees that have germinated from seeds blown in from the surrounding forest have been cut down. Since 1998, this project, carried out by a partnership of Forest Enterprise, Natural England, Northumberland Wildlife Trust and Northumberland National Park Authority, has restored around 240 hectares of bog in the Border Mires. A similar project is underway in the Durham section of the North Pennines.

The success of the project at Bellcrag Flow can be seen from the wooden boardwalks that reach out into the bog, for

the reversal of the trend has been rapid.

Formerly dry or muddy depressions and channels are now deep, black pools in which newts swim, and which attract wading birds, like lapwing and dunlin. Ten species of dragonfly and damselfly have been recorded. And at the edges are ever-growing carpets of sphagnum that will lock up carbon for hundreds, perhaps thousands of years.

A great deal of work remains to be done, with several thousand miles of drainage grips throughout the northern Pennines yet to be blocked. Nevertheless, the effort so far has been acclaimed as an example to be followed elsewhere, and will go some way toward preserving this rare and very fragile environment.

Anthony Toole, 65, Cheswick Drive, Gosforth, Newcastle upon Tyne, NE3 5DW, U.K. E. anthonytoole@fsmail.net http://myweb.tiscali.co.uk/lant_honytoole



Bellcrag Flow.



Drying peat.



Blocked drainage grip at Bellcrag Flow.

STRAWBERRIES

Wild & Cultivated

By Tony
O'Mahony

MENTION the word 'strawberry' to most people, and it immediately conjures up in the mind, the delightful association of warm, hazy, lazy, summer days and delicious strawberry treats, such as strawberry-and-cream dessert. There is no doubt but that strawberry fruits are a great favourite with humans, and this fondness is reflected in the fact that commercial strawberry cultivation is a major industry worldwide. Yet, as with all cultivated plants, the ongoing genetic breeding programmes aimed to improve commercial strawberry size, flavour, texture, and disease-resistance, ultimately depend on wild-sourced plant species for their raw material. Therefore it might seem counter-intuitive to discover that geneticists have, for over

a century, concentrated their attention on just a handful of the world's wild strawberry species for commercial use. Why should this be so? There is a sound, practical reason for this exclusiveness: the fact is, that most wild strawberry species bear insipid-tasting fruits that do *not* appeal to the modern-day human palate. The dominant, commercially-grown Garden Strawberry (*Fragaria ananassa*) is of hybrid origin, and was originally synthesised in France, being derived from the union of two American species: Beach Strawberry (*Fragaria chiloensis*) and Meadow Strawberry (*F. virginiana*). Another commercial taxon is the so-called 'Alpine Strawberry' (*F. vesca* forma *sempreflorens*) (a variant of the native Wild Strawberry of Ireland, Britain, and mainland Europe), notable for the fact that it bears an abundance of delicious, small fruits, right up to the first frosts of winter.

Wild Strawberry Species of the World

The small genus *Fragaria*, belongs within the vast Rose Family (*Rosaceae*), and is most readily recognized by its elongate, succulent, edible fruits (red, purple or whitish in colour) though in many species the taste is anything but enjoyable, and thus not worthy of cultivation, as mentioned previously. The leaves consist of three leaflets (i.e. a central terminal leaflet, and two laterals), while the circular flowers generally bear five overlapping petals (mostly white, but in some species cream, or red-flushed). In the majority of species, vegetative spread is rapidly achieved by means of arching runners (stolons) that, on contact with the ground, readily root to produce new plantlets, identical to the parent plant genetically. (Note: The name 'strawberry' may, therefore,

be a corruption of the words 'stray-berry', in reference to this vegetative mode of spread.)

Most surprisingly, there is still considerable doubt as to the number of wild species this genus contains: estimates range from twelve to thirty-five species, with a current consensus at twenty-two, though the true figure remains controversial. At the heart of this numbers-problem, is the fact that many species have a wide global distribution, and thus exhibit considerable morphological variation over their vast geographical range – the most distinctive variants being wrongly accorded species-rank in the past. This taxonomic problem is further compounded by the local frequency of interspecific hybrid swarms, especially in America.

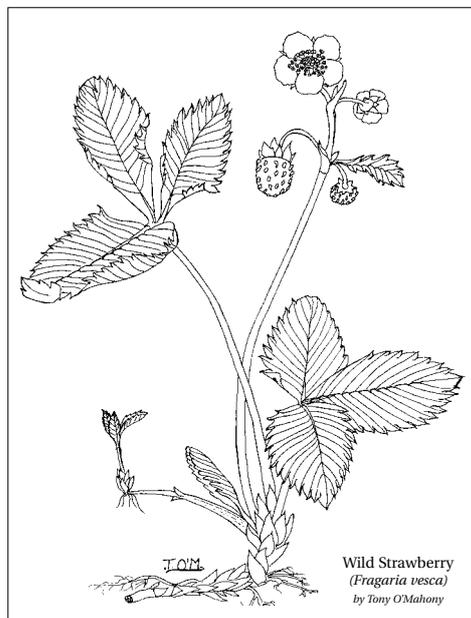
Three strawberry species are native to mainland Europe: Hautbois Strawberry (*F. moschata*), Cream-flowered Strawberry (*F. viridis*) and Wild Strawberry (*F. vesca*). Only Wild Strawberry is native to Ireland and Britain, though Hautbois Strawberry is very occasionally recorded as naturalised in these islands, it formerly being widely cultivated for the unusual wine-like taste of its fruits – a flavour no longer in favour commercially in this 21st Century.

Wild Strawberry (*Fragaria vesca*)

Wild Strawberry is of locally common occurrence in base-rich woodlands and on species-rich hedgerows throughout Ireland, Britain and Europe. (Its leaves and fruits have been used medicinally.) Its leaflets are a distinctive yellowish-green colour, taper to a point (the tiny apical tooth just exceeding the two, broader, lateral teeth), and the veins are deeply impressed, giving the leaflets a characteristic creased appearance. The pure-white flowers vary from 10-20mm in diameter and, after fertilisation, quickly develop their small, reddish-purple fruits, which are sweetly-scented and delicious to eat. In my experience, they are vastly superior in flavour to most (all?) cultivated



Wild Strawberry.



Wild Strawberry
(*Fragaria vesca*)
by Tony O'Mahony

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strains of the Garden Strawberry (*Fragaria ananassa*). (Note: Technically, strawberries are actually false-fruits, formed by the elongation and swelling of the flower-receptacle after fertilisation; the true fruits are the seeds (pips) scattered over, and partially embedded in, the spongy, red flesh.) The familiar strawberry, then, is merely an aid to dispersal; ensuring that the plant's seeds will be ingested by birds' and animals', to be returned later to the earth in their droppings, at some distance from the mother plant. For other examples of this dispersal-ploy in nature, think of the hard stones of Plums (*Prunus* genus) which are surrounded by succulent, sweet-tasting tissue; or the equally sweet pulp of Apples (*Malus* genus) that envelops its carpels and seeds.)

Garden Strawberry (*Fragaria ananassa*)

For better or worse, this species, with its large fruits,

has long been the dominant strawberry of commerce, though many of its genetic strains are (to me, at least) rather insipid or sour-tasting, and thus far inferior in flavour to the small, scrumptious fruits of Wild Strawberry (*F. vesca*). Garden Strawberry is locally naturalised throughout Britain and Ireland on roadside-embankments, grass-margins, and derelict railway lines. In these habitats it can form extensive clonal colonies, its distinctive leaves being thick-textured and sombre-coloured (dull-green or blue-green), the three terminal teeth of the leaflets subequal, giving the leaflet-apex a truncated appearance, as if cut transversely with a scissors. In overall appearance, the leaves of Garden Strawberry remarkably resemble a gigantic version of the leaves of Barren Strawberry (*Potentilla sterilis*).

Tony O'Mahony, 6 Glenthorn
Way, Dublin Hill, Cork.

Greater Risk Of Illness If You Drink Contaminated Water From Private Wells

By Margaret Keegan & Darragh Page

THIRTY PERCENT of private wells in Ireland are contaminated by *E.coli*. This is based on an assessment of the national groundwater monitoring programme results and is supported by findings of local spot surveys of private wells. The Central Statistics Office (CSO) census figures indicate that there are approximately 170,000 wells in Ireland and extrapolation would indicate that 50,000 private wells may be contaminated.

According to the Health Service Executive (HSE), Ireland has the highest rate of VTEC (*Veritoxigenic E.Coli*) in Europe. VTEC is a toxin producing form of *E.coli* and is a lot more serious than an ordinary

some persons, particularly children and the elderly, the infection can cause a complication called haemolytic uraemic syndrome (HUS), in which the red blood cells are destroyed and kidneys fail. This happens in up to 8% of cases. Some people are left with lifelong problems, which can, on rare occasions

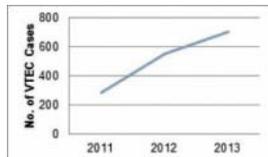


Figure 2: No. of VTEC cases as reported by the Health Protection Surveillance Centre HPSC



Figure 1: Microscopic image of E.Coli (Source: Sigma-Aldrich.com)

prove fatal.

Animals, particularly cattle, are the main source of VTEC and infection is spread from direct animal contact or through contaminated food and water. The cases in Ireland are predominantly associated with rural families and private domestic wells. However, visitors from urban areas have also been affected.

What is not generally known is that there is a greater risk of illness associated with private well supplies. People treated for VTEC are four times more likely to have consumed untreated water from private wells. These wells are generally poorly located and constructed and do not have any form of treatment, unlike the public and group water schemes. By taking simple steps to protect your well this disease is preventable.

You may have been using your

tummy bug.

Figures indicate that there is an increasing trend in the number of cases of VTEC in Ireland. In 2011 there were almost 300 cases but in 2013 that more than doubled to over 700 cases. The numbers for 2014 seem to be higher again with an estimated 7% increase to date on 2013 figures. Most cases in Ireland so far have affected children (60%) many of whom have been hospitalized. In



Figure 3: Poorly constructed wellhead with surface water entering the top of the borehole (Source: EPA)



Figure 4: An example of a sealed and protected wellhead/borehole (Source: EPA)

well for years and have had no health problems as you may have built up immunity to the contamination. However, friends, family and children may become ill as a result of consuming your well water.

Many well owners do not seem to be aware of the risks posed to their health from private well water. Little consideration has been given to the proper location or construction of private domestic wells. Most wells do not have any form of treatment nor are they regularly tested.

Poorly constructed wellhead with surface water entering the top of the borehole (Source: EPA) Poorly constructed wells run the risk of surface water ingress either directly over the top of the borehole casing and into the groundwater (if the wellhead is below ground or flush with the ground or in an area liable to flooding) or down the side of the casing (if it has not been properly grouted and sealed after drilling). In such cases, surface water contaminants such as VTEC and *Cryptosporidium* can travel directly into the water source putting consumers at risk of illness.

In 2007, the Institute of Geologists in Ireland (IGI) published *Water Well Guidelines*, which provide guidance on drilling wells for private water supplies and sets out best practice on water well construction. Building on these guidelines the EPA in 2013 published *Advice Note No. 14: Borehole Construction and Wellhead Protection*. The Advice Note sets out the best practice for the design, construction and protection of a drinking water supply borehole.

