

Atlantis Advances in Quaternary Science
Series Editor: Colm O'Cofaigh

Helgi Björnsson

The Glaciers of Iceland

A Historical, Cultural and Scientific
Overview

Atlantis Advances in Quaternary Science

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Series editor

Colm O’Cofaigh, Department of Geography, Durham University, Durham, UK

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The Glaciers of Iceland

A Historical, Cultural and Scientific Overview

Julian Meldon D'Arcy, University of Iceland:
English translation



Helgi Björnsson
School of Engineering and Natural Science,
Institute of Earth Sciences
University of Iceland
Reykjavík
Iceland

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MIÐSTÖÐ ÍSLENSKRA BÓKMENNTA
ICELANDIC LITERATURE CENTER

*I dedicate this book to my wife, Þóra Ellen
Þórhallsdóttir, and my children
Valgerður, Þórhallur, Ásdís, Björn
and Svanhildur*

Foreword

Glaciers are an essential part of the Icelandic identity. They hover in their beauty and magnificence on the horizons far and wide around the country, whatever their names: Snæfellsjökull, Örfajökull, Eyjafjallajökull. These white giants play such an important role in creating Icelanders' self-image wherever they are found, as they majestically reign over the landscape, extending over 10% of Iceland. All true Icelanders are fascinated by glaciers from childhood, and many of those who live in the area of our capital on the southwest coast begin the day by looking out across the bay towards the glacier Snæfellsjökull, the old beacon for seamen on perilous fishing grounds. For those in the west of the country it is our own mystic mountain, our Fujiyama.

The quest for knowledge of these white giants, which serve as guides to where we are located in life, commenced here earlier than elsewhere in the world, for Iceland is truly a land of glaciers. Scientists and daring pioneers, both Icelanders and other foreign nationals, were determined to learn all about these glaciers at whatever the cost—for conditions were so harsh that their work was all but impossible in the early days. Accounts of what they achieved and endured sound incredible: their packhorses inch their way forward over slippery ice at the edge of a precipice, before tumbling into crevasses, where they wait patiently until they are hoisted to safety—or until they expire.

In an account of one of the first crossings of the great Vatnajökull glacier in the first years of the twentieth century, two Scottish pioneers were the first to record their impressions of the indefinable beauty of the white frozen wilderness, as they lay in a blizzard, imprisoned in their tent, reading Cervantes' *Don Quixote* and other masterpieces of world literature.

We owe a huge debt of gratitude to the scientists who have explored our glaciers, both past and present. They have brought to us vital knowledge about these white giants which will provide essential testimony in the great forthcoming trial concerning the potentially catastrophic case of global warming.

Glaciologist Helgi Björnsson is certainly a first among equals in the science of observing the life of our glaciers. His book, the fruit of four decades' work, is a

unique testament to the history of Iceland's glaciers over countless centuries, and to their destiny. *The Glaciers of Iceland* is now finally available in English translation at a crucial time for the future of the world. It will be an important reference book on the beauty and magnificence of these phenomena of nature, which will not remain intact for ever, as we had so optimistically believed only a few years ago.

The glaciers of the world and of Iceland are no longer symbols of permanence and eternity—instead they remind us that everything in the world is transitory, even glaciers themselves—where beauty reigns alone, as our great writer Laxness expressed it in *World Light*. Glaciers are most certainly beacons of light in the world, and it is our profound wish that we may continue to live in their light, and not in the shadows.

Vigdís Finnbogadóttir
Former President of Iceland

Preface

Wherever one looks in Iceland, its landscape bears witness to the impact of ice and fire. The terrain appears to be moulded either by a glacier that covered Iceland 18,000 years ago, or by lava which had flowed after the glacier had thawed. Long after glaciers had disappeared, extant landforms indicated their previous existence, for they have chiselled bedrock, scooped out corries, shattered cliff faces, and left behind massive and jagged sculptures and sharp mountain pinnacles. Glaciers have gouged deep and narrow fjords far out into Iceland's continental shelf, and hollowed out valley floors and troughs that are now full of lakes. Taking a closer look at the landscape, more refined pieces of evidence can be seen: striated rocks, serrated crags, polished whalebacks and erratic boulders. Glacial rivers have harrowed out ravines, often during catastrophic floods, and discharged sediments over outwash plains. In many places there are visible signs of volcanic eruptions beneath glaciers. Palagonite ridges rise above volcanic fissures and precipitous table mountains, some of the most magnificent in the country, tower high above their surroundings, bearing witness to the thickness of an ice-age glacier. Glacial moraines illustrate the power of previously advancing outlet glaciers, and both fresh-water lakes and the ocean have sediment strata which have been borne and dispersed there by glacial rivers. Iceland's flora still reveals signs of the vegetation which had been destroyed in a glacial age.

Glaciers now cover only about 10 % of Iceland and are retreating rapidly. Ancient glacial plains and valleys have become the country's most fertile agricultural areas. But there are signs of life left in the glaciers, nonetheless, they still sometimes expand and even surge forward, responding quickly to changes in the climate. The greatest rivers of the country flow from them into power stations, groundwater systems and the ocean, and they also provide the greatest storage facility for our fresh water. Glacial rivers continue to need bridging or containing with defensive levees. Huge outburst floods (jökulhlaups) still rush from proglacial lakes in geothermal areas and from subglacial volcanic eruptions.

