Glasgow museums

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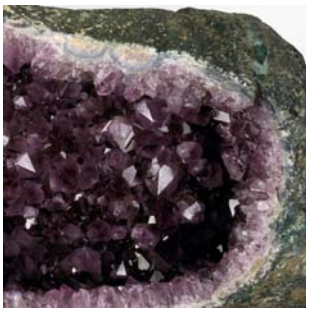


Natural History Collections

Introduction

The natural history collection at Glasgow Museums is the most outstanding natural history collection in a civic museum in Scotland and is also one of the largest natural history collections owned by a Local Authority anywhere in the UK. Specimens range across a broad spectrum of zoology, botany and geology. Many of the specimens relate to Glasgow and the west of Scotland but there are also extremely important collections from other parts of Scotland and all over the world. Some specimens date from the late eighteenth and early nineteenth centuries and are of historical interest.

The collection includes some hugely valuable material in scientific terms. There are numerous examples of type, figured, cited & voucher specimens. Type specimens are the actual specimens which were used when new species of animals or plants were described. Figured specimens are those illustrated in taxonomic works. Cited specimens are referred to or illustrated in scientific publications other than taxonomic works. Voucher specimens are specimens which relate directly to biological records.

Many of the collections have important associated documentation including notebooks, photographs and other archives, which add greatly to the value of the collection.

The collections were acquired through donations, purchases and fieldwork. Some very large and important collections have been gifted to the museum by notable naturalists in the past. Today fieldwork plays a vital role in building up the collections. In the 1970s, museum staff collected deep-water fish and invertebrates on board the Research Ship *Challenger*, around Rockall. More recently they have undertaken fieldwork in Russia, Trinidad, St. Kilda, and many sites in the west of Scotland. Fieldwork by staff means that any specimens collected are normally fully documented. This makes them much more useful for future scientific research than many of the older parts of the collection, which sometimes lack full data.

Taxidermy has played a large role in the preservation of the natural history collections and there are some early and important examples of the taxidermist's art from internationally renowned as well as local taxidermists.

Glasgow Museums also operates a Local Biological Records Centre, covering the city and neighbouring Local Authority areas. The data from old specimens in the collection can relate directly to biological records, making the 'dead' collections very relevant to present day nature conservation.

Zoology: Fish

Fish are cold-blooded aquatic vertebrates, covered with scales, and equipped with fins. They account for more than half the known vertebrates in the world, with almost 28,000 known species. Classes of fish include bony fish, sharks, rays, hagfishes and lampreys

Size of Collection

There are approximately 2500 specimens.

Collection Description

The fish collection consists mainly of Scottish and N.E. Atlantic species, but there are also some from other parts of the world. Specimens were collected from the late nineteenth Century to the present. The collection has examples from most of the families of fish found in British waters, although there are many gaps as far as genus and species levels are concerned.

The majority of the specimens are preserved in liquid (mainly alcohol, some in propylene phenoxetol), but there are also dried specimens, some osteological specimens (skeletons, skulls etc, including jaws, teeth and otoliths (ear bones)); mounted specimens and beautifully and accurately made and painted casts etc. There are some scales, egg cases and a few unusual items, such as the end of a sword fish's 'sword' stuck in ship's timbers and the famous 'Endrick Pike' head.

Many specimens were donated individually between the 1870s and the present. A few large collections came in during the 1970s. Most of these were collected by Dr Dietrich L. Burkel (then Glasgow Museums' Depute Keeper of Natural History) on board the Scottish Marine Biological Association's RS *Challenger* in 1975 and 1976. There are also many specimens from Dr M. Stehmann, Institut fur Seefischerei, Hamburg, collected on voyages of the German Fisheries Research Vessel *Walter Herwig* between 1974 and1978. Other important material came through the Fisheries Laboratories at Torry, Aberdeen.
There are also many individual fish which were given to the museum by anglers when Dietrich Burkel was the official verifier for the Scottish Federation of Sea Anglers. Several of these fish are Scottish angling records.

Collection Significance

The main scientific strength of the collection is the large number of deep-water specimens of fish from off the west coast of Scotland collected by the *Challenger* and *Walter Herwig*. These come from the Rockall Trough, Porcupine Bank, Anton Dohrn Seamount and similar areas. Many were collected from depths of over 3,000m and would be extremely difficult to obtain by normal means. They are therefore rarely found in collections outwith National Museums. There is associated documentation (Scottish Marine Biological Association Reports etc) relating to these specimens. Having been collected as part of a proper scientific survey, as well as accurate locations, there is full data for each trawl, including accurate depths, temperatures, salinity etc.

There are no obvious type specimens, but there are numerous cited and several figured specimens in the collection. Further research may reveal important specimens

among the early historical collections. The collection contains many unique, rare and unusual items including the Lancet Fish caught off St Kilda in 1911 – the first record of the species in British waters, deep water angler fish, and the very large head pike head found near Loch Lomond, known as the 'Endrick Pike'.

This collection has a high potential for research by fish zoologists, due to the presence of rare species with good data. Some specimens have previously been examined by Scottish Marine Biological Association scientists, but the existence of the collection is not well known outside Scotland.

There are a few good fish collections, such as the Natural History Museum and the National Museums of Scotland, but no other collection has the same emphasis on the West of Scotland. The large number of deep-water specimens, which are difficult to obtain and are rarely found in non-National museums are of particular importance. The fish collection is therefore considered of UK significance.



Bibliography

Sawers, J. (1911) 'Alepisaurus ferox off St Kilda', *Annals of Scottish Natural History* 1911, 247

Kirk, C. (1913) 'Rare Fishes in the Kelvingrove Museum, Glasgow', *The Scottish Naturalist* 1913, 21-22

(1913) 'Aphanopus carbo in British seas' *The Scottish Naturalist* 1913, 285

Buller, Fred (1979) *The Domesday Book of Mammoth Pike*

Sutcliffe, R. (1995) 'Swordfish from Loch Fyne', *Glasgow Naturalist* 22(5) 529-531

Swinney, G.N., Sutcliffe, R. & Bland, K.P. (1995) 'A specimen of the Deep-sea Anglerfish Cryptopsaras couesi Gill (Telecostei, Lophiiformes, Ceratiidae) caught on the Eastern flank of the Rockall Trough, with comments on the distribution of the species in the N.E.Atlantic', *Glasgow Naturalist* 22(5) 505-511.

Zoology: Amphibians

Amphibians are cold-blooded vertebrates that spend part of their lives in water and part on land. There are three orders of living amphibians: newts and salamanders (urodeles); frogs and toads (anurans); and caecilians (worm-like gymnophiones).

Size of Collection

There are approximately 100 specimens

Collection Description

This collection includes frogs, toads, newts and salamanders plus a single example of a Caecilian. The specimens were collected from the early nineteenth century to the present. They are mainly from Scotland, and mainland Europe. There are also a few from England, Ireland, India, Sri Lanka, Seychelles, Mexico, North and South America. Several specimens have no locality information. The majority of specimens in the collection are preserved in spirit. There are also a few osteological specimens (skeletons, etc), and a few mounted specimens and casts.

About 20 of the specimens came to Glasgow Museums in 1988 from Birmingham City Museum. Many of these had originally been in the Andersonian College collection in Glasgow, before being given to the University of Glasgow, who in turn passed them onto Birmingham. Birmingham Museum decided they no longer required them and offered them back to Glasgow. These include several old specimens, which are potentially of historical importance. Several specimens (newts and toads) were added in 1989 and 1990. These were mainly specimens accidentally caught in pit-fall traps intended for spiders during research in Argyll.

Collection Significance

This collection is a representative sample of British amphibians and contains most of the British species of amphibians. There are only a few examples of non-British species. Alien species of amphibians which occur in Britain are not well represented: there are no examples of marsh frog, pool frog, fire-bellied toad or clawed toad.

