





Scottish Natural Heritage is a government body responsible to the Scottish Government and Scottish Parliament.

Our mission

Working with Scotland's people to care for our natural heritage.

Our aim

Scotland's natural heritage is a local, national and global asset. We promote its care and improvement, its responsible enjoyment, its greater understanding and appreciation and its sustainable use now and for future generations.

Our operating principles

We work in partnership, by co-operation, negotiation and consensus, where possible, with all relevant interests in Scotland: public, private and voluntary organisations, and individuals.

We operate in a devolved manner, delegating decision-making to the local level within the organisation to encourage and assist SNH to be accessible, sensitive and responsive to local needs and circumstances.

We operate in an open and accountable manner in all our activities.

SCOTTISH FOSSIL CODE

Scottish Natural Heritage

CONTENTS

Foreword

Part 1: Introduction	1
1.1 What is a fossil?	1
1.2 Where fossils are found	2
1.3 How fossils are preserved and classified	4
1.4 When a fossil is an archaeological find	6
1.5 The nature of the fossil resource	6
1.6 The scientific importance of the fossil heritage	7
1.7 Scotland's world-class fossil heritage	9
1.8 How fossils are used	10
1.8.1 Scientific research and display	11
1.8.2 Education	11
1.8.3 Recreational collecting	12
1.8.4 Tourism	13
1.8.5 Commerce	13
1.9 Threats to Scotland's fossil heritage	14
1.9.1 Natural erosion	14
1.9.2 Quarrying	15
1.9.3 Land-use change	16
1.9.4 Irresponsible collecting	16
1.9.5 Neglect of collected specimens	18
1.10 Conserving Scotland's fossil heritage	18
1.10.1 The Geological Conservation Review (GCR)	18
1.10.2 Legislative protection	19

1.10.3	Voluntary conservation of fossil localities	20	2.4.5	Other collection management issues	43
1.10.4	The need to prepare the Scottish Fossil Code	21	2.5	Buying specimens for your collection	43
1.11	Ownership of Scotland's fossils	21	2.6	Dealing with old and perhaps neglected collections	44
Part 2:	Code for the collecting and care of fossils	23	2.7	Disposing of an old or redundant collection	46
2.1	Collecting fossils responsibly	23	2.8	Bequeathing a collection	46
2.1.1	Know more about fossils and where they are found	23	Part 3:	Supplementary Code for specialist and other groups in the collecting and care of fossils	47
2.1.2	Access to land for collecting	24	3.1	Amateur collectors interested in research	47
2.1.3	Permission to collect and keep specimens	25	3.1.1	Working with researchers	47
2.1.4	Fossil collecting and respecting wildlife	25	3.1.2	Working with other amateur collectors and sharing your knowledge	48
2.1.5	How much fossil material to take	26	3.2	Commercial collectors and dealers	49
2.1.6	The use of equipment in fossil collecting	27	3.2.1	Resource selection and the discovery of new fossil localities	49
2.1.7	Record your find	29	3.2.2	Systematised collecting and information recording	50
2.1.8	Avoid leaving rock litter and respect other users	30	3.2.3	Selling exceptional fossils	50
2.1.9	Fossils and the built heritage	30	3.3	Large field parties	51
2.1.10	Exceptional and unusual finds	31	3.4	Researchers	52
2.1.11	Identifying fossil finds	33	3.5	Owners of mineral rights and land managers	54
2.1.12	Informing land managers of your finds	33	3.6	Quarry operators, managers and developers	55
2.2	Protected sites and instances where collecting is not permitted	34	3.7	Operators of websites that promote fossil collecting in Scotland	56
2.3	What to do in the event of encountering people collecting irresponsibly	35	3.8	Taking Scottish fossils from the UK	57
2.4	How to care for the fossils you collect	36	Part 4:	Museum and other public collections	59
2.4.1	Cleaning, extraction and preparation of newly collected fossil material	37	4.1	The nature of fossil collections	59
2.4.2	Labelling and documentation	39	4.2	Museum Accreditation	60
2.4.3	Storing and displaying	40	4.3	Museum services in Scotland	60
2.4.4	Problems associated with conserving collected specimens	42			

4.3.1	National Museums Scotland	61
4.3.2	University museums	62
4.3.3	Local museums	62
4.3.4	British Geological Survey	62
4.3.5	Scottish Museums Council	63
4.4	The use of fossils in museums	63
4.5	Donating a fossil or collection to a museum	65
4.6	Promoting the local fossil heritage	67
Part 5: Further information sources		69

The Scottish Fossil Code comprises five sections as follows:

- Part 1** – provides an introduction to fossils and the fossil heritage of Scotland, outlining their importance and use. The threats to the fossil heritage are described as are the means employed to conserve it. A note on ownership is also provided.
- Part 2** – is the core of the Code and provides best practice and guidance for the responsible collecting and care of fossils.
- Part 3** – is supplementary best practice and guidance for specialist and other groups with a particular involvement in Scotland’s fossil heritage.
- Part 4** – provides information on museum and other public collections with advice on donating specimens.
- Part 5** – lists supporting and further information including a simplified geological map of Scotland, a geological timescale and a list of Scottish museums with substantial collections of Scottish fossils.

Foreword

Scotland has a remarkably rich geological heritage that spans nearly 3 billion years of Earth’s history. Part of this ‘Earth heritage’ is the record of the development and evolution of life on Earth in the form of fossils.

The fossil heritage exists in the natural environment, and is also preserved in museums and private collections. It comprises an irreplaceable and finite resource that has uses in science, education and recreation. This element of Scotland’s geological heritage is vulnerable to abuse and damage and so needs safeguarding and management to ensure its survival for future generations.

Experience has shown that the best method of managing and safeguarding the world’s fossil resources is a combination of legislative and non-legislative measures. The Nature Conservation (Scotland) Act 2004 included provision for Scottish Natural Heritage to prepare the Scottish Fossil Code, to provide guidance for those who have an involvement in the owning, collection and care of Scottish fossils.

This Code, produced by Scottish Natural Heritage with assistance from palaeontological researchers, land managers, collectors and others with an interest in Scotland’s fossil heritage, provides advice on best practice in the collection, identification, conservation and storage of fossil specimens found in Scotland. The Scottish Fossil Code applies only to fossils found in Scottish rocks and does not cover fossils imported into Scotland.

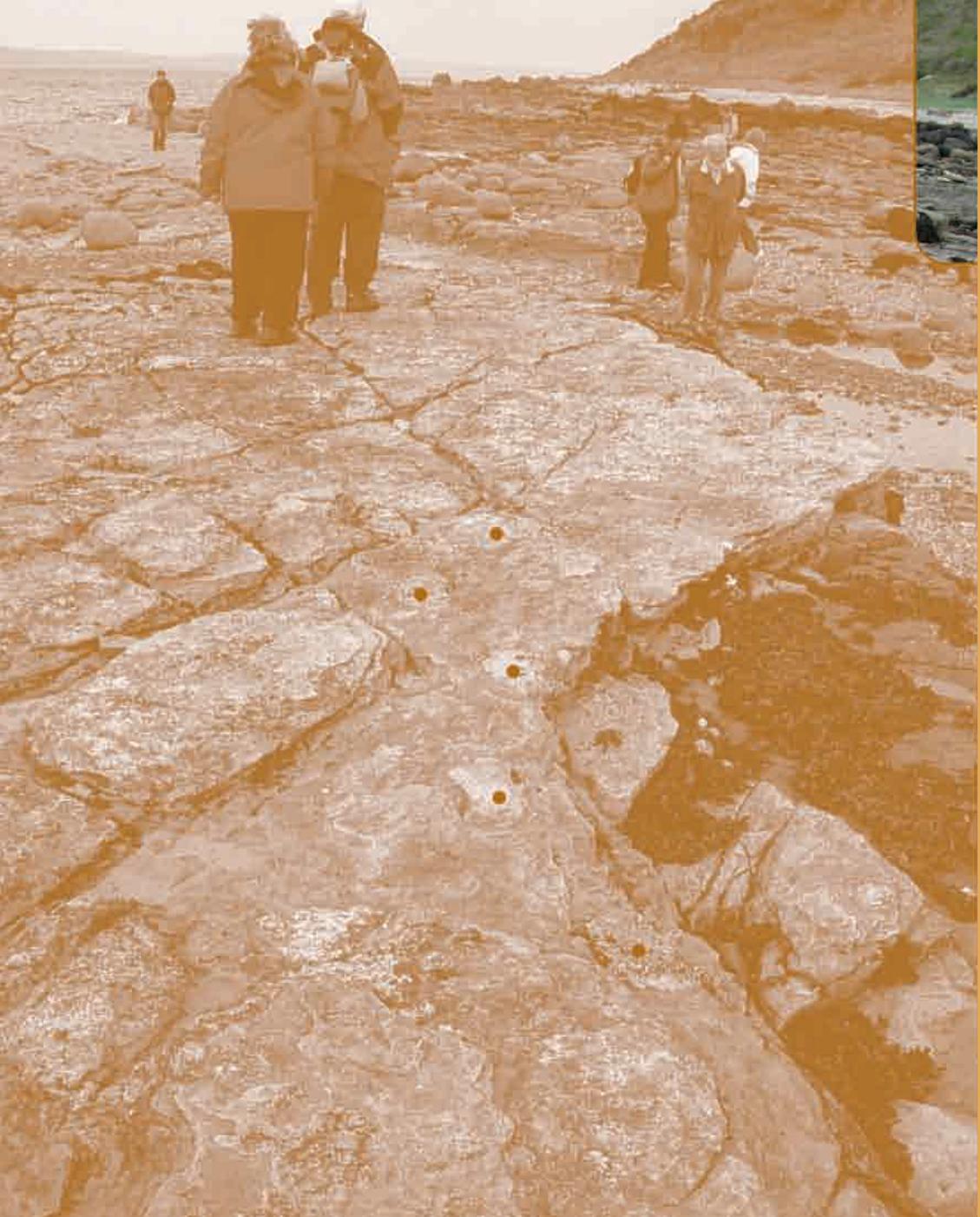
The Code encourages fossil collectors: amateur, academic, institutional and commercial, to collect responsibly and to manage collections in such a way that they will be useful to future generations. The Code also aims to enhance public interest in the fossil heritage of Scotland and promote this resource for scientific, educational and recreational purposes.

Fossil collecting is an essential activity that provides the basic material and data for the science of palaeontology. New finds add to our record of past life and environments on planet Earth. Following the Code will increase the personal interest and satisfaction that can be gained from forming a fossil collection, and help conserve the fossil heritage of Scotland.

I very much welcome the publication of the Scottish Fossil Code and hope that everyone with an interest in fossils will support the advice it contains.



Mr Michael Russell
Minister for Environment
Scottish Government



Introduction

Intertidal rock exposure within a Site of Special Scientific Interest on the Isle of Arran, provides an opportunity to examine tackways left by reptiles in soft sediment when the area was a flood plain 240 million years ago.

Some reptile footprints forming a trackway are indicated.

Image: Colin MacFadyen

PART 1: INTRODUCTION

1.1 What is a fossil?

Historically, the word 'fossil' was applied to anything dug up out of the ground. Thus mineral deposits and archaeological relics were referred to as 'fossil'. However, since the early 19th century, the term has become exclusively applied to the remains of ancient life.

For the purposes of the Code the great majority of fossils can be defined simply as 'the remains of, or traces made by, an ancient animal or plant preserved in rock'. There are basically two types of fossils:

- Body fossils – representing the whole or parts of an actual animal or plant. The actual original material of the organism, such as shell, bone and wood, may be preserved as it is, or altered physically and chemically by rock-forming processes (fossilised) to another substance. Even if only an impression or cast of the object is preserved, it is still a fossil.
- Trace fossils – the evidence of the activity of an organism. These include fossil footprints and trackways made by animals such as dinosaurs and scorpions; burrows made by worms and many other animals; and even fossil excrement (coprolites).



1 / National Museums Scotland

2 / Scottish Natural Heritage



Most fossils that are collected are 'macrofossils', those large enough to be seen without the use of a microscope. However, many sedimentary rocks, especially limestone and shale, contain numerous 'microfossils', some of which are only fractions of a millimetre in length, that require specialist extraction and study techniques. Chalk, for example, consists almost entirely of microfossils.

Objects known as 'pseudofossils' are pieces of rock, or patterns within rock, that superficially resemble an organism. Many pseudofossils are rocks weathered by chance into a shape resembling an organism, or are chemically produced features in rocks, or marks made on rocks by modern organisms. All fossil collectors find objects that may be identified as pseudofossils.