The purpose of the Advice Note is to inform and instruct all to apply the IGI Guidelines when assessing the construction of existing drinking water supply boreholes, and also apply the Guidelines when commissioning the construction of new

drinking water supply boreholes. These two documents provide best practice guidelines for water wells and should be used when constructing both public and private water supplies.

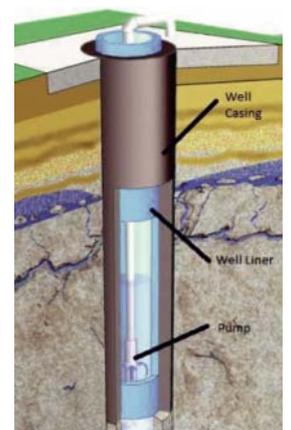
In summary, you should carry out a few simple steps to assess if your well is at risk of contamination and take action to protect your own and your family's health:

1. Assess the location, construction and protection of your well. You can do this by using an assessment tool developed by the EPA which is available at www.epa.ie. The web application *Protect your Well* asks a series of questions with multiple choice answers and takes 5-10 minutes to complete. Once completed, it will provide you with advice specific to your well, depending on the answers you provide.

2. Test your well water at least once a year for microbiological contamination, preferably after heavy rain, when the risk is highest. If you are concerned, boil your water while you wait for the results to come back. If the results of testing confirm that contamination is present well owners will need to take steps to protect their well (e.g. fencing the source or preventing surface water from entering the well).

3. Seal your wellhead to prevent any contaminated surface water from flowing down over the top of the well and prevent shallow groundwater from entering the well by properly lining and grouting the well; and by ensuring that the groundwater itself is not contaminated by nearby pollution sources.

4. Consider treating your well water if these measures are insufficient to prevent contamination (e.g. in karst areas where groundwater is heavily influenced by surface water). Permanent treatment including disin-



fection as a minimum should be installed, or consider connecting to a group or public water scheme.

The EPA and HSE want to help well owners learn how to protect their well and reduce the risk to their family's health. A lot of relevant information is now available on the EPA's new private wells webpages <http://www.epa.ie/water/dw/hhinfo/protprivwell>. The information includes:

- a short animation (in English and Irish) to explain the risks to well water quality and the simple things that can be done to reduce the risks;
- the Protect your Well assessment app and
- an infographic leaflet.

Well owners can also find a list of testing laboratories that are offering a discount for those wishing to have their water tested – see <http://www.epa.ie/water/dw/hhinfo/>

Margaret Keegan and Darragh Page, Environmental Protection Agency m.keegan@epa.ie d.page@epa.ie

Seabirds feeding on a 'bait' of fish, brought together by a whale, off Sherkín Island, West Cork.



The gannet's soaring flight helps it save energy when covering large distances at sea.



The Herring Gull is Ireland's commonest gull. It is equally at home on or off rubbish dumps as following trawlers far out to sea to scavenge fish discards. It has silvery grey back wings with black and white wing tips and pink legs.



The Great Black-Backed Gull is Ireland's largest breeding gull. It has black back wings, white wing tips and flesh-coloured pink legs.



The Sooty Shearwater larger than the Manx Shearwater and are an all-over dark rusty brown.



SEABIRDS

off the South West Coast of Ireland

PHOTOGRAPHY BY ROBBIE MURPHY

Lesser Black-backed Gulls (with an oystercatcher in the foreground) on one of the Roaringwater Bay islands. These gulls have dark grey back wings, with white wing tips and yellow legs.



Black Gullinets in the breeding season are all black with a buffing large oval black patch on their wing and red feet.

Common Terns nest on sand and gravel banks, laying their eggs in a hollow in the ground with no real nest.



Fulmars breed on grassy ledges on inaccessible cliffs.



Manx shearwaters passing Fastnet Rock.



The Manx shearwaters have black upper parts and a white underside.



A Fin Whale, south of Baltimore, feeding on a shoal of fish, with seabirds taking advantage of a feeding opportunity.



Gannets are striking seabirds, with a white body and black 'tipped in ink' wingtips and yellow heads. They can easily be recognised at great distance.



Gullinets have a chocolate brown upper body and head, with a slim, dagger-like beak, and white underside. They nest on steep coastal cliffs, often on narrow ledges.



Puffins are the smallest auks in Ireland. Gullinets, Black Gullinets and Razorbills are also auks - and spend much of their life at sea, only coming ashore during the breeding season.



The Black-headed gull has a distinctive chocolate brown head, which in the winter is replaced by a mask behind the eye.



Corncorants and Shags resting on a rock in Roaringwater Bay, West Cork.



Corncorants have white immature plumage, which will eventually have all black, but in large colonies will also nest inland on tree-covered islands.

Shags are smaller versions of Cormorants. Unlike Cormorants, they nest in loose colonies, with individual nests being placed under boulders or in caves.

Atlas of Cork City

A review by Matt Murphy

THIS book is a fascinating history of Cork City. The evolution of the city is traced through a rich tapestry of images including photographs, archival materials, satellite images and artwork. The contributions from over fifty contributors is presented in forty chapters. The authors include historians, geographers, archaeologists, climatologists, planners and engineers. They combine to tell the story of Cork from early times.

The five sections of the Atlas present a broad canvas upon which the city is portrayed.

- *The city in the landscape: The environmental heritage.*
- *Transformation: a minor Port town becomes a major Atlantic Port City.*
- *The City in the 19th and 20th centuries.*
- *Culture and the City.*
- *Contemporary Transformation.*

One cannot refer to every article here so I am cherry picking. The Weather and Natural Disasters by Kieran Hickey and Robert Devoy is very interesting. A huge variety of weather and other natural phenomena have been recorded in Cork City over the period known as the Little Ice Age. This spanned times of significant climate change from the 1400s until early 1850. The 16th, 17th and 18th centuries saw many severe weather events featuring snow, hail, frost, storms and drought. There were even two earthquakes: on 1st November 1755 and 31st March 1761. In 1683 there was a most severe frost, during which the River Lee froze over and people could walk 3 miles on the ice. The cold and drought of 1739-41 saw liquids freeze indoors and ice floes at the mouth of the rivers. The development of the North Infirmary in 1744 and the poorhouse/founding hospital in 1747 are attributed to the impact of this event on the city.

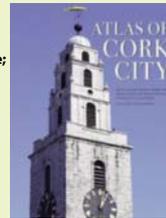
In the chapter Nature's Immigrants by Padraig Whelan there is a beautiful aerial photograph of The Lough on the southside. It is a small freshwater limestone lake in a shallow depression, receiving water from springs and water percolating in from the ridge to the north. A wonderful friend of mine, Denis Twomey, lived just a few yards across from The Lough as a young man. With the help of sponsorship from a number of companies, he introduced a number of pairs of ornamental waterfowl to the lake and these are the foundation of its present bird population. The Lough is one of Ireland's oldest protected areas and captivates young and old in the city.

How many Cork people know that the city once had its own Botanic Garden at Tory Top Road? Land was purchased by the Royal Cork Institution in 1809 to establish the garden but unfortunately its history was short, due to vandalism and robbery of plants and it closed in 1829. A section of the land was then leased by Fr. Theobald Matthew, the well known Capuchin temperance campaigning priest, for the free burial of Catholics (now St. Joseph's Cemetery). A statue to honour Fr. Matthew is a familiar landmark in the city, situated on Patrick Street, near St. Patrick's Bridge.

The histories of the various religions and their establishments are most interesting. The Huguenots (French Protestants) came to Cork in the latter half of the 17th century, building their first church in the city centre in 1712. They and their descendants set themselves up as merchants, craftsmen and manufacturers and became prominent in the guild of goldsmiths and silversmiths. Though there are few Huguenot names still evident in the city, not all have disappeared. Fleury, de Foubert and



Clockwise from top left:
A view of Cork City showing the two channels of the River Lee; The Lough; Atlas of Cork City; St. Mary's Church, Pope's Quay.



Dukelow remain as reminders of those early 17th and 18th century arrivals.

The Quakers have been in Cork since 1655. Most were small tradesmen and shopkeepers. Some were prominent in commerce and initiated many new 'manufactories'. A map (p. 172) shows the industries they founded amongst them Gouldings – *Fertiliser* (1855), Haughton – *Iron* (1822), Hatton and Haughton – *Cotton* (1787), Fenn – *Sugar* (1731) & *Brewery* (1693), Moses and Newsom – *Cotton* (1755), Haughton – *Flour* (1798), Neale and Beale – *Paper* (1768). Other names involved in 'manufactories' included Newenham's, Penroses and Carrolls. Cork Quakers are remembered for their non-sectarian administration of relief during the Great Famine from 1845 to 1848.

Donal O'Driscoll has a most interesting article on Murphy's Brewery. In 1825 the Murphy family, who were one of Cork's 'merchant prince' families, established the James Murphy and Company Distillery. The family prospered in tanning but branched out into shipping and international trading, importing sugar, rum, spices, coffee and tea. Five young brothers from the family established Murphy's Lady's Well Brewery in 1856. It prospered up to the 1920s but after a slow decline it was bought in 1983 by the Dutch brewery company Heineken.

The Jewish community in Cork, which originated principally in Lithuania, gravitated to a part of the city near Albert Road. This area became known colloquially as 'Jewtown'. In 1901, 55 Jewish families lived there but by 1939 only 11 families remained. Over time a new professional class supplanted an older generation of peddlers, drapers, tailors and shopkeepers. Though the community today has declined to a handful, the synagogue on the South Terrace, the only one in the city, remains a significant cultural landmark.

The chapter on the Famine by Larry Geary and Martin Foster makes harrowing reading. The words used by Dr. Callanan, one of the workhouse physicians, captured the situation in Cork during the winter and spring of 1846-47. "From the commencement of 1847, however, Fate opened her book in good earnest here, and the full tide of death flowed on everywhere around us. During the first six months of that dark period one-third of the daily population of our streets consisted of shadows and spectres, the impersonations of disease and famine, crowding in from the rural districts, and stalking along to the general doom – the grave – which appeared to await them at the distance of a few steps, or a few short hours."

The Cork Relief Committee was established in March 1846. From 28th March, the committee sold Indian meal for one penny per pound at three city outlets but this had increased to 10 by October 1846. Private charities played an increasingly important role in helping the poor people, as the situation deteriorated in the city. The St. Vincent de Paul, established in March 1846, distributed food, coal and some money to the needy. The Quakers opened a soup kitchen and supplied 1500 gallons of soup on a daily basis. A photograph of an extract from the minute Book of the Cork Poor Law Union on 3rd April 1847 shows the "Return of Paupers who were Admitted into, or Discharged from, the Workhouse; and of the number of Sick, and the number Born, or who Died therein, during the Week ended Saturday, 3 day of April 1947". At week end, 80 had been admitted, bringing the total number of those in the workhouse to 4,803, having taking into account those who has been discharged (342) or had died (159) that week.

