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Personal Beginnings

The White Rabbit put on his spectacles. "Where shall I begin, please your Majesty?" he asked.
"Begin at the beginning," the King said gravely, "and go on till you come to the end: then stop."

Lewis Carroll, Alice's Adventures in Wonderland

The beginning for me was summer 1970. I sat in a tent with two other students on Pabbay, a small uninhabited island in the Outer Hebrides off the north-west coast of Scotland. Andrew Ramsey, Norman Macdonald and I were working for Operation Seafarer, the first complete census of seabirds of Britain and Ireland. As part of this effort, I had trudged after Andrew to other islands in the Sound of Harris, to Auskerry in the Orkneys and for several visits to Canna, a wonderful Hebridean island to the west of Rùm and to the south of Skye. For close to 1,000 years, Pabbay was home to a small settlement. Now all that remains are the foundations of the village, some lazy beds (those patches in which vegetables were cultivated by sowing them on terraces created from rotting kelp and peat) and the roofless walls of a small church. The former islanders rest under its protection, lying beneath little mossy hummocks and peacefully metamorphosing into luxuriant pink splashes of sea thrift. There were fulmars sitting atop these natural gardens, brooding on their nests with an air of great and inner sanctity unless you approached them too closely. Then, you were welcomed with a warm vomit of fishy oil.

We were marooned. There were no birds uncounted and it was hard to find one that was not shyly sporting a shiny new ring on a leg. Our work was over, a north Atlantic gale was blowing, and our boatman in North Uist was wisely prudent. Pabbay, situated in the Sound of Harris, is completely exposed to the Atlantic. Our boatman had decided

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to stay at home. As we watched our daily food supply dwindle with the wind and rain doing its best to flatten our tent, we amused ourselves with my ragged volume of Robbie Burns and imagined where in an ideal world we would like to be the following summer. It was difficult to dry off and we rarely ventured outside, but we did have a short moment of excitement. Andrew headed out one morning with spade and toilet paper. A little later, he exploded into the tent, shouting "Quick – get the nets." A brightly coloured bunting had fluttered around him just as he settled into his moment in the lazy beds. Soon, the bunting was in our mist nets and identified as a yellow-breasted bunting a long way from home.

When the seascape reached new heights of foam-streaked anger, shouts came from the beach – and there was the boatman at last. Our accommodation in the boat – a lifeboat recycled from an old freighter – was beneath the roofed-over forward deck. All we could see was our man, silhouetted starkly in front of alternating sky and walls of frothy water, racing horizontally eastward. I had often been in small boats around Scottish seabird colonies and in seas that seemed to me to be pretty rough. Any sense of adventure was always deflated by a glance at the helmsman, nonchalantly steering with elbows on the tiller or foot on the wheel. This is how it had been on our way out. Now the boatman gripped the tiller with both hands, with his gaze riveted on whatever was happening to the west. I still remember the aroma and taste of the fresh bread he kindly brought for us and that we munched as we wedged our feet against the little hull. I am not a great sailor, but my stomach never had a fleeting thought of giving up that bread. It was on the foam-flecked journey on the Sound of Harris that next year's destination was decided. It would be the Svalbard archipelago.

I never really expected to see Svalbard, but Andrew had the energy of A. A. Milne's Tigger, and before long, he had persuaded Chalmers Clapperton, a geologist faculty member at Aberdeen University, to organise a small expedition. Andrew then departed for graduate work at the University of Manitoba and Norman became the president of the student union at Aberdeen University. Two years later, however, Sandy Anderson and Bill Murray (researchers at Aberdeen), Robert Swann (a fellow student at Aberdeen University) and I were working amidst the seabirds of Kongsfjorden.

We were a year late, but I never complained because in the interim summer, I met Thérèse Ní Ógáin while we worked on either side of a conveyor belt in a smoked herring factory on the Shetland

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Islands. Thérèse had a B.A. from University College Dublin and was en route to an archaeological dig in Brittany.