A few specimens, particularly those originally from the Andersonian collection, are of great interest from a historical perspective. There are also several specimens collected systematically in Argyllshire, which have potential for further study, and act as voucher specimens for biological records. About 30 specimens have little or no information relating to provenance, but further research may help.

In February 1974, several ‘old bleached specimens’ (mainly Indian species) which were of little value for display (but still of scientific importance) were transferred to the British Museum (Natural History).

Zoology: Reptiles
Reptiles are cold-blooded, mainly egg-laying vertebrates characterised by a scaly skin. There are approximately 8,200 species divided across four main groups of snakes and lizards, crocodiles and alligators, turtles and tortoises and tuatara.

Collection Size
There are approximately 1600 specimens in the collection.

Collection Description
The reptile collection includes species from all orders of reptiles: Chelonia (turtles), Sphenodonta (Tuatara), Squamata (snakes and lizards), Crocodylia (crocodiles and alligators), although not all families are represented. Specimens date from the early nineteenth century to the present and come from all over the world: particularly Africa (especially Egypt, South Africa, Nyasaland (Malawi)), Australia, North America, South America (especially Guyana, Argentina, Chile), India, Ceylon (Sri Lanka), Burma (Myanmar) etc. There are many examples from Scotland, and several from England. Many specimens have no locality information.

The largest single part of the collection (c.400 specimens) came to Glasgow Museums in 1988 from Birmingham City Museum. Many of these specimens were originally in the Andersonian College collection in Glasgow, before being given to the University of Glasgow, who in turn passed them onto Birmingham. Birmingham Museum decided they no longer required them and offered them back to Glasgow.

The majority of specimens in the collection are preserved in spirit. There are also about 80 mounted specimens of snakes, lizards, crocodiles and turtles. Some lizards and slowworms have been freeze-dried. There are about 20 snake skins, a few osteological specimens (skeletons, skulls etc) and about 20 turtle ‘shells’ (carapaces and plastrons). A small number of specimens are casts, such as the Gila Monster and Leathery Turtle. There are 4 examples of reptile eggs. There are also objects confiscated by H.M. Customs and Excise, such as snake skin and crocodile skin belts, handbags etc.

Collection Significance
The collection contains a good representative collection of British species. All British species of reptiles are present in the collection, with the exception of the sand lizard and Kemp's Ridley Turtle. It also includes rare and endangered species such as the Tuatara, and rare Scottish examples of marine turtles.

In February 1974, about 100 ‘old bleached specimens’ (mainly Indian snakes) which were of little value for display (but still of scientific importance) were transferred to the British Museum (Natural History).

The collection is possibly of UK and even International significance, but it is difficult to be certain at this stage. There are examples of specimens collected in the first half of the nineteenth century, which are potentially of historical interest and could possibly include type material. Further research is required.

Bibliography

Sutcliffe, R. (1992) ‘A juvenile Loggerhead Turtle from Colonsay’, *Glasgow Naturalist* 22(2), 196.

Zoology: Birds

Birds are bipedal, warm-blooded, egg-laying vertebrate animals. There are around 10,000 known living bird species, making them the most diverse class of vertebrates in the world.

Collection Size

Approximately 9,000 bird specimens - about 5,600 cabinet skins, 2,300 mounted specimens, 260 osteological specimens (skeletons, skulls etc), plus miscellaneous heads, wings, feet etc. salvaged from damaged specimens. There is a small collection of owl pellets, gizzard stones etc. There are also about 250 (mainly British) birds' nests, and a large number (possibly 30,000) of birds' eggs.

Collection Description

The bird collection includes all orders of birds, although not all families are represented. It includes examples of birds from all over the world (North America, South America, Africa, India, Malaya, Borneo, Burma, Australia etc; but with an emphasis on the Western Palaearctic, especially Scotland). Specimens were collected from the early nineteenth century to the present. There are some examples of extinct species including a Great Auk, Passenger Pigeon, Huia and Moa. Nearly all resident British birds are represented and there is a particularly good collection of Scottish species, with only a few gaps, such as the Scottish Crossbill.

Specimens are mainly preserved as skins or mounts, but there are also skeletons, eggs, nests, pellets, birds preserved in alcohol, and other miscellaneous specimens. Many of the more recent small birds are freeze-dried. Unique and unusual specimens include the last rooks' nest in Kelvingrove Park, a Magpie's nest made from wire and a one-winged willow warbler.

There is associated documentation relating to several of the collections – including notebooks and egg catalogues. There is also a collection of early bird photographs (glass plates) taken by Charles Kirk in the early 1900s. Some of these are stereoscopic.

Collection Significance

Due to its extensive nature, the importance of certain individual specimens and the scientific data held on much of it, Glasgow Museums' bird collection is regarded as highly significant in a UK context. The collection is wide-ranging and generally of high quality. There are examples of early historical specimens such as the Great Auk (pre 1835) and the last Red Kite from Arran (1829) and several first records of species for Scotland and Britain. Notable historical collections of skins and mounts include the A.B. Stewart Collection, Cochrane Collection, James Lumsden Collection, W.E. Praeger Collection, and Poltalloch Collection. There are also several excellent egg collections, notably from J.M.D. MacKenzie, Myatt , Arbuthnott , Peter Hay and Capt. Donald Cross.

Historical specimens with data have been and will continue to be useful for research including DNA and isotope analysis. There are very good series of some species –

making them especially useful for taxonomic research, DNA analysis etc. The collection is also a valuable resource for University undergraduate studies. The extinct and endangered specimens are particularly important for research purposes. Although there are no bird type specimens there are some figured and many cited specimens in the collection. There are also several first records of species for Scotland and Britain.

The extensive egg collection includes some interesting historical specimens, such as sea bird eggs from St Kilda, collected by St Kildans for sale to early tourists. Many of the clutches of eggs are extremely well documented, giving valuable information about not only the eggs themselves, but also the localities and also the collectors. These egg collections are irreplaceable, as it is now illegal to collect most birds eggs without a licence. Many of the sites where the eggs were collected have now gone or changed considerably, so that the specimens may provide information about past habitats etc.

There are many high quality specimens prepared by well-known taxidermists, such as the great auk mounted by Rowland Ward, and a golden eagle mounted by Peter Spicer. Scottish taxidermists are well represented, including Charles Kirk, who prepared specimens for many local museums and individuals, and George Sim, who worked in Aberdeen. The wide range of specimens dating from the early nineteenth century to the present day makes the collection of significance for the study of taxidermy.

Documentation associated with the collection includes notebooks, egg catalogues etc. which add further significant information to the specimens. Photographs include some from the early 1900s by Charles Kirk, mainly taken on Ailsa Craig. Kirk was a pioneer of early bird photography, as well as a taxidermist.

Bibliography

Andrews, I.J., (2002) Species and subspecies recorded in Scotland on up to 20 occasions. *Scottish Birds* 23(2) [relating to p66, American Bittern, Z.1982.145.22; and p 90 Black-billed Cuckoo, Z.1950.132].

Angus, W.C., (1869) 'Notice of the Occurrence of the White-throated Sparrow (Zonotrichia albicollis) in Aberdeenshire', *Proceedings of the Glasgow Natural History Society VI p 209-211.*

Sutcliffe, R. (1995) 'Magpie's nest – with a difference', *Scottish Birds* 18(1) 59.

Summers R. W., Jardine, D. C., Marquiss, M. and Rae, R. (2002) The distribution of crossbills *Loxia* spp. in Britain, with special reference to the Scottish Crossbill *Loxia scotica*. *Ibis* 144: 393-410.

Fuller, E. (1999) *The Great Auk*

Tait, N.T. (2005) *Kirk on the Craig: Charles Kirk's Photography on Ailsa Craig 1896-1922*

Forrester, R. & Andrews, I. (Eds) (2007) *The Birds of Scotland*, Scottish Ornithologists' Club (forthcoming November 2007).

