

Large Print Guide

MAKING NATURE

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How we think about animals is fundamental to how we understand ourselves and our place in the world. The differences and similarities we perceive between humans and non-human animals have been the subject of enquiry since the ancient Greeks, but it was not until the 18th century that we began to seek scientific explanation. Taxonomy – the naming, describing and classifying of organisms – proposed a system for objectively ordering and ranking the animal kingdom. Today, its legacy underpins almost every aspect of our daily lives.

Natural history museums, zoos and wildlife documentaries create representations of nature that frame our ideas about other animals. They arrange the natural world, whether through realistic displays of preserved specimens, the dramatic staging of living animals or the careful editing of film footage. What we see and how we encounter it has a significant effect on our behaviour towards other animals.

With the rapid loss of habitats and species threatening the health of our planet, the historical roots of our beliefs about other animals are coming under scrutiny. Is the separation of humans from other animals – both in our minds and in our environments – compatible with creating a sustainable world?

Degreecoordinates. Shared Traits of the Hominini Apes (Humans, Bonobos and Chimpanzees), 2015

Marcus Coates in collaboration with primatologist Volker Sommer

This work presents questions about our anatomy and behaviour. Since identical answers are possible for all members of the Hominini 'tribe' of apes (humans, bonobos, chimpanzees), they do not define differences between these species. Instead, responses reveal our cultural boundaries, which we share with some individuals but not others – whether human, bonobo or chimpanzee.

Commissioned by Haus der Kulturen der Welt, Berlin, for *Ape Culture* 2015. Kate MacGarry, London and Workplace Gallery, UK

ORDERING

The idea of a “natural order” in the living world has become embedded in our society. The “great chain of being” began with the ancient Greek philosophers. Later, religious scriptures reinforced this hierarchical structure with divine explanation. By the 18th century, the science of naming, describing and classifying organisms (taxonomy) started seeking rational explanations for the perceived differences between human and non-human animals.

One of the first attempts to record, describe and rank the animal kingdom scientifically was made by Swedish physician and botanist Carl Linnaeus, in his 1735 publication *Systema Naturae*. Humans were classed as animals for the first time and later named *Homo sapiens* (“wise man”). Linnaeus described us with the words *Nosce te ipsum* (“know thyself”), reasoning that our ability to recognise ourselves as human is what separates us from non-human animals.

The Linnaean classification system is a human construct imposed on the natural world. Still in use today, this system affects the value we place on particular animals, which has far-reaching consequences for the world's biodiversity.

Other ways of organising nature have been proposed by artists, writers and scientists. Their works challenge the fixed position of each species in the “great chain of being” and expose its arbitrary divisions.

WALL LABELS

Adam in Paradise – Genesis chap. II ver. 19, 1743.
Etching and engraving

Gérard Jean Baptiste Scotin II

The act of naming animals had a powerful Biblical precedent: “whatsoever Adam called every living creature, that was the name thereof” (Genesis 2:19). Linnaeus’s religious beliefs led him to natural theology, a school of thought that sought to gain knowledge of the divine through observing and experiencing the natural world.

Wellcome Library

The Bedroom of Linnaeus, 1864. Albumen-silver print

Emma Schenson

The walls of Linnaeus’s bedroom are papered with proof copies of botanical drawings and the bed curtain decorated with *Linnaea borealis* flowers. The small cold frame on the table would have contained just some of the thousands of specimens with which Linnaeus surrounded himself in his study of the natural world.

Victoria and Albert Museum

Linnaea borealis L., 1864. Hand-coloured photograph

Emma Schenson

The twinflower, *Linnaea borealis*, was a favourite flower of Carl Linnaeus and was named in his honour. Linnaeus devised the first standardised two-part naming system for all lifeforms, which has been used ever since. In 1751 Linnaeus wrote “If you do not know the names of things, the knowledge of them is lost too” (*Philosophia Botanica*).

Victoria and Albert Museum

A lion devouring its prey in a cave while its crown and sceptre are perched on a rock at the entrance, late 17th century. Etching

Wenceslaus Hollar

Aesop’s fable of the sick lion shows him feigning illness to lure animals into his cave and eat them. The fox remains outside, representing the moral of the story: that we should learn from the misfortunes of others. The naturalist Conrad Gessner encouraged learning about animals because of the moral messages they could impart.

Wellcome Library

The Great Silence, 2014. Three-channel HD video installation, 16:22 mins. Text by Ted Chiang

Allora & Calzadilla

The artists pair footage of a sanctuary of endangered Puerto Rican parrots with that of the Arecibo Observatory, also in Puerto Rico. The Observatory's transmitter is used to broadcast messages into outer space in search of extra-terrestrial intelligence. The accompanying text, written from the perspective of the parrots, highlights the importance of listening as well as looking.

The artists and Lisson Gallery

Extract from *El idioma analitico de John Wilkins* (The analytical language of John Wilkins), from *Other Inquisitions (1937–1952)*. First published 1952

Jorge Luis Borges

In his essay Borges references a (fictitious) Chinese encyclopedia that classifies animals using the 14 categories listed here. He concludes that “it is clear that there is no classification of the Universe not being arbitrary and full of conjectures”.

Wellcome Collection

Advertisement for Julia Pastrana, “the nondescript”, 1857. Colour woodcut

Julia Pastrana was born with hypertrichosis, a condition causing excessive hair growth. Her unusual looks led her to be toured around the world, billed as half human, half animal. The term “nondescript” is here applied to those who straddle descriptive boundaries, resisting classification.

Wellcome Library

from earth, 2015. Earth rubbings on paper

herman de vries

de vries trained as a botanist but since the 1950s has been making art about humankind’s relationship with the natural world. Much of his work explores the difficulties of objectively describing, categorising and representing plants and animals. In these rubbings, the soil is impressed into the paper, creating a direct relationship between the raw material of nature and its representation.

The artist

CASE LABELS

A general system of nature, through the three grand kingdoms of animals, vegetables, and minerals, volume 7, 1806. Translated by William Turton from the 13th edition

Carl Linnaeus

Wellcome Library

Zeus faber, 1758. Pressed fish specimen collected by Carl Linnaeus

This is the type specimen of the John Dory fish, *Zeus faber*, that Linnaeus used to describe the species. A species is described and named for the first time using just one specimen. This then becomes the definitive example of that species – the type specimen. As organisms continue to be discovered, comparisons with existing type specimens allow scientists to see whether they have found a new species.