Our main camp in Svalbard was just outside the small settlement of Ny-Ålesund, but Robert and I had another small camp at the head of the fjord. In front of our tent lay raised beaches of shin-high moss, where hummocks of Arctic-alpine flora celebrated their brief moment in the sun. Amidst the flowers, eider duck females sat with maternal pride over their young, and in the small tundra lakes, red-throated diver females and phalarope males imitated their eider neighbours. Above and behind us was a small mixed-species seabird colony, while immediately to our right was the huge ice front of the merged Kongsvegen and Konebreen glaciers. Kongsvegen is an outlet glacier, descending at the breakneck velocity (for a glacier) of about 2 metres a day from an upper ice field. With this speed, it is heavily crevassed and is almost continually calving small icebergs into the fjord. The ice front was a pandemonium of seabird activity. Our task was to chart the diurnal behavioural pattern of the kittiwakes (the most common species) feeding in the twenty-four-hour cycle of sunlight intensity. It turned out that the birds were much more interested in the intensity of ice calving than they were in the passage of the sun. The glacial front floats on the fjord, and if there was a correlation with anything, it was with the tidal cycle.

Robert and I were concerned about polar bears and our lack of a gun was considered by the staff at the Ny-Ålesund research station to be the height of folly. We explained confidently to them that we did not need one, as the experts at Aberdeen had told us that bears in summer always follow the retreating sea ice with its cargo of seals. After a few moments of quiet and reflective thought, our sage in Ny-Ålesund responded in that deliberate Norwegian way: “Ja, that is true, but the bear that stays behind – he is a hungry bear!” Of course, he was right. On the way north between Nordkapp and Longyearbyen, our ship made a supply stop at Bear Island, where a radio operator had been killed the previous autumn by a bear that had come ashore several months before the arrival of the ice and seals. Seven years later, when doing an oceanographic section by ship, we encountered a bear swimming exactly halfway between Disco (Greenland) and Baffin Island. It was more than 150 kilometres from the nearest land and (it being late summer) was at least 300 kilometres from the closest pack ice. The bear did not seem to be lost or disorientated and kept swimming in a straight line towards the west, sublimely undisturbed by the ship circling around.

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It is constantly surprising how quickly time glides by. I have not seen Robert for 40 years. He became the geography teacher at the school in Drumnadrochit, not far from Loch Ness, and later at Tain. His enthusiasm for birds obviously never waned. From time to time, I read about him accompanied by bands of lucky schoolchildren working on birds all over the highlands and islands but especially on Canna. Here, he has maintained a summer ringing (banding in North America) and census programme of the bird population that must be one of the most valuable ornithological records in Scotland. I often think about the learning experiences provided by Robert, along with Andrew Ramsey, Peter Macdougal and Alastair Duncan (three other teaching friends from my Aberdeen days), and by my wife, Thérèse, who also became a teacher. Their exciting extracurricular environmental activities with young minds must have encouraged a public awareness of environmental issues in adult life.

Glaucous gulls preyed heavily on the young seabirds behind our Kongsfjorden tent. The adult glaucous gulls are magnificent, but from a purely human viewpoint, they probably have few friends. They will murder anything they can. However, with them having not evolved into raptors, it is a clumsy and cruel business. A few days before our return to Aberdeen, I noticed one close to our tent. It was behaving in a distressed way, and soon after, it was dead. I was puzzled. It looked so healthy, with a lot of fat and no obvious parasite problems. I took some organ and fatty tissue samples and added them to the puffin material collected earlier by Sandy Anderson. All the samples were passed to Bill Bourne, who was then working at Aberdeen University. Later, we learned that the puffins contained similar levels of PCB derivatives as were found in other auks from the Scottish coast despite their apparent isolation in Svalbard. However, my glaucous gull had the highest levels of PCBs that the analyzing laboratory had encountered up to that time.

I do not believe the glaucous gull levels were ever published. It was a single bird and of no statistical significance. However, it was a personal milestone for the rest of my life and for the theme of this book. How could an Arctic bird, whose winter migrations would rarely (if ever) take it into industrialized waters, carry such a large burden of a toxic chemical and what is the underlying message for the Arctic and global environments?

I made a museum skin of the gull. It remained a barely tolerated guest at the home of my aunt in southern England. One night, after an aggressive spring-cleaning operation, my bird was tossed over the estate wall of some local gentry whom she particularly disliked.