Zoology*:* Mammals
Mammals are warm-blooded, vertebrate animals. Characteristics include the birth of live young (except for the egg-laying echinda and platypus), the production of milk in females and the presence of hair. There are 5,096 species of mammal currently recognised.

Collection Size
There are approximately 1800 mammal specimens in the collection – including about 560 mounted specimens, 700 osteological specimens (skeletons, skulls etc), 330 cabinet skins, 48 specimens preserved in fluid, 53 wax models plus various miscellaneous specimens.

Collection Description
The mammal collection includes species from all over the world and covers most orders of mammals, ranging in size from tiny shrews to the Asian elephant known as *Sir Roger* and two adult giraffes. British orders are very well represented. Of the non-British mammals, there are good collections of Marsupials, Primates, Deer and Bovids. Specimens were collected from the early nineteenth century to the present.

Much of the non-British species came from the Scottish Zoo (based in Glasgow) between 1897 and 1926. Other foreign mammals came from Wilson's Zoo in Oswald Street, Glasgow from the 1930s to 1960 and Glasgow Zoo from the 1950s until the Zoo closed in 2003. Some material was also obtained from animal dealers such as William Cross of Liverpool. Mammal specimens were sent to Glasgow by 'big game hunters'. Of particular note are those from James McNeil and Henry Brown who sent specimens from Northern Rhodesia, German East Africa and Nyassaland in the early 1900s.

The majority of specimens are preserved as mounted specimens, trophy heads, skins, hair, skeletons, teeth, individual bones, antlers, tusks, etc. Many of the more recent small mammals are freeze-dried. A small number of specimens are preserved in liquid (mainly alcohol). There are also a few more unusual specimens, such as Embryology and brain models, droppings, examples of rodent damage, etc. The collection also includes some human tissues – osteological specimens (complete skeletons, skulls and individual bones), some foetuses and a sample of tattooed human skin in spirit.

The collection includes some excellent examples of taxidermy from well-known taxidermists such as Thomas Hall, Rowland Ward, Charles Kirk etc, as well as the work of many Glasgow Museums staff taxidermists.

Collection Significance
The collection is wide-ranging and generally of high quality. There is a good representative collection of British, and in particular Scottish mammals. The Orkney vole is the only terrestrial Scottish species not represented.

There are some historically important specimens, including several objects relating to African explorer and missionary David Livingstone including hippo teeth and elephant tusks. There is also a leopard mounted by taxidermist Thomas Hall c.1810. This is one of the earliest examples of large mammal taxidermy and is of major historical importance.

Historical specimens with data have been and will continue to be useful for research. There are very good series of some species, covering wide geographical range and time periods, making them especially useful for taxonomic research, DNA analysis etc. Specimens are often used for teaching by Glasgow University. There are no obvious type specimens, but there are a few cited and figured specimens in the collection. Further research may reveal important specimens in amongst the early historical specimens. There are many examples of rare and endangered species, such as a Sumatran rhinoceros, primates, etc.

There is also some extremely valuable associated documentation relating to several of the collections, including photograph albums relating to James McNeil and big game, notebooks from the noted naturalist and author R.A.H. Coombes, letters and other archives. There is also an excellent collection of glass plate negatives of Clydesdale Horses taken by A. Brown & Sons of Lanark in the early 1900s. These include the famous Baron of Buchlyvie (whose skeleton is in the collection) and many other champions.

The mammal collection may not be as extensive as those in the National museums, but is still highly significant in UK terms. This is not just because of the natural historical value of the specimens, but also because of the importance of the early historical taxidermy, which includes the work of many noted taxidermists rarely found in Scottish museums.

Bibliography

Jenkins, P.D. (1987) *Catalogue of Primates in the British Museum (Natural History) and elsewhere in the British Isles. Par IV: Suborder Strepsirrhini, including the subfossil Madagascan lemurs and Family Tarsiidae*. British Museum (Natural History)

Jenkins, P.D. (1990) *Catalogue of Primates in the British Museum (Natural History) and elsewhere in the British Isles. Par V: The apes, Superfamily Hominoidea.* British Museum (Natural History)

Napier, P. H. (1981) *Catalogue of Primates in the British Museum (Natural History) and elsewhere in the British Isles. Part II: Family Cercopithecidae, Subfamily Cercopithecinae.* British Museum (Natural History)

Napier, P. H. (1985) *Catalogue of Primates in the British Museum (Natural History) and elsewhere in the British Isles. Par III: Family Cercopithecidae, Subfamily Colobinae.* British Museum (Natural History)

Zonfrillo, B., Sutcliffe, R., Furness, R.W. & Thompson, D.R., (1987) 'Notes on a Risso's Dolphin from Argyll, with analyses of its stomach contents and mercury levels', *Glasgow Naturalist* 21(3) 297-303

Zoology: Insects

Insects are arthropods characterized by 6 pairs of jointed legs, segmented bodies and a tough outer skeleton. They make up more than half of the living organisms on the planet, with an estimated 10 million species. The UK is currently home to over 20,000 insect species.

Collection Size

The Entomology collection contains approximately 200,000 insects; over half (54%) of which are Lepidoptera (butterflies and moths). The remaining collection is 27% Coleoptera (beetles), 9% Diptera (flies), 4% Hymenoptera (bees, wasps and ants) and 6% other groups.

Collection Description

The collection is predominantly British but there are large holdings of butterflies, moths and beetles from all around the world. The collections of Lepidoptera (butterflies and moths) from Spain and Southern Africa are particularly comprehensive and of high scientific value. There are also many specimens from South America, Africa, South East Asia, Australasia and the Pacific. In general, the collection provides good coverage of the popular British groups and a broad and useful selection of foreign ones.

The specimens date from the mid nineteenth century to the present, with the majority being collected during the twentieth century. The entomology collection is mostly dried and pinned insects. There is a cabinet of insects stored in alcohol, predominantly immature and aquatic specimens. There are also small collections of decorative articles comprised of insects, insect nests, dried plant material showing insect damage and historical entomological collecting equipment.

Collection Significance

Glasgow Museums hold the largest Lepidoptera Collection in Scotland outside the National Museum, Edinburgh. The holdings include specimens of both indigenous and foreign insect races and species that are now extinct. There are numerous examples of such lepidoptera that are no longer found in Britain e.g. the New Forest Burnet moth (*Zygaena viciae ytenensis)*, the black-veined white butterfly (*Aporia crataegi*) and the large blue (*Maculinea arion eutyphron).*

The collections of Lepidoptera (butterfly and moth) from Paul Smart (1941 -), and Lt Col. W.B.L. Manley (1900-1985) are of particular significance. Smart is an international authority on butterflies and founded Britain's National Butterfly Museum. In 1985 his collection was sold and dispersed at which time Glasgow Museums acquired over 3000 specimens from it, including butterflies, beetles, bees and wasps. Manley was a meticulous and gifted amateur. American museums were keen to acquire the collection but Manley wanted it to be kept in the United Kingdom and so it came to Glasgow Museums. Every specimen is superbly documented and exquisitely presented. Even the altitude at which the insects were encountered is recorded on the specimen label.

The Smart and Manley collections contain a number of type and figured specimens and rare endemic species, which are of international significance to researchers. The

collection includes type specimens such as the Holotype of the Peruvian butterfly *Lasiophila gita* (Smart Collection) and many type specimens of European Burnet moths (Manley Collection). They also form the basis for key subject texts, including Manley's *A Field Guide to the Butterflies and Burnets of Spain'* (1970) and Smart's *The Illustrated Encyclopedia of the Butterfly World* (1976).

The collection is of great scientific value due to the quality of the data that accompanies it. We hold specimens from localities that have already been destroyed by or are threatened by development and climatic changes. This specimen data is invaluable for studying changes in species distribution, which can directly input into current species conservation strategies.

The collection is a useful reference tool for anyone studying British insects or wanting to compile faunas, checklists or distribution maps. The collection of British craneflies is strong and includes first British records, such as the voucher specimen for the first British record of *Tipula invenusta*, a cranefly that was first recorded in Britain in 1986.