Palaeontology is the study of fossils; it may be defined as the study of life forms that existed in past geological periods, as represented by fossilised remains of plants and animals. Geologists, specifically palaeontologists, utilise and study fossils.

1.2 Where fossils are found

Scotland's land surface is underlain by a complex patchwork of rock types of different ages. Large areas are formed from igneous rocks (derived from molten rock) and metamorphic rocks (rocks altered by heat and pressure) which are normally unfossiliferous. A few fossils occur in rocks associated with volcanic activity, and are preserved in ash, or in some

3 / Scottish Natural Heritage



exceptionally rare cases lava. However, nearly half of the 78,000 km² land surface of Scotland is underlain by sedimentary rock and it is in these rocks that Scotland's fossil heritage is found.

Sedimentary rocks generally form from the accumulation of layers of sediments such as sand and mud, within a variety of environments such as oceans, tropical seas, rivers, lakes and deserts that have existed through geological time. Fossils are the remains of life that lived in these environments.

Rocks that were originally deposited in marine conditions are generally more fossiliferous than those deposited on land, and limestones are generally more fossiliferous than sandstones. There are many fossiliferous localities in Scotland. The distribution of sedimentary rocks of different ages is shown on geological maps, and descriptions of localities are given in many geological field guides. Information is also available through websites and museums.

Fossils might in principle be found in any outcrop of sedimentary rock, but the most productive localities are:

- coastal exposures on foreshores;
- natural outcrops associated with streams, rivers and hills; and
- quarries and other man-made exposures.

Some of Scotland's rocks of Precambrian age yield fossils, but the majority occur in rocks of Cambrian to Quaternary age. Marine fossils from Carboniferous limestones of the Central Belt are among the most commonly found Scottish fossils. These include brachiopod shells and corals found in locations such as the Fife coast, Ayrshire and East Lothian. Fossils from the

Jurassic Period include those of marine animals such as ammonites and belemnites and are reasonably common in certain areas of Skye and the north-east coast in the vicinity of Brora and Helmsdale. Fossil fish remains dating from the Devonian Period are common in some areas of Caithness and Orkney.

1.3 How fossils are preserved and classified

Fossils are preserved in a wide variety of ways. The rock-forming processes, by which most fossils are preserved, can take place gradually over millions of years. This is a continuous process, and the point at which an object becomes a fossil can be the subject of debate based on a number of criteria such as the decay of organic matter, the point at which organic material is replaced by minerals (mineralised), and its age.

The process of fossilisation involves initial burial of the object beneath successive layers of sediment that may eventually bury the object tens to thousands of metres below the surface over a time period, that may span millions of years. During burial the sediment turns to rock and the object becomes fossilised. In most situations for a buried fossil to be found, the rocks have to go through tectonic uplift and erosion so that the fossil-bearing rock is exposed at the Earth's surface.

Examples of preservation:

- Relatively unaltered – for example insects preserved in amber.
- Physically altered – for example shells crushed in shale, fossil fish in Caithness flagstone.

- Chemically altered – the organic material may be replaced by minerals (petrification), or minerals may fill spaces in the organic structure (permineralisation). The internal structure in, for example, shell, wood or bone, may not be preserved if the object is replaced by a new mineral. The most commonly observed examples are the petrification of wood by silica or calcium carbonate, and the replacement of shell material by calcium carbonate (calcite), iron sulphide (pyrite) or silica (for example quartz, flint, or chert).

It is important to be able to recognise features of physical and chemical preservation, since these have an important bearing on the methods used to extract and clean the fossil, and may affect the conditions in which it needs to be kept.

The word 'rock' in the above definitions includes not only hard ('lithified') rocks that require a hammer to break them, but also poorly consolidated clays and sands. The remains of animals and trees within peat, soil, and other unconsolidated material, that date from the last Ice Age to fairly recent times, may be regarded as fossils.

Fossils are classified in the same manner as modern animals, and are scientifically described, and given binomial formal scientific (Latin) names. Thus *Homo sapiens* is the formal scientific name applied to human beings. Very few fossils have been given common names, hence fossils are generally referred to by their formal scientific names. Most palaeontology textbooks are organised according to biological classification.

1.4 When a fossil is an archaeological find

Although animal and plant remains in peat, soil and other unconsolidated material may be regarded as fossils, when such finds are associated with archaeological sites, they are, for the purposes of this Code considered archaeological finds. They are therefore excluded from the Scottish Fossil Code, even though some processes of fossilisation may have taken place after burial.

Archaeological finds comprise all human artefacts and other objects made or modified by people, including natural objects altered by human action such as bones that had been cut or worked in any way. Archaeological finds are specifically covered by the Scots common law of Treasure Trove and bona vacantia (the legal name for 'ownerless goods'), under which the Crown has the right to all such finds irrespective of material, age, origin, location or context. They must therefore be reported to the Treasure Trove Secretariat c/o National Museums Scotland. Doubtful cases must also be reported, as failure to report is an offence.

The Scottish Fossil Code also excludes all human remains, as they have special legal status. These are not 'collectable', cannot be owned as property, and must be treated with the respect afforded them under the law.

1.5 The nature of the fossil resource

In general terms Scotland's fossil resource can be regarded as vast. The natural processes of weathering and erosion, such as occur at the coast, and human activities, for example quarrying, continue to reveal new fossil-bearing



4 / Robert Davidson

rocks. Together, these processes provide opportunities for the discovery and collection of fossil material.

A layer of rock that represents and preserves the floor of an ancient sea can provide a huge resource of fossilised marine creatures. However, not all fossil-bearing resources are that extensive. The remains of some ancient environments such as hot springs or lagoons, preserved as localised layers in the rock record are, by their nature, of limited extent. The fossil resource within rocks only accessible in a disused quarry or coastal cliff, where there are low rates of erosion, can also be regarded as limited. There are also many situations where the fossils themselves are naturally rare.

1.6 The scientific importance of the fossil heritage

Scotland has a remarkable variety of fossiliferous rocks. In what is a relatively small area, there are fossils representing all the periods of geological time

from the Precambrian to the Quaternary, spanning more than 1200 million years of Earth's history.



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Some of the major geological events that shaped Scotland are documented by fossil assemblages. The similarity of Cambrian fossils in the North West Highlands with those in North America show that the two areas were once geographically very close to each other. The fossil record of Ordovician and Silurian marine animals in the Central Belt and the Southern Uplands shows that they were mixing with other populations of marine creatures from opposite sides of a closing ocean, as plate tectonics brought slices of the crust that forms Scotland's foundations together. During ocean closure, sediments from the ocean floor were uplifted and now form the Southern Uplands. An understanding of precisely how and when this occurred, and therefore how the evolution of the Southern Uplands took place, has been achieved partly through the study of fossilised planktonic organisms known as graptolites.

Scottish fossils have, in such ways, played an important role in the interpretation of the succession of changing geographies and environments that existed throughout Scotland's long and varied geological history. Fossils are also used to date rock sequences and enable correlation with other areas of the world allowing Scotland's geological history to be tied into the global story.

Historically Scotland was at the cutting edge of geology when the science

developed in the late 18th and early 19th centuries. The early Scottish geologists James Hutton, Charles Lyell, Roderick Murchison, James Nicol, Hugh Miller and others established basic geological principles based on rocks and fossils from Scottish localities, and made them widely known to the general public. These fossil localities are of historical and cultural importance to the world as well as being scientifically valuable.

1.7 Scotland's world-class fossil heritage

Scotland has many world-class fossil localities. Examples of exceptional Scottish fossils include:

- Extraordinary Silurian water scorpions and other arthropods of Lesmahagow.
- Perfectly preserved small plants and animals in an Early Devonian hot spring deposit at Rhynie, Aberdeenshire, representing the world's earliest and most complete terrestrial wetland ecosystem.
- Middle Devonian fossil fish of Caithness, Orkney and the Moray Firth, which lived in a vast freshwater lake that once covered the area.
- Fossilised shrimp-like crustaceans of Lower Carboniferous age, superbly preserved at Gullane, East Lothian.
- The first complete remains of a fish-like organism known as the 'conodont animal'; a formerly enigmatic organism only known by its microscopic



6 / Scottish Natural Heritage

teeth, found in Carboniferous rocks at Granton, near Edinburgh.

- One of the most important fossil shark sites in the world found in Carboniferous rocks at Bearsden in Glasgow.
- Stands of Carboniferous fossil tree stumps in Victoria Park, Glasgow, and at Saltcoats on the Ayrshire coast, which are fragments of equatorial coal forests.
- Bones and trackways of Permian and Triassic reptiles that lived around desert sand dunes in what is now the Elgin area.
- Rare Middle Jurassic mammal fossils and dinosaur footprints of Skye.
- Exceptionally well preserved leaves of Palaeogene age on Mull and Skye from trees that were living in a warm climate as the North Atlantic Ocean was opening.

These are just a few of the fossil highlights scattered in space and time through the long geological history of Scotland. All of these locations are of great significance from the perspective of understanding the evolution of life on Earth and in the historical development of geology.

1.8 How fossils are used

Scotland's fossil heritage is an important scientific, economic, educational and leisure resource which has a wide range of users including research scientists, students, school pupils, amateur collectors, commercial collectors and the general public.

1.8.1 Scientific research and display



7 / Hunterian Museum

Scientific palaeontological research is active in Scotland, involving universities, museums, the British Geological Survey, and amateur and commercial collectors. There is little doubt that much fossil material awaits discovery and description in Scotland. New fossil finds are described in scientific journals such as the *Scottish Journal of Geology* and the *Earth and Environmental Science Transactions of the Royal Society of Edinburgh*, and particularly spectacular discoveries are frequently reported in the media. On behalf of the public, museums collect and purchase fossils for research and display.

1.8.2 Education

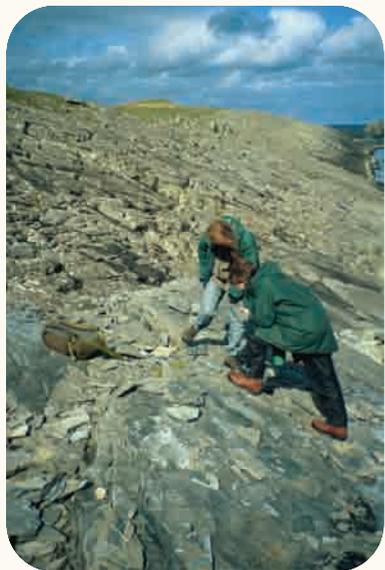
Fossils are used in teaching from primary school to postgraduate education and lifelong learning. Schools, colleges, universities and museums all have roles to play in geological education involving the use of fossil specimens. Educational



8 / Scottish Natural Heritage

themes include the use of fossils in demonstrating the evidence for biological evolution; dating and correlating rocks in different places; and interpreting ancient environments and their ecologies and geographies (palaeoecology and palaeogeography). The process of forming a documented scientific collection is also an educational exercise.

1.8.3 Recreational collecting



9 / Scottish Natural Heritage

Fossil collecting as a hobby is an enjoyable, rewarding and increasingly popular leisure occupation that can contribute to the science of palaeontology.

Involvement ranges from those who make chance finds, to those who research sites and make journeys specifically for fossil collecting. Such recreational 'field collecting' is educational, and finds of scientific value are frequent. The more enthusiastic collectors maintain labelled collections of their finds, and seek professional advice on identification. There

are also 'assemblers of collections of fossils', sometimes referred to as 'cabinet collectors', who choose not to undertake field collecting themselves, their collections being made through purchase and/or gift and exchange.

1.8.4 Tourism

International interest in Scotland's fossil heritage results in tourist visits from the rest of the UK and from overseas. Tourists visit museums to view displays, and some visit fossil localities



10 / Colin MacFadyen

to collect. Some locations offer spectacular fossils still in the situation where they were discovered, such as the fossil tree stumps at Fossil Grove in Glasgow's Victoria Park, MacCulloch's Tree on the west coast of Mull, and the reptile footprints and trackways near Elgin.

1.8.5 Commerce

There is a worldwide market in fossils. Scottish fossils form part of that market, with specimens being extracted and then sold commercially, both in the UK and abroad. Currently, there are no figures available on the value of the fossil 'industry' to the Scottish economy.

Rare and unusual fossils often command a high price in the world of collectors and museums, and may also have a high scientific value to researchers. Common fossils such as ammonites, belemnites and brachiopods may sell for a few pounds, with larger, well-preserved and prepared specimens commanding higher prices (tens to hundreds of pounds) according to rarity and quality. Common Scottish fish fossils can be bought for less than £50, but

rare fish, amphibians and reptiles may sell for thousands of pounds depending on condition. Costs also reflect the labour and skill in the preparation of the specimen; the commercial value of the most common fossils may be below the cost of collection, when time and travel are considered.