Some two million emigrated from Ireland in the decade 1845-1855. Reading the treatment given to those who arrived in Cork to emigrate to America is shocking, showing that there as always people who prey on the helpless. The constable in charge of passengers regulation in the Port in 1849, a Mr. Duross, describes how a 'runner' (tout) would bring the person to the emigration broker who in turn would give him 1 to 2 shillings for each passenger brought. The grocer, the fish store, the bacon store and the bakery each also gave commission to the runner. Duross assessing the difficulties facing passengers departing from Cork concluded "there is a general impression that the emigrants are defrauded from the date they start from their home until they are at sea". In the section Queenstown/Cobh - An Emigrant Port, there is much more on these runners who were employed by lodging-house keepers to 'escort' emigrants to their respective premises. Some of these premises begged belief: "Four or five men are sometimes put into one bed, while others lie about the floor, and that 26 people have been known to lie in a room of about 17 feet by 10 feet..."

Kevin Hourihan in the chapters *Cork City in the 20th Century* and *The Suburbs* brings the reader from the Cork of the new Free State to the decentralisation of the city in the 1960s to its renewal from 1986 onwards and on to the development of the suburbs. 1920 saw the burning of large parts of St Patrick's Street and Oliver Plunkett Street by British forces. Compensation paid for the construction of several of the city's landmark buildings.

The author gives a fascinating insight into the various housing developments by the City Council from the first in 1886 - Madden's Buildings, Blackpool - which comprised of 76 houses, three schemes in 1922-23, McCurtain's, McSwiney and French's "Villas" and many other estates, including 152 houses in 1930 at Turner's Cross and 500 houses in Guranabraher in 1934-36. In the period 1934 to 1941 the Corporation built 1900 new houses which was a major achievement. The 1970s, 80s and 90s saw the decentralisation of the City Centre to the suburbs to Togher, Douglas, Mayfield, Hollyhill and Bishopstown and the chapters include aerial photographs showing the development of the city and county.

Richard Wood brings us on a wonderful tour of the city in the chapter Buildings and Architecture. The chapter maps the location of significant buildings in Cork: City Hall, Turner's Cross Church, Old City Jail, Court House, Old Custom House (Crawford Art Gallery), St. Annes' and Shandon are but a few mentioned. Included is St Mary's Dominican Church, with photos of its beautiful ceiling and Corinthian columns and stone carvings in the portico. I have wonderful memories of St. Mary's as I was an altar boy there for many years. We lived a quarter of a mile from it. It is only on reading this chapter that I realised we Corkonians have a wonderful history in many of our buildings - did we then or do we now appreciate them?

Sport also has a place in this book. GAA enthusiasts would find the map of GAA clubs in the city and their founding years Blackrock (Hurling & Football) 1883, Sarsfield (H) 1896, St. Finbarr's 1876 (H&F), Glen Rovers 1915 (H), St. Nicholas 1900 (F) are to mention but a few. My father played for the latter in the 30s when he was also playing rugby for Cork Constitution. When it was discovered, he and most of the team (also other rugby players) were suspended as GAA members were banned from playing 'foreign games'! There is a full chapter on Glen Rovers and a map of the birthplaces of Glen Rover players who won Senior All-Ireland medals with Cork, including the "real Taoiseach" Jack Lynch, who lived under the shadow of Shandon at Bob and Jones – a stones throw from our house. Other sports, including soccer, rugby and road bowling are also given space in this book.

There are many more wonderful and informative articles in this magnificent book, amongst them:

- *Living in the City*
- *Underneath the City* - The Cork Main Drainage System between 1999 and 2004 sought to eliminate all pollution discharge into the River Lee.
- *Migration* - which includes a wonderful piece by the famous Con Houlihan on his departure from Cork on the Inisfallen in his younger years.
- *Community Development and Catholic Church*
- *Nano Nagle and Catholic Cork 1718-1784*, who opened schools for poor children in the 1750s. She founded the Presentation Sisters in 1775.
- *Planning and Development.*

This book is a wonder, especially for Cork people and the Cork Diaspora. For them it is an excellent reference on the city, with many fascinating gems of information. Need I add it should be in every secondary school libraries in both city and county.

Atlas of Cork City. Edited by John Crowley, Robert Devoy, Denis Linehan & Patrick O'Flanagan. Cork University Press. www.corkuniversitypress.com ISBN: 9781859183809. Price: €59.00. Printed 2005. Reprinted 2011.



Looking towards Cahirciveen from Valentia Island, Co. Kerry.

JOHN AKEROYD pays tribute to the man who wrote Munster's first County Flora.

THE years 1866–1916 were, in the words of the late Professor David Webb, “the hey-day of Irish Botany”. In 1866, *Cybele Hibernica* by Alexander More and David Moore appeared, a district-by-district account of Irish plant distribution. Exactly 50 years later in 1916, a year remembered more in Ireland for the Easter Rising and the Battle of the Somme, Reginald Scully published his *Flora of County Kerry*. Few Irish Floras would appear for another two generations, and few would pack in so much scholarly information – and it remains a key work today.

That half century after the publication of *Cybele Hibernica* provided both stimulus and a framework for floristic investigation that saw botanists explore Ireland extensively in search of plants. The result was numerous botanical papers and several Floras, together with the discovery of a score or more plant species new to Ireland. All this botanical activity reflected the general cultural buzz in Ireland, with the birth of the Gaelic League and GAA, growth of the Irish Literary Revival of Lady Gregory, J.M. Synge, W.B. Yeats and their circle, and agitation for Home Rule.

Reginald William Scully (1856–1935) is a man about whom we know little, though he was a considerable presence on the Irish botanical scene during that period. He was born in southern England, in Wincanton, Somerset, but

Reginald Scully

Chronicler of Kerry's wild plants

his father came from Dublin and his mother too was Irish. Scully seems to have been a modest and retiring man, who qualified at the then Royal College of Physicians in Dublin but never practiced as a doctor. He lived in Dublin, at Dundrum, but spent much time in the field in Kerry. One cannot discuss Scully without reference to Nathaniel Colgan (1851–1919), another retiring individual who worked as a clerk for the Dublin Metropolitan Police Court, retiring in 1916. By then Colgan's had moved on to sea-slugs and sea-squirrels, which he was already studying by the time his own *Flora of the County Dublin* appeared in 1904. Both men worked with More to produce an expanded, posthumous second edition of his *Cybele Hibernica*, which appeared in 1898. That same year saw *Flora of the County Donegal* by H.C. Hart, who had already published *The Flora of Howth* (1887). Robert Lloyd Praeger, who would become the doyen of Irish naturalists, published *A Tourist's Flora of the West of Ireland* (1909), having earlier compiled his famous *Irish Topographic Botany* (1901), similar to the *Cybele* but based on county records, half of them from his own extensive collecting.

More had long encouraged Colgan and Scully in their own Flora projects. Scully's took a little longer to deliver than did that of his colleague, but covered more remote areas. The Floras are similar in content and meticulous attention to detail, including full distribution data by district, historical and present plant distribution, ecology (then a new science) with notes on which plants preferred lime-poor soils, and variation within species. Colgan not only assisted Scully in the field but also helped him read proofs, a considerable task in itself. Clearly they were, and remained, good friends. The list of acknowledgements in the Preface, which includes distinguished English botanists, shows Scully was in contact with a wide network. He didn't publish anything again, apparently finding fieldwork too onerous (1916 was also his 60th birthday), although Praeger recalled an excursion with him as late as 1931. By this time he had retired to Rushbrooke on Cork Harbour, just west of Cobh. Perhaps too he was just overtaken by the political upheavals in Ireland and felt the need to live quietly in what had become unsettled times. His book certainly marks the end of an era in Irish botany, and relatively little would emerge for another 20 or 30 years.

His was a quiet life well lived. Here was a man whose interests were not as wide as those of some contemporaries and who published relatively little else, but devoted himself to his life's task and brought it to a triumphant conclusion. *Flora of County Kerry* is a masterpiece – “for fullness and critical accuracy, one of the best books on Irish botany that has appeared”, according to Praeger – and a worthy memorial to the dedication and skill of its author. The book itself is now rare and expensive, but Nabu Press, South Carolina, USA, have this year published a paperback edition.

Yet perhaps Scully's most durable legacy was to encourage James Bruncker to work up his *Flora of the County Wicklow*, which eventually appeared in 1950 (born in 1885, he died only in 1970), although clearly a last flowering sprig of



Reginald Scully (Image courtesy of National Botanic Gardens)

Irish botany's heyday. Bruncker in turn encouraged Howard Hudson, whom I remember fondly from the Dublin Naturalists Field Club in the early 1980s, by which time he was elderly but still a fit and enthusiastic botanist. Hudson himself was mentor to a young Declan Doogue, now one of Ireland's most distinguished naturalists, a schoolmaster, excursion leader and author of *The Wild Flowers of Ireland* (2010), who has done so much to raise awareness of botany and biodiversity in Ireland. I myself am delighted to have been involved over these last 35 years in what has proved to be a New Heyday of Irish Botany.

Dr John Akeroyd is author of A Beginner's Guide to Ireland's Wild Flowers (2008), and edited The Wild Plants of Sherkin, Cape Clear and adjacent islands of West Cork (1996) and The Wild Plants of Bere, Dursey and Whiddy Islands in Bantry Bay, West Cork (2013) for Sherkin Island Marine Station.



Gleninchaquinn, Co. Kerry.

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Ice loss sends Alaskan temperatures soaring

Scientists analysing more than three decades of weather data for the northern Alaska outpost of Barrow have linked an astonishing 7°C temperature rise to the decline in Arctic sea ice.

By Alex Kirby

If you doubt that parts of the planet really are warming, talk to residents of Barrow, the

Alaskan town that is the most northerly settlement in the US.

In the last 34 years, the average October temperature in Barrow has risen by more than 7°C – an increase that, on

its own, makes a mockery of international efforts to prevent global temperatures from rising more than 2°C above their pre-industrial level.

A study by scientists at the

University of Alaska Fairbanks analysed several decades of weather information. These show that temperature trends are closely linked to sea ice concentrations, which have been recorded since 1979, when accurate satellite measurements began.

The study, published in the *Open Atmospheric Science Journal*, traces what has happened to average annual and monthly temperatures in Barrow from 1979 to 2012.

Most striking

In that period, the average annual temperature rose by 2.7°C. But the November increase was far higher –



more than six degrees. And October was the most striking of all, with the month's average temperature 7.2°C higher in 2012 than in 1979.

Gerd Wendler, the lead author of the study and a professor emeritus at the university's International Arctic Research Center, said he was "astonished". He told the Alaska Dispatch News: "I think I have never, anywhere, seen such a large increase in temperature over such a short period."

The study shows that October is the month when sea ice loss in the Beaufort and Chukchi Seas, which border northern Alaska, has been highest. The authors say these falling ice levels over the Arctic Ocean after the maximum annual melt are the reason for the temperature rise. "You cannot explain it by anything else," Wendler said.

They have ruled out the effects of sunlight because, by October, the sun is low in the sky over Barrow and, by late November, does not appear above the horizon.

