Case 4

Mammal Biodiversity

Biodiversity is the term used to describe the variety of life on Earth. It is more than just the number of species that are found in any given area: it is also the unique evolutionary history of animals over 2.5 billion years. Mammals show incredible biological diversity and have evolved to fill a wide range of ecological niches, adapting their physiology, life history, and behaviour to good effect. Mammals play an important role in ecosystems by, for example, regulating insect populations and influencing seed dispersal and pollination; they also provide a useful indication of general ecosystem health.

Losses in biodiversity are disproportionally large in mammals compared with the number of species that have recently become extinct and it is predicted that these losses will continue apace for at least the next 50 years. It will likely take millions of years for mammals to naturally recover from these predicted losses without enhanced conservation efforts.

Elgin Museum has contributed to ‘The Wild Escape’ which is a creative project led by Art Fund UK (supported by Arts Council England and Museums Galleries Scotland) to provide an opportunity for the next generation to join in the conversation about biodiversity.

This display of skulls from our collection concentrates on teeth as an example of how mammals have evolved to best exploit their environment.

The Wild Escape

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Diversity Hot Spot: India and Asia:

1. Indian Brown Bear
Its teeth are suited for a wide variety of food items from fish, moose, and insects to nuts and berries. It needs large canines to grip and hold prey but large flat molars to chew tough plant material.
ELGNM: 1978.495

2. Tiger
Needs strong jaws to grasp moving prey so its jaws only move up and down, not sideways. They don't chew meat – just slice it with sharp-edged premolars and molars.
ELGNM: 1978.468

3. Lioness
Incisors are used to pull meat from a carcass, scrape bones and groom fur. The canines are used to grab and hold fleeing prey and suffocate it. The largest premolars and molars are called carnassial teeth. They have sharp edges, used to shear and slice meat like scissors.
ELGNM: 1844.2

Diversity Hot Spot: Africa

4. Striped Hyena
Have a large head and strong jaws filled with huge teeth. Its powerful bite (800 pounds per square inch) is used to crush bones. It scavenges more than it hunts but can take down relatively large prey.
ELGNM: 1978.496

5. Ring-tailed Lemur
The incisors and canines on the lower jaw form a comb for grooming their fur and the fur of other individuals. They have flat premolars and molars to chew their vegetable food.
ELGNM: 1978.513

6. Baboon
Eats plant material and meat so it needs sharp teeth to pierce and kill prey. The long canines are used to threaten and fight: the longer they are the more dominant the individual is likely to be.
ELGNM: 1978.501

7. Leopard
A carnivore which eats small- and medium-sized prey to avoid competition with larger predators such as lions. Its teeth are therefore smaller. The carnassial teeth along the sides of the jaw have sharp edges to shear and slice meat, so the leopard swallows its food without chewing it.
ELGNM: 1978.498

Marine Mammals:

8. Porpoise
Porpoises have 60 -120 spade-shaped teeth which they use to eat a variety of fish, squid, octopi, and crustaceans. Their tooth shape is used to distinguish them from dolphins which have cone-shaped teeth set in a prominent elongated ‘beak’ (Compare with 10.)
ELGNM: 1978.476

9. Sperm Whale
The sperm whale has 18-26 teeth on each side of its lower jaw which fit into sockets on the upper jaw. The teeth are con-shaped and weigh up to 1 kg each. The teeth are possibly more important in aggression between males than in capturing their food, which mostly comprises large squid.
ELGNM: 1850.3

10. Dolphin
Bottlenose dolphins, like those in the Moray Firth, have 80-100 teeth. They use them to grab, grip and secure a fish, before swallowing it whole, head first.
ELGNM: On loan

11. Polar Bear
Has a very powerful bite of 1,200 pounds per square inch. The incisors are sharp for shearing off pieces of blubber and flesh. The canines grasp prey and tear tough hides. The jagged premolars and molars tear and chew.
ELGNM: 1978.321

12. Seal
Seals have sharp conical teeth for gripping slippery fish.
ELGNM: 1978.517

Case 4 – Mammal skulls: teeth and diet

This display of skulls and analysis of their dentition and diet links with the story of our Museum. Elgin Museum was built in 1842 out of the urgent need to house the collections of our founders. Natural history donations feature strongly in the First Accession Book. Collecting in the 19th century was a popular occupation, whether for aesthetic pleasure, in a spirit of scientific enquiry, or for sport. Note that the back of the skull of the **Tiger (2),** date and donor unknown, has been blasted away!

Our collecting policy now for natural history is very restrictive. We concentrate on conserving and sharing our existing material rather than acquiring more. Recent examples of research:

Asiatic lioness skull (3): collected by Forres-born medical doctor and palaeontologist, Dr John Malcolmson, before 1844. This has been sampled at the Natural History Museum's ancient DNA lab for a project at Queen Mary University, London.

Polar bear (11): we have no history for this skull except that it came to the Museum before 1978. An Edinburgh University palaeontology post-graduate student, here researching our Permian reptile material, spent some time comparing the anatomy with our extinct reptiles. Study of skull features is a key tool in interpretation of many aspects of earlier lifestyles and environment.

Display by Museum volunteers Martin Cook and Alison Wright, with additional notes by Janet Trythall.