Many large and visually impressive fossils sold for large sums are not necessarily rare, and if locality details are missing, they are of diminished scientific value. Some insignificant-looking fossils, on the other hand, may have a high scientific value, but small commercial value.

Commercial collectors provide museums, universities and educational outlets with an opportunity to purchase fossil material. Most commercial collectors are skilled and responsible and provide a service to science, to other collectors and the general public.

1.9 Threats to Scotland's fossil heritage

Scotland's fossil heritage is an irreplaceable and non-renewable resource that has been millions of years in the making. Consequently, if not properly looked after and managed, it is vulnerable to being damaged and destroyed. There are five principal threats: natural erosion, quarrying, land-use change, irresponsible collecting and the neglect of collected specimens.

1.9.1 Natural erosion

In certain areas, particularly sea and river cliffs, weathering and erosion can reveal fossil material. However, the natural mechanisms that uncover fossils in the first instance also damage and destroy them. In these cases, it is argued



11 / Scottish Natural Heritage

that the responsible collection of newly exposed fossils, especially if loose, is highly desirable and of conservation value, since without collection the fossils would inevitably only become weathered, eroded and lost.

1.9.2 Quarrying

Commercial quarrying of a fossil-bearing rock, a limestone for example, is the other main means by which new fossil material is revealed, but it can also be a threat. However, this is the nature of quarrying, and in many cases the loss of fossils during the lifetime of a quarry is not significant as the resource being quarried is vast and therefore some of it will survive for research and educational purposes. There are however some rare situations where quarrying could lead to the loss of a fossil-bearing rock layer that has only a very limited extent.

The importance of quarrying to palaeontology is highlighted by the fact that many extremely important fossil discoveries are made in active quarries. It is also reflected in the considerable number of disused quarries which are now geological sites protected by statute (see Section 1.10). In many instances quarrying, like natural erosion, is valuable in renewing exposures of fossil-bearing rock and making available previously inaccessible rock sections.

1.9.3 Land-use change

One of the primary causes of losing fossil localities in Scotland is through changes in land-use. The infilling of quarries, river valleys and disused railway cuttings with waste, is a means by which fossil localities become obscured, buried and lost.



12 / Scottish Natural Heritage

At coastal locations, sea defences, coast protection works and coastal road development may involve the building of rock armour berms, gabion banks and wave-return walls, all of which can obscure rock exposures and prevent access for research, education and collecting.

Similarly the afforestation of hillsides and river banks can lead to the prevention of access to fossil-bearing rocks and the accumulation of plant debris that in time can lead to soil formation and rock outcrops becoming lost from view.

1.9.4 Irresponsible collecting

In many circumstances, fossil collecting is not harmful to fossil resources and fossil localities. This is particularly true where the fossils are relatively common or the locations in which they are found are subject to high levels of natural or artificial degradation, such as coastal cliffs that are being eroded or quarries that are being actively worked. In such situations collecting fossil specimens,

that might otherwise be destroyed, can benefit our understanding of geology provided that they are properly documented and made available for study. Collecting also helps prevent fossil locations becoming neglected and overgrown. Ongoing fossil collecting can therefore be a valuable activity in the management and safeguarding of our fossil heritage.

However, some localities are highly sensitive to certain fossil collecting activities, and if these activities are not carefully managed, the scientific value

of the resource can be damaged. Locations where there is either a limited fossil-bearing resource, or particularly rare and exceptional fossils, are vulnerable and susceptible to damage. Locations are also regarded as vulnerable where



13 / Carol Hopkins

fossils exposed at the surface are used for educational field demonstrations.

Mechanical diggers, rock saws, and even explosives have all been used to collect fossils in Scotland, to the benefit of palaeontological research.

However, in the hands of irresponsible collectors, such equipment can cause enormous damage and can threaten to annihilate vulnerable fossil-bearing resources and the fossils they contain. Excavation by collectors at river and coastal exposures can cause undermining, resulting in the collapse of rock faces, and burial of fossil-bearing layers.

When rare and particularly significant fossils are collected by inexperienced and/or irresponsible people, the fossils can lose their geological context and

much of their value as objects of study. The collectors may not recognise the importance of a find, or fail to record essential information at the locality.

1.9.5 Neglect of collected specimens

The failure to adequately care for collected specimens and collections as a whole can result in their deterioration and loss. This threat to the fossil heritage is not peculiar to specimens and collections in the possession of amateur collectors, since inadequacies in funding and staffing can threaten curated museum-based and research collections.

1.10 Conserving Scotland's fossil heritage

The landscape and its underlying geology comprise a fundamental part of the natural heritage underpinning Scotland's biodiversity. Although they give the impression that they are solid and fixed for all time, they are vulnerable to development pressures and changes in land-use. Scotland's irreplaceable Earth heritage resource, including the fossil heritage, has to be adequately conserved and managed wisely for the benefit of future generations.

1.10.1 The Geological Conservation Review (GCR)

In an effort to conserve and afford protection to the Earth heritage of Britain, the then Nature Conservancy Council undertook the Geological Conservation Review (GCR). This project, which began in 1977 and was completed in 1990, used the highest scientific standards to identify systematically the key Earth science sites in Britain. Together these GCR sites reflect the range and

diversity of Great Britain's Earth heritage and demonstrate the geological history and development of the country.

Each site selected for the GCR is of at least national importance for Earth heritage conservation, and many of the sites are of international importance. In Scotland, the GCR process selected 804 sites, of which 84 were selected specifically for their fossil fauna and flora. An additional 107 sites selected to represent various periods in Scotland's geological history contain fossil-bearing rocks.

In time the list of Scotland's GCR sites will be reviewed. It is expected that some new palaeontological sites will be added to the register, as new discoveries are made. A public record of all GCR sites is being made available through the publication of the Geological Conservation Review Series.

Most GCR sites in Scotland are designated Sites of Special Scientific Interest (SSSI) and are afforded protection from damaging activities.

1.10.2 Legislative protection

The Nature Conservation (Scotland) Act 2004 places a duty on all public bodies proposing to exercise their functions in a way that would affect an SSSI to consult Scottish Natural Heritage (SNH); have regard to SNH's



14 / Scottish Natural Heritage

advice; and take reasonable steps, in the proper exercise of their functions, to further the conservation and enhancement of the natural features of the SSSI.

SSSI owners and managers must obtain consent from SNH before carrying out or permitting operations which SNH considers likely to damage the site's protected natural features. If SNH considers an operation likely to cause damage it may suggest other ways to carry out the work. This could be to only partially infill a quarry, or to adopt a lower impact approach to coastal protection.

SNH advises land managers and others on the management of SSSIs and, where appropriate, supports work to enhance the value of SSSIs, for example through clearing rock exposures of rubbish and vegetation. SNH also monitors the condition of the Earth science features in SSSIs, and may support their scientific study.

It is an offence for any person to intentionally or recklessly damage the natural features of an SSSI. By illustration, a collector who without the necessary permission removes fossils from an SSSI designated for its fossils, knowing that it is damaging to the SSSI or with disregard to the site's protected status, is committing an offence and could be prosecuted.

1.10.3 Voluntary conservation of fossil localities

Although Scotland has a network of statutorily protected sites, fossil localities in the wider countryside are also under threat from damaging activities. Some fossil locations not protected by statute have 'Local Geodiversity Site' recognition, belonging to the 'Local Nature Conservation Site System'. It is

possible for individuals to become involved in the conservation of fossil localities, through a local geological society, and by either joining or forming a RIGS (Regionally Important Geodiversity Sites) group.

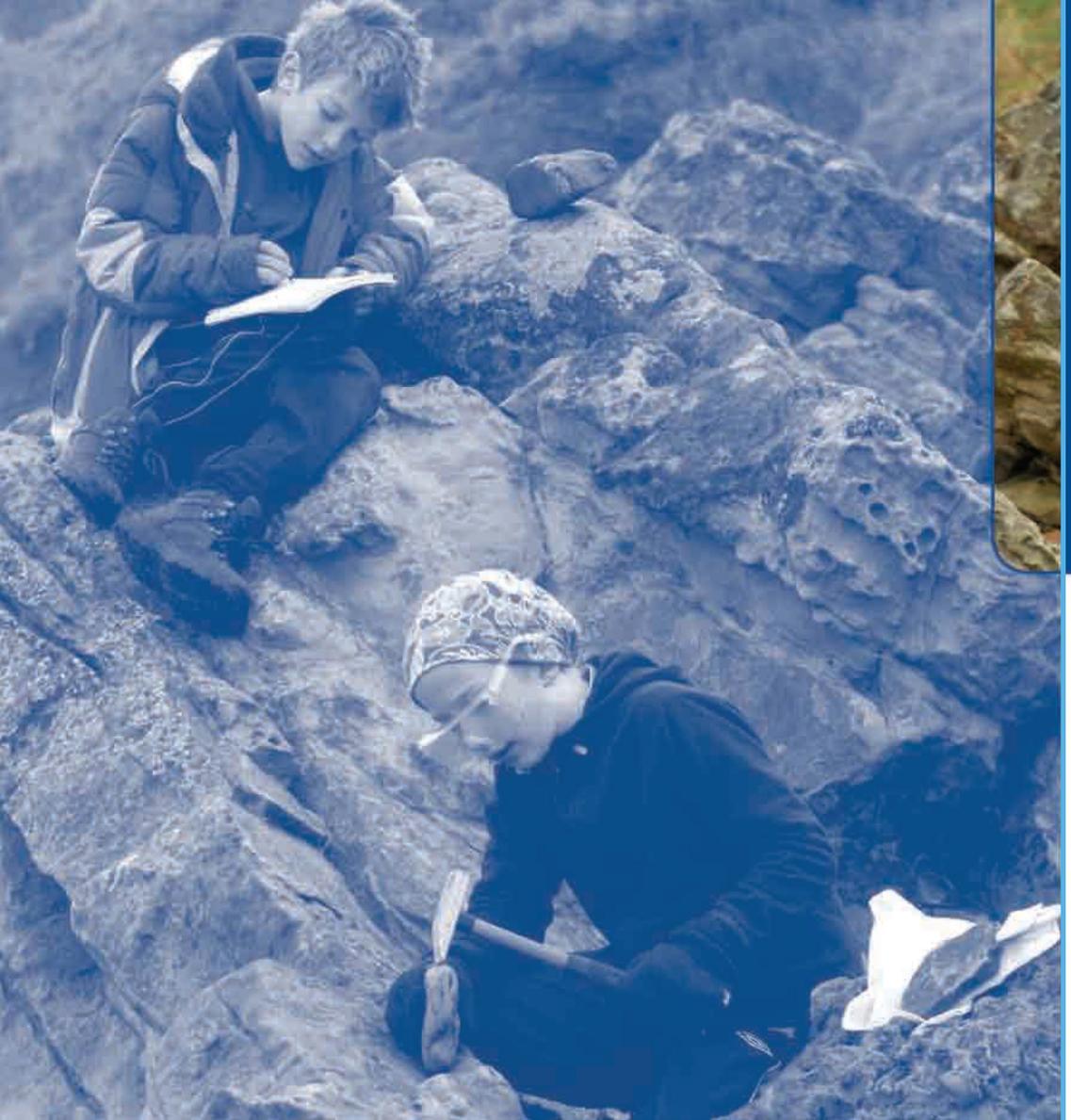
1.10.4 The need to prepare the Scottish Fossil Code

Legislative measures to protect against damaging activities alone cannot entirely safeguard the fossil heritage. Consequently, the Nature Conservation (Scotland) Act 2004 required Scottish Natural Heritage to prepare the Scottish Fossil Code. A Code is required for those with an interest and involvement in Scottish palaeontology that sets out guidelines, advice and information allowing for the safeguard of Scotland's fossil heritage, ensuring that collecting continues in a responsible manner, and that collectors are operating within the law. The Code is to be reviewed from time to time and if the need is identified, it will be revised.

1.11 Ownership of Scotland's fossils

From the legal perspective, fossils in Scotland are treated as 'minerals' in the legal sense of the word. 'Minerals' also include coal, building stone and other substances in or under the land obtainable by underground or surface working. Scotland's fossil resources are therefore owned in law by the relevant owners of mineral rights, be they private, public, voluntary sector or the Crown.