Instead, they say, the north wind picks up stored heat from water that is no longer ice-covered in late autumn and releases it into the atmosphere.

At first sight, the team's findings are remarkable, as Barrow's 7.2°C rise in 34 years compares with a global average temperature increase over the past century of up to about

0.8°C. But what's happening may be a little more complex.

Warming faster

The fact that temperatures in and around Barrow are rising fast is no surprise, as the Arctic itself is known to be warming faster than most of the rest of the world.

The Intergovernmental Panel on Climate Change says observed warming in parts of northern Alaska was up to 3°C from the early 1980s to the mid-2000s. It also concludes that about two-thirds of the last century's global temperature increase has occurred since 1980.

But Barrow's long-term temperature rise has not been uniform, the Fairbanks study says. Its analysis of weather records between 1921 and 2012 shows a much more modest average annual rise, of 1.51°C. In 2014, the city experienced the coolest summer day recorded – 14.5°C.

So one conclusion is to remember just how complex a system the climate is – and how even 34 years may be too short a time to allow for any certainty.

Alex Kirby,
Climate News Network
www.climateneutralnetwork.org
October 2014

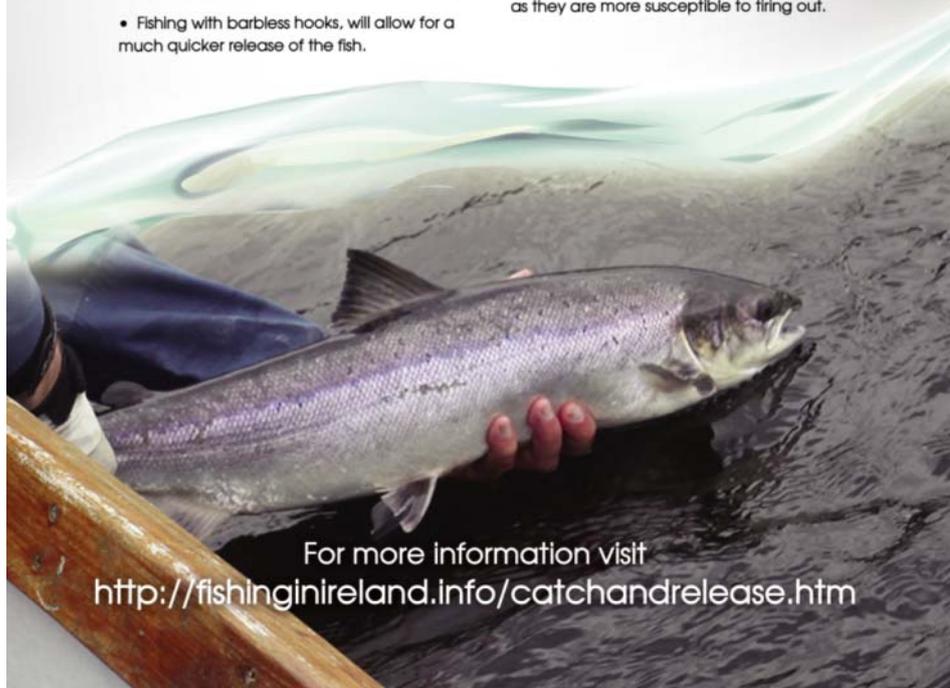


Catch & Release

Inland Fisheries Ireland supports catch and release for all species. Increased care is needed to ensure that the fish you release are returned in good condition.

So when you are out fishing this season, bear the following points in mind:

- If you are lucky enough to have a bumper catch of coarse fish, avoid over filling your keepnets.
- Ensure keepnets are properly submerged in deeper water to minimise exposure to sun.
- Try to bring fish quickly to the net and avoid over playing, which will tire fish unnecessarily.
- Fishing with barbless hooks, will allow for a much quicker release of the fish.
- Where possible, unhook the fish in the water, thus minimising the stress on the fish.
- If you have to take fish from the water to unhook, wet your hands before handling them.
- Ensure that you hold fish carefully in the water until they revive and swim away of their own accord. This applies particularly to bigger fish, as they are more susceptible to tiring out.



For more information visit

<http://fishinginireland.info/catchandrelease.htm>

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(www.ravenstamps.com), the largest stamp dealer in Ireland, has kindly given *Sherkin Comment* extra sets of 300 different world stamps so that you can start your new hobby. If interested in a set please contact us by postcard, letter or email at sherkinmarine@eircom.net to receive a set (limit of one request per family).



Accessing Environmental Information

IT STARTS IN YOUR BACKYARD



Pictured at the launch of My Local Environment are Fiona O'Rourke (EPA GIS Team) and Laura Burke (EPA Director General).

By Fiona O'Rourke

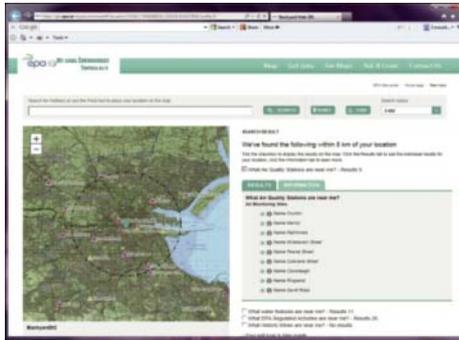
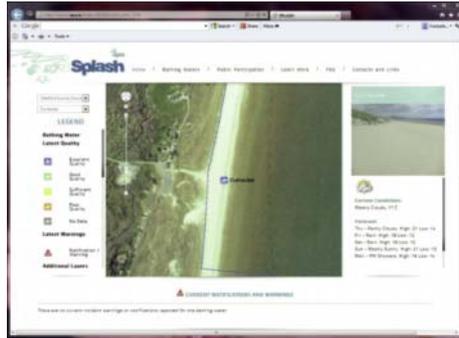
THINKING globally and acting locally has been made a little easier by the development of a new Environmental Protection Agency (EPA) mapping application called *My Local Environment* or *Timpeall an Ti*. *My Local Environment* provides easy access to information about the environment close to where people live, work or play.

My Local Environment is the latest in a number of tools developed by the EPA to make environmental data more accessible, and more importantly to frame it in a local setting. The addition of this new service will make it even easier to access live data and learn more about the areas of Ireland's environment in which people have an interest, such as their local air and water quality.

My Local Environment (*Timpeall an Ti*) can be found by clicking the "My Local Environment" link on www.epa.ie or directly at <http://gis.epa.ie/myenvironment/#/search>. Enter your address or click a point on the map and select the search radius you would like to use. The map will centre on your location and the search results show what types of features are present in your area. A brief explanation of each topic is presented along with an opportunity to browse to another EPA web page to learn more. Existing EPA WebGIS tools – such as the *Splash* website – appear in *My Local Environment* too.

You will find information about the following on *My Local Environment*:

The EPA has an important role to play as an environmen-



tal data provider. We understand that part of this role is to make data as easy to access and understand as possible. *My Local Environment* is not a once-off project. It is an active and ongoing initiative that will be developed by the EPA. The EPA is reviewing innovative user engagement options such as interactive comment cards that allow a

dialogue with users. Please visit <http://gis.epa.ie> and use the Contact Us link to tell us what you think of the work done so far and what you would like to see added and developed in the future. Your views would be very welcome.

Fiona O'Rourke,
Environmental Protection Agency www.epa.ie

You will find information about the following on My Local Environment:	
What Air Quality Stations are near me?	Provides a list of local Air Monitoring Sites; a user can click on each site to view the current air quality and any related information on the Air Quality Index for Health.
What water features are near me?	Provides a list of local sites e.g. bathing water, rivers, coastal, groundwater etc. and indicates their status - Bathing Water Status; River Status; Coastal Status; Transitional Status; Groundwater Status.
What EPA Regulated Activities are near me?	Provides a list of all licensed sites (Licensed IPPC Facilities, Licensed Waste Facilities, Dump Site Boundaries); by clicking on further information a user can access PDF documents available online including: <ul style="list-style-type: none"> • All licences granted to-date. • Applications received by the EPA since 1 December 2004. • A limited number of applications received by the EPA before December 2004. • Annual Environmental Reports for 2008 onwards.
What Historic Mines are near me?	Users can click the hyperlink to see the overview report that was done for each mine site.
What is my soil type; subsoil type; landcover class?	Examples: "Your soil type is Man made" "Your subsoil type is Man made" "The Corine 2006 Landcover map classes your location as Discontinuous urban fabric. Click the hyperlinks to see pop up boxes.
What is my Coal Restricted area type?	Example: You are in a coal restricted area type Coal Restricted Area. Click the hyperlink to see a pop up box.
What is my Air Zone type?	Example: "You are in Air Zone type x Conurbation." Click the hyperlink to see a pop up box.
What is my River catchment area?	Example: "You are in the river catchment area x." Click the hyperlink to see a pop up box.
What is my River Basin District?	Example: "You are in Eastern River Basin District." Click the hyperlink to see a pop up box.
What is my aquifer type and aquifer vulnerability?	Example: "Your aquifer type is L1." "Your aquifer vulnerability is M." Click the hyperlinks to see further information in pop up boxes.

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Cara Partners wish continued
success to Matt and his team at
Sherkin Island Marine Station

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Outlook palls for fossil fuel investments

Warnings within the world of high finance are coming thick and fast that the increasingly urgent need to combat climate change means investors could lose heavily by sinking funds into coal, oil and gas.

By Kieran Cooke

LIKE most central bank governors, Mark Carney, the Governor of the Bank of England, chooses his words carefully.

So the financial community – and government policy makers – sat up and took notice earlier this month when Carney, addressing a World Bank seminar on corporate reporting standards, said he was concerned about investments in fossil fuels.

“The vast majority of reserves are unburnable,” Carney said.

‘Tragedy of horizons’

He warned companies, investors and policy makers that they need to avoid what he described as the “tragedy of horizons”, and to look further ahead to meet challenges such as climate change.

Investors are being repeatedly told that money sunk into fossil fuels is not only bad for the climate, but is also potentially seriously dangerous to financial health.

The fundamental idea espoused by a wide spread of influential voices – ranging from the International Energy Association (IEA) to finance funds that have many billions of dollars worth of investments under their control – is that, in order to combat climate change, a large portion of the world’s remaining fossil fuel reserves must stay in the ground.

“Not more than one-third of proven reserves of fossil fuels can be consumed prior to 2050 if the world is to achieve the 2°C goal,” the IEA says.

Limiting a rise in average global temperatures to 2°C by mid-century is considered to be the minimum necessary to prevent catastrophic climate change.

As action is taken and regulations are tightened, investments in fossil fuels, whether in a coal mine or in oil or gas exploration and production, will become frozen – or, in the parlance of the finance industry, “stranded”.

In the lead up to a major UN conference on climate change in New York in September 2014, a group of high-roller investment funds – which, together, control more than \$24 trillion worth of assets – called for an end to fossil fuel subsidies and for urgent action on climate change.

