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 narrowed 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.

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