It is important to note that the person who owns mineral rights over an area of land may not necessarily be the owner or even the occupier or manager of



Code for the collecting and care of fossils

Responsible fossil collecting on the coast of Fife.

Image: Scottish Natural Heritage

the land. The situation can arise where a fossil locality on an area of farmland may be owned by one person, the mineral rights and thus the fossils are owned by another, and the land itself is occupied and managed by yet another.

The ownership of beaches and sea-cliffs in Scotland may reside with the Crown, a local authority or an individual.

PART 2: CODE FOR THE COLLECTING AND CARE OF FOSSILS

This part of the Scottish Fossil Code provides best practice, set in a context of guidance, in the collection, identification, care and storage of fossil specimens. It addresses instances where collecting is not permitted and how to deal with collections that are no longer required. Best practice and guidance are also provided for the purchase of fossil material, and what ought to be done if irresponsible collecting is encountered.

2.1 Collecting fossils responsibly

Whatever your reason for collecting fossil specimens, be it for research, recreational, or commercial reasons, this section applies equally to everyone.

2.1.1 Know more about fossils and where they are found

In order to find fossils it helps to know what you are looking for. The more you know, the more you are likely to find and recognise fossils. There are publications (see Part 5) that provide information on the different types of fossils, and the biological groups to which they belong.

- **Fossil collectors are encouraged to learn more about the fossil heritage, and to visit museums to see actual fossil specimens.**

2.1.2 Access to land for collecting

Collecting fossils from the countryside involves accessing land owned by an individual or an organisation. Under the Land Reform (Scotland) Act 2003, everyone has access rights over most land and inland water in Scotland, for recreational purposes, some educational and commercial purposes, and for crossing from place to place. However, access rights come with responsibilities and are conditional on those taking access doing so responsibly. Having the right to take access over land does not mean that people have the right to extract or remove fossils, which are the property of the owner of the mineral rights associated with the land. The Land Reform Act specifically excludes being on or crossing land for the purpose of taking anything away for commercial use or for profit.

The Scottish Outdoor Access Code provides guidance on the responsibilities of the public and land managers in relation to public access.



- **Consult the Scottish Outdoor Access Code prior to accessing land.**

Access rights do not extend to works sites such as building or civil engineering sites, working quarries and mines, and railway and motorway cuttings.

Access to these places can be dangerous and is restricted by law.

- **You must have appropriate authority to enter works sites such as building or civil engineering sites, working quarries and mines, and railway and motorway cuttings.**

2.1.3 Permission to collect and keep specimens

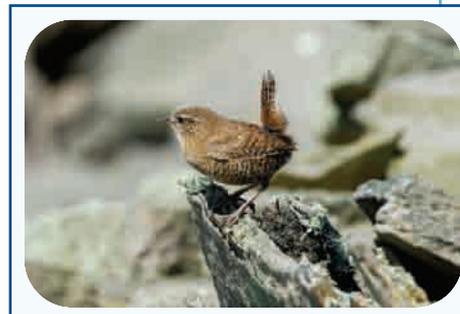
In practice, common fossils and small geological specimens have traditionally been collected without permission and usually without hindrance. However, from a legal perspective it is against the law to remove fossils without permission, and technically this includes loose material from beaches and in whatever other setting fossils may be found, even if they appear to be abandoned.

To extract, collect and retain fossils that are either loose or form part of any rock exposure, requires permission from the owner of the mineral rights. The permission of the landowner, occupier or manager of the land may also be required.

- **You are acting within the law if you obtain permission to extract, collect and retain fossils.**

2.1.4 Fossil collecting and respecting wildlife

Fossil localities are usually intimately or closely associated with other features of the natural heritage. Be aware that some plants can be easily damaged and that some birds and other animals can become alarmed or distressed if you do not take care. Disturbing soil whilst fossil collecting can lead to soil erosion and affect the biodiversity it supports.



15 / Scottish Natural Heritage

- You should always take proper account of wildlife and other aspects of the natural heritage by following the guidance in the Scottish Outdoor Access Code.

2.1.5 How much fossil material to take



16 / Scottish Natural Heritage

At most locations where fossils are to be found there is adequate broken rock lying around from which to collect. However, fossils are a limited resource and should not be taken without good cause. To ensure that you do not 'over-collect' and therefore deplete the fossil resource, consider your reasons for collecting and the vulnerability of the locality to fossil extraction.

- Exercise restraint and take no more than you need as a representative assemblage of fossils. Leave material that you do not want at the locality for others to find.

A fossil in a collected rock sample can become either damaged or destroyed through the collector's efforts to reduce the size of the fossiliferous rock sample for ease of carrying and transport. The successful reduction of a rock specimen to a more convenient size, minimising risk of damage to the fossil, will require the use of appropriate equipment.

- You should not attempt to reduce the size of a rock sample containing a fossil without the appropriate equipment.

Remember that incomplete specimens or specimens broken during collection have scientific value, therefore it may be worth retaining them; with the broken specimens being carefully repaired.



17 / Scottish Natural Heritage

When collecting ensure that you have a supply of packaging materials such as boxes, bags, newspaper and tissue in which to wrap specimens. Secure packing of specimens will help prevent them being damaged whilst being carried and during transport.

- Fossil material should be carefully packed for carrying and transport.

Fossils and associated rock found at one location must not be disposed of at a different locality. This is an irresponsible action that could confuse the scientific understanding of a fossil locality, with fossils being attributed to the wrong location and rock sequence.

- Never discard fossil material and associated rock collected from one fossil locality at a different location.

2.1.6 The use of equipment in fossil collecting

Hardened steel hammers and chisels, specifically manufactured for breaking rock, are the traditional hand tools of the fossil collector. In Scotland most

fossil-bearing rocks are hard and the careful use of such a hammer is necessary to extract a fossil in a proper manner. However, since many good specimens can be found by looking through loose and weathered material the use of a hammer is not always required.

- **A hammer should only be used when essential to do so.**



18 / Colin MacFadyen

Rock saws can be used responsibly in the extraction of fossils and for trimming excess rock from fossil specimens. However, the use of rock saws, power tools and other equipment, such as drills, mechanical excavators and tools, to extract fossils from outcrops is

generally not regarded as a sustainable and responsible activity. Such activity accelerates the depletion of fossil-bearing resources and can cause unsightly damage to outcrops.

- **Apart from trimming specimens, the use of mechanical equipment to extract and remove fossils should only occur for the purposes of palaeontological research projects (for example by museums and universities) and then only when essential.**
- **Rock saws should not be used in instances where their disfiguring effects cannot be removed easily without further damage to fossils or the fossil resource.**

2.1.7 Record your find

As soon as a fossil is removed from the rock and the area in which it is found, irreplaceable scientific information is lost. This can be minimised by recording basic information at the time of collection such as the precise locality and position in the exposed rock sequence. Unless this is done and records are kept permanently with the specimen, the potential scientific value of the specimen will be drastically reduced.

- **When you remove a fossil, record the precise locality, and the position it was found in the rock sequence.**

The fossil locality record should be precise. Merely naming a broad coastal stretch or bay in Fife for example, is not sufficient, as a single stretch can include a variety of fossil beds, formed at greatly varying times and in different ancient environments. Try and pinpoint the precise locality, to within ten metres, by using permanent landmarks or, ideally, eight-figure Ordnance Survey grid references. Thus it is useful to carry detailed maps and/or a GPS system.

If the specimen is excavated, you should sketch the outcrop and record features of the rock, including any layering (bedding) and the position in the exposed rock



19 / Scottish Natural Heritage

20 / Scottish Natural Heritage



sequence at which the fossil is found, in a notebook. Ideally a photograph should be taken of the outcrop with the location of the fossil find marked.

2.1.8 Avoid leaving rock litter and respect other users

Large quantities of freshly broken rock debris scattered about are unsightly and can be dangerous. Rock fragments may cause injury and are a hazard to farm animals, vehicles, and other fossil collectors.

- Leave a fossil locality in a tidy condition as you would expect to find it and do not make things more difficult or hazardous for those coming after you.
- Return loose and broken material to where it was found, and do not spread rock debris on pasture, footpaths and other access routes.

2.1.9 Fossils and the built heritage

Some Scottish building stones contain fossil material. Similarly field boundary dry-stone dykes and animal pens sometimes incorporate fossiliferous blocks of stone. In these situations the fossils are an educational resource to be examined in situ. They are not to be collected, as this would be a criminal offence.



21 / Colin MacFadyen

- On no account should fossils be collected from stone in dry-stone dykes, walls or buildings.

2.1.10 Exceptional and unusual finds

If you are fortunate enough to find an exceptional fossil (for example a rock surface with many fish fossils, a dinosaur bone, or a reptile trackway), it is possible that others may already know about the find. It may be the focus of a research project or be used for educational purposes and therefore should not be collected. In such situations it is best to seek expert advice. Similarly if you encounter an unfamiliar fossil or other feature in the rock



22 / Scottish Natural Heritage

and you are uncertain what it is, or in your experience it appears unusual, you should also consult an expert.

- Seek expert advice if you find, exceptional, large, unfamiliar or unusual fossils.

Record the position of the find, take photographs and contact your local or national museum, university or the British Geological Survey. An expert will then be able to assess the find, determining whether it has already been

discovered and is being used for research or education purposes. If found to be of particular significance, arrangements may be made for its extraction and removal.

- **Do not attempt to extract part of a fossil specimen, as this will damage it, and reduce its scientific value.**

An 'unusual' fossil may be:

- A species new to science.
- A species new to the country.
- A species new to the locality.
- A particularly well-preserved specimen, possibly showing features of the animal or plant that have not been previously described.
- The oldest or youngest of a known species. Such a find may extend its fossil record considerably.
- **It is good practice to donate scientifically important specimens to an Accredited museum.**

If donated to a museum the specimen is then available for fuller study to determine its importance. If it proves to be new to science it will require a name and a detailed published description and illustration. Finders of new species frequently have their name incorporated in the name of the fossil when it is described. A permanent memorial to the finder and the fossil!

2.1.11 Identifying fossil finds

The identification of fossils is an important part of collecting. Most fossil collections are organised according to biological classification and thus some knowledge of the classification of animals and plants is useful. Some collectors will be content to identify fossils to a general level (for example fish, trilobite, ammonite), but most wish to identify specimens to genus and species level. There are many books with fossil illustrations that the amateur can use (see Part 5). However, only a tiny proportion of known fossils is illustrated in such guides, and expert help and advice is normally required.

- **Try to identify the specimens you have found using reference books and seek expert help if required.**

The major museums, the British Geological Survey, and university geology departments generally provide an informal service for fossil identification, and are pleased to help collectors. However, the staff in these institutions do not have time to identify whole collections of fossils, and are not experts in all fossil groups.

2.1.12 Informing land managers of your finds

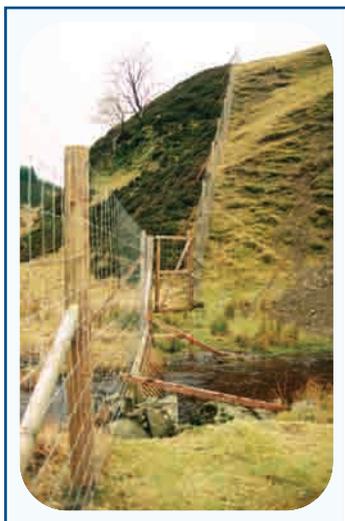
It is good practice to maintain good relations with those that have given their permission to collect fossils. It is recommended that they are informed of the results of your collecting efforts.



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2.2 Protected sites and instances where collecting is not permitted

Many of the scientifically important fossiliferous localities around Scotland are Sites of Special Scientific Interest (SSSI). It is possible to collect at the majority



24 / Scottish Natural Heritage

of these protected sites, provided you have the required permission as outlined in section 2.1.3. However, a responsible approach to fossil collecting in SSSIs is essential to prevent damage and maintain their scientific value.

The fossil-bearing rock resources in some SSSIs are very limited and consequently are vulnerable to fossil collecting of any kind. In these locations only collecting for approved scientific research is permitted and even then a

multidisciplinary approach is required to maximise the information derived during excavation. Consequently, recreational collecting is not permitted at these sites. Collecting restrictions may also apply at other statutory and non-statutory sites and areas such as National Nature Reserves, and Local Geodiversity Sites.

- You must be familiar with any collecting regulations that may be in force before visiting fossil localities in statutory and local nature conservation sites.

As set out in section 1.4, you must not collect fossils from loose and unconsolidated material such as peat, sand and soil that has an archaeological association. Even if such an archaeological association is not apparent, it is best they are left undisturbed and uncollected.