There are interesting and important Scottish specimens, including examples of *Ceutorhynchus insularis,* a beetle that is found in few collections due to the fact that in the U.K. it is endangered and only found on the remote archipelago of St. Kilda. In partnership with the Hunterian Museum, Glasgow Museums are home to a uniquely comprehensive collection of invertebrates from St Kilda. The Thomas Gordon Coleoptera collection is of local and national significance due to the number and variety of Scottish Beetles it contains.

There are also a number of historically interesting specimens that were collected by the explorer David Livingstone (1813–1873) during his African adventures.



Bibliography

Elliot, G.F.S. et. al, (eds), *Fauna, Flora & Geology of the Clyde Area*. British Association for Advancement of Science, Glasgow, 267-271.

Manley, W. B. L and Allcard, H. (1970) *A Field Guide to the Butterflies and Burnets of Spain*. E. W. Classey Ltd., Hampton, Middlesex, England.

Smart, P. (1975) *The International Butterfly Book*, New York.

Smart, P. (1976) *The Illustrated Encyclopedia of the Butterfly World*. London.

Tennent, W.J., 2005. The 'National Butterfly Museum' (Bramber, West Sussex) and dispersal of butterfly 'type' material following a Sotheby's sale in 1983. *Entomologist's Gazette* 56: 13-24.

Zoology: Non-Insect Arthropods (Arachnids, Crustaceans & others)

Arthropods are the largest phylum of animals and include insects, arachnids, crustaceans, and others. More than 80% of described living animal species are arthropods, with over a million modern species described. They range in size from microscopic plankton to crabs several metres long.

Collection Size

Approximately 51,000 specimens – dried specimens and specimens in spirit

Collection Description

The non-insect arthropod collection consists of Chelicerates (spiders, scorpions, ticks, mites, etc), Crustaceans (crabs, lobsters, shrimps, barnacles, woodlice, etc) and Myriapods (centipedes and millipedes).

Chelicerates – There are about 10 dried Merostomata (horseshoe crab) specimens; approximately 30 Pycnogonida (sea-spiders) all in spirits; and approximately 40 dried Arachnids (spiders, scorpions, harvestmen, mites, ticks and pseudoscorpions) and 50,000 in spirits

Crustaceans – There are approximately 500 samples of dried Ostracods (seed shrimps) many mounted in slides; approximately 50 dried Cirripedia (barnacles); 100 dried Malacostracans (lobsters, crabs, and shrimps) and approximately 800 specimens in spirits. Most specimens are British but there are a few foreign species as well

Myriapods – There are approximately 100 British centipedes in spirits with a few large foreign specimens; and approximately 100 British millipedes in spirits; with a few foreign specimens

Collection Significance

The arthropod collections are very important in a Scottish context, and the spider collections are important in a national and international context. The strength of this collection is in the number and range of Scottish spiders with virtually all families and habitats covered in the 50,000 specimens. The data associated with these is also very detailed, giving details of habitat, field conditions, dates, times, etc. Some of the Scottish spiders in the collection have been published in the proceedings of the British Arachnological Society, for example *Pardosa amentata.*

The crustacean collections of Ostracods and Malacostracans also cover a wide range of species from around the UK. The marine crustaceans from the west of Scotland are of particularly high importance. The data associated with many of the specimens provides very important collection information as they were collected by the University of Glasgow field station at Millport.

Although most specimens were gathered by recent collectors there are a few important specimens from early collectors including Alexander Patience (1865-1954) who was an expert on crustaceans around the beginning of the twentieth century. His collection includes several possible type specimens of woodlice.

Bibliography

Beaumont, David (1991) ‘Atypical *Pardosa amentata* (Clerck, 1775) Males from the Isle of Islay, Inner Hebrides, Scotland’, *Newsletter of the British Arachnological Society* 60: 4

Moore, P.G. & E.G. Hancock. (2004) ‘Alexander Patience (1865-1954): Glasgow's little-known Edwardian carcinologist’ *Glasgow Naturalist* 24 (2): 119-129.

Zoology: Molluscs
Molluscs are a phylum of the animal kingdom. They mainly consist of shelled animals but also include slugs, squids and octopuses. There are some 112,000 known species of mollusc.

Collection Size
Approximately 100,000 objects including dry shells, specimens in spirit and other miscellaneous objects

Collection Description
This collection includes specimens of terrestrial, fresh water and marine molluscs from all over the world. It offers an excellent representation of virtually all families, environments and geographic ranges with particularly good collections of freshwater bivalves, terrestrial molluscs from Europe, worldwide terrestrial island species and tropical marine species. The specimens date from mid nineteenth century right up to the present day. The geographical range is worldwide but there is a particular emphasis on British and European faunas.

The majority of the collection consists of dry empty shells although there are several specimens in spirit including the soft-bodied cephalopods. There is also a small collection of objects made from shells including cameos, trinkets and jewellery and several Blaschka glass models of molluscs with some incorporating real shells.

Collection Significance
This collection is of very high importance for the study of molluscs as it contains such a wide range of specimens. This range makes it a collection of very high importance in a Scottish, UK and International context. The holdings of dry shells are the major strength of the collection, covering almost all habitats and geographical locations. They are generally in good condition and with detailed information. The smaller collection of specimens in spirits, mostly from Scotland, provides a useful comparison. They are in good condition and have detailed data associated with them.

There is also a small collection of glass models made by Blaschka of Dresden. These consist mainly of sea slugs and cephalopods and were made around the end of the nineteenth century.

There is a large range of contextual information relating to the collection including detailed information about the origins of many specimens; diaries of some of the collectors; magazine, journal and book articles that mention parts of the collection; photographs of some of the specimens and accurate field records for many specimens.

Several of our big collections were amassed by famous names in the conchological world including Thomas Gray (collection donated in 1910), Robert P. Scase (collection donated in 1993) and S. Peter Dance (collections donated in 1990 & 2002). Gray's shells were at the time thought to be one of the best private collections in the world and contained many type specimens. He also produced several illustrated monographs on his shells. Scase and Dance have written several books on molluscs and have been

important members of the Conchological Society of Britain and Ireland. Their collections have a worldwide coverage and contain many rare and unusual specimens.

There are many rare shells from deep-seas, isolated islands and remote jungles. There are also many examples of endangered and extinct species. Many of these shells are irreplaceable and as time goes by unfortunately many more of the museum's shells will increase in value as species in the wild disappear.

There are many different type, figured and cited specimens in the mollusc collection ranging from specimens from the late nineteenth century up to specimens from the end of the twentieth century. These include the figured specimen 1910.7.clm – *Helicostyla fulgetrum,* the cited specimen: Z.1993.76.159 - *Cypraea vredensbergi*, and the type specimen: Z.2002.2.770 - *Limnea praetenuis.*

Bibliography

Woodward F. (1986) 'The Glasgow Museums and Conchology' *Hawaiian Shell News*.

Thomas Gray (1841), *Illustrations of Conchology*, Glasgow

Dance S.P. (1974) *The Encyclopedia of Shells* Blandford Press Ltd., England

Scase, R. & Storey, E. (1975) *The World of Shells*, Osprey Publishing Ltd., England,

Rutherford, M (2005), 'Photographs of Z.2004.9 Partula sp. tree snails' *Mollusc World*

Zoology: Echinoderms (Starfish & Sea Urchins)
Echinoderms are a phylum of marine animals found at all ocean depths. They are characterized by radial symmetry, with several arms radiating from a central body. They have no heart, brain, nor eyes. They include starfish, sea urchins and sea cucumbers.

Collection Size
Approximately 750 objects – dried specimens and specimens in spirit

Collection Description
The collection is composed of approximately 600 dried specimens and 150 specimens in spirit. The majority of the dried specimens are Asteroidea (sea stars) and the remainder are Echinoidea (sea urchins, sand dollars and heart urchins) with a small number of Crinoidea (sea lilies and feather stars) and Ophiuroidea (brittle stars and basket stars). The wet specimens all derive from the above classes as well as including the Holothuroidea (sea cucumbers).