The Linnean Society of London

Icones Animalium, 1560

Conrad Gessner

Linnaeus was not the first to attempt to order nature. From 1551 to 1558, the naturalist Conrad Gessner created a compendium of all recorded knowledge on animal life. It is considered the starting-point of modern zoology. Unlike Linnaeus, who sought scientific objectivity, Gessner drew from a wide variety of sources. These included fables, medieval bestiaries and the Old Testament.

Zoological Society of London

Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers, volume 8, 1762–1772

Denis Diderot, Jean Le Rond d'Alembert, Pierre Mouchon

Linnaeus's attempt to create a universal system of organisation was not unique to natural history but was part of a wider classification craze that swept across 18th-century Europe. French essayist Denis Diderot compiled the first encyclopedia encompassing all human knowledge, writing that "organised material is knowledge and knowledge is organised material".

Wellcome Library

A general system of nature, through the three grand kingdoms of animals, vegetables, and minerals, volume 1, 1806. Translated by William Turton from the 13th edition

Carl Linnaeus

Linnaeus was the first to place humans (*Homo*) in a system of biological classification, grouping us among the primates. Later, he divided our species further into a number of different races based on what he considered to be their physical, social and emotional attributes.

Wellcome Library

Idea of the ladder of natural beings, from *Oeuvres d'histoire naturelle et de philosophie*, volume 1, 1783

Charles Bonnet

The “Great Chain of Being” was a ladder of life with man at the top and the four elements at the bottom. Unlike Linnaeus, the naturalist Charles Bonnet did not consider nature to be unchanging. He proposed that groups of animals could move up the ladder: simpler animals could become intelligent, primates develop into humans and humans grow into angels.

Wellcome Library

Translation of Charles Bonnet's *Idea of the ladder of natural beings*, 1783

MAN

Orangutan

Monkey

QUADRUPEDS

Flying squirrel

Bat

Ostrich

BIRDS

Acquatic birds

Amphibious birds

Flying fish

FISH

Crawling fish

Eels

Water snakes

SERPENTS

Slugs

Snails

SHELLFISH

Tubular worms

Tinea (Ringworm)

INSECTS

Gallflies

Tape-worm

Polyps

Sea-anemone

Sensitive

PLANTS

Lichens

Molds

Mushrooms, Agarics

Truffles

Corals, Coraloids

Lithophyte

Asbestos, Amianthus

Talc, Gypsum, Selenites

Slates

STONES

Formed Stones

Crystallizations

SALTS

Vitriols

METALS

SEMI-METALS

SULPHURS

Bitumens

EARTHS

Pure Earth

WATER

AIR

FIRE

Ethereal matter

Gulliver's Travels, 1864 (first published 1726, amended 1735). Illustrations by W L Thomas

Jonathan Swift

Swift's fictitious traveller's tales satirised ideas about the fixed position of each species in the "Great Chain of Being". Swift imagines a world in which human-like creatures, the Yahoos, have become beasts of burden in a land ruled by horses, the Houyhnhnms (their name means "perfection of nature"). These illustrations depict the Yahoos as ape-like, swinging from branches with clawed hands.

The British Library

Bill of a duck-billed platypus, *Ornithorhynchus anatinus*, provenance unknown

The rough edge of this platypus bill indicates it was torn off the specimen and not removed by dissection. It is not known why, although initially this unfamiliar animal was considered so exotic it was suspected to be a fake. It is possible that experts tugged at the bill to discover if it had been sewn onto the body of a different animal.

Grant Museum of Zoology, UCL

The naturalist's miscellany: containing accurate and elegant coloured figures of the most curious and beautiful productions of nature, volume 10, 1813.
Illustrations by F P Nodder

George Shaw

In the 18th century, global travel led to the discovery of previously unknown animals. This posed challenges to the existing taxonomic categories into which they could be grouped. The platypus, with the fur of a mammal and the beak of a duck, was a particular puzzle. Experts suspected the first specimen to be a fake.

Wellcome Library

Taxidermy, around 1825

Charles Waterton

Waterton was an English naturalist and taxidermist. He created imaginary taxidermy creatures by joining together pieces of different animals. This example is made from saki monkeys; one head is true to life and the other reshaped to appear human-like. Waterton's most famous creation was 'The NonDescript'. The title suggested an undescribed species and satirised the shortcomings of Linnaeus's categorising system, of which Waterton disapproved.

Collection of Errol Fuller

Systema Naturae (System of Nature), first edition,
1735

Carl Linnaeus

In *Systema Naturae* Linnaeus laid out and described the three kingdoms of nature: animal, vegetable, mineral. It was the first attempt to systematically organise the entire living world and was one of the most important scientific works of the 18th century. At the top of the animal kingdom Linnaeus placed man, *Homo*, describing us with the words “*Nosce te ipsum*” – “know thyself”.

The Royal Society

Musa Cliffortiana (Clifford's Banana Plant), 1736

Copperplate engraving

Martin Hoffman

Linnaeus was the first to successfully cultivate the banana plant in the Netherlands. His study of nature was driven by a desire to understand how natural resources could be best exploited for food, medicine or trade, helping to make the nation more self-sufficient.

The Royal Society

DISPLAYING

Inside natural history museums, preserved animals can be seen in carefully arranged exhibits. The choices museums make about what animals to put on display and how – such as their posture, their appearance and the behaviours they demonstrate – have a profound influence on how we come to think about certain species.

By creating highly realistic exhibits, museums offer an “authentic” experience that reinforces our existing ideas about nature. Over the years these displays have taken different forms. They reflect scientific approaches to understanding other species but they also document wider cultural attitudes that shape, and in turn are shaped by, science. A desire to showcase an empire’s riches or a museum’s educational policy may affect display choices as much as developments in evolution or ecology.

The impact of these exhibits can be felt long after we have left the museum. Representations of certain animals in popular culture often exaggerate the qualities and behaviours expressed in museum displays. These establish themselves in modern folklore, creating animal stereotypes that linger in our collective imagination.