- Fossils must not be collected from loose and unconsolidated material with an archaeological association.

2.3 What to do in the event of encountering people collecting irresponsibly

You may come across a situation where you suspect that irresponsible and reckless collecting is taking place (for example a mechanical excavator being used to remove fossils from a rock exposure). If so, it may be appropriate, provided you are not putting yourself at risk, to enquire whether the person or persons has or have permission to collect fossils, and has heard of the Scottish Fossil Code. Useful action would be to note down details including an exact location or grid reference, and the registration number, make, model and colour of motor vehicles in the area, if you are able to do so without arousing suspicion.

- If you encounter irresponsible and reckless collecting, use your common sense and do not put yourself at risk by intervening.

You do not have to report the incident directly, as there are anonymous ways of reporting a crime, but if damage to the site is taking place, or material is being removed illegally, it ought to be reported as soon as possible to land managers, the police and the local office of Scottish Natural Heritage.

If you are concerned that reporting a crime to the police might put yourself at risk, you can call Crimestoppers on 0800 555 111. You will not be asked your name and you can leave your information anonymously. It may still be very helpful to the police if you can give more detailed information to them in person.

- **Try and inform the land manager and report the incident to the police.**

2.4 How to care for the fossils you collect

Fossils are a limited resource, and are irreplaceable. You should therefore take good care of them, and also of their accompanying data once they have been found and removed from the ground. If you cannot do this, then collecting fossils, or retaining a fossil collection, is wasteful of Scotland's fossil resource. Better to leave fossils for others to find, or pass them to a more suitable home.

- **Take good care of collected fossils and their accompanying data.**

Standards of collections care are well established for museums. Academic, commercial and serious amateur collectors should follow broadly similar standards. However, it is unreasonable to expect children and other less experienced collectors to follow such high standards. Nevertheless, the basic principles still apply, and are to be encouraged, at all levels.

A brief outline of good practice is given here. It is not possible to be more specific, as the actual standards to be expected depend on individual

collectors' expertise and resources, and on the content and significance of their collections, as well as currently available materials and techniques. The references given in Part 5 provide information on the care of collected fossil specimens.

2.4.1 Cleaning, extraction and preparation of newly collected fossil material

To prevent damage to the specimen, material wet with seawater should be rinsed and soaked for at least several hours in clean fresh water to remove as much salt as possible, preventing damage when the salt crystallises in the pores of the specimen. Other wet material should be dried gently and slowly to avoid cracking.

Soil and other substances adhering to the specimen should be removed very gently using a brush or other tool that will neither mark nor otherwise damage the fossil. Beware that cleaning of fossils preserved in soft shales can present problems, as wetting may damage the fossil or cause it to disintegrate.

The degree of 'preparation' required to remove rock obscuring part of a fossil, will depend on the specimen and collector, but in general it should inflict no damage on the fossil specimen itself, or promote cracks, which could in time lead to more damage. In general, some rock material should remain with the specimen as it, together with any associated fossils, provides information which will probably add to its scientific value.

In the laboratory a variety of tools is available for preparing fossils. Apart from hammers and chisels, electrically powered engraving tools, air abrasives,

rock saws, dental tools and a variety of chemical treatments, including acids, can be used. Safety rules must be followed in preparation techniques. It is wise to practice techniques on poor material, and to take advice before attempting the preparation of a good specimen. Specimens can be ruined by poor preparation.

- **Fossil material should be processed as soon as possible after collection.**
- **If you are in doubt about the techniques and lack the necessary equipment to extract and prepare a fossil specimen, consult publications on palaeontological preparation techniques and seek expert help before attempting to work on it.**

The unnecessary use of adhesives and varnishes is not considered good practice, even to 'improve' the look of a specimen. Varnish and other types of coatings may damage surface detail and reduce the scientific value of a specimen. Coatings can deteriorate with time, and further problems may arise when they are removed.

Glues used in fixing together the component parts of a broken fossil specimen should be 'reversible', i.e. soluble in a solvent such as water, so that the joint can be remade if need be. For this reason, polyacrylate ('superglue') and epoxy resin adhesives are not normally considered suitable. PVA emulsion is one reasonable compromise for those starting collecting.

- **In preparing fossil specimens, use reversible glues and do not varnish.**

2.4.2 Labelling and documentation

The basic information such as where and when found, recorded when a fossil specimen is collected (see section 2.1.7), should be carefully transferred and included on an accompanying data label. This allows for accurate information to be attributed to the specimen before the collector's memory fades.

- **Data labels should be prepared and kept with collected specimens.**

The information on a data label ideally should include:

- Find locality, including National Grid Reference from an Ordnance Survey map.
- Geological horizon (e.g. rock layer or bed, geological age).
- Date collected.
- Specimen number.
- Name of the collection to which it belongs (this may be indicated as a prefix to the specimen number).
- Identification, for example genus and species (less important than find locality, horizon and collection information, as this data can be added or modified at any time).
- Collector.



25 / Robert Davidson

- Details of collecting permission, where appropriate (although collecting permission may be better filed with the collection as a whole).

Each specimen should bear a unique number written in waterproof permanent ink, ideally on a label of acid-free paper stuck with 'reversible' glue that, if required at a later date, can be detached from the specimen. Although more difficult to remove, a patch of matt white paint may also be used to allow number labelling of a specimen. Whatever labelling method is used, it should be applied so as not to obscure any details of the specimen. A coat of clear varnish should be applied over the paper label or paint patch to preserve the number. This number must also be put on the accompanying data label and on any other information records, for example field notebooks recording the location of the find. Using numbers ensures that the information on the data label cannot be mixed up with that for any other specimen. It is good practice to have a running list of all your specimens and their details in a hardbound book (a register), to avoid duplication of numbers.

The information should be in good quality paper form. Computers can be used to generate and process the information, but should not be used as the primary (or sole) information store. Good documentation is essential for any fossil material that is being considered for donation to a museum.

2.4.3 Storing and displaying

Your fossil collection should be organised so that individual specimens can readily be located. Specimens in most fossil collections are primarily divided and stored by fossil group. Some popular ways are:

- fossil group, then geological age;
- geological age, then fossil group; and
- geological age, then site, then fossil group.

At the simplest level, the storage and display of fossil specimens will comprise of placing them in dustproof conditions, protected to stop them rolling around and abrading each other, for instance when a drawer is opened. A simple way to do this is to keep each specimen in its own cardboard tray with its label, and if necessary some rolled tissue padding to stop it moving around (cotton wool is not good as it catches on specimens). At a more sophisticated level, you could use museum-quality materials such as acid-free card and tissue.

Environmental conditions, such as those in an unheated garage in winter, should be avoided, because of the effect of damp and mould growth on storage boxes, other packaging and labelling. Direct sunlight can also cause labels to fade and lead to problems associated with excessive drying out and fluctuating temperature.

Humidity and temperature-sensitive material (see below) may need particular care, to avoid excessively high or low humidity (the latter can happen in centrally heated houses in winter). This care extends to the maintenance of a reasonably stable temperature.



26 / Robert Davidson

- **The storage and display environment for your fossils should not damage, or cause deterioration to, the specimens.**

2.4.4 Problems associated with conserving collected specimens

There are problems associated with the conservation of specimens in a collection. If these are not adequately dealt with they can permanently damage a specimen and in extreme cases lead to its loss.

Breakage and abrasion – are commonly the result of poor packing in transport and storage, and subsequent handling.

Dust and dirt – commonly accumulate through poor storage and display.

Damp – causes mould growth on specimens, especially dirty ones, and encourages insects and other pests to attack the packing and labelling.

Extremes of humidity and temperature – can damage vulnerable specimens especially if changes are rapid. Varnishing a specimen will not prevent or halt such damage, and can make matters worse. It may be necessary to consider special storage conditions for important collections. Whether a given specimen is at risk from extremes of humidity and temperature depends on the mineralogy of the specimen, and also the site and source rock.

Fossil material potentially vulnerable to humidity and temperature includes:

- 'Poorly mineralised' bones from Quaternary deposits (for example mammal teeth and bones).
- Specimens in shale or clay rocks, especially those which expand and shrink with changes in humidity.

- Specimens containing some forms of the mineral pyrite, which under conditions of fluctuating temperature and humidity tends to oxidise to sulphuric acid, resulting in the specimen falling apart. A move to drier more stable conditions may not stop the process once it has started. Once a specimen starts to deteriorate through pyrite oxidation, it should be isolated to prevent damage to other specimens from acidic vapours.

2.4.5 Other collection management issues

It can be difficult to find advice and specialist help on looking after your collection, the references listed in Part 5 may be of some help with this. Your local or national museum or university may have a specialist geological curator and be in a position to offer you advice.

A significant collection should enjoy an appropriate level of physical security, and perhaps also financial insurance, against fire, flood or theft. Where appropriate, a photographic record of the collection (or at least key specimens) can help in proving the identity of stolen material and seeking to recover it, especially if it has been sold.

- **A significant collection should enjoy an appropriate level of physical security.**

2.5 Buying specimens for your collection

Many collectors, and museums, purchase specimens to add to their collections. This may be to gain more examples of an interesting group of

fossils, to obtain material from classic localities, to acquire research material, or to provide material for displays.

There are several factors to bear in mind before making a purchase:

- Is the seller the legal owner of the specimen, and was it collected with permission? This may be difficult to prove.
- Is it correctly described, and are locality details given correctly? Vague locality details (for example 'Caithness') are of little scientific value.
- Are the item and its data genuine? Faking is not currently believed to be a significant problem with Scottish fossils, but the buyer should be cautious, especially if the offer is unexpectedly good. Faking is common in the fossil trade worldwide, especially in the overseas tourist souvenir market. Fossils are also often restored or made up from incomplete specimens, or inserted into new 'stone' matrix, simply to make them look better and command a higher price as décor fossils.
- Has it been well prepared? Some material offered in rock shops has been varnished, carved, repaired and polished to enhance the superficial appearance and is therefore only useful as a decorative curio.
- If you choose to purchase specimens, use a reputable dealer who is prepared to give locality details for the material you wish to purchase; you may wish to enquire if the material was collected legally, is genuine and has been properly prepared.

2.6 Dealing with old and perhaps neglected collections

Old fossil collections, whether in museums or private hands, are an important

part of Scotland's fossil heritage. They may be of interest and significance because of their history and personal connections, and because of scientific work done on the specimens. They may also contain specimens that are rare, and perhaps no longer collectable (for instance because the locality has been worked out, or is a quarry that has now been infilled).

Unfortunately old collections are sometimes neglected, badly stored or disordered, and they may suffer the problems mentioned above (for example covered in dirt or have suffered from pyrite oxidation). A natural reaction is to unpack, sort and wash the collection. Such action can be disastrous as this is the wrong treatment, which can damage the collection's labelling and documentation. Sorting out, assessing and reorganising an old collection, neglected or otherwise, needs special care to avoid loss of old information and the introduction of spurious new information.

- **If you have reason to believe that an old and perhaps neglected collection is significant, you should, if possible, leave it undisturbed until you have sought expert advice (for example through a specialist museum curator).**



27 / Scottish Natural Heritage



Supplementary Code for specialist and other groups in the collecting and care of fossils

Part of the collection of a palaeontological collector and researcher, an illustration of best practice in the labelling and storage of fossil specimens.

Image: Robert Davidson

2.7 Disposing of an old or redundant collection

The method of disposal of an old or redundant collection depends on its quality. If in doubt seek advice from a specialist museum curator. If the collection is well documented and contains good specimens it may (wholly or partly) be of interest to a museum. If it is poorly documented and the specimens are generally common it may still be of interest to schools, colleges or museums to provide teaching and handling material.

- **When disposing of an old collection seek advice and consider donating it to a museum or educational establishment.**

2.8 Bequeathing a collection

If you are the owner of a significant private collection, you cannot usually expect your family or executors to know what to do with your fossil collection in the event of your death. Thought should therefore be given to its long-term future with instructions left in your will.

Instructions should be sufficiently flexible to allow for changing situations (for example the policies of particular museums), and for the fact that museums may not accept an entire collection, or may use some of it for exchange or as handling material (see section 4.4). Sometimes it is best to deal with the matter yourself while you are still able to do so.

- **If you are the owner of a significant private collection, thought should be given to its long-term future with instructions left in your will.**

PART 3: SUPPLEMENTARY CODE FOR SPECIALIST AND OTHER GROUPS IN THE COLLECTING AND CARE OF FOSSILS

This part of the Scottish Fossil Code provides additional best practice and guidance in the collection and treatment of fossils. It is intended for specialist groups and others including land managers, with a particular involvement in Scotland's fossil heritage, and is supplementary to that outlined in Part 2.