The specimens represent mainly coastal and deepwater Scottish species although a few tropical and temperate species from around the world are also present.

Collection Significance
This collection is reasonably important for the study of this subject in a Scottish context, although larger collections are held elsewhere. The great scientific strength of the collection is the large number of deep-water specimens of echinoderms from off the west coast of Scotland collected by the research vessels *Challenger* and *Walter Herwig* between 1974 and1978. These come from the Rockall Trough, Porcupine Bank, Anton Dohrn Seamount and similar areas. Many specimens were collected from depths of over 3,000m and would be extremely difficult to obtain by normal means. They are therefore rarely found in collections outwith National Museums. There is associated documentation (Scottish Marine Biological Association Reports etc) relating to these specimens. Having been collected as part of a proper scientific survey, as well as accurate locations, there is full data for each trawl, including accurate depths, temperatures, salinity etc.

Zoology: Other Invertebrates
Invertebrates are animals without a spinal column. They form 97% of all animal species. This section covers several smaller phyla of invertebrates.

Collection Size
Approximately 2000 objects – dried specimens (1000), specimens in spirit (400), models (100) and microscope slides (200).

Collection Description
This collection includes small orders of invertebrates such as Porifera (sponges), Cnidaria (corals, jellyfish, sea anemones, hydroids, hydrozoans), Platyhelminthes (flatworms, tapeworms, flukes), Annelida (bristle-worms, earthworms, leeches), Nematoda (roundworms), Brachiopoda (Lampshells), Bryozoa (sea-mats), Sipuncula (peanut-worms), Nemertea (ribbon-worms), Onychophora (velvet-worms), Rotifera, Urochordata (tunicates, sea-squirts), Cephalochordata (lancelets), and Protozoa (foraminifera, radiolarians, amoebas, flagellates).

Specimens come predominantly from the coastal and deepwater areas of Scotland although there are also specimens from around the world, from a range of environments. There are also several glass models by Blaschka of many different invertebrates.

Collection Significance
The real strength of this collection lies in the corals, Foraminiferans and Brachiopods. These collections include a wide range of species from many locations including rare deep-sea Scottish corals.

The scientific strength of the collection is the large number of deep-water corals from off the west coast of Scotland collected by the research ships *Challenger* and *Walter Herwig*. These come from the Rockall Trough, Porcupine Bank, Anton Dohrn Seamount and similar areas. All specimens come with accurate supporting data. They are of high scientific value, partly due to their rarity and difficulty in obtaining them, and in a Scottish and UK context this collection is of high importance.

Some of the microscope slides are also of great scientific and historical interest, being made by the eminent and controversial German scientist Ernest Haeckel (1834 - 1919), a key promoter of Darwin's theory of evolution. The radiolarian microscope slides date from 1890 and include material from the groundbreaking oceanological research expedition undertaken by HMS *Challenger* between 1873-1876.

There is also a small collection of glass models by Blaschka of Dresden. These were made in the late nineteenth century and were the only way at the time of displaying microscopic and soft bodied animals in a museum setting. The models include jellyfish and microscopic protozoa.

Bibliography

Moore, P.G., & Sutcliffe, R., (2002). Haeckelian radiolarian material and the Microscopical Society of Glasgow. *Glasgow Naturalist 24(1), 98-101*

Botany: Flowering Plants and Ferns (Vascular Plants)
Vascular plants represent the familiar 'higher' plants such as flowers, trees, grasses and ferns, and are distinguished by their specialized vascular tissues for conducting water, minerals, and photosynthetic products through the plant. Flowering plants and conifers reproduce by seeds whereas ferns (including clubmosses and horsetails) produce microscopic spores.

Collection Size
There are approximately 80,000 specimens in total.

Collection Description:
The collection encompasses the vascular plants: the 'higher' flowering plants and ferns. The majority of the collection is in the form of labelled herbarium sheets comprising pressed and dried plant material mounted onto card.

The specimens (totalling 80,000) are mainly from the British Isles, with an emphasis on Scotland, but also include some 10,000 specimens from overseas, mainly from western Europe, South Asia, North and South America. Several are of historical interest. There is also a small auxiliary collection consisting of fruit, seed and timber samples.

The collection represents three major collections: Glasgow Museums' original civic collection (Herb GLAM, comprising some 30,000 specimens – UK and exotic); the recently acquired Glasgow University Botany Department's British collection (Herb GL – 40,000 specimens) and Strathclyde University's collection (Herb GGO – 7,000 specimens; British and exotic). Each of the three main collections comprises many smaller collections and donations, from individuals, organisations or institutions; collectors include Prof Walker Arnott, D Steuart, P Ewing, R Kidston, W Gourlie, L Watt, JR Lee, R Mackechnie, G Horn, Rev J Fleming, J Scouler, R Hennedy and many more.

Collection Significance
The collection represents a comprehensive coverage of the British flora and is of high value to serious botanical students, including specialists working on a particular plant genus or family, but is also a useful educational asset for beginners or school students.

The collection is of national importance for its comprehensive British collection of specimens, notably its Scottish strength. There are a few gaps in the collection including a few native species mainly from southern England, some critical groups, and recent alien (non-native) plant arrivals. However, with the incorporation of the two university collections, the museum now holds all of Glasgow and the west of Scotland's major collections. All of the accessioned British specimens (66,000) have been catalogued and entered into databases allowing rapid and detailed interrogation of the collection.

The collection also includes a number of historical records of interest including several first discoveries for the British Isles, with a parallel situation for more local specimens, and help to verify past literature records. This is of high importance for national and local studies on past and present geographical distributions, and also dates of collections and collectors activities. The old specimens (British Isles and overseas) are

important historical objects reflecting past presence but also adding information on the activities of past collectors and societies; several of the overseas specimens may well be co-types made by early taxonomists. The reference set of specimens noted in the Flora of Glasgow and other local Floras (notably Renfrewshire and Lanarkshire) will be of value to future workers.

Bibliography

Patton, D. (1954). The British Herbarium of the Botanical Department of Glasgow University. *Glasgow Naturalist*. 17, pt 3.

Lloyd, B. (1964) The Herbarium of the Royal College of Science and Technology Glasgow. *Glasgow Naturalist*. 18 pt 7.

Macpherson, Dr P & Watson, KJ (1996) Strathclyde University Herbarium Computerised Database *Glasgow Naturalist*. 23, pt 1.

Jones, G. (1980). The Herbarium of the Glasgow Museum and Art Gallery. *Glasgow Naturalist*. 20 pt 1.

Botany: Mosses and Liverworts (Bryophytes)
Bryophytes are distinguished from the more familiar higher plants by their lack of vascular tissue and by reproducing with microscopic spores (as opposed to seeds). They are typically small plants growing in tight cushions or creeping wefts, often found on rocks, walls, trees as well as on the ground.

Collection Size
There are approximately 25,000 specimens in total. The majority of the specimens are mosses, but the total includes approximately 5,500 liverworts (Hepatics) and over 2,000 bog-mosses (Sphagnum).

Collection Description:
The bryophyte collection consists of mosses and liverworts (including hornworts), mainly in the form of dried plant material, mostly loose or mounted on card, and contained in small paper packets; some are stuck in historical plant books.

The vast majority of the specimens are from the British Isles and the majority of the specimens have been collected in Scotland. There are also sizeable collections from Europe and more exotic locations including the Indian subcontinent, New Zealand and South America, with a few from other locations such North America, Jamaica and Africa. The exotic material largely dates from the nineteenth century.

The collection represents three major collections: Glasgow Museums' original civic collection (Herb GLAM, comprising some 9,000 specimens – UK and exotic); the recently acquired Glasgow University Botany Department's British collection (Herb GL – 14,000 specimens) and Strathclyde University's collection (Herb GGO – 2,000 specimens; British and exotic). Each of the three main collections comprises many smaller collections and donations, from individuals, organisations or institution.