Barack Obama, the US president, has joined in the chorus, calling for fossil fuels to stay in the ground. “We’re not going to be able to burn it all,” Obama said earlier this year. “Science is science. And there is no doubt that if we burned all fossil fuels that are in the ground right now that the planet’s going to get too hot, and the consequences could be dire.”

Major campaigns calling for divestment from fossil fuels have been launched. Groups



such as 350.org, which campaigns for more awareness on climate issues, have had considerable success in persuading various bodies – from universities to the UK’s leading medical association – to stop investing in fossil fuels.

A number of pension funds, with billions of dollars worth of investments under their control, have said they will either cut back or stop putting money into the fossil fuel industry.

Public pressure

Meanwhile, giant coal, oil and gas corporations have been told they could face a public backlash if they seek to avoid or deny public pressure on climate change issues.

But for those who want to see an end to the fossil fuel industry, the battle is by no means won. It is only just starting.

A report by the Carbon Tracker Initiative and the Grantham Research Institute on Climate Change and the Environment says the world’s 200 largest publicly-quoted fossil fuel companies spent an estimated total of \$674bn on exploring and developing new reserves in 2012. And that figure does not include the hundreds of billions of dollars spent on exploiting existing fossil fuel sites.

Coal, the most polluting of fossil fuels, is still king in many regions of the world, particularly in the fast-growing economies of China and India. Coal companies, urged on by politicians, are still investing billions in new facilities.

Tony Abbott, Australia’s prime minister, opening a huge new mine in Queensland that will produce about 5.5 million tonnes of coal each year, said recently: “Coal is vital for the future energy needs of the world. So let’s have no demonisation of coal – coal is good for humanity.”

Kieran Cooke, *Climate News Network*.
www.climateenewsnetwork.net
18 October, 2014

IDEAL STOCKING FILLER

A Beginner’s Guide to Ireland’s Wild Flowers – @ €7.50 (plus p&p €1.00) – see page 29 for details.



IRELAND'S GENEROUS NATURE

Celebrating our Wild Plant Resources

A review by
Dr John Akeroyd

THIS first comprehensive account of Irish ethnobotany* is both a mine of information and an enjoyable read. It also presents, as the author says, a timely and important message: "Our native flora is a vital resource for the present and for the future". Indeed, Dr Peter Wyse Jackson notes that just over half of Ireland's 925 higher plant species have been recorded as having some human use. His *magnum opus*, beautifully illustrated with his own colour photographs, historical pictures and the elegant water-colours of Lydia Shackleton (1824-1914) held at the National Botanic Garden, Glasnevin, catalogues these numerous uses as foods, drinks, medicines, materials and ornaments, and their place in Irish life and ritual. He writes from personal knowledge as well as a wide study of published sources.

Much traditional plant knowledge has been lost in Ireland not only because of progress - modern materials and supermarkets - but also because so much of the information was passed on by word of mouth rather than written down. At the same time, with regard to wild collected food-stuffs, the social disruption and collective shock of prolonged wretched poverty in the 18-19th centuries, notably the Great Famine (1845-52), seems to have stigmatised the gathering of wild plants. This activity perhaps became all too often associated with deprivation and misery. As the author (himself a great forager) points out, even in the 1930s a Department of Agriculture booklet on home preservation listed only blackberries as a suitable hedgerow fruit. Ironically, blackberries were apparently a major food source during the Famine, alongside nettles, dandelions, sorrel, watercress and the cabbage-like weed charlock. Medicinal herbs too have, after millennia of service, been replaced by the synthesised drugs of the modern pharmacy.

Despite this loss of usage and information, Peter Wyse Jackson has himself been surprised by the wealth of plant use, past and present, in Ire-



***Rubus fruticosus* - Blackberries were one of the most important wild food sources of ancient Ireland and were widely gathered and used as a food and sugar source throughout history; *Quercus* species - Oak remains one of the most highly prized and most widely used trees for timber. 'Ireland's Generous Nature'; Dog-rose *Rosa canina* - Ireland is home to a wide variety of wild rose species.**

land. He has mined rich seams of what clearly remains a living tradition and the book is full of his own discoveries from just talking to country people. His wealth of experience, warmth, geniality and humour shine through and, coupled with an astonishing compendium of data, he gives the botanist, historian and lay person a lively excursion to the wilder shores of Irish culture and identity. This is no catalogue. He has sifted his data and, although firmly rooted in botanical science, he is unencumbered and undistracted by biology and ecology - here are plants with personality, rather than objects of conventional scientific study. He is discursive, with all manner of anecdote and aside, but never really strays from his main theme of

illuminating the value of Ireland's flora. Folklore intrudes but he wisely restricts himself to symbols and children's games rather than dwelling on myth and legend. He is unafraid of anecdote and a little whimsy (for example he includes, as a digression under sloes (*Prunus spinosa*), a priceless piece by Myles na gCopaleen about barm brack), and adds spice in the form of several of his favourite wild food and drink recipes.

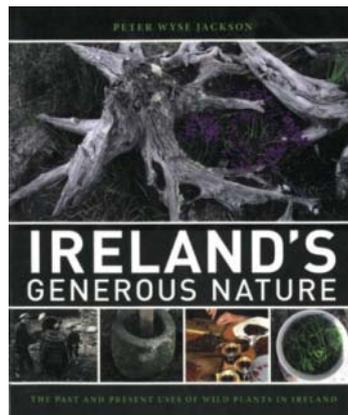
The text provides an English, scientific (Latin) and often several Irish names for each species, with at least a brief sentence or two to describe the plant, and there are numerous illustrations, contemporary and historical. As well as flowering plants, conifers and ferns, it includes bog-mosses (*Sphagnum*),

some seaweeds (marine algae) and a good selection of fungi. The material is almost entirely Irish (rather than including Britain, a different tradition) but the author alludes to plant uses in Britain, Europe, America and beyond, many examples deriving from his own travels.

Among the longer, more detailed species accounts are woodland and hedgerow trees such as ash (*Fraxinus*, the wood of the hurley), birch (*Betula*), elm (*Ulmus*), hawthorn (*Crataegus*, with a digression on fairies), holly (*Ilex*), oak (*Quercus*), willows and sallows (*Salix*, with at one point a nod to W.B. Yeats), and that Irish native woodland speciality Strawberry Tree (*Arbutus unedo*). Some of the wild fruits also have particularly full accounts, in

particular bilberries or fraughans (*Vaccinium myrtillus*), the author's favourite blackberries (*Rubus fruticosus*), and elderberries (*Sambucus nigra*), also rowan berries (*Sorbus aucuparia*), which he warns may be poisonous in larger quantities. He frequently stresses the need to take care with wild foods, especially red fruits, and also describes a number of highly poisonous species, including Lords and Ladies, Foxglove, and the sinister but sporadic Thorn-apple that once appeared in thousands in a beet field in West Cork.

The book is an endlessly fascinating parade of obscure and fascinating facts. The uses of Irish wild plants in aphrodisiacs, beers, dyes, soaps, kitchen implements (including natural pot-scour-



ers), tanning, thatching, basketry, animal bedding, herbal tobacco and, of course, a miscellany of foods and traditional medicines for man and beast well deserve to be more widely known. Summary tables gather lists of species use together under general headings, and a particularly useful appendix lists plant names that feature in local place names. One example shows how important these are: Yew (Iubhair in Irish) features in almost as many place names as Oak (dair), yet is today a rarity mostly found on cliffs and islands. Similarly, the former presence of Strawberry Tree can be traced by place names.

It is a particular joy for me to see this splendid book published, having known the author as friend and colleague from the day I first set foot in Ireland 35 years ago. He introduced me then to the idea of eating Alexanders (*Smyrniolum olusatrum*), and the late Prof. David Webb and I joined him and his family on more than one blackberry-picking excursion (actually more of a blackberry festival!). More recently I enjoyed, in America, gathering spring dandelions and helping him make dandelion flower syrup. Little did I know that this enthusiasm for what we now call "foraging" would result in the present volume. Peter Wyse Jackson has done botanists and the Irish public a huge service with a book that should become a standard reference. I cannot think of anybody else who could have written such a book, nor found so apt and evocative a title.

**Ireland's Generous Nature: the Past and Present Uses of Wild Plants in Ireland.* Peter Wyse Jackson, Missouri Botanical Garden Press. pp. 768. 2014. €60.00. ISBN: 9780915278784.

Dr John Akeroyd is author of A Beginner's Guide to Ireland's Wild Flowers (2008), and edited The Wild Plants of Sherkin, Cape Clear and adjacent islands of West Cork (1996) and The Wild Plants of Bere, Dursey and Whiddy Islands in Bantry Bay, West Cork (2013) for Sherkin Marine Station.

The Extreme Life of the Sea

Stephen R Palumbi and
Anthony R Palumbi
Princeton University Press
www.press.princeton.edu
ISBN 978-0-691-14956-1

Price:
€28.99/2014

If there is an empty niche in Nature, however inhospitable, then a living organism will evolve to call it home.

Nowhere have I seen this better illustrated than in this fascinating book. The authors, a marine biologist and his novelist son, have drawn on the creatures that thrive in the oceans' most extreme environments to celebrate the astonishing diversity of life on Earth.

From the origins of all present-day body plans in the Cambrian Explosion, they take us through the hottest, coldest, deepest, shallowest and most toxic places in the seas, to show us the lives of their oldest, fastest, toughest and most abundant inhabitants. Some of these live in conditions so hellish, or display lifestyles so bizarre that they would tax the imaginations of the most inventive fantasy fiction writers. Many have evolved body forms that have remained unchanged for millions of years, and have survived because of the generally stable deep sea environment. Others survive at the very limits of their capabilities. All, the authors stress in the final chapter, are very vulnerable, in different ways, to the effects of climate change.

The life in our oceans is vast, and much of it is still unknown. To



emphasise its complexity, the authors have chosen a small, but representative sample from each ecosystem and described their interactions in language that is both beautifully descriptive and refreshingly free of technical terms. Here is a book that will be enjoyed by anyone with an interest in the biology of the seas, whatever their level of scientific education.

Anthony O Toole

Rare and Threatened Bryophytes of Ireland

Neil Lockhart, Nick Hodgetts & David Holyoak

National Museums Northern Ireland

www.nmni.com

ISBN: 978-1-905989-35-5

Price:
£25.00 /
2012

This book is a substantial contribution to the study of the Irish flora. Ireland may be relatively poor in native flowering plants, but holds nearly half (835 species, subspecies and varieties) of the European taxa of bryophytes (mosses and liverworts). A damp mild climate, in-



dedent coastline and often mountainous terrain provide conditions for numerous bryophytes, especially those of Atlantic woodland, bogs and sand-dunes. Many comprise a globally rare 'Atlantic' suite of species, which has its greatest richness in western Ireland and western Scotland. Mosses are an important feature of the Irish landscape and a vitally important element in the integrity of ecosystems, notably water and carbon storage.