3.1 Amateur collectors interested in research

The 18th and 19th century pioneers of palaeontology were, by today's standards, almost all amateurs. Even today, Earth science remains accessible to all and this provides a great opportunity for highly informed amateurs to continue to make significant contributions to palaeontological research.

As an amateur collector you may have the opportunity to work on and research a particular fossil locality or area of special interest, and consult research publications on a topic. In time, you may develop considerable knowledge of this special interest, and such detailed knowledge can yield important new information or highlight gaps in existing research.

3.1.1 Working with researchers

If you have an interest, for example, in taxonomy (classification of organisms) or the ancient environments in which the organisms that gave rise to the fossils lived, you may collect material or gather data that is of scientific value, and

worthy of publication. Publication is the main way in which scientific information is made public and some amateurs attain a level of knowledge and skill that enables them to write magazine articles and publish papers in scientific journals. However, collaboration with a professional palaeontologist working in a museum or university is another and often quicker way to publish your finds, and is a better strategy for most amateur palaeontologists.

- **If you have an interest in undertaking palaeontological research, consider working in collaboration with an expert.**

It is relatively straightforward to find out to whom an approach should be made at a university, the British Geological Survey, or one of the museums. Successful collaborations of this nature are common in palaeontology and the levels of achievement and subsequent rewards to the amateur can be significant and satisfying. If you wish to participate in research it is essential to maintain the best standards of data recording and collection management as advocated in the Scottish Fossil Code.

3.1.2 Working with other amateur collectors and sharing your knowledge

It is important to share the knowledge gained through collecting and to work with other collectors. There are few organised clubs that cater for fossil collectors, so it is useful to form a small group of collectors with similar interests. Excursions can be organised to localities, and finds shared, discussed and appreciated. Sharing your knowledge may also be achieved for example by giving a talk at a school or club, showing others your fossil collection, or organising a display of your collection. At such educational

events you will have the opportunity to encourage others to take an interest in fossils, the local geology and responsible fossil collecting.

3.2 Commercial collectors and dealers

A 'Commercial Fossil Collector' – is someone whose income is obtained partly or wholly through the employment of him/herself and/or others in the physical collection of fossils and their sale.

A 'Fossil Dealer' – buys, sells or exchanges fossils originally collected by others not directly in their employ.

The roles of Commercial Collector and Fossil Dealer are frequently combined.

3.2.1 Resource selection and the discovery of new fossil localities

As a commercial collector you should ideally be involved in identifying new localities for collection rather than seeking permission to further reduce the reserves at sites and areas that already have statutory protection. Be aware that large excavations may require planning permission from the appropriate authority and that terms for the extraction and sale of fossil material will have to be agreed with the owner of the mineral rights and other land managers.

- **You must agree terms for the commercial exploitation of a fossil locality with the owners or their representatives.**

Newly discovered localities producing notable fossils should be worked in close liaison with museum, university-based or British Geological Survey

palaeontologists. Working in this way will allow a co-operative and sympathetic partnership that will best serve the commercial, scientific and natural heritage interests. All parties, and Scotland's fossil heritage, can benefit greatly from such co-operation.

For the benefit of both science and education, you should consider the permanent retention of a new exposure produced through large-scale excavation. Efforts should be made to work with landowners and the local Regionally Important Geodiversity Sites group to determine the feasibility of such work.

3.2.2 Systematised collecting and information recording

The commercial exploitation of fossil localities should be well planned and undertaken responsibly and systematically. This should entail the keeping of accurate records of the rock layer sequence exploited, important in any future research work conducted on the fossil specimens. A photographic record of the work and a written account should be lodged with the landowner and owner of the mineral rights for posterity and with the local museum.

- **Documentation including locality data should accompany specimens that are marketed.**

3.2.3 Selling exceptional fossils

Given the scale and frequency of commercial collecting it is almost inevitable that exceptional/unusual fossils (see section 2.1.10) will be found. Such fossils



28 / National Museums Scotland

are invaluable for the advancement of palaeontological science and ought to be secured within a curated permanent collection within an Accredited museum, where they are available for research purposes.

There may be some fossil locations where access and collecting permission are given on condition that scientifically important specimens will in the first instance be offered to museums. Before selling fossils you must ensure that you have secured full legal title to the material.

- **You should offer finds of exceptional fossils to an Accredited local or national museum in Scotland for possible purchase on the nation's behalf, before considering other museums and the open market.**
- **You must have full legal title to a fossil in order to sell it.**

3.3 Large field parties

Many locations in Scotland that are important for their fossil heritage attract groups such as geological societies, and university and school study parties, largely for educational purposes. With the attention of many potential collectors focussed on an area, a vulnerable site may be at threat from over collecting.

It is essential therefore that in leading a large group you ensure that the spirit of the Scottish Outdoor Access Code (SOAC) and the Scottish Fossil Code is upheld by encouraging good practice in accessing fossil localities and in all aspects of collecting and data recording.



29 / Edinburgh University

- As a group leader you should bring the Scottish Fossil Code and the Scottish Outdoor Access Code to the attention of the group members and be aware of any restrictions at any fossil location(s) visited.

3.4 Researchers

Palaeontological research requires a resource of fossil material with which to work. However, if you are collecting for research purposes you have a duty to collect responsibly to ensure the sustainable use of the fossil-bearing resource to enable the continuation of future research. No researcher has the right to 'dig out', in other words, remove in its entirety, a fossil-bearing resource.

- You should strive to minimise the quantity of material removed and the amount of damage undertaken at a fossil locality.

You should also contribute to the conservation of the fossil resource, through detailed fossil provenance recording, curating the material you collect and making maximum use of fossils already held in museum, university, and British Geological Survey collections. By doing so, present and future researchers can use existing collected and curated material and associated information, without having to resample a diminishing resource.

Use should also be made of the skills, experience and knowledge of amateur and commercial collectors.

- Maximum use must be made of fossils already held in existing collections, using only curated material for research that is to be published.
- Collected research material should be curated in a museum or British Geological Survey collection.

You should ensure that rock faces are not disfiguring with core holes and permanently engraved or painted numbers or symbols, especially in aesthetically sensitive locations. Your responsibilities also extend to becoming familiar with the best means of preparing and preserving fossil samples.

Fostering good relations with those that have given their permission to extract, collect and retain fossil specimens, should include offering copies of any resulting publications and, if appropriate, duplicates of fossils to show other visitors.



30 / Hunterian Museum

3.5 Owners of mineral rights and land managers

As owners of mineral rights, and the owners, occupiers and managers of land, you variously have jurisdiction over any fossil resource on your land. You are therefore encouraged to find out about the fossils and help in the conservation and use of that resource. This may include ensuring that loose fossil material is safeguarded through encouraging responsible collecting, with minor collecting of loose fossil material being allowed without hindrance, rather than letting the fossil material continue to be damaged and destroyed through weathering and erosion.

- You are encouraged to show sympathy to the interests of collectors when considering whether to grant access to the land and giving permission to excavate, collect and retain fossils.

When considering giving access and collecting permission, it is suggested that you ask the purpose of the collecting to ascertain whether it is for:

- teaching instruction;
- personal collection;
- research purposes (and if so, for which institution); or
- commercial gain.

You may wish to keep a record of names and addresses of individuals collecting on your land, or leaders of parties (for example a university). If allowing commercial collectors to excavate fossils, you may wish to enter into a co-operative agreement with them.

In granting permission to access and to collect fossils, you may wish to set some conditions, such as:

- adherence to a particular route to the fossil locality;
- a restriction on equipment used; and
- being informed of what is found.

If collectors are encountered, who are in ignorance of the Scottish Fossil Code, then you should bring it to their attention, with encouragement being given on good practice in fossil collecting.

- You should take appropriate action if you consider that abuses of the Fossil Code occur (see Section 2.3).

3.6 Quarry operators, managers and developers

If you operate, manage or work a quarry from which fossiliferous rock is extracted, you are encouraged to find out about any fossils that are to be found there. Any unusual or rare fossils uncovered during quarrying should be set aside and the local museum, university or the British Geological Survey alerted to enable their study and collection.



31 / Scottish Natural Heritage

- **Any unusual or rare fossils uncovered during quarrying should be set aside and experts in palaeontology alerted to enable their study and collection.**

Sympathy should be given to the interests of hobbyists, researchers, commercial collectors and educational groups in granting access to the land for collecting. Those given access and collecting permission should be encouraged to collect responsibly and follow the Scottish Fossil Code. Close working and co-operative arrangements may be fostered between quarry operators and staff and those with an interest in fossils exposed by quarrying. Collaboration can be of benefit to all, and the fossil resource.

If following the cessation of quarrying, after-use proposals include infilling, efforts should be made to maximise opportunities to rescue any fossil resource and associated data which would be lost by infill of the site. In addition, efforts should be made to conserve the most important areas and faces in a stable and safe condition to facilitate future research, fossil collecting, and use of the site as an educational resource.

3.7 Operators of websites that promote fossil collecting in Scotland

The promotion of the geological and palaeontological heritage of Scotland via Internet websites has educational and general awareness-raising value. Such websites can represent a useful resource, providing general geological information, illustrating fossil material and detailing information specific to particular fossil localities. They may have an associated club through which experiences of collecting may be shared and field trips undertaken. However,

promotion of the palaeontological heritage of Scotland via Internet websites should be undertaken in a responsible manner, and every effort made to ensure information supplied is accurate.

- **Websites that promote fossil locations in Scotland should carry a link to the Scottish Fossil Code pages on the Scottish Natural Heritage website.**

3.8 Taking Scottish fossils from the UK

The United Kingdom Government retains customs powers. Currently there is no control over the export of fossils from the UK as such. There are, however, certain controls on the export of fossils from the European Union (EU). Moreover, the position on the export from the UK is currently under review.

- **If you are intending to export Scottish fossils from the UK and/or the EU you should check the current situation regarding export legislation.**

Under the existing system controlling export from the UK, licences can be refused or deferred for objects of special historical, aesthetic or scholarly importance, usually to enable a UK museum to buy the object. The current wording of the regulations is not considered to cover fossils or other geological items.

Special export licences are required for certain categories of 'cultural objects', under the system run by the Museums, Libraries and Archives Council on behalf of the UK Department of Culture, Media and Sport (DCMS). These



Museum and other public collections

Public museums represent an important resource of Scottish fossils. They provide an opportunity to see, learn about and handle fossils.

Image: National Museums Scotland

will apply to material exported both permanently and temporarily (for example for display or research).

There are specific controls on export from the EU. An EU system currently requires licences for the export from the EU of collections of "palaeontological ... interest" valued at (currently) £30,400 and above.

This brief guidance does not cover:

- general customs regulations and laws, for example on false declaration of goods;
- special issues concerning stolen and other illicitly collected fossils (for instance, export of such fossils from the UK may be illegal depending on the cultural heritage laws or international treaties of the state of destination); and
- import of fossils into the UK.

PART 4: MUSEUM AND OTHER PUBLIC COLLECTIONS

Many Scottish fossils are held in public museums. Museums are important places for the public to see, learn about and handle fossils. They are also important for palaeontological research, and have a role in tourism and encouraging the wider public understanding of Scotland's fossil heritage. Museums are important for preserving the information about specimens just as much as the specimens themselves. Given their importance, this part of the Scottish Fossil Code concerns collections in Scotland and fossil donations to museums.

4.1 The nature of fossil collections

As an important resource of our geological heritage, fossils in museum collections must be looked after, just as much as new finds. Old museum specimens and new finds complement each other. Older finds are often the only evidence of fossils from quarries and fossil locations that are now worked out or infilled. They may also be historically interesting. Newer finds tend to have more complete information and to have been collected with more modern techniques.

Fossils in private collections are not normally publicly accessible; but in the long run private collections often end up in museums, whose collections frequently grow more in this way than by direct field collection. The collections of Scottish fossils in National Museums Scotland include vast and important collections which initially were in private hands, but which are now

part of the National Collections and are available for study.

4.2 Museum Accreditation

Museum Accreditation is a voluntary quality assurance scheme for museums across the United Kingdom. It was formerly known as the Museum Registration Scheme. It recognizes that a museum conforms to, or is working towards, basic nationally agreed standards of collections care and documentation, organization and management, and services to users. In particular, it helps safeguard the collection if the holding institution is dissolved (for example goes bankrupt). It is increasingly used as a benchmark by funding organizations (for instance, the Heritage Lottery Fund).

