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Being the only place in the northern North Atlantic yielding late Cainozoic terrestrial sediments rich in plant fossils, Iceland provides a unique archive for vegetation and climate development in this region. This book includes the complete plant fossil record from Iceland spanning the past 15 million years. Eleven sedimentary rock formations containing over 320 plant taxa are described. For each flora, palaeoecology and floristic affinities within the Northern Hemisphere are established. The exceptional fossil record allows a deeper understanding of the role of the “North Atlantic Land Bridge” for intercontinental plant migration and of the Gulf Stream-North Atlantic Current system for regional climatic evolution. Iceland sits as a “fossil trap” on one of the most interesting biogeographic exchange routes on the planet - the North Atlantic. The fossil floras of Iceland document both local vegetational response to global climate change, and more importantly, help to document the nature of biotic migration across the North Atlantic in the last 15 million years. In this state-of-the-art volume, the authors place sequential floras in their paleogeographic,

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paleoclimatic and geologic context, and extract a detailed history of biotic response to the dynamics of physical change.’ Bruce H. Tiffney, University of California, Santa Barbara ‘This beautifully-illustrated monograph of the macro- and microfloras from the late Cenozoic of Iceland is a worthy successor to Oswald Heer’s “Flora fossilis arctica”. Its broad scope makes it a must for all scientists interested in climatic change and palaeobiogeography in the North Atlantic region. It will remain a classic for years to come.’ David K. Ferguson, University of Vienna

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This open access book offers a fully illustrated compendium of glossary terms and basic principles in the field of palynology, making it an indispensable tool for all palynologists. It is a revised and extended edition of “Pollen Terminology. An illustrated handbook,” published in 2009. This second edition, titled “Illustrated Pollen Terminology” shares additional insights into new and stunning aspects of palynology. In this context, the general chapters have been critically revised, expanded and restructured. The chapter “Misinterpretations in Palynology” has been extended with new research data and additional ambiguous terms, e.g., polyads vs. massulae; the chapter “Methods in Palynology” has been

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extensively enhanced with illustrated protocols showing the majority of the methods and techniques used when studying recent and fossil pollen with LM, SEM and TEM. Moreover, additional information about the description and publication of pollen data is provided in the chapter “How to Describe and Illustrate Pollen Grains.” Various other parts of the general chapters have now been updated and/or extended with more comprehensive textual passages and new illustrations. The chapter “Illustrated Pollen Terms” now features new and more appropriate examples of each term, including additional LM micrographs. Where necessary, the entries for selected pollen terms have been refined by rewording or adding definitions, illustrations, and new micrographs. Lastly, new terms are included, such as “suprasculpture” and the prefix “nano-“ for ornamentation features. The chapter “Illustrated Pollen Terms” is the main part of this book and comprises more than 300 widely used terms illustrated with over 1,000 high-quality images. It provides a detailed survey of the manifold ornamentation and structures of pollen, and offers essential insights into their stunning beauty.

L'Islande est une île volcanique unique du fait de sa position au centre de l'Atlantique et de son englacement répété. C'est un enregistreur précis de l'évolution à la fois géodynamique et climatique régionale depuis au moins 15

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millions d'années. Cet ouvrage retrace l'histoire de cette île, liée à l'ouverture de l'Atlantique Nord et au recyclage d'une suture ancienne, celle de l'océan lapetus. Il offre une lecture de l'évolution climatique sous contrôle de la dynamique du fond océanique et analyse la dérive de la plaque Jan Mayen et l'insularisation de la ride Groenland-Féroé, qui ont donné naissance à l'Islande. Il traite enfin de la migration du point chaud profond islandais et de l'épanchement majeur de laves qui ont, depuis plusieurs millions d'années, façonné cette île. Cet ouvrage allie les géodynamiques interne et externe de notre planète pour comprendre le fonctionnement de cette île et son rôle comme enregistreur de l'évolution paléoclimatique de l'hémisphère nord.

Published in 1931 for non-specialist readers, this engaging book explains what plant fossils can tell us about prehistoric times.