WALL LABELS

Skeleton of Man and of the Male Gorilla (Troglodytes Gorilla) II, around 1855. Salted paper print

Roger Fenton

Taken four years before the publication of Charles Darwin's *On the Origin of Species*, Fenton's photograph shows the gorilla skeleton reconstructed in an unnaturally upright stance to emphasise the similarities between humans and apes.

Victoria and Albert Museum

Idea of a Museum of Natural History, 1859

Pen and ink on paper

Richard Owen

Richard Owen was the first director of the Natural History Museum in London. His ambition for the display of the museum's collections, described in this sketch, brought Linnaeus's system of classification to life. With the mammals arranged closest to the centre of the museum and the less complex organisms towards the edges, the arrangement naturalised the artificial systems of taxonomy.

Trustees of the Natural History Museum, London

Designs for the Natural History Museum, 1878.

Watercolour

Alfred Waterhouse

Richard Owen wanted a natural history museum that was a “cathedral to nature”. His vision is reflected in the semi-circular arches, stained glass windows and high vaulted ceiling of the museum’s central hall. The architecture embodied Owen’s attempts to combine his belief in a divine creator with scientific optimism around evolution – a combination that was increasingly at odds with the secular science of the day.

RIBA Library Drawings and Archives Collections

Photograph of the façade of the Natural History Museum, and detail, 1920s

The crowning glory at the museum’s entrance was a statue of Adam. The figure, now lost, referenced man’s perceived position at the top of the animal kingdom, as well as the creation narrative in the Book of Genesis.

Trustees of the Natural History Museum, London

Pencil sketches for the terracotta decoration of the Natural History Museum, around 1874–79

Alfred Waterhouse

Richard Owen commissioned the decoration on the outside of the Natural History Museum, which was intended to be instructive as well as ornamental. Extinct animals were shown on the east wing and living animals on the west wing. The decision to separate them reflected Owen's reservations about the nature of evolutionary theory.

Trustees of the Natural History Museum, London

Fungi study, 1888. Watercolour

The Toad's Tea Party, 1905. Pen, ink and watercolour

The Weasel's Poultry Shop, around 1891. Pen and ink

Beatrix Potter

Beatrix Potter studied and sketched the collections at London's Natural History Museum. Scientific accuracy was important to her and she did not shy away from depicting the crueller aspects of nature. In the *Poultry Shop*, the weasel has strung up his victims for sale.

The Trustees of the Linder Collection; Victoria and Albert Museum. Linder Bequest; Victoria and Albert Museum.
Linder Bequest

In his *Museology* series, Ross documents the displays and behind-the-scenes activity of natural history museums. His photographs dwell on the surreal and unnatural quality of these exhibits, breaking the sense of illusion on which the museum spectacle relies.

The Muséum national d'Histoire naturelle in Paris was one of the earliest natural history museums in Europe. Its exhibit of birds taxonomically arranged in regular rows, captured by Ross, was typical of 19th-century museums. These displays were designed to show the full range of specimens, in every development stage, sex and seasonal plumage. The exhibit encouraged comparative studies of variations in species and showcased the riches of France's national collection.

Museum National D'Histoire Naturelle, Paris, France
1982 Digital photograph

Museum National D'Histoire Naturelle, Paris, France
1982 Digital photograph

British Museum, Natural History, London, England
1985 Digital photograph

Richard Ross

The artist

Galapagos, 1980. Gelatin silver print

Hiroshi Sugimoto

Sugimoto began photographing museum dioramas in 1974. After studying pictures of the original location, he then re-photographs the museum diorama based on these images. By removing all signs of the diorama's creation, such as the frame or the reflections on the glass, Sugimoto creates an illusion of reality equal to that of the display itself.

The artist and Pace Gallery

Making the Marsh Birds Diorama (edit), 1952. Silent film, 12:41 mins

This short film shows the painstaking work that goes into the creation of museum dioramas. It records the careful preparation of the bird skins and the meticulous recreation of the landscape, where each individual leaf is cast and coloured by hand.

Field Museum of Natural History, Chicago

Moth, 2002. Video, 4:42 mins

Edwina Ashton

In her videos, drawings and performances, Ashton explores the complexities and politics of representing other animals. Dressed in a giant homemade moth costume, she moves around a domestic interior while a voiceover reads from *Moths*, one of the Collins New Naturalist series of amateur natural history texts. These generic scientific descriptions contrast with the idiosyncratic behaviour of the giant insect on screen.

The artist

3D-printed Barbary lion skull

This 3D printed skull of the now extinct Barbary lion was created using digital information from the data portal of the Natural History Museum, London. 3D printing allows scientists across the globe to access and research rare and fragile specimens. Technology is changing the way animals are being discovered and recorded, but it also has implications for museums, who rely on the unique spectacle and authenticity of their specimens to attract visitors.

Natural History Museum, London gift shop

Transcript of *Moth*, 2002. Video, 4:42 mins

Edwina Ashton

The aim of this book is to create an interest in wildlife, to recapture the enquiring spirit and to foster the pride of the public in fauna and flora. These plants and animals are described in relation to their homes and are portrayed in the full beauty of their natural colours by the latest methods of photography and reproduction. To my friend, Ermeline Rycroft, in gratitude for her help and encouragement.

Contents: Moths versus butterflies. Types of habitat: the seashore, marshes, heaths, moors, chalk downlands, woods, the new forest, sand hills, alpine pastures, mountains, tiger tundra, steppes, moths of the deserts, the last ice age, arctic, alpine moths, extinction, Irish lepidoptera and the [holoseam 0:01:52] colonists.

The ears of moths, eyes and scent brushes, the relative growth of the larval horn. Blue in moths is exceedingly rare, green is unusual and, when present in green silver limes, can be covered by acid, which restores some of the beauty of youth even to the old brown specimens. To retain their colouring green insects should be killed by potassium cyanide while the emeralds should be killed by ammonia. In mutant forms eyes are bright blue. Our own pale tussock has a double cocoon preventing damp and mould. Some

moths, the goat moth and the buff tip, produce unpleasant scents. The glands which manufacture this are probably cells scattered all over the body. Because of how they breathe, moths are small and could be no larger. Their blood has direct access to their tissues, which is effective but dangerous in the event of injury. Moths eat but do not wear clothes. They are very susceptible to desiccation and must guard against it. Their eyes are complex but rather inefficient.