The book results from ten years of field, herbarium and literature studies funded by welcome cross-border collaboration between the National Parks and Wildlife Service and the Northern Ireland Environment Agency. We now have a clearer picture of Ireland's rare bryophytes, threatened by a range of factors, from major habitat changes such as over-stocking of sheep or drainage of wetlands to seemingly minor events such as the tidying or loss of old walls. The introductory chapters incorporate a Red List of Irish bryophytes, with updated IUCN categories of threat, and outline descriptions of 47 Important Bryophyte Areas (IBrAs). Other topics covered include a review of habitats, with beautiful colour photographs, and details of the history of recording Irish bryophytes.

Individual accounts of 251 taxa provide notes on identification,

Irish and global distribution, ecology and biology, threats and conservation status. Clear close-up photos and maps with pre-1970 and 1970-2010 records, and some more habitat photos, make for an indispensable summary of our knowledge of these plants. A further 146 taxa are illustrated, and described in brief. The three authors, their many collaborators (and illustrious forbears), between them a 'Who's Who' of Irish bryology, are to be congratulated on a work of record and of beauty that will be a basis for all future study of Ireland's rich resource of bryophytes.

John Akeroyd.

Easy Guide to Garden Birds of Britain and Ireland

By Marie Louise Heffernan

Aster Publications

www.aster.ie

ISBN: 978-0-9574965-0-7

Price €6.99 / 2012

There are many wonderful books on the market to help those who want to learn the names of every single bird in the sky. Sometimes, however, that type of book can be daunting - especially for young children and their parents who may want to take small steps and just learn the names of birds

that feed in the garden or in the local park. This book is ideal for that purpose. At 17cm x 17cm, it is a lovely size for a child to handle and the large, colourful photographs of



24 featured birds, with short and concise text on the opposite page, gives both the child and the adult enough information to become familiar with these garden visitors.

Susan Murphy Wickens

The Woods of Ireland A History, 700-1800

By Nigel Everett

Four Courts Press

www.fourcourtspress.ie

ISBN: 978-1-84682-505-7

Price: €50.00 / 2014

Ireland has a treeless landscape compared with most European countries. Based on government and private papers, this book explores the frequently scanty evidence as to how Irish woodland, a great natural resource, was eroded during the medieval and early modern periods. In the past, commentators blamed the English for this destruction, but modern au-

thors are moving to the view that the last of the ancient Irish woodland was much diminished well before the Elizabethan conquest.

This book does not dwell on woodland ecology but takes us through the history of an unsettled period, quoting extensively from the records, reports and surveys of a range of military, political and commercial figures. Political instability, poor regulation and a failure to replant all played their part, and English and Irish each

blamed the other during the various wars and disturbances. Both parties saw woodlands as the refuge of fugitives or haunt of rebels, and it was perhaps this association of woods with the loss of the old Gaelic order that led to the conventional view of English destruction of Ireland's trees. The author shows how, certainly by the late 17th century, the wealthy and influential busily planted trees to make good the loss, and also notes that the 'iron masters', so often blamed for that loss, "typically failed for reasons more related to inadequate demand and indifferent ores than deficient timber."

John Akeroyd

John Akeroyd

Seasons, Species and Patterns of a North East Atlantic Rocky Shore

By Carmel T. Madigan

www.carmelmadigan-gallery.com

ISBN: 9780957212718

Price: €29.95/2014

THE recently published book *Seasons, Species & Patterns of a North East Atlantic Rocky Shore* describes the marine life on Ross beach situated on the Loop Head Peninsula on the west coast of County Clare. The Atlantic Ocean is to the north and west and the River Shannon to the south. Carmel Madigan grew up a stone's throw from that beach - the ocean was but 80 metres from her home. The seed for this book was sown when as a child she explored the beaches nearby with her siblings, beachcombing, swimming; locating the living creatures and collecting seaweeds, especially Dillisk and Carrageen. On Sunday's they went on long nature walks with their mother and father. The strong winter winds and spring tides were at times severe. Her father often had "to re-enforce our front door on a regular basis".

With her husband and young family, Carmel returned to live in Barefield, within Loop Head, and she renewed her association and interaction with the beach, through her youngest son James.

She and James explored Ross beach throughout the four seasons. Their combined monitoring, research and enjoyment became their very own Institution and it remains so. She describes it as the journey of a lifetime. To her Ross beach

became "the most fascinating place on earth". In the five years of this book she took over 6000 photographs of the beach, not to present the best but to browse through them as evidence to back up the story of the beach and its inhabitants. She chose 300 photographs in the main of marine life but the most dramatic are the photographs in the chapter *Pulse Events - an ocean in flux and at war*. They showed the damage to the shore and the adjacent road from Storm Catherine in January 2014 and Storm Bridget in February 2014. Stone debris ended up four fields from the beach and a newly tarred road was destroyed, cutting off the local community from many facilities. A photograph of an incredibly colourful assemblage of rock, gravel, lichen, flora and seaweed in May 2013, which was no more in 2014, shows how the shore is an ever-changing environment.

Carmel in introducing the chapter *Creating Starting Points* tells of her aim throughout the book to keep scientific terminology to a minimum. She succeeds on this score and has produced a book that is very accessible. The minimal terminology that Carmel has used to help describe life on the rocky shore is explained straightaway in a glossary at the beginning of the book. Another great support for a beginner are the considerations and planning for field trips.

This is followed by a simple explanation of the lunar cycle and tidal patterns of neaps and springs. As Carmel notes, many shore creatures are internally clocked with the tidal rhythms that determine critical factors, like when to eat and when to reproduce.

The Atlantic rocky shore at Ross is a

temperate climate rocky shore. Carmel looks at the shore's exposure, its intertidal zones and defines and describes the habitats on the shore, factors which help to explain why certain animals and plants are found there. As Carmel puts it, "one finds amazingly concise classifications, patterns, locations, movements, seasonal variation, each creature in its place, defining vertical lines of growth of a species, pool depth preferences, coverage preference and so forth. Ross beach is full of 'code'. Cracking this code is akin to cracking all the habitats of the shore."

The chapter *Animal Life on the Rocky Shore* has wonderful photographs of many of the animals found on the shore, such as anemones, jellyfish, sea urchins, limpets and dogwhelks - animals that are familiar to many of us. Each species is described and discussed in detail, with many additional photographs to explain observations made. This combination brings these species to life.

Limpets, for example, are one of the most common animals on the seashore. How many people know that limpets are fighters and stave off attacks from starfish and dogwhelks for example? They use a combination of stomping and muddrooming, swinging their shell to offload dogwhelks or rapid stomping of their razor edged shell on the arms of the starfish predator.

Carmel goes on to explain how animals compete for space on the shore and how they reproduce. As she observes "Understanding some of the processes involved bring a whole new meaning and sense of wonderment to the diversity of shore life."

Seaweeds play an very important part

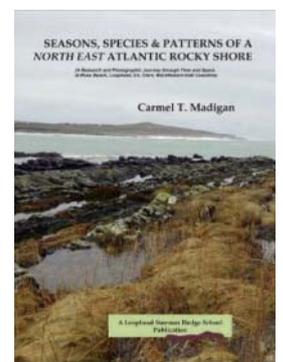
on the shore. They provide fodder for grazing shore and offshore animals, refuge for tiny sea animals and a place for some to lay their eggs. The book gives a wonderful overview of seaweeds throughout the seasons - from seaweeds that come and go with the seasons to ones that stay all year round.

Carmel does not neglect to mention life above the tide-line, the area referred to as the "splash zone". On Ross beach this area is dominated by bedrock containing a community of coastal lichens, many of which are described in the book.

The richness of animal and plant life on Ross Beach can be found on hundreds and hundreds of little beaches around Ireland's coastline. It is a richness that is not appreciated enough but by highlighting this ordinary, yet extraordinary, beach in Loop Head, Carmel gives us a wonderful insight into all these other beaches around our coast.

The last two paragraphs of Carmel's *Final Words* sums up the core reason for the book. She stated:

"I believe Irish people have not engaged or properly appreciated their coastline since the Famine era. As the Famine era came to an end, coastal folk shied away from the shoreline associating it with extreme poverty. Indeed the shore kept many alive during the Famine, even if they had neither the know how or means to make tasty dishes with its offerings. Times have changed, and education and study have replaced this humble era. It is now time to reconnect with the shoreline, for its entire package, amenity, knowledge building, intrigue, diversity, edible offerings, opportunity, fresh air and connections with



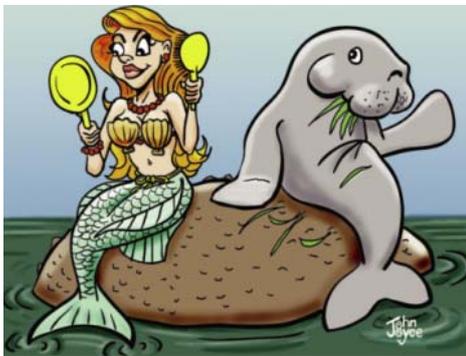
the wild world. As a country with 2600kms of coastline, I believe we should make better use of it across the above spectrum. I believe our National Authorities need to assist in the education of our coastal communities. Education and opportunity development in this respect needs to be delivered right to the edge."

"Generations will come and go and Ross Beach will radically, if quietly change both ecologically and physically through time. Here as with all life forms, the only constant is change. This book serves as a record in time and space, a record that may be referred to as climate change, ecological mix and physical ocean pressures are each brought to bear on its address at the North East Atlantic rocky shoreline at Ross Beach, Loophead, Mid-Western Irish Coastline."

Matt Murphy



JUNIOR PAGES



Mermaids - Fish or Fiction

The first recorded sightings of the mythical sea creatures known as 'Mermaids' - beings who are half human and half fish - date right back to early Arab sailors and the Greek Pliny in 586 AD - with reports continuing as late as the 1900's. From our modern knowledge of marine biology, it is likely that these sightings were of marine mammals such as manatees, dugongs and the now extinct sea cow, which have paddle-shaped flippers that could resemble the famous 'mermaid's mirror' and do actually appear to cradle their young as a human mother would do. The mermaids described by Christopher Columbus off the island of Haiti, in 1493 were almost certainly manatees. He wrote that they "came quite high out of the water", but were "not as pretty as they are depicted, for somehow in the face they look like men." The mythical Irish mermaid, or 'Morrow' is lovely and graceful however and teases men with her beauty. The legend says that, if a man can capture her red cap or cloak, she will forget her life as a mermaid and marry him, but will return to the sea immediately if she gets her cap or cloak back.

by John Joyce

For more Fun Facts check out www.spindriftpress.com

Superstitious Fishermen

Until the development of sophisticated fish detection equipment and modern fishing methods, getting a successful catch seemed to depend a great deal on luck. This is why fishermen have traditionally been very superstitious around having luck and keeping it. For example, some fishermen would never sail from port if they passed either a nun, a cat or a rook on their way to their boat. Others would not sail if they saw a rat come ashore from their vessel, since they assumed the rat was abandoning the boat in case it might sink. At mealtimes, it was considered bad luck to stir tea with either a knife or a fork, the teapot was not to be emptied after fishing had started, for to do so might make the boat turn over and sink, or bring bad luck. Knives were not to be crossed on the table, nor was a loaf of bread to be cut and turned upside down. Salt was considered to be particularly lucky, so fishermen were not to pass the salt (since to part with salt was to part with luck). The use of certain words at sea - such as pigs, fox, cat, hare, salmon or rabbits, the church, or anything to do with the land - was considered bad luck. To bring good luck, fishermen needed to eat fish from the head to the tail, shed a few drops of blood before a trip in an accident or a fight, or even (on Scottish boats), throw a crewman overboard and haul him back, so that the fish would follow.