Iceland is known as “the land of fire and ice”. Those who come to know this country intimately, however, can see that even the island's inhabitants are full of fire. They are hearty, honest, and proud of their ancestors. This book is dedicated to the Icelandic men and women involved in prospecting and mining of Icelandic coal deposits during the First and Second World Wars. Their effort helped the nation survive cruel periods of war and commercial blockades. The book is the first to provide a self-contained overview of the history of coal mining in Iceland,

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including extensive introductory chapters on the geology of the island and the origin of coal-bearing formations. The histories of exploratory works, mining methods, and mining companies also find their place in the book. The focal point, however, lies in the description of individual coal mines, ranging from the largest systems of adits and galleries of commercial origin to small pits utilized by local farmers. Besides its historical-economic aspect, the book will be of great significance for the support of geoheritage and the promotion and protection of inanimate nature. It will appeal to a wide range of readers, such as historians, anthropologists, geologists, paleontologists, climatologists, and the general public interested in the history and nature of this beautiful Nordic country.

The volcanic island of Iceland is a unique geological place due both to its position in the middle of the Atlantic Ocean and its repeated glaciations. It has been an accurate recorder of geodynamic and regional climatic evolutions for at least the last 15 million years. This book traces the history of Iceland, which is linked to the opening of the North Atlantic and the reactivation of the ancient suture of the Iapetus Ocean. It gives a view of climate evolution that is partly controlled by the dynamics of the ocean floor and analyzes the movement of the Jan Mayen tectonic plate and the progressive insularization of the Greenland–Faroe Ridge, which gave birth to Iceland. It also tries to understand the formation and migration of the deep Iceland hotspot and the lava flows

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that have, for millions of years, shaped this island. This book brings together the internal and external geodynamics of our planet to understand how Iceland functions and its role as a recorder of the paleoclimatic evolution of the Northern Hemisphere. Translation of Sverenyi Ledovityi Okean i ego poberezhe v Kainozoe. Collected articles on the origins, evolution and paleo-geography of the Arctic Ocean and coastline in the light of hydrological, biogeographical, climatological and archaeological data. Much emphasis is placed on the evolution of modern arctic flora and fauna, both terrestrial and aquatic.

This book provides a complete Phanerozoic story of palaeogeography, using new and detailed full-colour maps, to link surface and deep-Earth processes.

The Australian vegetation is the end result of a remarkable history of climate change, latitudinal change, continental isolation, soil evolution, interaction with an evolving fauna, fire and most recently human impact. This book presents a detailed synopsis of the critical events that led to the evolution of the unique Australian flora and the wide variety of vegetational types contained within it. The first part of the book details the past continental relationships of Australia, its palaeoclimate, fauna and the evolution of its landforms since the rise to dominance of the angiosperms at the beginning of the Cretaceous period. A detailed summary of the palaeobotanical record is then presented. The palynological record gives an overview of the vegetation and the distribution of important taxa within it, while the complementary macrofossil record is

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used to trace the evolution of critical taxa. This book will interest graduate students and researchers interested in the evolution of the flora of this fascinating continent.

Often regarded as the 'Cinderella' of palaeontological studies, palaeobotany has a history that contains some fascinating insights into scientific endeavour, especially by palaeontologists who were perusing a personal interest rather than a career. The problems of maintaining research facilities in universities, especially in the modern era, are described and reveal a noticeable absence of a national UK strategy to preserve centres of excellence in an avowedly specialist area. Accounts of some of the pioneers demonstrate the importance of collaboration between taxonomists and illustrators. The importance of palaeobotany in the rise of geoconservation is outlined, as well as the significant and influential role of women in the discipline. Although this volume has a predominantly UK focus, two very interesting studies outline the history of palaeobotanical work in Argentina and China.

There have been at least ten English-language textbooks of palaeobotany since D. H. Scott published the first edition of *Studies in Fossil Botany* in 1900. Most have been written by scientists who were primarily botanists by training, and were aimed largely at a readership familiar with living plants. They tended to follow a general pattern of an introductory chapter on preservation of plants as fossils, followed by a systematic treatment, group by group. Only Seward in his *Plant Life Through the Ages* departed from this pattern in presenting a chronological sequence. In the present book, Meyen

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breaks with?is tradition. Although having a basically biological approach, he reaches out into all aspects of the history of plant life and the wider implication of its study. Only half of the present work deals sequentially with fossil plant groups, treated systematically. The remainder then explores those topics which most other textbooks have incidentally??e generally either ignored or have only mentioned rather problems of naming and classifying fragmentary plant fossils, their ecology; biogeography and palaeoclimatic significance and the contribution that?ey have made to the understanding of living plant morphology, and of the process of evolution.