Collection Significance
The collection, containing some 25,000 specimens, represents a major reference set of the British flora. It is strong in local plants (Glasgow area, but also western Scotland and the Highlands), containing examples of many of the plants likely to be encountered. It is thus a valuable resource for anyone wanting to study bryophytes or to carry out more detailed research or compile local or regional Floras and Checklists. With the exception of the GL material, most of the British and overseas specimens have been fully catalogued allowing rapid and detailed interrogation.

There are a few gaps in the collection, although some of these may be represented but specimens need specialist examination in light of modern taxonomic advances to establish their presence. The nineteenth century origin of many of the specimens adds further interest for historical studies, including distribution and modern day conservation.

The Stirton collection, collected by James Stirton (1833-1917) is of international significance containing 203 individual type names (over 700 specimens). Other collections also include a few first collections of specimens and some co-type material; some local collections also have local significance. The overseas material is limited in scope and size but contains some important collections notably those associated with

James Stirton and John Scouler, and collections by Faulds and Spruce from South America and Buchanan from New Zealand.

The collection is of national importance for its comprehensive British collection of specimens, notably its Scottish strength, but also has a high international value because of the important Stirton collection and other historical overseas material. With the incorporation of the two university collections, the museum now holds all of Glasgow and the west of Scotland's major collections, and represents one of the largest bryophyte collections outside of the Royal Botanic Garden, Edinburgh.



Bibliography

Patton, D. (1954). The British Herbarium of the Botanical Department of Glasgow University. *Glasgow Naturalist* 17, pt 3.

Lloyd, B. (1964) The Herbarium of the Royal College of Science and Technology Glasgow. *Glasgow Naturalist* 18 pt 7.

Sayre, Geneva (1977) 'Authors of Names of Bryophytes and the Present Location of Their Herbaria'**,** *The Bryologist*, Vol. 80, No. 3, pp. 502-521

Macpherson, Dr P & Watson, KJ (1996) 'Strathclyde University Herbarium Computerised Database' *Glasgow Naturalist*. 23, pt 1.

Jones, G. (1980). The Herbarium of the Glasgow Museum and Art Gallery. *Glasgow Naturalist*. 20 pt 1.

Crundwell, AC (1952) Bryological Collections in Britain. *Transactions of the British Bryological Society*, V.2, Pt 1.

Botany: Lichens
Lichens are fungi that grow symbiotically with various algae, resulting in a composite plant-like organism. They characteristically form colourful shrubby, leafy, crust-like or powdery growths most noticeably on rocks and trees in unpolluted air.

Collection Size
There are over 5,800 specimens in total in the collection.

Collection Description
This collection represents a broad coverage of British lichens in the form of dried lichen material virtually all contained in small paper packets. A few are mounted on larger herbarium sheets.

The collection contains specimens from the nineteenth century (generally from the latter half), with the remainder collected in both early and later parts of the twentieth centuries. The majority of the specimens are from the British Isles and many of these have been collected in Scotland. There are also important international collections, most notably from New Zealand, Australia and South Africa. There are also a much smaller number from the 'New World'.

The collection represents three major collections: Glasgow Museums' original civic collection (Herb GLAM, comprising some 2,500 specimens – UK and exotic); the recently acquired Glasgow University Botany Department's British collection (Herb GL – 3,000 specimens) and Strathclyde University's collection (Herb GGO – 300 specimens; British and exotic). Each of the three main collections comprises many smaller collections and donations, from individuals, organisations or institutions. Collectors include J. Stirton, FM Bailey, J Buchanan, W Mudd, P. Topham, Rev D Lillee and Rev W Leighton.

Collection Significance
The collection is of national importance for its British collection of specimens, which although lacking a complete coverage of the British flora, includes important collections made by William Mudd (1830-1879), James Stirton (1833-1917) and Rev. D. Lillee, which have high scientific and historical value due to the presence of type material (notably by Stirton). Many of the British and overseas specimens have been catalogued, allowing rapid and detailed interrogation of the collection.

Of the overseas material the Stirton collection is of high international significance as it contains 499 type specimens (346 unique names) and is an important resource for professional research.

With the incorporation of the two university collections, the museum now holds all of Glasgow and the west of Scotland's major collections, and represents one of the largest lichen collections outside of the Royal Botanic Garden, Edinburgh and the British Lichen Society's collection at Dundee.

Bibliography

The following are general references to the collection, but there are many publications by Stirton, which reference species descriptions to the collection held by the museum, and more recent researchers cite material held in Glasgow.

Patton, D. (1954). The British Herbarium of the Botanical Department of Glasgow University. *Glasgow Naturalist* 17, pt 3.

Lloyd, B. (1964) The Herbarium of the Royal College of Science and Technology Glasgow. *Glasgow Naturalist* 18 pt 7.

Jones, G. (1980). The Herbarium of the Glasgow Museum and Art Gallery. *Glasgow Naturalist* 20 pt 1.

Botany: Algae

Algae are groups of relatively simple, usually pigmented, photosynthetic aquatic plants. They vary from small single-celled species to giant kelps. The study of algae is often known as phycology (algology).

Collection Size

There are over 8,000 specimens in total in the collection.

Collection Description:

The algal collection consists of specimens of marine seaweeds (the familiar 'red, browns and green' types found in saltwater), smaller collections of freshwater (green) material (including stoneworts) and blue/green algae (cyanophytes), and microscopic slide collections (chiefly diatoms).

The specimens date mostly from the nineteenth century or early twentieth century, with a few from the eighteenth century. The majority of the specimens are from the British Isles, mainly from the west of Scotland, but with collections from south west England. There are also important international collections notably specimens from Australia collected by William Harvey during an expedition from 1854 – 1856. There are smaller numbers from places such as south west France, India, the Cape, Florida and the Caribbean. Microscopic slide specimens are from several oceanic sites, ranging from Sandwich Islands, the North Atlantic, the Azores, Australia and the Black Sea.

The collection is in the form of dried material mounted on card of various sizes with additional material in the form of microscope slides (e.g. diatoms) and coral-type calcareous algae in paper packets.

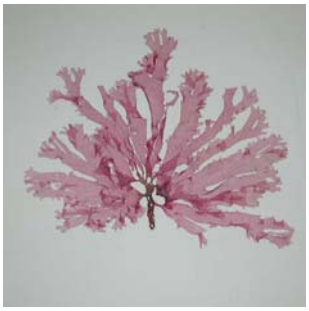
The collection represents three major collections: Glasgow Museums' original civic collection (Herb GLAM, comprising some 3,000 specimens mainly from the UK); the recently acquired Glasgow University Botany Department's British collection (Herb GL – 4,000 specimens) and Strathclyde University's collection (Herb GGO – 1,200 specimens; British and exotic). Each of the three main collections comprises many smaller collections and donations from individuals, organisations or institution. There is also an important collection of early 'cyanotype photograms' by Anna Atkins and bound 'Treasures of the Deep' volumes by Rev. David Landsborough.

Collection Significance

There are some 8000 British specimens, mainly marine seaweeds, and although largely uncatalogued, represent a very good coverage of the algal flora of the coastal British Isles. The value of the collection is greatly increased by the historical nature of the material, dating from the early 19th century. A number of well-known collectors are represented in the collection including Edward Holmes, William Harvey, George Johnston, Dr R. Greville, AM Griffiths, Rev D. Landsborough, Rev. John Fleming, H & J Groves, John Scouler, Roger Hennedy, Prof. Walker Arnott and David Robertson. Several specimens will represent type material, notably those collected by the pioneering phycologist William Harvey (1811-1866).