By researching present-day glaciers we can discover the basic laws of their formation and behaviour and their relationship to climate change. Here, as in other

geophysical sciences, the key to the future can be found in the past. Questions may be asked about glaciers as to when and how they originated, how large were they during the settlement of Iceland, and how did they thrive while the nation endured a long-term cold period? A knowledge of present-day glaciers is no less a key to the future. Will glaciers be able to grow again and advance in the coming years, or will they shrink and retreat so much that glacial rivers will run dry? What effect will that have on hydroelectric power stations, groundwater systems, and supplies of drinking water? What would the hitherto hidden mountains and valleys look like, should the glaciers that cover them disappear?

The aim of this book is to record a history of the knowledge and understanding of the origins, habitats and behaviour of glaciers and how we evaluate their role in nature. The first part traces this history from the first settlement of Iceland in the ninth century right up until modern science has revealed the island's hidden, subglacial terrain. It also reveals how research into remnants of ancient glaciers has made mankind realise how Earth's climate is in a constant state of fluctuation. The second part contains a detailed study of all of Iceland's major glaciers as they now are in the beginning of the twenty-first century.

In writing this book I have used a wide variety of historical and scientific sources, from the Sagas of the Icelanders to recent academic research, from pencil drawings to computer-generated and satellite images. I have tried to produce a text that, while avoiding an overuse of scientific discourse, can nonetheless present precise and valid explanations of glaciological phenomena and data in a lucid manner accessible to the general reader and geoscientists alike.

Glaciers are now rapidly receding all over the world and the surface of the ocean is rising and threatening our coastlines and Earth's hydrologic cycles, while global warming is stimulating increasingly volatile climate changes. The questions and answers relating to glaciers are thus of vital relevance to all of mankind for the foreseeable future.

Reykjavík, Iceland

Helgi Björnsson

Translator's Note

In keeping with the spirit of Helgi Björnsson's multidisciplinary approach to the scientific, cultural and historical content of *The Glaciers of Iceland*, I have attempted to provide an English translation which, while retaining formal elements of glaciological and scholarly discourse, will hopefully remain accessible, informative, interesting and enjoyable to the general reader. All translations of Björnsson's Icelandic sources are mine, unless otherwise stated in the reference sections. Sources in English are, of course, quoted from the original texts.

I have followed the common practice of translating all Icelandic personal and place-names in their original Icelandic spelling in the nominative case, except in instances where a place-name (on maps) is specifically declined, e.g. the river Jökulsá á Fjöllum. Although I sometimes attempt to indicate the kind of geographical entity certain place-names imply (hill, spur, tongue, bog, etc.), many common and frequently used suffixes are not continually repeated in English, and it is hoped the reader will quickly grasp the meaning of most of them. These include, most importantly, the following: **-jökull** = glacier, outlet glacier; **-fjörður** = fjord; **-flói** = bay; **-fjall, -fell** = mountain (**-fjöll**, pl. mountains); **-heiði** = highland moor, mountain; **-á, -fljót, -kvísl** = river; **-vatn, -lón** = lake, reservoir; **-dalur** = valley, dale; **-hraun** = lava field; **-sandur** = outwash or gravel plain; **-öræfi** = wilderness. The Icelandic **jökulhlaup** (for pro- or subglacial outburst flood) has been internationally accepted as the scientific term for this phenomenon.

A rough guide to the pronunciation of the consonants and vowels special to the Icelandic alphabet, as compared to general, standard RP English pronunciation, is as follows: The non-diacritic vowels a, e, i, o and u, are very similar to those in English (bat, bed, bid, bog, bun), the Icelandic medial 'r' is often trilled, and the double 'll' is usually pronounced 'tl' as in kettle or the Welsh 'll' in Llangollen; Þ þ = unvoiced 'th' as in: Beth, bath, path (always at beginning of words); ð is a voiced 'th' as in: then, this, that (always in middle or end of words); Á á = 'ou' as in bound, found, round; É é = 'ye' as in yet, yellow, yesterday; Í í = 'ee'/'ea' as in seen, keen, lean, mean; Ó ó = 'o'/'oe' as in go, no, foe, doe; Ú ú = 'oo' as in moon, boon, doom; Ö ö = 'ur' as in burn, turn, urn; Æ æ = 'i' as in bite, kite, trite.

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Julian Meldon D'Arcy
University of Iceland

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Into the Glacier offers various tours into the man-made Ice Caves in Langjökull. Once in a lifetime trip to the amazing Ice Tunnels. Come join us for an adventure that will lead you to the untouched beauty and raw nature of Langjökull, Iceland's second largest glacier. Enjoy the opportunity of a lifetime as we journey up the white slopes and go deep inside the man-made ice tunnels leading to the blue heart of the glacier. Glacier hike in Iceland – our experience. First, let me start by sharing a short review of our experience of the glacier walk we did on the Solheimajokull glacier in winter. Solheimajokull Glacier is only 2 hours drive from Reykjavik and can easily be visited as a day trip from Reykjavik (check availability here). Best glacier hikes in Iceland and where to book them. There are many companies offering glacier tours in Iceland. Glacier hiking is very popular and the tours often sell out.