Climate change has shaped life in the past and will continue to do so in the future.

Understanding the interactions between climate and biodiversity is a complex challenge to science. With contributions from 60 key researchers, this book examines the ongoing impact of climate change on the ecology and diversity of life on earth. It discusses the latest research within the fields of ecology and systematics, highlighting the increasing integration of their approaches and methods. Topics covered include the influence of climate change on evolutionary and ecological processes such as adaptation, migration, speciation and extinction, and the role of these processes in determining the diversity and biogeographic distribution of species and their populations. This book ultimately illustrates the necessity for global conservation actions to mitigate the effects of climate change in a world that is already undergoing a biodiversity crisis of unprecedented scale.

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This book simulates a historical walk through nature, teaching readers about the biodiversity on Earth in various eras with a focus on past terrestrial environments. Geared towards a student audience, using simple terms and avoiding long complex explanations, the book discusses the plants and animals that lived on land, the evolution of natural systems, and how these biological systems changed over time in geological and paleontological contexts. With easy-to-understand and scientifically accurate and up-to-date information, readers will be guided through major biological events from the Earth's past. The topics in the book represent a broad paleoenvironmental spectrum of interests and educational modules, allowing for virtual visits to rich geological times. Eras and events that are discussed include, but are not limited to, the much varied Quaternary environments, the evolution of plants and animals during the Cenozoic, the rise of angiosperms, vertebrate evolution and ecosystems in the Mesozoic, the Permian mass extinction, the late Paleozoic glaciation, and the origin of the first trees and land plants in the Devonian-Ordovician. With state-of-the art expert scientific instruction on these topics and up-to-date and scientifically accurate illustrations, this book can serve as an international course for students, teachers, and other interested individuals.

L'Islande est une île volcanique unique du fait de sa position au centre de l'Atlantique et de son englacement répété. C'est un enregistreur précis de l'évolution à la fois géodynamique et climatique régionale depuis au moins 15 millions d'années. Cet

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ouvrage traite du magmatisme quaternaire associé au point chaud islandais, et notamment de ses particularités géochimiques et volcanologiques. Il analyse l'englaciation de l'Arctique en relation avec la dynamique d'ouverture de l'Atlantique Nord et l'apparition de la circulation océanique actuelle. Il étudie l'englaciation quaternaire, propre à l'Islande, dans son contexte océanique, notamment sur la base de datations radiométriques, de l'évolution du Groenland et de la Scandinavie et de données sédimentaires marines. Il explore enfin les particularités environnementales de l'île depuis la fin de la dernière glaciation jusqu'au réchauffement actuel. Cet ouvrage allie les géodynamiques interne et externe de notre planète pour comprendre le fonctionnement de cette île et son rôle comme enregistreur de l'évolution paléoclimatique de l'hémisphère nord.

What do we now know about the origins of plants on land, from an evolutionary and an environmental perspective? The essays in this collection present a synthesis of our present state of knowledge, integrating current information in paleobotany with physical, chemical, and geological data.

With detailed essays on the Arctic's environment, wildlife, climate, history, exploration, resources, economics, politics, indigenous cultures and languages, conservation initiatives and more, this Encyclopedia is the only major work and comprehensive reference on this vast, complex, changing, and increasingly important part of the globe. Including 305 maps. This Encyclopedia is not only an interdisciplinary work of reference

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for all those involved in teaching or researching Arctic issues, but a fascinating and comprehensive resource for residents of the Arctic, and all those concerned with global environmental issues, sustainability, science, and human interactions with the environment.