In Mr Beaujois' photograph of the [puss 0:03:31] moth, the male is striking. Moth antennas are feathered, never knobbed. In most females, the wings are teeny little flaps. The waved black was until recently an insect of the greatest rarity; obscure and little known on the Continent, as in England. Most of the British specimens had been taken in London about the City or in the docks. And the larvae had, on few occasions, been feeding on a fungus in old houses. However, in 1932, larvae were discovered in Surrey. They had been overlooked owing to their unusual and secretive habits. [Mr Grighorn 0:04:20] and I, during one afternoon, easily obtained specimens. The pupae are housed in swimming, hammock-like cocoons. The skulking behaviour of the full-grown insects ensures that they are rarely seen.

[END OF TRANSCRIPTION]

CASE LABELS

The Crystal Palace Dinosaurs were the first 3D recreations of extinct creatures. Created almost 30 years before London's Natural History Museum opened, this theatrical spectacle heralded a new way of learning about science – one designed to “teach through the eye”.

The dinosaurs attracted over a million visitors a year during the next 50 years – more than had ever viewed a scientific work of any kind. They embedded a vision of dinosaurs in the public imagination. This filtered into popular culture through art, literature and film, turning them into familiar cultural icons.

1. *Crystal Palace and Gardens* [at Sydenham], around 1868. Oil print by George Baxter, produced by Le Blond Baxter Prints
2. Miniature *Iguanodon* model (1/20 life size), 1853. Plaster with bronze dust coating, by Benjamin Waterhouse Hawkins. From a set sold as educational aids to museums and schools in Britain

Friends of the Crystal Palace Dinosaurs; Trustees of the Natural History Museum, London

In an elaborate publicity stunt, the project's scientific adviser, Richard Owen, hosted a dinner in the *Iguanodon* cast. Above the table, he included his own name in a roll call of eminent male palaeontologists. Missing from these is commercial fossil hunter Mary Anning. Anning discovered the first nearly complete *Plesiosaurus*, but her class and gender excluded her from the formal scientific debates of the day.

3. Invitation to dinner in the *Iguanodon*, 1853, from Benjamin Waterhouse Hawkins
4. Engraving of the *Iguanodon* dinner party in the *London Illustrated News*, 7 January 1854
5. Letter from Mary Anning detailing her discovery of a fossilised *Plesiosaurus* and its sale, including a sketch, 26 December 1823

Trustees of the Natural History Museum, London; Friends of the Crystal Palace Dinosaurs; Wellcome Library

6. Selection of model dinosaurs from the teaching collection of the Grant Museum of Zoology, 1960s–1980s

The Grant Museum of Zoology has a large collection of plastic dinosaurs, originally acquired to instruct students in the appearance of whole dinosaurs and their relationship to obscure fossils. Although these models were based on fossil evidence as it was interpreted at the time, many modern dinosaur toys play simply to an abstract idea of ‘dinosauriness’ that has become embedded in the public imagination.

Grant Museum of Zoology, UCL

Scrapbook of Eliza Brightwen, 1867–80

Brightwen was an amateur naturalist whose writings interpreted and popularised scientific ideas for a general readership. Her scrapbook pairs natural history specimens and illustrations with Biblical passages. In the later Victorian period the familiar voices of self-taught amateurs were replaced by professional scientist-naturalists. Amid an increasingly secular science, Brightwen’s scrapbook frames nature as a source of moral guidance.

Whipple Museum of the History of Science, University of Cambridge

Grandmama's New Game of Natural History, around 1850. Card game with wooden box and hand-coloured lithographic playing cards

This game aimed to teach children about animals using nursery rhymes, fairy tales and scientific descriptions. This combination suggests that culture plays as important a role in how we learn about other species as science.

Victoria and Albert Museum

Twelve British birds, Drawn from the collection of Mr E.T. Booth at Brighton, Sussex, Sept 1917.
Sketchbook

Anonymous

These sketches were drawn from the taxidermy displays in the Booth Museum of Natural History, Brighton. They are accompanied by quotations from well-known natural history books. This combination gives the feel of a field guide – a scientific publication designed to help readers accurately identify animals and plants in the field. Despite this, the taxidermy they depict is an artistic interpretation, just like the sketches themselves.

Wellcome Library

The first specimen birds of paradise arrived in Europe with no feet or wings and small shrunken heads. Their strange appearance came from the preservation of the specimens in New Guinea. It led Linnaeus to name them *Paradisaea apoda*, the footless paradise bird.

Their impact on the Western world was immediate and by the 19th century their exquisite plumage was highly sought-after for fashionable feathered headdresses – Western counterparts to the decorative headgear of the Papua New Guinea tribes. The so-called “plume-boom” caused the devastation of wild bird species across the globe and led to the founding of the Society for the Protection of Birds in 1889, which in its early days was open only to “Lady-Members”.

1. *A Black King Bird*, 17th century, attributed to Pieter Withoos. Watercolour of a trade skin of an Arfak six-wired bird of paradise
2. *The Malay archipelago: the land of the orang-utan and the bird of paradise. A narrative of travel, with studies of man and nature*, by Alfred Russel Wallace, vol. 2, 1869
3. Headdress made of mounted bird of paradise feathers, around 1910
4. *Punch* cartoon from the *Designs After Nature* series, by Linley Sambourne, 1870

Collection of Renaud de Noray; Wellcome Library; Victoria and Albert Museum. Given by Mrs Frank Wooster; Reproduction courtesy of Punch Ltd.

Paradisaea raggiana bird of paradise, date unknown.
Trade-skin specimen with feet and wings removed

Count Raggi's bird of paradise, *Paradisaea raggiana*,
around 1900. Study skin

Headdress made by a Torres Strait Islander from
bird of paradise feathers, 19th century

Trustees of the Natural History Museum, London; Collection
of Errol Fuller; Trustees of the British Museum, London, UK

Taxidermy foxes diorama, 1876

Peter Spicer

Towards the end of the 19th century, a new style
of display emerged in museums – the diorama.
These lifelike recreations of animals in their natural
habitats responded to growing scientific interest in
animal behaviour and ecology. Their theatricality
appealed to visitors' emotions, reflecting the agenda
of a growing conservationist movement and concern
about the extinction of species. The playfulness of
these fox cubs perfectly encapsulates the charm of
these new displays.