4.3 Museum services in Scotland

Different museums are run in different ways and with different priorities as regards fossils. Many museums have collections and perhaps also displays of fossils, but only some have geologists on their staff, or perhaps as volunteers. In other words, not all museums, even those with fossil collections, have people with a wide knowledge of fossils.

Part 5 lists just some Scottish museums with substantial collections (though this can vary from thousands to millions of specimens). Most have displays of fossils (allowing for closures and renovations), but rather fewer have palaeontologists on their staff at any given time.

Museums with small collections are not listed for practical reasons, but that does not mean that the collections are not useful. Some, such as the Hugh

Miller Museum at Cromarty, and the Scottish Mining Museum at Newtongrange, hold interesting fossil collections in support of broader aims of the organisations.

Scottish fossils are also held by museums in other parts of the UK (for example the Natural History Museum in London) and abroad. This is testimony to palaeontology being an international science.

4.3.1 National Museums Scotland

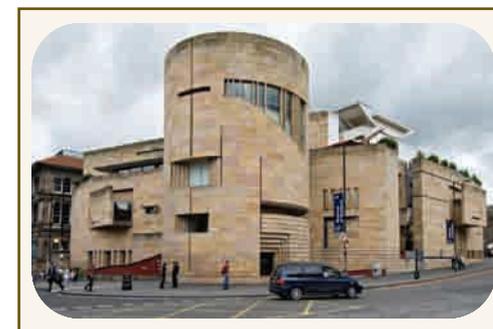
Scotland's national museum service is National Museums Scotland, which is partly funded by the Scottish Government. It has an important national fossil collection of its own and displays fossils to the public at its museums and by loans to other Scottish

museums. It has specialist palaeontological staff experienced in the study and research of fossils, and their interpretation to the public.

National Museums

Scotland collects its own

finds of fossils, as well as those found by others, concentrating especially on those from Scotland. National Museums Scotland also offers advice, expertise and co-operation to the museums community across Scotland.



32 / Scottish Natural Heritage

4.3.2 University museums

University museums include the Hunterian Museum at the University of Glasgow, which collects fossils from all over the world. The Hunterian has specialist staff experienced in the study and research of fossils, and their interpretation to the public.

4.3.3 Local museums

Many local museums, run either by local authorities or independent trusts, have fossil collections. Local museums tend to focus on a particular geographical area, although they will sometimes have fossils from elsewhere in Scotland and beyond, to complement their local fossils.

Many local museums have geological collections, perhaps acquired long ago. Only some have specialist staff in the natural sciences, and fewer have a geologist, but they provide a valuable service over much of Scotland.

4.3.4 British Geological Survey

The British Geological Survey (BGS) holds a major collection of Scottish fossils in its Edinburgh office. Access for bona fide study is available by appointment or loan, and public displays form part of BGS Open Days. It has experienced palaeontologists available to answer enquiries from the public.

The Survey also holds significant collections of Scottish fossils at its headquarters in Keyworth, Nottinghamshire, and these are also available for study by appointment. Internet access to the collections database is available on the BGS website.

4.3.5 Scottish Museums Council

The Scottish Museums Council (SMC) is the membership organisation for museums and galleries in Scotland. It provides advice and funding from the Scottish Government to all museums (except for National Museums Scotland which is directly funded) but does not offer specialist advice on collecting subjects, and does not take a direct role in dealing with fossils.

4.4 The use of fossils in museums

Museums usually add new specimens to their permanent collections for one or more of the following reasons:

Display – the fossil is an especially good, complete and clear example, which will enhance a display.

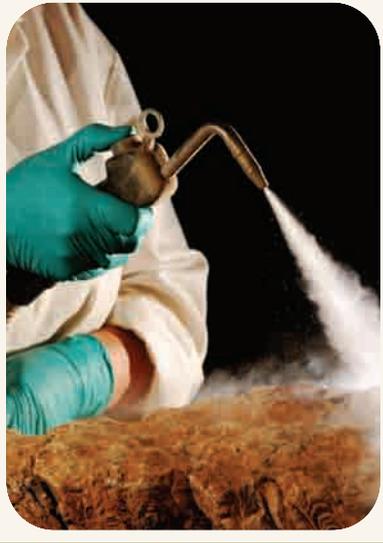
Only a small proportion of fossils in a museum will be on display. The majority are usually in store. Some are unsuitable for display purposes but are held for reference. Many may go on display in the future, as permanent and temporary exhibitions change.



33 / National Museums Scotland

Local provenance – the fossil helps build up a representative collection of finds in the geographical area of especial interest to the museum.

Study and research – the fossil is interesting to palaeontologists, for example



34 / National Museums Scotland

because it is evidence for the occurrence of a particular organism at a particular place and time, or because it shows certain features of the original animal.

The most important specimens are those that have been or should be published in scientific journals. This reflects partly their inherent scientific value, and partly the importance which publication confers. Good science demands that work can be repeated by other scientists, thus scientists must be able to examine published specimens. Therefore it

is especially important that such specimens are permanently placed in public collections.

Specimens which are simply mentioned or discussed in publications are called **cited specimens**; **figured specimens** are more important, as they have been illustrated in publications; most important of all are **type specimens** – those which are the defined reference specimens for a species or genus of animal, plant or microorganism. On these rest all classification, and therefore all palaeontology.

Historical importance – the fossil was found, or is otherwise associated with, an interesting historical figure, perhaps a famous scientist or author, or a local collector.

35 / National Museums Scotland



Handling and Exchange specimens –

these specimens are not registered in the permanent collections but provide a really worthwhile service, used for handling by school parties and visitors, or loaned out to schools. They are inevitably relatively prone to damage



36 / Scottish Natural Heritage

and loss in a way which would be unacceptable for the permanent collections. Exchange specimens are saved for swapping with collectors and other museums, or for giving out to schools for them to keep.

4.5 Donating a fossil or collection to a museum

If you are considering a home for your finds for the public benefit, you should choose an Accredited museum (which may be operated by national or local government, a charitable trust, or a university) or the British Geological Survey.

A scientifically important specimen should normally go to a museum with specialist staff to care for it and arrange for it to be studied. Other specimens can be used by museums for any of the uses mentioned in section 4.4. The museum will be especially accountable for the specimens added to the permanent collection.

- If you are considering donating a fossil or collection to a museum, you should choose one that is Accredited.



37 / Robert Davidson

In order for a museum to accept your donation, you will need to demonstrate that you are the owner of the fossil, if the museum is to obtain valid title from you. You will also be asked to make the gift (or sale) an absolute

one, without strings, and to let the museum deal with the find as it thinks fit. The museum will want to put the fossil to the most suitable use, as outlined in section 4.4.

The museum may not be able to accept your offer if your finds duplicate what the museum has, or may not be a priority for the museum. It has to be judicious in what it acquires and stores, owing to limited resources and storage space. If this is the case the museum may well suggest another museum better suited for your finds. Different museums have different priorities and an Accredited museum will have an acquisition policy, often on its website. National and university museums tend to be particularly interested in scientifically important fossils. Local authority and local trust museums tend to be more interested in fossils from their geographical area of coverage.

It was once common to place fossils on 'long loan' to museums, however, this is no longer good practice. The museum has the cost of housing the fossil without being able to deal with it properly. In addition, the museum cannot plan for the future if the fossil may be removed at short notice. It is however

quite proper for the museum to borrow a fossil for an agreed short-term period, typically for an exhibition, or to enhance a display.

4.6 Promoting the local fossil heritage

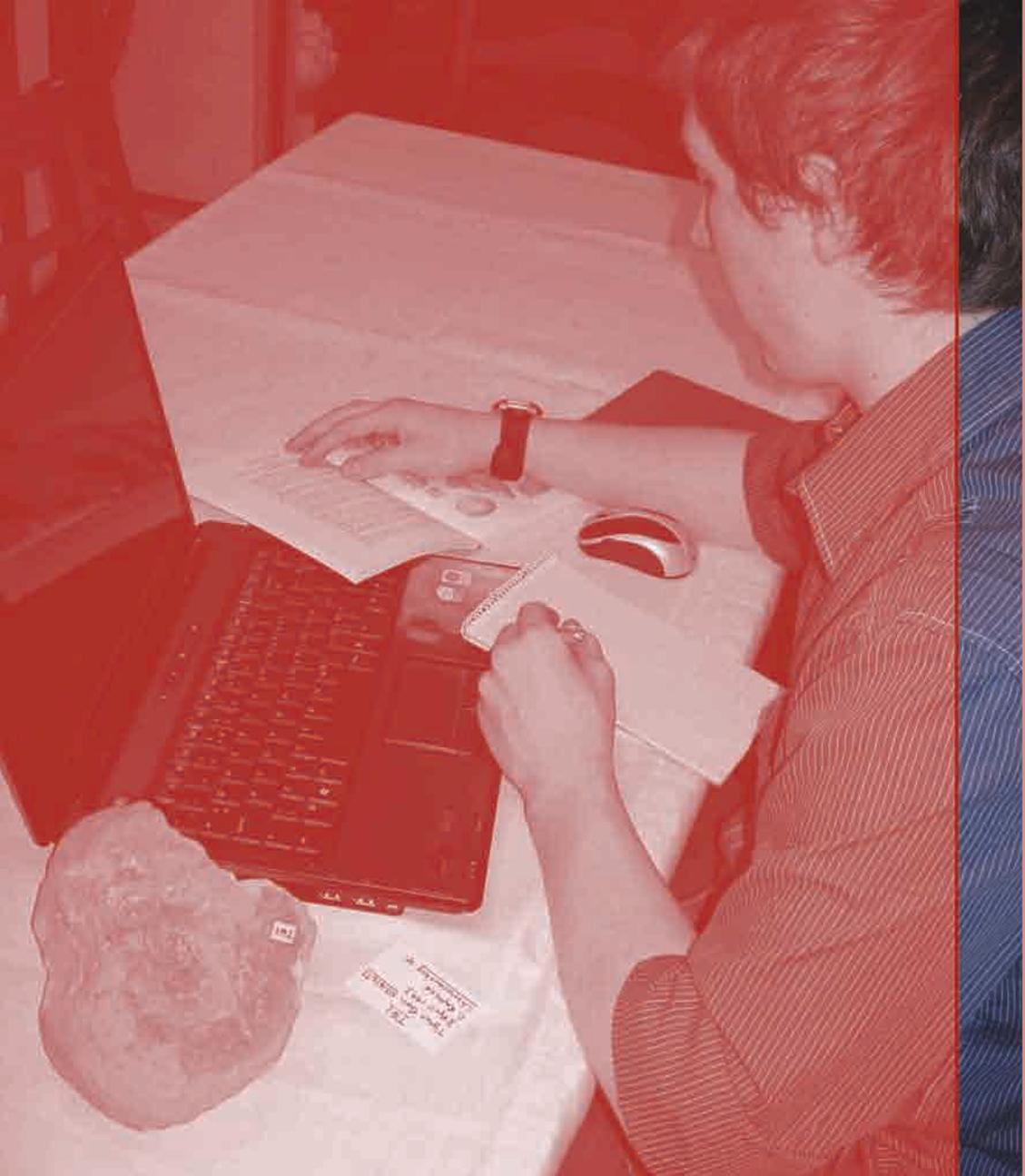
If no local museum deals with fossils or provides a public service, then those who seek to promote and safeguard their local fossil heritage may well feel the solution is to set up a museum. The Scottish Museums Council provides valuable advice and guidance that will help you think about what you really want to do, and can realistically achieve. However, there



38 / Scottish Natural Heritage

are many ways to raise awareness, interest, and understanding amongst local people and visitors, of your local fossil heritage, which do not involve setting up a museum with a formal collection. Possibilities include:

- producing interpretive materials such as leaflets and on-site panels;
- the creation of a website;
- organising local talks and planning open days and activities for families;
- preparing displays of local fossils; and
- preparing press releases and engaging the media.



Further information sources

Reference books and the internet being used to aid the identification of fossil specimens.

Image: Colin MacFadyen

Where appropriate and practical, loans from museums such as the National Museums Scotland may be organised. Clearly, if you want to display borrowed fossils in a visitor centre, then that means an appropriate degree of security and insurance cover will be required.

PART 5: FURTHER INFORMATION SOURCES

This part of the Scottish Fossil Code lists the sources used in the preparation of the Code and other information that may be of use in the collection and care of fossil specimens, and for finding out more about Scottish fossils generally. Also included is a list of Scottish museums with substantial collections of Scottish fossils, a simplified geological map of Scotland and a geological timescale.