Salty Sea Stories

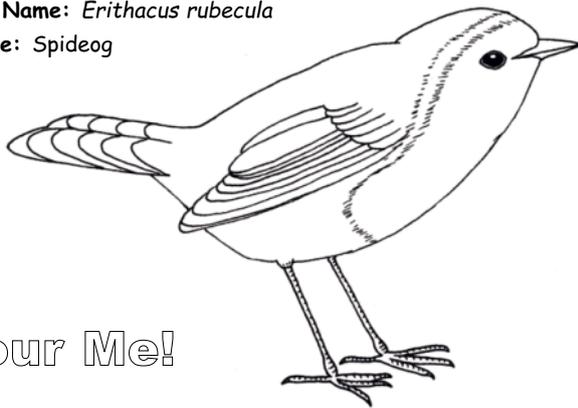
There are many legends as to why the sea is salty. In the Philippines, the stories describe island villages that ran out of salt due to storms which prevented them sailing to a nearby island where a gentle giant had large quantities of it in a cave. Then a child suggested that the people ask the giant to stretch out his legs over the ocean to form a bridge which the people could walk to get the salt. All was going well, until the giant put his foot into an ant hill. He called to the people to hurry with their full sacks of salt, but the people didn't believe that such a huge man could feel the sting of the ants, and did not hurry at all. At last, the giant grew so distressed that he thrust his foot into the sea to ease the pain and all the salt fell into the water, which has made the sea salty ever since.

In Scandinavia, the story goes that a rich man persuaded his poorer brother to lend him a magical millstone that could grind out anything a person asked for. He then sailed off in a boat to grind salt for the local fishing fleets, but in his haste had forgotten to ask for the magic words that would make the mill stop grinding. His boat soon filled with salt and sank, sending the magic mill - which was still grinding out salt - to the bottom of the sea. This is why the sea is salty.

The Robin



English Name: Robin
Scientific Name: *Erithacus rubecula*
Irish Name: Spideog



Colour Me!

THE ROBIN is probably the most familiar and most easily recognised garden bird. It has a striking red face and breast, with a brown back and wings, and a white belly. It can appear quite plump, especially in cold weather when it fluffs up its feathers. In the garden it can often be seen hopping along the ground and will often sit motionless close to you while you are gardening.

The female robin builds her nest in walls, hedges, sheds, trees, ivy and even tin cans, and will also use open-fronted nestboxes. The nest is made from moss, dead leaves and grass.

The robin is very territorial. This means that it does not like other robins in its area and will defend it fiercely. You are therefore unlikely to see more than one robin at a time in a small garden.

If another robin comes too near it puffs up its red breast and sings out in alarm to warn the trespasser off. When alarmed it makes a "tick" sound, which can sound like an old clock being wound up. At other times it can either sound sad or make a pretty warbling song.

Fact File

Plumage Colour: Red face and breast. Brown back and wings, with white belly.

Height: 12.5-14 cm

Diet: Worms, insects, snails and fruit.

Habitat: Gardens, hedges, parks and woodlands.

No. of eggs: 3-6



Top right: American Robin (*Turdus migratorius*). Bottom right: Rose Robin (*Petroica rosea*) from Australia.

Robins, but no relation!

There are other birds known as "robins" but though some have a similar red breast, they are not related to the European Robin. Such birds include the American Robin (which is more closely related to the thrush) and the Australian red robins (more closely related to crows).

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HOW MUCH DO YOU KNOW ABOUT... BIRDS

How much do you know about birds? Find out with this fun quiz. Choose one of the answers and see how many you can answer correctly.

1. Which bird lays its eggs in other birds' nests?

- a. Wren
- b. Little Egret
- c. Cuckoo



2. Which bird is not white?

- a. Mute Swan
- b. Little Egret
- c. Bullfinch



3. Which one of these birds is the tallest?

- a. Grey Heron
- b. Curlew
- c. Puffin



4. On the Skelligs, off the coast of Co. Kerry, what birds would you most likely see:

- a. Wrens
- b. Gannets
- c. Swallows



5. What bird is connected with a clock.

- a. Crow
- b. Owl
- c. Cuckoo



6. What bird is connected to the story, The Children of Lir?

- a. Eagle
- b. Swan
- c. Robin



7. What bird's name is also a child's name?

- a. Gannet
- b. Robin
- c. Duck



8. Which of these birds is not a bird of prey?

- a. Blue Tit
- b. Kestrel
- c. Peregrine



9. Which bird has a red breast?

- a. Oystercatcher
- b. Puffin
- c. Robin



10. Where might you see an oystercatcher?

- a. Near the coast.
- b. In the city.
- c. In a tree.



11. The wingspan of the White-tailed Eagle is:

- a. 1 metre
- b. Over 2 metres
- c. 50 centimetres



12. Owls are more likely found in:

- a. Ruins and sheds
- b. Bird boxes
- c. Nesting in reedbeds



13. Which one of these birds has the longest beak?

- a. Puffin
- b. Swallow
- c. Curlew



14. Which one of these birds is not resident in Ireland?

- a. Penguin
- b. Starling
- c. Blackbird



15. Which one of these birds lives by a river?

- a. Kingfisher
- b. Gannet
- c. Puffin



16. Where does a bird lay its eggs?

- a. In a nest
- b. In an egg box
- c. In a hospital



17. To which family of birds does the magpie belong?

- a. Crow
- b. Wren
- c. Starling



18. Which of these birds has webbed feet?

- a. Blue Tit
- b. Bullfinch
- c. Duck



19. Which one of these birds does not have blue feathers?

- a. Puffin
- b. Kingfisher
- c. Blue Tit



20. When swallows return to Ireland in the spring, where do they come from?

- a. North America
- b. South America
- c. Africa



Answers on page 30.



Kestrel



Curlew



Grey Heron



Blue Tit

BIRD WATCHING

All the birds below are mentioned in the quiz on page 28. Can you find them in the wordsearch? Answers on page 30.



Starling



Owl



Cuckoo



Kingfisher



Swan



Robin



Wren



Gannet



Puffin



Oystercatcher



Magpie



Blackbird

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GAISCE - the President's Award

By Pat Kavanagh

IN 2009 the Ballyrunners Programme was established. It was created, facilitated and managed by the The Ballymun Job Centre & Probation Service. The funders are Dept of Social Protection, Probation Service, Ballymun Local Drugs Task Force. The initial aim was to engage young people at risk in constructive activities that alleviated boredom and promoted life skills and pro-social attitudes and activities. It was envisaged that this in turn would lead to a reduction in anti-social and criminal behaviours, decreased drug use, increased engagement with services, improved self worth and improve their chances of employment.

The objectives of the programme were as follows:

- completion of FETAC Level 3 Health and Fitness
- achieve the Bronze Gaisce Award

- promotion of routine and stability
 - increase civic responsibility
 - enrich existing relationships with services
 - promote positive mental well-being
 - build positive relationships with young people
 - promote peer support
 - improved self confidence
- Given the abstract nature of certain objectives, indicators of success were to be evidenced in terms of
- Engagement in training/employment
 - Decrease in anti-social behaviour
 - Retention of participants throughout the programme
 - Engage in career planning.
- Whilst the Ballyrunners Programme consists of a number of different activities and projects, research has found that providing an activity, where previously there was none, is more important than the type of

activity provided. (Catalano et al, 1998) This relates to the fact that the activity is a mechanism for diverting youth away from anti-social behaviour. This said, it was agreed that the Ballyrunners needed to align itself with an accredited and universally recognised training programme. Given the desired focus of the Ballyrunners original programme was sport and fitness the Further Education and Training Council Awards Council (FETAC) Level 3 Health and Related Fitness was the module selected for the programme. The emphasis on sport served as an incentive for young people to participate in the Ballyrunners as it targeted their area of interest, offered accreditation in a career they had a genuine interest in pursuing and it did not require a high level of academic ability.

In subsequent Ballyrunners Programmes in 2010, 2011 & 2012 the core framework for the pro-



Images courtesy of Gaisce - the President's Award

gramme is the Bronze Gaisce Award.

The Bronze Gaisce Award. The Gaisce Award has 4 components:

- Physical Activity - young people train for and participate in a FUN RUN for Simon Community as well as undertaking their studies for the FETAC accreditation.
- Personal Development - modules in drama, dance and film making
- Community Involvement - restoration of community gardens for senior citizens in the area

This year we also organised a highly successful Community Football League which included many local agencies and An Garda Síochana in Ballymun.

The key features of the Ballyrunners Programme are that the young people are not paid for the participation. Their engagement is voluntary but we are happy to report that our retention of the young people is very high; thus demonstrating their motivation to engage in something meaningful.

Secondly is that the facilitators from each agency actively participate in the programme, so if the young people are dancing, we're



The Ballyrunners Programme has proved to be very successful and Gaisce are delighted that their award programme is being utilised and is part of the core framework of The Ballyrunners Programme.

dancing, if they're digging gardens in the rain, we're digging. Not only is this pro-social modelling but it also demonstrates our investment in the young people and the programme. It also has huge benefits in terms of relationship building.

To date 45 young people have completed the programme,

- 32 have gone onto further training, of these
- 7 have entered third level education.
- 5 are involved with Springboard and
- 14 went on to employment.

Key to success is motivated and enthusiastic

facilitators who believe in the programme and in the young people's capacity to make positive changes, interagency collaboration, flexibility and creativity.

The Ballyrunners Programme is a universal programme not confined to areas of disadvantage; it could be used in schools and youth groups, it is low cost and easy access. Most importantly due to its inter-agency collaborations it utilises resources from local agencies.

For information on Gaisce - The President's Award see www.gaisce.org

Marine Harvest currently employs 260 staff in the West of Ireland, supporting local communities in rural coastal areas to produce the finest salmon in the world, which is proudly presented to customers all around the world.

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ANSWERS TO "How Much Do You Know About Birds?" (page 28)

1 = c. Cuckoo; 2 = c. Bullfinch; 3 = a. Grey Heron; 4 = b. Gannet; 5 = c. Cuckoo; 6 = b. Swan; 7 = b. Robin; 8 = a. Blue Tit; 9 = c. Robin; 10 = a. Near the coast; 11 = b. Over 2 metres; 12 = a. Ruins and sheds; 13 = c. Curlew; 14 = a. Penguin; 15 = a. Kingfisher; 16 = a. In a nest; 17 = a. Crow; 18 = c. Duck; 19 = a. Puffin; 20 = c. Africa.

Birdwatching Wordsearch (page 29)

(Over Down Direction): Blackbird (3,9,N); Cuckoo (10,1,SW); Curlew (22,1,W); Gannet (24,7,NW); Grey Heron (8,9,NE); Kingfisher (14,10,NW); Magpie (22,9,E); Owl (16,2,SW); Oystercatcher (13,10,W); Puffin (24,6,N); Robin (6,7,NE); Starling (12,6,E); Swan (9,1,SE); Wren (18,3,S).