Collection of Errol Fuller

Taxidermy diorama of squirrels playing cards, 1900–10

Walter Potter

Walter Potter was an amateur taxidermist whose playful dioramas earned him international fame. While his creations are unashamedly anthropomorphic – attributing human characteristics or behaviour to animals – they encourage us to reflect upon real animals and our relationship with them. This diorama is one of the few Potter made in which the animals are clothed, a distinction that further blurs the boundary between human and animal.

Collection of Pat and Mary Morris

Nomenclature of Colours, 1821

Abraham Werner with additions by Patrick Smye

Distinctions between colours have always been critical for scientists. Colour dictionaries provided a common language to describe different hues, fundamentally changing how scientists communicated about plants and animals. Charles Darwin took a copy of Werner's dictionary on the voyage of the HMS Beagle, using it to catalogue the flora and fauna that later inspired his theory of natural selection.

The British Library

OBSERVING

A trip to the zoo offers the promise of coming face-to-face with a live animal. In their architecture and landscape design, these institutions contend with the challenges of exhibiting nature in unnatural environments. Their history reveals how concepts of nature have evolved and tells of a modern tendency to romanticise wildness.

The naturalistic style of early zoo design later gave way to Modernist architecture that acknowledged the zoo as a public attraction. In the 21st century, new exhibits combine the geographies of animal life and human culture, reflecting a conservationist agenda that seeks to narrow the gap between the two.

The behaviours of the zoo's human visitors offer insights into the bonds we form with other species. The personas we create for zoo celebrities – individual animals that appear in the media and on merchandise – confirm the importance of storytelling. They speak of the symbolic value of these mascots, onto which we project very human hopes and fears. As with the visually seductive natural history documentaries on our televisions, the danger is of looking at animals but not seeing them.

WALL LABELS

William Temple Hornaday was chief taxidermist to the Smithsonian Institution. In 1886 he travelled to the American West to hunt bison for a new museum display. With the bison facing extinction due to overhunting, preserving these national animals in a museum was crucial. However, the sight of the dwindling herds transformed Hornaday into one of America's earliest conservationists. He went on to found the first national zoo, known today as the Bronx Zoo, which opened in 1899.

William Temple Hornaday (centre) and Andrew Forney, with an unidentified man, working in the Taxidermy Studio in the South Yard, around 1880

Two bison in a paddock in the South Yard behind the Smithsonian Institution building, 1886–89

William Temple Hornaday and bison calf Sandy, 1886

Bison taxidermy group, 1887

A group of schoolchildren viewing the first bison at the National Zoological Park, 1899, by Frances Benjamin Johnston

Reproductions courtesy the Smithsonian Institution Archives.
Images MNH-3662, MAH8008A, 74-12338, NHB-5470, 2003-19498

Moran joined the first geological survey of America's Yellowstone region as the official artist. His paintings of this extraordinary landscape were instrumental in lobbying Congress to establish Yellowstone as the world's first national park in 1872.

The drama of his scenes plays to the idea of the park as a site of true wilderness, untouched by human civilisation. In reality, it was established as a pleasure ground and nature reserve. None of the park is designated as wilderness under the Wilderness Act of 1964.

The Great Blue Spring of the Lower Geyser Basin, Yellowstone National Park, 1876. Colour lithograph

Tower Falls and Sulphur Mountain, Yellowstone National Park, 1874. Colour lithograph

Wellcome Library

Ming of Harlem: Twenty One Storeys in the Air, 2016.
Two-screen video installation, 36:21 mins and 25:12
mins (looped)

Phillip Warnell

Warnell's installation explores the true story of Antoine Yates, who lived in a high-rise New York apartment with a tiger called Ming and a large alligator. On the smaller screen, Yates reflects on his experience of living in close proximity to the large predators, while the projection is a meditative study of the animals themselves.

The artist

Regent's Park Zoo, 1930. Transport for
London poster

Arnridd Banniza Johnston

London Underground commissioned a number of posters to encourage travelling by tube to the Zoological Society of London. In this playful design the human visitors are on display for the animals' entertainment. The bears, goats and deer of the Mappin Terraces have been replaced by university students and politicians in top hats and tails, to whom a family of bears throw cigars.

London Transport Museum

The New Architecture and The London Zoo, 1936,
16:03 mins

László Moholy-Nagy

In the early to mid-20th century, ZSL invited a number of notable Modernist architects to redesign its animal enclosures. These designs rejected the man-made naturalism of earlier exhibits, instead creating architectural settings that framed the animals to maximum visual effect. These acknowledged the unnatural conditions of the zoo and its role as a public attraction. Today many of these structures are listed buildings.

Hattula Moholy-Nagy/DACS 2016

Record drawing for Elephant and Rhinoceros Pavilion, Zoological Society of London, around 1971.
Pencil, pen with black ink and coloured washes on polyester sheet

Hugh Casson

In 1964, the architect Hugh Casson designed a new elephant and rhinoceros enclosure “in the spirit of an exhibition building”. The animals’ platform was raised to emphasise their size and they were lit from behind, illuminating them as silhouettes. Casson’s dramatic design recast the animals and visitors as performers and spectators.

Royal Academy of Arts, London

Black-and-white photographs of the elephant and rhinoceros pavilion at ZSL, 1965

Henk Snoek and Reginald Hugo de Burgh Galwey

Casson Condor Partnership Architects

The Land of the Lions exhibit at ZSL, 2016. 5:27 mins

Chris Chapman and Simon Moore

ZSL's lion exhibit opened in 2016, designed by Ray Hole Architects. It is inspired by Gir National Park and Wildlife Sanctuary in India, whose human inhabitants live in close proximity to its Asiatic lions.