The Anna Atkins cyanotype photograms are of high scientific and historical value; the Glasgow material is considered to be the largest cohesive set, representing a full 'British Algae'. Atkins trained as a botanist and developed an interest in photography as a means of recording botanical specimens for a scientific reference book, *British Algae: Cyanotype Impressions.* This publication was one of the first uses of light-sensitive materials to illustrate a book. Only about twelve copies of the book were made. It was intended to complement William Harvey's un-illustrated *A Manual of the British Marine Algae* (1841).

With the incorporation of the two university collections, the museum now holds all of Glasgow and the west of Scotland's major collections, and represents one of the largest algal collections outside of the Royal Botanic Gardens, Edinburgh.



Bibliography

Powell, HT and E Conway (1963) The Marine Algal Collection of Dr and Mrs David Robertson. *British Phycological Bulletin* 2 (4), 237.

Lloyd, B. (1964) Letter to the Editor: Algal Herbaria a) Herbaria of John Scouler and Roger Hennedy. *British Phycological Bulletin* 2 (5), 305-306.

Patton, D. (1954). The British Herbarium of the Botanical Department of Glasgow University. *Glasgow Naturalist* 17, pt 3.

Lloyd, B. (1964) The Herbarium of the Royal College of Science and Technology Glasgow. *Glasgow Naturalist* 18 pt 7.

Jones, G. (1980). The Herbarium of the Glasgow Museum and Art Gallery. *Glasgow Naturalist* 20 pt 1.

Schaaf, Larry J. (1986) *Sun Gardens: Victorian Photograms by Anna Atkins*

Botany: Fungi

Fungi are a large group of spore producing, plant-like organisms lacking chlorophyll but obtaining their nutrients by breaking down other organic matter. They include yeasts, moulds, smuts and various pathogens, as well as the more familiar mushrooms and toadstools. The study of fungi is known as mycology.

Collection Size

The collection includes some 3,800 specimens in total.

Collection Description:

The fungi collection consists of fungi (excluding lichens) such as the familiar mushrooms and toadstools, and including bracket and jelly types, but also smaller cup fungi, rusts and other microfungi. Also included are the Slime Moulds (Mycetozoa), which are technically Protists but are traditionally covered under the fungal heading.

The collection represents a broad coverage of chiefly British fungi, in the form of dried material some kept in small packets or contained in small, card boxes, with very few sectioned and mounted on larger herbarium sheets; some of the larger agarics have been freeze-dried.

The majority of the specimens are from the British Isles and most of these have been collected in Scotland. The important Mycetozoa collections are from England and there is a small amount of material from overseas. The vast majority of the collection dates from the early and later parts of the 20th century, but does contain a few specimens from the nineteenth century.

The collection represents three major collections: Glasgow Museums' original civic collection (Herb GLAM, comprising some 700 specimens – UK and exotic); the recently acquired Glasgow University Botany Department's British collection (Herb GL – 2,000 specimens) and Strathclyde University's collection (Herb GGO – 240 specimens; British and exotic). Each of the three main collections comprises many smaller collections and donations, from individuals, organisations or institution. A range of noted collectors are associated with the collections including J. Fleming, A. & G. Lister, E. Fries, R. Johnstone and D. Boyd.

Collection Significance

The 3000 or so British specimens represent only a limited coverage of the fungus flora of Scotland or British Isles, it is unlikely that the collection will contain many specimens of high historical significance, however it does provide a basic coverage and is of local value.

The value of the collection is greatly increased by the Lister and Fries collections, which have high historical and international value due to the presence of type material. Elias Fries (1794-1878) is known as the father of mycology and was the first to develop a system of classification for fungi. His collection of 'Scleromyceti Sueciae' (microfungi from Sweden) dates from 1819 – 1825 and is part of the Herb GL collection.

Arthur Lister (1830-1908) and his daughter Guilielma Lister (1860-1949) were amateur naturalists whose work greatly influenced fungi taxonomy. They were founding

members and presidents of the British Mycological Society and donated a set of type specimens to Glasgow University.



Bibliography

Lloyd, B. (1964) The Herbarium of the Royal College of Science and Technology Glasgow. *Glasgow Naturalist* 18 pt 7.

Jones, G. (1980). The Herbarium of the Glasgow Museum and Art Gallery. *Glasgow Naturalist* 20 pt 1.

Geology: Rocks
Rocks are aggregates of minerals and are divided into three main groups defined by their mode of formation – igneous (formed from molten magma), sedimentary (formed by compaction and hardening of sediments) and metamorphic (formed from pre-existing rocks by the effects of heat and pressure).

Collection Size
3,400 hand specimens and 800 rock thin sections.

Collection Description
This is a general collection including a wide variety of examples of the three major rock groups, ranging in age from the Pre-Cambrian to Quaternary. There are also specimens illustrating rock structures. The rocks are mainly Scottish but with some from England, Wales and Ireland and a small number from other parts of the world. The igneous material includes a range of common types of both intrusive rocks and volcanic lavas and ashes dating mainly from the Tertiary, Devonian and in particular from the Carboniferous. The metamorphic rocks include examples of gneiss, schist, slate, phyllite, quartzite, and marble. Those from the Dalradian Supergroup of the Southern Highlands predominate but there are also specimens from the Moine Supergroup and the Lewisian Gneiss. Most of the common sedimentary rocks are represented. Those of Ordovician, Silurian and Carboniferous age form the largest part of the collection.

Examples in the collection are mainly hand specimens but there are also larger specimens, up to a 1.5 metre high basalt column from the Giant's Causeway. Rock thin sections are also represented. These are mainly of Scottish dolerites and of rocks from the Girvan area. Extraterrestrial rocks are represented by about 10 meteorites.

Collection Significance
This is one of the largest collections of Scottish rocks in Scottish museums. Its strength lies in the range of examples from Scotland with a good coverage of the commoner types making it of great Scottish significance. It forms a very useful scientific and educational resource and reference collection of Scottish rocks. Some rock types such as sandstone or basalt are present in many different varieties and from different localities. The collection includes rocks of economic interest such as fossil fuels, building stones, limestone and ironstone. There are coals from old Glasgow mines and sandstones from disused quarries that are now unobtainable. These can provide links to illustrate environmental issues such as exploitation of natural resources and climate change.

Although there is a representative collection of rock specimens the collection of thin sections is more restricted in scope. The Arthur Pratt collection of rock thin sections donated in 1903 contains about 430 rock thin sections mainly of Scottish dolerites. These were produced by Pratt himself and are of historical interest. In 1972 Dr Stuart M K Henderson, ex Director of Glasgow Museums donated material collected during his research into the sedimentology of the Ordovician rocks of the Girvan area. As well

as of 300 rock thin sections it includes approximately 400 rocks. The collection could have future research potential in this field.



Bibliography

Campbell, E. 1976. Geological Collections and Collectors of Note: 12. Glasgow Art Gallery and Museum. *Newsletter of the Geological Curators'Group* 1 (7), 336-345

Macnair, P. 1911. *Introduction to the Study of Rocks and Guide to the Rock Collections in Kelvingrove Museum*

Geology: Minerals
A mineral is a naturally occurring substance with its own characteristic chemical compositon and physical properties that has formed through geological processes. There are over 4,000 known species varying in composition from pure elements to complex silicate compounds. Gold, quartz, emerald and gypsum are well known examples.

Collection Size
8000 minerals

Collection Description
This is a general collection containing a wide range of specimens from around the world and from across all mineral groups including native elements, carbonates, oxides, sulphides, sulphates and phosphates. There is an emphasis on specimens from Britain and the rest of Europe but there is also material from North and South America, Asia and Australia.

The collection of silicate or rock-forming minerals has examples of micas, garnets, tourmalines, feldspars, pyroxenes, amphiboles and zeolites. Quartz and other varieties of silica such as amethyst, cairngorm, agate, chalcedony and jasper are also represented. There are metal ores and other minerals of economic use but the collection of gemstones is limited. In all there are over 400 mineral species represented including most of the commoner minerals but with some rarer and unusual examples. Some minerals may be represented by only one specimen but for others, particularly common minerals such as quartz and calcite, there are a variety of specimens from different localities. There are also some glass and wooden models, showing different crystal forms.