From



THE Geological Survey of Ireland (GSI), which is part of the Department of Communications Energy and Natural Resources (DCENR), has a long and happy history of fruitful collaboration with Matt and the team at the Sherkin Island Marine Station.

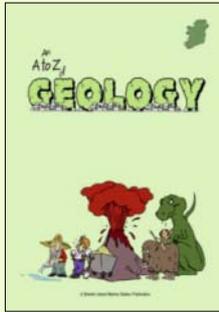
In 2008 GSI cooperated with the Sherkin team on the production of an A-Z Guide to Geology. It is primarily aimed at children in the 11-14 age bracket. However, this simple, well-illustrated 30 page guide has also proved to be of interest to primary school teachers, secondary school geography teachers and the wider general public. The work was largely organised by Susan Murphy Wickens on the Sherkin side and Enda Gallagher, then Marketing Manager for GSI, but relied on



assistance and input from a wider team in Dublin and Sherkin and benefited from sponsorship of printing costs by An Post and PharmaChemical Ireland. Since its launch it has proved a consistent best-seller on GSI's online shop.

The book aims to illustrate in a simple way the importance of geology in our everyday lives. It took just one geology topic for each letter of the alphabet and produced straightforward text that is illustrated by good quality photos, illustrations and cartoons. So, D is for Diamonds, G is for Gold, O is for Oil, J is for Jurassic (age of the dinosaurs), V is for Volcanoes and so on. Lots of interesting topics are covered and many of them are things we might never associate with geology at all!

Fast forward to 2013 and GSI's parent department DCENR were lucky enough to engage the services of a new Irish language officer, Tomás Ó Maonaile and his trusty assistant Neil Ó Conchubhair. In discussing how GSI could utilise their services, it was suggested that, amid the necessary



translation of important new Bills, papers, websites and speeches, perhaps we could look at some of our most popular publications. Following some discussion between Matt and GSI, a refresh of any dated text, and some great translation by the DCENR team matched with Susan's desktop publishing and graphic skills a new publication is now ready. Dubbed *An Gheolaíocht Ó Bhun go Barr* (Geology from top to bottom), it could not be A to Z as there is no Z in Irish! However any loss of alphabet is more than made up for in the excellent content. The new booklet is scheduled to be launched shortly by Minister Joe McHugh TD, who appropriately enough has responsibility for both Natural Resources, including GSI, and the Gaeltacht.

A copy will be sent to every Gaelscoil in the country over the coming months, while additional copies are available online from gsi.ie and sherkinmarine.ie at the very reasonable price of €5. A must have Christmas present!

To



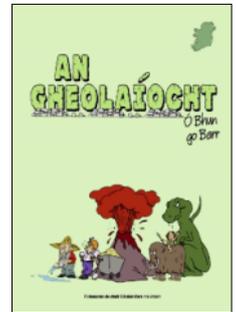
TÁ stair fhada shéanmhar ag Suirbhéireacht Geolaíochta na hÉireann (SGÉ), a feidhmíonn mar chuid don Roinn Cumarsáide, Fuinneamh agus Acmhainní Nádurtha le Matt agus an foireann i Stáisiún Mara Inis Arcáin.

I 2008 rinne an SGÉ comhoibriú le foireann Inis Arcáin agus iad a obair ar an "A-Z Guide to Geology". Tá an leabhar seo dírithe ar pháistí idir a 11 agus a 14 bliana d'aois. Ach tá sé soléir go bhfuil an leabhar seo mar ábhar seise do múinteoirí sunscoile, múinteoirí meánscoile agus don phobal i gcoitinne freisin. Is iad Susan Murphy Wickens ó foireann Inis Arcáin agus Enda Gallagher, Bainisteoir Margaíochta san SGÉ ag an am, a d'eaighraigh formhór na hoibre ach bhí cabhair agus ionchur le fáil ó foireann leathan i mBaile Átha Cliath agus ar Inis Arcáin agus ba bhuntaiste é urraíocht a fháil ar na costais phríontála ó An Post agus PharmaChemical Ireland. Ó seoladh é, tá móréilimh air i siopa ar-líne an SGÉ.

Is í aithne an leabhair seo an tábhacht a bhaineann leis an Gheolaíocht i

ghnáthshaoil na ndaoine a léiríú. Tógann sé ábhar geolaíochta amháin le haghaidh gach litir san abítir agus cuirtear téacs simplí intuigthe ar fáil, tacaithe le griangrafanna, léaráidí agus cartúin ar ard chaighdeán. Mar shampla, seasann "D" le haghaidh "Diamonds", "G" le haghaidh "Gold", "O" le haghaidh "Oil", "J" le haghaidh "An Tréibhse Iúraisic" (Aois na nDínasár", "V" le haghaidh "Bolcáin" agus mar sin de. Clúdaítear an chuid ábhair éagsúla, ina measc rudaí nach samhlaítear go bhfuil aon baint acu leis an ngeolaíocht ar chor ar bith!

Ar aghaidh linn chuig 2013 agus bhí an t-ádh ar Roinn sinsearach an SGÉ, an RCFAN, seirbhísí Oifigeach Gaeilge nua a fháil darbh ainm Tomás Ó Maonaile agus a chúntóir Neil Ó Conchubhair. Agus plé á dhéanamh ar chonas mar a d'fhéadfadh an SGÉ na seirbhísí Gaeilge seo a úsáid, bhí moladh ann go mba chóir roinnt foilseacháin don SGÉ a raibh éileamh an phobail orthu a aistriú, chomh maith le Billí, páipéaraí, suíomhanna idirlín, óráidí agus rudaí tábhachtacha



den chineál sin. Tar éis teagmháil idir Matt agus an SGÉ, uasdátú ar an téacs, agus aistriúcháin ón RCFAN chomh maith le scileanna foilsíocháin agus grafaicáil Susan, tá foilsíocháin nua curtha ar fáil. "An Geolaíocht ó Bhun go Barr" is ainm dó, ní fhéadfaí A - Z a ghlaoch air de bharr nach bhfuil an litir "Z" le fáil sa Ghaeilge! Is cuma faoin gcailliúnt seo san abítir de bharr go bhfuil an t-inneachar é féin ar chaighdeán chomh hard sin. Beidh an leabhar á sheoladh go luath ag an tAire Stáit Joe McHugh, a bhfuil freagracht cuí air as Acmhainní Nádurtha, an SGÉ ina measc, agus as an Ghaeltacht.

Beidh cóip á chur chuig gach Gaelscoil sa tír sna míonna atá le teacht agus beidh cóipeanna breise le fáil ar líne ó gsi.ie agus sherkinmarine.ie ar €5. Bronntanas Nollaig iontach!

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GSI



Impact of climate change on aquatic contamination

By Mike Ludwig

ONE of the least understood but potentially serious problems created by Global Climate Change is the impact the anticipated changes will have on contamination that now lie on or just beneath the surface. Could climate change-related storms, flooding, or other events compromise existing engineering and/or institutional controls and cause releases of contamination? The traditional design of contamination site remediation affords them protection from historical and predicted environmental conditions. Unfortunately, those engineered solutions may not account for future conditions created by Global Climate Change. While all contaminate deposits are concerns, those located beneath the waters of our rivers, lakes, and estuaries or adjacent to those waterbodies are the more immediate concern.

The waterways of catchment or drainage areas have evolved by moving the precipitation that falls within them in a way that responds to the amount of water moving through them at any instant. All rainfall events induce erosion. But, it is during larger runoff events that waterways can be heavily eroded as water surges through the system in response to gravity and erosion of unstable embankments becomes a serious concern. While escalating rainfall in some areas had been predicted by the earliest modeling of Global Climate Change and rainfalls exceeding 2 inches were becoming more common, the passage of tropical storms Irene and Lee in the late summer and early fall of 2011 were an unexpected ver-

ification of the model outputs. During their passage through the Pennsylvania, New York and the New England states these two storms deposited more than twenty-one inches of rain. That unprecedented rainfall caused massive erosion of the infrastructure. Along the Hudson River, between Albany and New York City roads, rail lines and entire communities were swept away by the floods and more than fifty waste treatment plants were either flooded or forced to simply discharge the water flowing to the plants.

Changes in sea level will generally distance waves and strong currents farther offshore (deeper water) and thus may have a beneficial impact on contamination embedded there. However, for the majority of the repositories along or near a waterway, the more frequent, stronger storms with their increasingly unparalleled rainfall amounts pose distinct pollution management problems. Curiously, sites experiencing fewer but more intense and increased rainfall events have similar issues. Old pollution management methodologies may be becoming inappropriate. Whether the increases in erosion is water or wind driven, the consequences are more erosion and dispersion of contaminated sediments. Dispersion makes clean ups more complicated and expensive. The predicted consequences of climate change; sea level rise, increased rainfall, more severe storm events in general, the landward encroachment of larger storm surges, and the associated flooding, represent a disturbing array of challenges to our way of managing pollution that could affect our way of life.

Additionally, while some countries have established procedures to rein in and correct

pollution even though the efforts and costs have been significant, others have not been as active. Unfortunately, not all countries have the political or economic ability to address their existing social condition let alone those pending from Global Climate Change. Management of hazardous waste sites under the environmental conditions currently being projected by climate scientists present a broad and diverse assortment of challenges and those challenges are often overlooked in the need to address more visible and pressing societal and infrastructure needs.

Although pollution problems are present wherever life exists, the problems associated with remobilization of contaminated sediments in flowing waterways and estuarine mixing zones are of particular concern. These areas represent the interface where land and sea resources mix and where many organisms have come to rely. For instance, on average, more than 50 percent of our harvested marine species use estuaries (coastal mixing zones) to facilitate their reproduction and successful early life stage development. It is important to note that these estuarine waters are where aquatic life is concentrated where our pollution is headed.

We have been watching the consequences of increasing flow in waterways due to urbanization and the loss of natural surfaces to absorb rainwater, the flows from storms Irene and Lee caused a need to look at the nation's waterways that contain heavy concentration of polluted materials. A look at the Polychlorinated Biphenyl (PCB) concentrations in the upper Hudson relieved reviewers as the deposits were upstream of the heavy rains. Unfortunately, the contaminated sediments in parts of New York



Hudson River at West Point, New York, USA.

Harbor received the full impact of massive flows and the associated erosion. Some of these deposits were dispersed.

While it is inappropriate to report that improved cleanup actions were spurred on by the storms of 2011, it can be reported that great strides have been made in advancing cleanups of several heavily polluted waterways within the Hudson/Raritan River Catchment area. Without these pollution cleanups the cost of maintaining the Port of New York and New Jersey as the third most heavily used port in the US could become a serious economic burden. How are your ports dealing with old pollution problems in the light of new climatic conditions?

Mike Ludwig, Ocean and Coastal Consultants, Inc., 35 Corporate Drive, Suite 1200, Trumbull, CT 06611, USA.
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