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What is it about the Arctic that is so seductive? People whose ancestors have lived there through hundreds if not thousands of generations will have a perspective that outsiders such as myself can never experience or fully understand. What has it been for me? I cannot really say, but I do know it is a magic that has never weakened since those days in 1972 amongst the flowering dryas with the utterly unstoppable Kongsvegen glacier thundering into Kongsfjorden and the feeding orgy of the clamorously shrieking kittiwakes. It is a landscape that engenders the true measure of how insignificant one really is. To paraphrase from a poem by Chief Dan George, your spirit soars.

Whatever it was and still is, the spell was cast. That summer beside the Kongsvegen became a turning point for the rest of my life. Returning to Aberdeen, I wondered what research topic would get me back into the Arctic. The seabirds at Kongsfjorden were obviously feeding at the ice front. What were the conditions that gave them such a feast? I wrote a doctorate proposal and sent it to every university I thought would be interested. The first reply came from Alan Lewis, a professor at the Institute of Oceanography at the University of British Columbia in Vancouver, Canada. I arrived there in late August 1973 and spent the next four years working on plankton ecology in Knight Inlet, a very long glacial runoff fjord about a 24-hour sail north of Vancouver.

These were wonderful years. Thérèse came to Vancouver just before my first Christmas there and we were married two days later before five guests and the officiating priest. Our two sons, Dáithí and Scellig, were born in Vancouver. After many years living and working in Nova Scotia, the Arctic and Ottawa, we now have a home in retirement on a small island in the Salish Sea. On a clear day, from the windows of our house, we can see Vancouver and the forest that surrounds the university. Hidden in those trees is the little church in which we were married.

Knight Inlet is not the Arctic, but my research inevitably led me north once the doctorate was completed in 1977. I spent the next three years as a biological oceanographer working mainly between Greenland, Baffin and Ellesmere islands and Lancaster Sound. That was the end of my experience as “a bench and field scientist”. For the rest of my career, I worked as a manager of Arctic environmental science programmes. Initially, the scope was restricted to the Canadian Arctic. However, Arctic science is incredibly expensive and the topics of interest have no respect for international boundaries. Therefore, as time passed, the work took on ever-growing levels of circumpolar

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cooperation and I was soon also involved in intergovernmental actions to protect the Arctic and global environments.

Those of us given these roles are very fortunate. We could gaze at the landscape of interdisciplinary Arctic environmental knowledge as it evolved over the past 35 years. We could see emerging issues on the Arctic's overall health and do our best to set up international cooperation and funding to move the science frontiers forward. Perhaps most importantly, we were placed in the privileged positions of bringing knowledge on the deteriorating Arctic environmental situation to circumpolar and global political levels and to argue for governmental mitigation.

Despite the huge expansion of Arctic environmental knowledge, very little has penetrated beyond the small circle of Arctic specialists. At science planning meetings over the last few years, the challenge has been thrown out many times to the dwindling band that can trace a history back to the 1970s: "You people should write a book." Well, this is one response.

This book is not an intellectual review of the last 40 years of Arctic environmental science. Neither is it a summary of Arctic international environmental cooperation. What it contains is a very personal selection (almost a memoir) of some key developments and events over the last 40 years that have contributed to our present knowledge about the Arctic's general health and the Arctic's role as part of the global ecosystem. I have concentrated on the physical, chemical and toxicological parts of the story that mark the beginnings of the environmental and their associated human health problems now coming to pass in the Arctic. Until the recent advent of climate warming, there was a general perception that threats to the Arctic environment are largely the result of human activity within the Arctic (such as hydrocarbon exploration and production). This is not the whole story and this book will concentrate instead on the insidious impacts experienced in the Arctic resulting from human activities located at much lower latitudes.

Perhaps an analogy of the Arctic tale as being a theatre tragedy in three acts would help clarify this. The physical, chemical and toxicological parts of the story are the actors who star in Act One. In Act Two, they are still present on the stage of life and are progressively eroding the well-being of the marine, freshwater and terrestrial ecology of the Arctic as well as the cultural survival of its indigenous peoples. In Act Three, we – the audience – make our entrance. We have been shifting guiltily in our seats throughout Act Two as we recognize our destructive roles as paymasters to the Act One cast. We also come to realize that we

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are also being drawn into an unhappy destiny because the Arctic interacts with the physical, chemical and biological elements of our own lower-latitude ecosystems. Not only do we have a moral responsibility to change our ways, but it is also in our own interests to do so and we will examine the adequacy of our circumpolar and global political responses. To continue the analogy, this book deals with Acts One and Three. The wildlife and indigenous cultural aspects of Act Two are equally as important, but they are completely outside my area of expertise. You will find here the barest Act Two threads necessary to connect the first and last acts. It remains the work of other writers to do justice to the subjects of Act Two.