Collection Significance
This is one of the largest mineral collections in Scottish museums. Its quality as a whole is high and is of UK importance. It is of interest in both a historical and a scientific context.

The historic interest of the collection is a major factor in assessing the importance of the mineral collection. The period of greatest growth was in the late nineteenth and early twentieth century but some major collections acquired then contain earlier material and have a high proportion of specimens collected during the late eighteenth and early nineteenth century. Notable among these are the collections David Corse Glen (1824-1892) and Professor John Fleming (1785–1857), which together make up a large part of the total mineral collection. The Glen collection was acquired in 1896 and contains minerals from around the world. Glen acquired a collection of minerals around 1886 which had originally been sold in 1805 and includes material from the Earl of Bute, Abraham Gevers and others. John Fleming’s collection of around 850 specimens was donated by Major J M Fleming in 1902 and contains a high proportion of Scottish material. Fleming was an important figure in early Scottish geology and his collection contains minerals from Shetland whose minerals he described in his first published paper in 1807. This material has the potential to provide historical information on early mineral collecting and on collectors and collections of the period. They can also

provide material from localities such as old mines no longer accessible or worked out today. There is potential for mineralogical research and further work into the history of the collection may prove it to be of international importance.

The collection is of scientific interest mainly on account of the range of minerals present providing good coverage of a wide variety of species. Many of the commoner minerals are represented by a suite of specimens from different localities and showing different forms. There is also a wide range in the date of collection from the late eighteenth century to the present. The early material can provide specimens for scientific study from localities such as old mines no longer accessible or worked out today. The collection also includes unique, rare or unusual items. A rare example of Strontianite, from the type locality of Strontian, Argyllshire in the Glen collection is part of the collection of minerals sold in 1805. It must have been collected either before or just after the identification of this mineral species in 1790. There are several examples of calcite pseudomorphs after ikaite (once termed peusdogaylussite) dredged from the muds of the Clyde estuary. Old specimens of heulandite from the local Clyde Plateau Lavas of a quality not now collectable are included.

Bibliography

Macnair, P. 1921. *Introduction to the Study of Minerals and Guide to the Mineral Collections in Kelvingrove Museum* (2nd edition)

Campbell, E. 1976. Geological Collections and Collectors of Note: 12. Glasgow Art Gallery and Museum. *Newsletter of the Geological Curators' Group* 1 (7), 336-345

Gunning, A. 1986. Museum File 8: Glasgow Art Gallery and Museum Geological Collections. *Geology Today*,118-120

Macnair, Peter. 1904. On pseudogaylussite dredged from the Clyde at Cardross and other recent additions to the Mineral Collections in the Kelvingrove Museum. *Proceedings of the Royal Philosophical Society of Glasgow*, 35, 250-262

Geology: Fossils
Fossils are the preserved remains or traces of once living animals and plants. For example the shell of a marine snail, the delicate impression of fern leaves or the complete skeleton of a huge dinosaur can all be preserved as fossils.

Collection Size
40,000 to 50,000 fossils

Collection Description
The fossil collection includes examples from most of the major animal and plant groups. Invertebrates dominate and include fossil corals, brachiopods, foraminifera, porifera, molluscs (bivalves, gastropods, ammonites and other cephalopods, scaphopods and chitons), arthropods (including trilobites, eurypterids, ostracods), echinoderms (particularly crinoids and echinoids) and graptolites. The fossil vertebrate collection is smaller, just under 2,000 specimens, and contains mainly fish. There are fewer higher vertebrates but there are some excellent specimens such as *Balanerpeton*, a Carboniferous amphibian as well as a spectacular ichthyosaur and giant Irish deer skeleton. The fossil plant collection contains mainly Carboniferous non-flowering plants with some from other periods notably the Devonian and Tertiary. A high proportion of the fossils are from Scotland and in particularly from the west of Scotland but with smaller amounts of material from the rest of Britain and from elsewhere. Although wide ranging in terms of geological age the collection is particularly rich in Carboniferous (359 to 299 million years ago) and Quaternary fossils (approximately 12,000 years old).

Collection Significance
The fossil collection is one of the largest in Scottish museums. Overall its quality is very high and its areas of strength make it of international importance. It contains many type specimens and material figured and cited in scientific literature. For example it includes *Hibbertopterus scouleri*, the lectotype of a Carboniferous eurypterid collected from East Kirkton Quarry, Bathgate about 1830. The collection is an important resource for future taxonomical and other research. Much of the collection dates from the nineteenth century making it also of historic interest.

By far the largest and most important aspect of the collection is Scottish Carboniferous invertebrate fossils. It is particularly strong in microfossils (foraminifera and ostracods), coelenterata (corals), bryozoans, brachiopods, gastropods, bivalves, cephalopoda (nautiloids and goniatites) and echinoderms (crinoids and sea urchins) but also includes a range of other invertebrates. Much of this material is from the area around Glasgow and the west of Scotland. The most significant collection is that of John Young, donated in 1901. His collection was the basis for the *Catalogue of Western Scottish Fossils* (1876) and contains many type specimens described by Young himself or by later workers. Among other collections of Carboniferous invertebrates of note are the James Thomson collection of corals that was extensively used by Dorothy Hill in her monograph of Scottish rugose corals and a collection of fossils from Ayrshire donated by Robert Craig.

Another strength is Quaternary invertebrates, particularly gastropod and bivalve molluscs and microfossils (foraminifera and ostracods), from the Late Glacial marine deposits of the Glasgow and Firth of Clyde area. A large part of this material was acquired from David Robertson in 1902, who published on both the Quaternary and present day fauna of the Clyde area, and James Coutts in 1914.

There is also an excellent collection of Ordovician and Silurian fossils from southern Scotland. This includes an important collection of arthropods (eurypterids and phyllocarids) and early fossil fish from the Silurian of the Lesmahagow area. The material was collected mainly by Robert Slimon and by Camp Siluria (a camp set up by a group of members of the Geological Society of Glasgow) and donated in 1909 and in 1903 and 1904 respectively. James Dairon donated an important collection of the Ordovician and Silurian graptolites from the Southern Uplands in 1901.

The fossil plants range in age from Cambrian to Quaternary with the majority from the Carboniferous of Scotland. The largest collection is that of Dr R G Absalom (1902 – 1975), a former curator of natural history. This includes about 1000 Carboniferous plants, many collected from old Scottish coal mines. Some fossil plants from East Kirkton, Bathgate was acquired more recently and some have been figured in the literature on this famous locality. The fossil plant collection also includes a small but scientifically and historically significant collection of Tertiary specimens (including types) from the leaf beds at Ardtun, Isle of Mull. This material was donated by Lord Archibald Campbell, son of the 8th Duke of Argyll who first brought these fossils to the notice of palaeontologists around 1850.

The collections of Scottish Devonian and Carboniferous fishes are of significance while among other vertebrates there are important individual items such as the Carboniferous amphibians, *Stagonolepis robertsoni* scutes and ribs from the Triassic of Elgin and Quaternary mammal remains (reindeer, mammoth and woolly rhinoceros) from around Glasgow.

Bibliography

Campbell, E. 1976. Geological Collections and Collectors of Note: 12. Glasgow Art Gallery and Museum. *Newsletter of the Geological Curators'Group* 1 (7), 336-345

Gunning, A. 1986. Museum File 8: Glasgow Art Gallery and Museum Geological Collections. *Geology Today*,118-120

Macnair, P. 1912. *Introduction to the Study of Fossils and Guide to the Palaeontological Collections in Kelvingrove Museum*

Rolfe, W. D. I., Ingham, J. K., Currie, E. D., Neville, S., Brannan, J. and Campbell, E. 1981. *Type specimens of fossils from the Hunterian Museum and Glasgow Art Gallery and Museum*, Microfiche produced by Glasgow University