Wellcome Collection

In 1955, the BBC broadcast a 30-minute black-and-white film of woodpeckers shot through the back of their nesting hole. Made by the German filmmaker Heinz Sielmann, it offered a view of nature never seen before. Its popularity led to the rapid growth of natural history documentary making and, for the general public, a new way of looking at nature. The naturalist and broadcaster James Fisher described Sielmann's film as "escape to reality", capturing both the appeal and the dangers of these cinematic visions of the natural world.

This selection of films traces a brief history of nature documentaries from the dream-like works of Surrealist filmmaker Jean Painlevé through to the popular television broadcasts of David Attenborough.

Extracts from:

Hyas and Stenorhynchus, Marine Crustaceans, 1929, 2:12 mins. Directed by Jean Painlevé

Seal Island, from the True-Life Adventures series, 1948, 2:00 mins. Directed by James Algar, produced by Walt Disney

WOODPECKERS, 1955, 1:55 mins. Photography Heinz Sielmann, presented by Peter Scott

Trailer for the BBC series *Frozen Planet*, 2011, 1:53 mins

Archives Jean Painlevé, Paris; Disney Enterprises, Inc.; BBC/Getty; BBC/Getty

CASE LABELS

Our Vanishing Wildlife, 1913

William Temple Hornaday

Hornaday's book was one of the first devoted entirely to the relatively new concept of wildlife conservation. It used graphic photographs to communicate the dangers of overhunting and the threat of extinction. Hornaday advised his readers that "every possible means of preservation – sentimental, educational and legislative – must be employed". He sent a copy to each US congressman to encourage legal reform around the sale of game meat and plumage feathers.

Wellcome Collection

Minds and Manners of Wild Animals, 1922

William Temple Hornaday

In his study of animal intelligence Hornaday attached great importance to the work of professional animal trainers and keepers in zoological parks. He argued that the performance of "educated" animals allowed him to see their true capabilities, such as Baldy the chimpanzee, who he described as a "natural comedian".

Wellcome Collection

Letter from William Temple Hornaday to the Secretary of the Smithsonian, 1886

Although Hornaday went on to become a passionate conservationist, in 1886 his priority was preserving the bison in a museum: “...we killed very nearly all we saw and I am confident there are not over thirty-head remaining in Montana, all told. By this time next year the cowboys will have destroyed about all of this remnant. We got in our Exploration just in the nick of time... we can have a series of mounted specimens that will be envied by all other museums.”

Reproduction courtesy the Smithsonian Institution Archives. Images SIA2015-009436, SIA2015-009437, SIA2015-009438, SIA2015-009439

Magazine of The British Association for Shooting and Conservation, March/April 2016

There remains a long-standing and contentious relationship between hunting and conservation. The British Association for Shooting and Conservation defines its mission as “to act for the benefit of the community by promoting practical habitat conservation, wildfowl, game and deer management... education and scientific research”. Many national parks, in the UK and overseas, evolved from lands that were originally protected as private hunting reserves.

In the 19th century, Jumbo the elephant delighted visitors to the zoo by accepting treats and offering rides. His sale to P T Barnum's circus in the USA in 1882 caused a public outcry, generating extensive Jumbo-mania paraphernalia and countless poems, songs and stories.

Polar bear Ivy and her cub Brumas attracted ZSL's highest visitor figures of all time and featured in numerous toys and souvenirs of the 1950s. The chimpanzees' tea party was another popular attraction at ZSL from 1926 to 1972. These inspired the PG Tips advertisements which began in 1956 and were broadcast until 2002.

These zoo celebrities have captured the hearts of the nation and blurred the distinction between domesticated and wild animals.

1. Zoo Newsletter Rebuilding Issue, January 1965
2. *Jumbo's Jinks: a Comic Vocal Medley*, 1882. Sheet music
3. *Jumbo's Farewell*, 1882. Comic book
4. Chimpanzees' Tea Party toy set, 1946–1950
5. Ivy and Brumas, 1950–1955. Stitched and stuffed mohair plush, manufactured by Dean's Co Ltd.

Victoria and Albert Museum. Gift of Sir Hugh Casson Ltd.; Zoological Society of London; Zoological Society of London; Museum of London; V&A Museum of Childhood

6. Illustration for *The Murders in the Rue Morgue* by Edgar Allan Poe, 1870. Engraved by Eugene Michel Abot

Daniel Urrabieta y Vierge

Poe's story traces the violent murder of two women to an escaped orangutan, brought to Paris by a travelling sailor. Now at large, this one-time pet becomes a wild and dangerous beast. His inhuman, irrational wildness sits in contrast to the analytical mind of the story's amateur sleuth, Chevalier Auguste Dupin.

Reproduction courtesy Bibliotheque Nationale,
Paris/Bridgeman Images

Poster showing a future concept for a zoo,
around 1897

Carl Hagenbeck

Hagenbeck was an animal trader and showman who created the prototype for cageless, open enclosures. He drew on the traditions of 18th century English landscape gardening using ha-has (ditches) to control the movement of animals across the land. This allowed for uninterrupted views of the landscape, giving the illusion of an unbounded nature. Hagenbeck's concept was realised as Hamburg's Tierpark Hagenbeck in 1907 and influenced much future zoo design.

Reproduction courtesy of Archiv Hagenbeck, Hamburg

The zoological keepsake; or Zoology, and the garden and museum of the Zoological Society; for the year 1830. 1829

This bird's-eye view shows the design for the Zoological Society of London grounds by Decimus Burton, ZSL's first architect. Guides such as this one shaped the visitor's experience of the zoo by directing them along well-marked paths in manicured grounds. Set within the picturesque landscape of Regent's Park, the zoo appeared a seamless extension of its 'natural' surroundings.

Zoological Society of London

‘Whose conservation?’, *Science*, 2014

Dame Georgina Mace DBE, FRS

In this article, Georgina Mace, Professor of Biodiversity and Ecosystems, describes four historical phases of conservation since the 1960s. Mace outlines the key ideas driving conservation, exploring how changing motivations and values are informed by wider societal developments. The most recent “Nature and People” phase focuses on the interconnection between social and ecological systems, and reflects a narrowing of the gap between nature and society.