If you have been irretrievably lost in my meandering excuses, suffice it to say that the general framework I have chosen to follow is to describe our growing understanding of Arctic change, the Arctic environmental interconnections with ecosystems elsewhere and the reasons why we and our politicians should be paying close attention to what is happening in the far north.

Many remarkable people from around the world have played vital roles in the Arctic story. They are Arctic indigenous peoples and their leaders, scientists from almost every discipline imaginable, medical and nursing practitioners, school teachers, international diplomats, "bush" pilots who routinely land planes on snow, ice and water (and sometimes, it seems on all three at the same time) and ships' crews who are masters of improvisation. Most will remain anonymous, as I expect they would wish to be. A few people are identified for a number of reasons – in most cases because of a blinding scientific, managerial or political contribution that cannot be told without attribution. In this vein, you will learn that I have several personal heroes and heroines for my story. Finally, in some cases, names appear simply to add some life and depth to the story or to help locate key references.

In writing this book, I have aimed at the nonspecialist but have taken every opportunity to fully exploit the reader's curiosity. My hope is that university undergraduates will take a close look at this story. The issues facing the Arctic are extraordinarily diverse and offer wonderful career opportunities. These range, for example, from international politics and the challenges of managing Arctic science and monitoring to atmospheric chemistry and physics, oceanography, wildlife, human health and toxicology. To young students, I could shout: "The Arctic needs you!" For young Arctic indigenous peoples, I would shout even louder: "We need *you* most of all!" Some parts of the book will not be easy going. If a section is just too information laden or

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interminably boring, my advice is to skip it until you land on something tastier. At the end of each science chapter is a short summary of the main points to remember. I will be very happy if readers are encouraged to dive into the more detailed texts suggested in the bibliography to better understand what I have been trying to say. Failure on my part will be if readers never reach the last chapter and if the book fails to inspire further interest from young people in Arctic studies.

A few brief notes on the book's organisation: In Part 1, we will take a quick look at Arctic environmental change, with the result (I hope) that the reader will be tempted to read on. In Part 2, we will look at how the abrupt end of the Cold War enabled countries to work together and to set up ways to study the health of the Arctic environment that would previously have been impossible. Part 3 consists of a thematic summary of the present state of knowledge dealing mainly with persistent organic pollutants, mercury and climate change. Finally, in Part 4, we take stock of where we are.

In addition to the main story are two vignettes that provide the brain with a little rest. They are generic in nature and not exclusive to any particular theme. These commentaries appear as Chapters 5 and 9.

This is my first (and probably only) book. Getting started is not an easy task, but this is enough procrastination and we are ready to meet the "Changing Arctic".

Biting my truant pen, beating myself for spite;
"Fool," said my Muse to me, "look in thy heart and write."
Sir Philip Sidney, *Astrophel and Stella*

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PART I

The Changing Arctic

When my grandfather was born in 1877, the Arctic environment appeared to be in much the same condition as it was when our younger son was born exactly 100 years later. Today, it is known that even in 1877, change was under way and now it is unequivocal that these changes are beginning to happen much more quickly. We could be utterly amoral and say: "Well, that's too bad, but not many people live there." However, even if we had the moral turpitude to sacrifice such a unique ecosystem with its irreplaceable human cultures, we would be unforgivably ignorant of what these changes mean to the globe as a whole. We are now beginning to understand the towering import of the role played by the Arctic in moderating the global climate. If the Arctic climate continues to follow its present rate of change (it is actually exceeding projections), the implications for the rest of the globe are ominous. The words of John Donne written 400 years ago were never as apt as they are today:

> *No man is an island entire of itself; every man*
> *is a piece of the continent, a part of the main . . .*

That is one way of capturing the stark and naked message the Arctic is giving the world.

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