This volume sheds new light on the marine fauna and geological setting of the Tjörnes Sequence, North Iceland, which is a classic site for the Pliocene and Pleistocene stratigraphy of the North Atlantic region. Readers will discover descriptions of new data collected by the editors over a period of over three decades on marine faunal assemblages and sedimentology available for palaeoenvironmental reconstructions, as well as the tectonic and stratigraphical relationships on Tjörnes Peninsula. The book includes a comprehensive account of all the collections of marine fossil invertebrate macrofossils and foraminifera known to the editors from the Tjörnes Sequence. It is expected to elucidate sedimentological and faunal changes from relatively stable Pliocene conditions to highly variable and periodically harsh climatic conditions of recurring Quaternary glaciations. The distribution, recent or fossil, of various species is recorded and pertinent ecological and biological features are also discussed. The Tjörnes Sequence records the Neogene migration of Pacific species into the North Atlantic. Researchers in geology, climate science, environmental science and earth science will find this book particularly valuable.

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of the Atlantic Ocean and its repeated glaciations. It has been an accurate recorder of geodynamic and regional climatic evolutions for at least the last 15 million years. This book studies the Quaternary magmatism associated with the deep Iceland hotspot and, in particular, its distinctive geochemical and volcanological characteristics. It also analyzes that Arctic glacierization as it relates to the opening of the North Atlantic and the appearance of today's ocean currents. We will also investigate the Quaternary glaciation as it affected Iceland in its oceanic context, particularly on the basis of radiometric dating, looking at the formation of the Greenland and Scandinavian ice sheets and data from marine sediment. Finally, it explores the specific environmental features of the island, from the end of the last ice age to global warming today. This book brings together the internal and external geodynamics of our planet to understand how Iceland functions and its role as a recorder of the paleoclimatic evolution of the Northern Hemisphere.

Fifty million years ago, the Arctic Ocean was a warm sea, bounded by lush vegetation of the warm-temperate shores of Scandinavia, Siberia, Alaska and the Northwest Territories. Wind and storms were rare because Atlantic weather systems had not developed but, as today, polar day length added a hostile element to this otherwise tranquil climate. With the aid of scientists from all the countries close to the Arctic Circle, this book describes the palaeontology, the statistical analysis of vegetational features, comparisons with atmospheric, marine, and geological features and some of the first models of plant migration developed from newly constructed databases.

An edited volume based on the proceedings of the 18th AETFAT Congress held in Yaoundé, Cameroon. Includes 100 research papers in separate sections on taxonomy, phytogeography,

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ethnobotany, and the conservation and sustainable use of African plants.

This book is a unique and integrated account of the history of North American vegetation and paleoenvironments over the past 70 million years. It includes discussions of the modern plant communities, causal factors for environmental change, biotic response, and methodologies. The history reveals a North American vegetation that is vast, immensely complex, and dynamic.

Explore the dramatic forces that have shaped the Icelandic landscape over 30 million years Iceland's formation and ongoing evolution offers a masterclass in geophysical processes. Iceland: Tectonics, Volcanics, and Glacial Features presents a regional guide to the landscape of this unique island. Accessible to academics, students, novice geologists, and tourists alike, chapters reflect the most popular way to explore the island, beginning in the southwest region and ending in the northwest. Volume highlights include: An overview of Iceland's geologic history Exploration of the dynamic tectonic setting that has shaped the island Descriptions of landscape features of active and extinct volcanoes Discussion of the impact of glaciation in the past and present Techniques for monitoring geologic hazards Developments in harnessing geothermal energy The American Geophysical Union promotes discovery in Earth and space science for the benefit of humanity. Its publications disseminate scientific knowledge and provide resources for researchers, students, and professionals.

A group of geoscientists from a number of NATO countries met under NATO sponsorship in Copenhagen on February 27 and 28, 1978, and formulated a proposal entitled "EVOLUTION OF THE GREENLAND ICELAND-FAEROE-SCOTLAND RIDGE, A KEY AREA IN MARINE GEOSCIENCE". This part of the North Atlantic Ocean is of particular interest because of its

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anomalously shallow bathymetry which has profoundly influenced many aspects of the evolution of the North Atlantic. The proposed investigations therefore aim to study the deep crustal structure including relationship of continental and oceanic crust, history of subsidence of the ridge including its past role as a land bridge, age of the oceanic basement along it and its history of formation, and the influence of the ridge on Tertiary and Quaternary depositional palaeoenvironments. In furtherance of this proposal, it is intended to carry out a series of seismic and drilling operations on the Ridge during the coming years. These major marine investigations will be mainly funded from national sources. An important preliminary stage to the project is the collection and synthesis of available data. NATO has already approved a small budget for this purpose which has enabled a geoscientist to work partly at the Department of Geological Sciences of Durham University, UK, and partly at Lamont-Doherty Geological Observatory of Columbia University, Palisades, USA, for about six months to compile the data. The most important map showing magnetic anomalies and lineations in the area, is included in a pocket at the back of this volume.