Wellcome Collection

Screen Captions

Hyas and Stenorhynchus, Marine Crustaceans (extract)
1929, 2:12 mins

Directed by Jean Painlevé

In this early attempt to capture the wonders of the natural world on film, two species of marine crustaceans move, eat, greet each other and fight. The respiratory gills of a nearby spirograph worm fan out like exploding fireworks. As they dance across the screen to music by Chopin, the film's narrator (Painlevé) likens it to a ballet.

Archives Jean Painlevé, Paris

Seal Island, from the True-Life Adventures series
(extract) 1948, 2:00 mins

Directed by James Algar, produced by Walt Disney

Between 1948 and 1960, Walt Disney produced 14 nature documentary films. Seal Island chronicles the family life of the fur seal. In this extract the females arrive for mating season accompanied by a soundtrack of Richard Wagner's 'Here comes the bride'. Up until this point, nature films had been shown mostly in non-fiction cinema. By promoting these films as entertainment the True-Life Adventures series reached millions of cinema-goers.

Disney Enterprises, Inc.

WOODPECKERS (extract) 1955, 1:55 mins

Photography Heinz Sielmann, presented by Peter Scott

Sielmann pioneered infrared filming to capture footage inside the woodpeckers' nests. His film revealed aspects of the birds' parenting behaviour that was new to scientists, as well as the general public. When it was broadcast on the BBC's natural history series, Look, in 1955, it received the highest viewing figures after the Coronation.

BBC/Getty

Trailer for the BBC series Frozen Planet, 2011, 1:53 mins

David Attenborough's series aimed to raise awareness about the effects of climate change on the polar regions. It offered viewers unprecedented access to the furthest reaches of the planet. The dramatic trailer for the series features some of its most spectacular footage and encourages viewers to "journey to a world beyond imagination".

BBC/Getty

MAKING

In 2008, the Center for PostNatural History was founded in Pittsburgh, USA. It is the only institution in the world solely to collect and record organisms that have been intentionally altered by humans. These range from animals that have been selectively bred and domesticated, such as pigeons and dogs, to those that have been genetically engineered, including laboratory mice, photosensitive bacteria and BioSteel™ goats – all of which they term “PostNatural”.

The objects on display have been selected by the Center for PostNatural History. Unlike traditional natural history museums, the Center defines animals not by their biology but by their cultural history. Through specimens, artworks, books and music they explore some of the ways in which humans have taken control of the reproduction, habitats and DNA of certain animals and the evolutionary implications of this. In turn they acknowledge the role these altered organisms play in sustaining human culture, from the competitive breeding of dogs to the influence of birdsong on human performance.

Together these objects tell a different story of nature, one in which the past, present and future of humans are closely entwined with those of other animals.

WALL LABELS

Each of these organisms has been substantially altered by human beings, either through the slow process of domestication, such as the samples of corn varieties, or through the more rapid techniques of genetic engineering, such as the photosensitive bacterial film.

Each specimen is a reflection of particular cultural desires and fears. Some embody specific anxieties – a Finnish alcoholic rat, the frog that was one of the first reliable pregnancy tests – while others speak to a desire to influence our future habitat: a mosquito that is resistant to malaria and the American chestnut tree that can fend off a fatal fungus. Specimens like these are rarely, if ever, seen in a museum of natural history.

That was then. This is now.

Transgenic mosquito, *Aedes aegypti*, 2009
Pinned specimen

African clawed frog, *Xenopus laevis*, date unknown
Preserved in industrial methylated spirits
Grant Museum of Zoology, UCL

Five varieties of maize in chronological order of original cultivation: Blue Corn, Bloody Butcher, Pencil Cob, Gem Corn and Monsanto 850 RoundUp™ Ready, 2010s. Dried seeds in test tubes

Skull of a BioSteel™ goat, *Capra hircus hircus*, 2013

Transgenic American chestnut tree, *Castanea dentata*, 2009. Pressed leaf

Embryo of a ribless mouse, *Mus musculus*, 2012.
Specimen preserved in glycerin

Taxidermy white laboratory rat, *Rattus norvegicus*,
2012

'Hello World', 2004. Photosensitive *E. coli* bacteria
dried and preserved in acrylic

A transcript of the accompanying audio is available nearby

All Center for PostNatural History unless otherwise stated.

Three photographs from the *Atomic Age Rodents*
series, 2011

Richard Pell

The specimens in the Rodent collection of The Smithsonian Institution's National Museum of Natural History are sorted by the location in which they were collected. During a research fellowship, Richard Pell, curator of the Center for PostNatural History, noticed a bias towards locations where the United States military had been active during the 20th century. "In addition to stories about evolution and habitat," Pell explains, "these specimens are telling stories of war and the history of America."

Center for PostNatural History

Brown rat, *Rattus norvegicus*, specimen collected from Nagasaki, Japan, 2 October 1945

Having survived for nearly two months after the atomic bomb laid waste to Nagasaki on 9 August 1945, this brown rat was captured by a US military medic in the vicinity of a hospital as part of a Malaria and Epidemic Control programme.

Center for PostNatural History

Polynesian rat, *Rattus exulans*, specimen collected from Bikini Atoll, 8 March 1946

This Polynesian rat was trapped by Smithsonian researchers immediately before the Operation Crossroads atomic tests. These tests, the first atomic explosions since the end of World War II, were elaborately planned, involving the destruction of dozens of enemy and decommissioned American warships and the removal of the indigenous populations. Smithsonian researchers collected specimens of fish and mammals before and after the blasts.

Center for PostNatural History

Chisel-toothed kangaroo rat, *Dipodomys microps*,
specimen collected from Nevada Test Site, United
States, 23 July 1964

The Nevada Test Site has been home to more nuclear detonations than anywhere else on the planet. Between its establishment in 1951 and the end of US atmospheric testing in 1963, it experienced 904 atomic blasts. After the final atmospheric test, Smithsonian researchers were commissioned by the military to collect specimens as part of an atomic contamination assessment programme. After generations of its ancestors had survived the tests, this desert rodent met its end in one of their traps.

Center for PostNatural History

Human fascination with bird song extends as far back as the first written transcription of their song in ancient Greek theatre.

Humans soon discovered they could train captive birds to sing songs that may not attract mates in the wild, but would captivate human listeners. The songbird became a programmable musical device.