Publications

Section 1.4

Historic Scotland 2006. *The Treatment of Human Remains in Archaeology*.
Historic Scotland Operational Policy Paper 5.

Scottish Executive Education Department 1999. *Treasure Trove in Scotland – Guidelines for Fieldworkers*.

Section 1.10.1

Ellis, N.V. (ed) 1996. *An Introduction to the Geological Conservation Review*.
GCR Series No.1, Joint Nature Conservation Committee, Peterborough.

Section 1.10.2

Nature Conservation (Scotland) Act 2004.

Wildlife and Countryside Act 1981.

Section 1.10.3

Local Nature Conservation Site Working Group 2006. *Guidance on Establishing and Managing Local Nature Conservation Sites in Scotland*. Scottish Natural Heritage.

Section 2.1.1

Goldring, R. 1999. *Field Palaeontology*. 2nd edition. Longman.

Milsom, C. and Rigby, S. 2004. *Fossils at a Glance*. Blackwell Publishing.

Section 2.1.2

Scottish Outdoor Access Code. Scottish Natural Heritage.

Section 2.1.10

Tang, C. M. 2000. Ugly fossil syndrome. *Palaios*, 15, 175 -176.

Section 2.1.11

Benton, M. J. 2005. *Vertebrate Palaeontology*. 3rd edition. Blackwell Science.

Clarkson, E. N. K. 1998. *Invertebrate Palaeontology and Evolution*. 4th edition. Chapman and Hall.

Cleal, C. J. and Thomas, B. A. 1999. *Plant Fossils: The History of Land Vegetation*. Boydell Press.

Murray J. W. 1985. *Atlas of Invertebrate Macrofossils*. Longmans and Palaeontological Association.

Natural History Museum 1975. *British Cenozoic Fossils (Tertiary and Quaternary)*. 5th edition. Intercept.

Natural History Museum 1983. *British Mesozoic Fossils*. 6th edition. Intercept.

Natural History Museum 1975. *British Palaeozoic Fossils*. 4th edition. Intercept.

Walker, C. and Ward, D. 1992. *Fossils*. Eyewitness handbooks, Dorling Kindersley.

Section 2.4

Brunton, C. H. C., Besterman, T. P. and Cooper, J. A.

1985. *Guidelines for the curation of geological materials*. Geological Society (London) Miscellaneous Paper 17. Geological Society Publishing House.

Croucher, R. and Woolley, A. R. 1982. *Fossils, minerals and rocks: Collection and preservation*. Natural History Museum and Cambridge University Press.

Knell, S. J. and Taylor, M. A. 1989. *Geology and the local museum: Making the most of your geological collection*. Her Majesty's Stationery Office (HMSO).

Kummel, B. and Raup, D. (eds) 1965. *Handbook of Paleontological Techniques*. W. H. Freeman and Company.

Leiggi, P. and May, P. (eds) 1994. *Vertebrate Palaeontological Techniques (Volume 1)*. Cambridge University Press.

Museums and Galleries Commission 1993. *Standards in the care of geological collections 1993*. Museums and Galleries Commission.



39 / National Museums Scotland

Section 4.3

Stace, H. E., Pettitt, C. W. A, and Waterston, C. D. 1987. Natural Science Collections in Scotland (Botany, Geology, Zoology). Trustees of the National Museums of Scotland.

Websites

Section 1.2

Overview of Global Boundary Stratotype Sections and Points. A website concerning geological time.

www.stratigraphy.org/gssp.htm

Section 1.4

Official website for Treasure Trove in Scotland.

www.treasuretrovescotland.co.uk

Section 1.8.1

Scottish Journal of Geology.

www.ingentaconnect.com/content/geol/sjg

Earth and Environmental Science Transactions of the Royal Society of Edinburgh.

www.royalsoced.org.uk

The Palaeontological Association. This academic society publishes the scientific journal *Palaeontology*, and also *Special Papers in Palaeontology* and *Field guides to fossils*. It also organises an Annual Conference on Palaeontology.

www.palass.org

Section 1.10.1

Website of the GeoConservation Commission. The GeoConservation Commission is a UK forum for Earth heritage conservation.

www.geoconservation.com

Website of the Joint Nature Conservation Committee (JNCC). Includes information on the Geological Conservation Review Series (a series of 42 volumes 7 of which comprise descriptions of palaeontological sites. Various dates and authors).

www.jncc.gov.uk

Section 1.10.2

Website of Scottish Natural Heritage (SNH).

www.snh.org.uk

Section 1.10.3

Website for the association of UK RIGS Groups.

www.ukrigs.org.uk

Section 2.1.2

The Outdoor Access Scotland website.

www.outdooraccess-scotland.com

Section 2.3

Website of Crimestoppers, an independent UK-wide charity working to stop crime.

www.crimestoppers-uk.org

Section 3.8

Website of the Department for Culture, Media and Sport. Includes information on UK export licensing.

www.culture.gov.uk

Section 4.2

Website for the MLA Partnership, the UK Government agency for museums, galleries, libraries and archives. Includes information on the Accreditation Scheme for museums in the UK.

www.mla.gov.uk

Section 4.3.4

Website of the British Geological Survey (BGS). For general information about the collections and access to them, as well as the databases, follow the links to 'National Geoscience Data Centre' and 'GeolIndex'.

www.bgs.ac.uk

Section 4.3.5

Scottish Museums Council (SMC) website.

www.scottishmuseums.org.uk

General

The Website for the Geologists' Association (GA).

www.geologists.org.uk

Rockwatch, the nationwide club for young geologists (the junior club of the Geologists' Association).

www.rockwatch.org.uk

A gateway to Scottish Geology on the web.

www.scottishgeology.com



40 / National Museums Scotland

Scottish Museums with substantial collections of fossils

The following abbreviations indicate the principal operator, although it should be remembered that, for instance, a local council may run a museum using the collections of the local society, or an independent museum may operate with council subsidy:

- IND – independent charitable trust, society, etc.;
- LA – local authority;
- NAT – national; and
- UNI – university.

Institution	Address	Status
Geological Collections, Department of Geology & Petroleum Geology, University of Aberdeen	School of Geosciences, Meston Building, King's College Aberdeen, AB24 3UE	UNI*
Banff Museum	High Street, Banff, AB45 1AE	LA
Dumfries Museum and Camera Obscura	The Observatory, Dumfries, DG2 7SW	LA
McManus Galleries and Museum, Dundee	Albert Square, Dundee, DD1 1DA	LA
British Geological Survey, Edinburgh and Keyworth (Nottinghamshire)	Murchison House, West Mains Road, Edinburgh, EH9 3LA	NAT**
National Museum of Scotland (part of National Museums Scotland)	Chambers Street, Edinburgh, EH1 1JF	NAT
Elgin Museum (Moray Society)	1 High St, Elgin, Moray, IV30 1EQ	IND
Cockburn Museum, School of Geosciences, University of Edinburgh	Grant Institute, The King's Buildings, West Mains Road, Edinburgh, EH9 3JW	UNI*
Hunterian Museum, University of Glasgow	Main/Gilbert-Scott Building, University Avenue, University of Glasgow, Glasgow, G12 8QQ	UNI

Institution	Address	Status
Huntly Museum	The Square, Huntly, AB54 8AE	LA
Kelvingrove Art Gallery and Museum	Argyle Street, Glasgow, G3 8AG	LA
Inverness Museum & Art Gallery	Castle Wynd, Inverness, IV2 3EB	LA
Dick Institute, Kilmarnock	1 Elmbank Avenue, Kilmarnock, East Ayrshire, KA1 3BU	LA
Montrose Museum	Panmure Place, Montrose, DD10 8HE	LA
Nairn Museum	Viewfield House, Viewfield Drive, Nairn, IV12 4EE	NAT
Paisley Museum and Art Galleries	High Street, Paisley, PA1 2BD	LA
Perth Museum & Art Gallery	78 George Street, Perth, PH1 5LB	LA
Bell Pettigrew Museum, University of St Andrews	School of Biology, Bute Building, University of St. Andrews, St. Andrews, Fife, KY16 9TS	UNI*
Stromness Museum	52 Alfred Street, Stromness, KW16 3DF	IND

* Open on request or by appointment.

** The British Geological Survey is not a museum in the sense of having displays normally open to the public, but its collections are an important part of the "distributed national collection".

Photographs

1. Section 1.1 – The body fossil of an ammonite from Skye.
2. Section 1.1 – Reptile trackways from Hopeman, near Elgin, are examples of trace fossils.
3. Section 1.2 – Looking for fossils on a Fife beach.
4. Section 1.5 – An abundant resource of fossil-bearing rock at Achanarras Quarry SSSI, Caithness.
5. Section 1.6 – Dob's Linn, in the Southern Uplands, a locality of international importance and crucial in the understanding Scotland's geological development.
6. Section 1.7 – Fossil Grove in Glasgow's Victoria Park.
7. Section 1.8.1 – Fossils of a starfish and a carpoid (an extinct starfish relative) from the Girvan area.
8. Section 1.8.2 – Fossils near St Andrews providing an educational resource.
9. Section 1.8.3 – Fossil collecting on Shetland.
10. Section 1.8.4 – A fossiliferous rock exposure on Arthur's Seat, Edinburgh providing additional geological interest for tourists.
11. Section 1.9.1 – Belemnite fossils in a beach boulder on the Isle of Skye.
12. Section 1.9.3 – A disused quarry in Angus, partially infilled with rubble and other waste.
13. Section 1.9.4 – The effects of a rock saw having been used by an irresponsible collector to remove a reptile footprint near Elgin.
14. Section 1.10.1/1.10.2 – A disused building stone quarry in Angus. An internationally important SSSI for fossil fish.
15. Section 2.1.4 – Be careful not to disturb nesting birds and other wildlife when accessing land and collecting.
16. Section 2.1.5 – Ample broken rock at an SSSI in Angus provides adequate fossiliferous material from which to collect without the need to target rock exposure.
17. Section 2.1.5 – Discarded broken ammonite fossils left by a collector for others to find on a Skye beach.
18. Section 2.1.6 – Evidence of inappropriate equipment having been used by a collector in an attempt to remove a fossil coral from a locality near Bathgate.
19. Section 2.1.7 – Recording information after finding and collecting a fossil.
20. Section 2.1.7 – Photographing the location where a fossil has been found.
21. Section 2.1.9 – A Devonian age fossil fish within a Caithness flagstone on Holyrood Road, Edinburgh. Camera case for scale.
22. Section 2.1.10 – A large ammonite fossil on a Skye beach.
23. Section 2.1.11 – Internet resources being used to help identify a fossil specimen.
24. Section 2.2 – High fencing around a vulnerable fossil locality in the south of Scotland helps protect it from irresponsible collectors.
25. Section 2.4.2 – Good labelling of collected specimens.
26. Section 2.4.3 – Storage for collected specimens.

27. Section 2.6 – A box containing an old and neglected collection of significant fossils and assorted rocks requiring expert attention.
28. Section 3.2.3 – ‘Lizzie’, an internationally important fossil, acquired by National Museums Scotland through a public appeal.
29. Section 3.3 – A locality being used for educational purposes by a group of university students.
30. Section 3.4 – The large-scale research excavation undertaken in 1981-82 at Bearsden, Glasgow.
31. Section 3.6 – A limestone quarry in Ayrshire.
32. Section 4.3.1 – The Museum of Scotland in Edinburgh.
33. Section 4.4 – *Woodocrinus liddesdalensis*. A specimen of a fossil ‘sea lily’ from the National Museums Scotland collections.
34. Section 4.4 – Expert preparation of stromatolite fossils from Orkney.
35. Section 4.4 – A scientifically important ‘type specimen’ of a fossil fish, *Pterichthyodes*, from the Altyre Collection. It has additional historical importance having been found in the 19th Century by Lady Gordon Cumming.
36. Section 4.4 – National Museums Scotland specimens being used at an educational event for children.
37. Section 4.5 – The head of a cephalaspid fish from Angus.
38. Section 4.6 – A large trace fossil, a reptile trackway, being utilised for interpretation and education at Hopeman, near Elgin.
39. Part 5 – Fossil hazel leaf from Mull.
40. Part 5 – Tooth of a marine reptile from the Isle of Eigg.

Outside cover – Upper Devonian fossil fish (*Holoptychius*) in sandstone from Dura Den, Fife.

Inside cover – Upper Devonian fossil plant remains (*Archaeopteris hibernica*) from Berwickshire. Figured as "*Palaeopteris hibernica*" in the "Testimony of the Rocks" (1857, p. 411) by Hugh Miller.

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