This is a detailed description of the history and chronology of global climate based on event-signal stratigraphy. The history of global climate is described for the last fifty million years with the description for the last one million years in detail. Climatostratigraphic sequences of twelve key regions are taken as a basis, eight of them situated in the USSR territories. Chronology of climatic events of the Pleistocene, Pliocene and Miocene is developed based on palaeomagnetic and radiometric data. The authors' version of its correlation with oxygen-isotope scales of deep-sea sediments is given. Theoretical problems of climatic stratigraphy and palaeoclimatology are discussed, in particular, the causes of climatic change. The

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Northern Hemisphere palaeoclimatic reconstructions are made for the Holocene, Eemian and Pliocene temperature optima, considered as possible palaeoanalogues of climate of the 21st Century. The book is intended primarily for a wide circle of scientific workers, palaeoclimatologists and palaeogeographers, but will also interest geologists, biologists, palaeomagnetologists and archaeologists.

Land bridges are the causeways of biodiversity. When they form, organisms are introduced into a new patchwork of species and habitats, forever altering the ecosystems into which they flow; and when land bridges disappear or fracture, organisms are separated into reproductively isolated populations that can evolve independently. More than this, land bridges play a role in determining global climates through changes to moisture and heat transport and are also essential factors in the development of biogeographic patterns across geographically remote regions. In this book, paleobotanist Alan Graham traces the formation and disruption of key New World land bridges and describes the biotic, climatic, and biogeographic ramifications of these land masses' changing formations over time. Looking at five land bridges, he explores their present geographic setting and climate, modern vegetation, indigenous peoples (with special attention to their impact on past and present vegetation), and geologic history. From the great Panamanian isthmus to the boreal connections across the North Atlantic and North Pacific Oceans that allowed exchange of organisms between North America, Europe, and Asia, Graham's sweeping, one-hundred-million-year history offers new insight into the forces that shaped the life and land of the New World.

"An exceptionally concise and well-organized compilation of lucid accounts of the historical background and current research into all aspects of island science. Anyone with a serious

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interest in islands needs this tome close at hand."--Alex McBirney, author of "Volcanology and Igneous Petrology" "Scientific research on islands has greatly expanded our knowledge not only of insular biology, but also of the ecological and evolutionary processes that shape biodiversity throughout the world. This beautifully illustrated volume is a comprehensive compendium of all topics related to islands and the science conducted on them. It will be an invaluable resource not only to ecologists and evolutionary biologists, but also to anthropologists, historians, geologists, conservationists, and anyone else interested in the wonderful diversity of islands and their inhabitants."--Jonathan Losos, author of "Lizards in an Evolutionary Tree: Ecology and Adaptive Radiation of Anoles" ""Encyclopedia of Islands "is an excellent reference guide. I wish I'd had it onboard my vessel, the "Sorcerer II, " during our circumnavigation."--J. Craig Venter, President, J. Craig Venter Institute, and former Founder and Chair, The Institute for Genomic Research

The NAG-TEC project was a collaborative effort by the British Geological Survey, the Geological Survey of Denmark and Greenland, the Geological Survey of Ireland, the Geological Survey of the Netherlands, the Geological Survey of Northern Ireland, the Geological Survey of Norway, Iceland GeoSurvey and the Faroese Geological Survey (Jarðfeingi), along with a number of academic partners and significant support from industry. The main focus was to investigate the tectonic evolution of the region with a particular emphasis on basin evolution along conjugate margins. A key outcome was the development of a new tectonostratigraphic atlas and database that includes comprehensive geological and geophysical information relevant for understanding the Devonian to present evolution of the NE Atlantic margins. These provide the foundation upon which ongoing research and exploration

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of the area can build. This Special Publication provides some of the first scientific results and analysis based on the project, including regional stratigraphic analysis and correlations, crustal structure and interpretation of geophysical data sets, plate kinematics and the evolution of igneous provinces.

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