The advent of audio recording allowed these virtuosic birds, and their human imitators, to reach a global audience, even as this emerging technology replaced their role as domestic music-makers.

Birdlike and Wingless

Ian Nagoski in collaboration with the Center for PostNatural History

1. *Musurgia Universalis* by Athanasius Kircher, 1650
2. *Bird Fancier's Delight*, published by John Walsh & John Hare, 1717
3. Taxidermy yellow canary, *Serinus canaria domestica*, 20th century
4. *Actual Song of the Canary-Bird*, 1920s, 78rpm vinyl record produced by Victor Records at Karl Reich's aviary

University of Glasgow Library Special Collections; University of Glasgow Library Special Collections; Center for PostNatural History; Ian Nagoski

5. Taxidermy nightingale and Victrola recording horn
6. *Song of the Nightingale*, 1913, 78rpm vinyl record

Center for PostNatural History; Ian Nagoski

7. *A Suitable Teacher for Young Roller Canaries*, produced by the International Roller Canary Breeders Association, 1922, 78rpm vinyl record
8. *Songs of Wild Birds*, 1936, box set including two discs and a book by E M Nicholson and Ludwig Koch
9. *How Birds Sing* featuring Charles Kellogg, 1914, 78rpm vinyl record

A transcript of the accompanying audio is available nearby

Ian Nagoski; The British Library; Ian Nagoski

CASE LABELS

On the Origin of Species set out Darwin's theory of evolution by natural selection. It begins with a lengthy discussion of the domesticated pigeon. Darwin conducted his own experiments in the breeding of pigeons and, in his later writings, refers to the *Treatise on Domestic Pigeons*, one of the earliest instructional texts for pigeon breeders. His study helped him to develop his theory of evolution through natural selection in the wild.

Fantail pigeon study skin, *Columba livia* domesticated variety, from the collection of Charles Darwin, mid-19th century

John Moore, *Treatise on Domestic Pigeons*, 1765

Charles Darwin, *On the Origin of Species*, 1872 (first edition 1859)

Trustees of the Natural History Museum, London; Wellcome Library; Wellcome Library

This oil painting depicts a popular 19th-century blood sport: the men are betting on how long the dog takes to kill the rats. Rat-baiting inadvertently created a cottage industry in breeding rats. Recessive traits began to appear, notably albinism, and white rats were taken up by Victorian women as domestic pets.

Soon breeding 'fancy' rats and mice was a respectable hobby. Scientific researchers benefited: the common ancestor of the now ubiquitous C57BL/6 white laboratory mouse was owned by a hobbyist, Abbie Lathrop. There are thousands of variations of inbred mice in the catalogue of the Jackson Laboratory, an independent biomedical research institution founded in 1929. This case contains just three examples.

British School, *Rat-Catching at the Blue Anchor Tavern, Bunhill Row, Finsbury, 1850-1852*, oil on canvas

W Maxey, *Fancy Mice and Rats: How to breed and exhibit*, 1920 (3rd edition)

Three mouse specimens from Jackson Laboratory, 1920s. Breeds C57BL/6, BALB, DBA

Genealogies of JAX Mouse Inbred Strains, 20th century

Museum of London; Collection of Eric Jukes; Center for PostNatural History; Reproduction courtesy The Jackson Laboratory (JAX)

Set of 29 papier-mâché zoological models of horses' teeth by Auzoux, in fitted carrying case, France, 1890s

Before plastic anatomical models began to be used, Dr Louis Auzoux pioneered a secret method for accurately modelling human and animal anatomy in papier-mâché. This set of teeth was designed to help those buying horses to accurately age the animal and to spot undesirable traits such as over-bites, crib-biting and wind-sucking. This helped to eradicate poor breeding and assisted in the quest for an 'ideal' horse.

Whipple Museum of the History of Science, University of Cambridge

Set of 11 plaster models of chicken heads by Reginald Punnett, early 1930s

In 1912 Reginald Crundall Punnett became Balfour Professor of Genetics at the University of Cambridge, probably the first professor anywhere in the world of this new scientific discipline. These plaster chicken heads illustrate one of Punnett's key contributions to agriculture: his creation in 1929 of the Cambar, the world's first 'auto-sexing' chicken. The colour and patterning of the Cambar's female chicks differed from the males, enabling them to be rapidly and cheaply identified by egg farmers.

Whipple Museum of the History of Science, University of Cambridge

Six skin specimens of budgerigars, *Melopsittacus undulatus*, showing colour variations, 1935–1957

In the wild, budgerigar plumage is a combination of bright yellow and green with black stripes. Over the course of two centuries of selective breeding in human captivity, the domestic budgie has been modified to express a rainbow of different hues. Budgies are now one of the world's most popular pets.

Trustees of the Natural History Museum, London

DNA extracted from a taxidermy passenger pigeon, *Ectopistes migratorius*, 2012. Photograph and glass vial

This tiny vial captures an extremely unusual moment in the story of the extinct passenger pigeon. DNA samples are being collected from 19th-century passenger pigeons in museum collections, in order to assemble sufficient genetic diversity to be able to 'resurrect' the extinct species. While this project is in its infancy with much uncertainty surrounding it, if successful, the passenger pigeon would be the first species to be recovered from DNA alone.

The Long Now Foundation

The breeding of pedigree dogs began in the Victorian era and, with it, a growing obsession with animal aesthetics and purity of lineage. Qualities that until then had been subtle indicators of breed quickly became exaggerated in the extreme – the dachshund's shortened stature, the abbreviated snout of the English bulldog, or the small head of the King Charles Spaniel. Particularly good examples, such as Nina Advocate, were immortalised through taxidermy.

The American publication *Visualizations of the Dog Standards* describes the ideal characteristics, temperament and appearance of each breed while non-breeding agreements are sometimes used to remove undesirable traits from the gene pool.

Taxidermy head of Nina Advocate, King Charles Spaniel, 1910

Visualizations of the Dog Standards, 1968 (first edition 1962). Edited by Alice M Wagner and A B Sidewater

Canadian Kennel Club Non-Breeding Agreement, 2016

Trustees of the Natural History Museum, London; Center for PostNatural History; Center for PostNatural History