Australian Museum

Koala (*Phascolarctos cinereus*) – Fact Sheet

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Created by: Anja Divljan, Mark Eldridge and Ramy Moussa

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Introduction

The koala (*Phascolarctos cinereus*, Goldfuss 1817) is one of the best-known Australian animals, whose worldwide popularity has continued to grow throughout the 20th century [1]. Koalas are medium-sized, slow-moving, arboreal mammals belonging to the group Marsupialia (the marsupials). The koala is the only surviving member of the family Phascolarctidae, and is distantly related to the wombats.

Koalas evolved from a diprotodont ancestor (extinct, wombat-like marsupial) some 35 million years ago (mya), and the earliest koala-like fossils date back to 25 mya. A relatively large amount of koala fossil material has been discovered in the past few decades [1], with around 18 extinct koala species now recognised.

When compared to the fossils of other animal groups, koalas appear to have occurred in low abundance in the past. The dentition of fossil koalas suggests they fed on a similar diet to the modem-day koala - foliage of then-uncommon ancestral eucalypts [2]. As the climate became drier (late Tertiary, 5 mya), the eucalypt forests in Australia expanded, allowing the koalas to become more abundant and wide-spread. A continuing trend towards drier climates may ultimately have had a negative effect on koalas in some areas, with modern koalas disappearing from southwestern Australia during the late-Pleistocene (30,000 years ago) [2].

Another hypothesis is that these Pleistocene local extinctions of koalas coincided with the arrival of humans in Australia, suggesting that hunting and burning practices may have had a significant impact on the species [2]. Although such hypotheses are difficult to resolve, it is likely that both climate change and human activity had an effect on the distribution of koalas in the past, a trend which continues today. For instance, koalas were extensively harvested for their skins in the late 1800s and early 1900s, which caused a major decline of the species in the early 20th century and the subsequent need to protect them throughout their range.

Name Origins

The koala's scientific name *Phascolarctos cinereus* is derived from the Greek words 'phaskolos' meaning pouch and 'arktos' meaning bear; and the second word 'cinereus' is Latin and means ashy or ash-coloured, referring to the fur colour of the animals first encountered by Europeans around Sydney.

The common name 'koala' appears to be derived from an eastern New South Wales Aboriginal language, but the exact details are somewhat unclear. The first Aboriginal names for the koala were recorded by Europeans from around Sydney between 1798-1803 and included: 'cullawine' (or cullewine), 'colo' and 'koolah'. The name 'koala' is probably derived from one of these. Although Europeans first settled in Sydney in 1788, it was not until 1798 that the first koala

was noted by them and the first whole specimen was not obtained until 1803 [1]. The species was not formally given a scientific name until 1817.

Other common names given to the koala by early Europeans include: koala bear, native bear, native sloth, and monkey bear; although the word 'bear' is misleading and should not be used when referring to *P. cinereus*.

Identification

The koala is an unmistakable animal with a large round head, distinct black nose, small forward-facing eyes and large, oval, furry ears on the side of the head. It has a stocky build and no tail. Its fur is thick and ash grey, or grey-brown on the dorsal side, with the underside, including the collar to the base of the ears, being whitish or pale yellow-grey. Southern animals have longer fur, often chocolate brown across the upper back and shoulders, with long white ear tufts. The northern koalas are smaller and greyer with shorter fur. Male koalas have a sternal gland (moist, dark and hairless patch in the middle of the chest), used for scent marking tree trunks and branches.

Koalas are sexually dimorphic, with females generally being ~50 % smaller than males [3]. In addition, following Bergmann's rule, southern individuals living in cooler climates are larger (up to 50 %) than animals in the tropical north. The body mass of females in Victoria is on average 8.5 kg, while those in Queensland weigh around 5.1 kg. Similarly, males in Victoria are larger at 12.0 kg, compared with those in Queensland (6.5 kg) [1].

Based on their size and general appearance, three 'races' or sub-species of the koala have been proposed: *Phascolarctos cinereus cinereus*, intermediate distribution, *Phascolarctos cinereus adjustus*, found in the north, and *Phascolarctos cinereus victor* found in the south. However, these represent arbitrary selections from a distinct north-south cline and no subspecies designations should be recognised. Genetic studies show low levels of divergence between the proposed subspecies [4], suggesting the morphological differentiation is likely to be an adaptation to different climates.


Photography: G. Frankham
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Distribution & Habitat

Koalas are widespread and can be found in an area of around one million square kilometres in eastern Australia. They do not live in Tasmania and Western Australia. The current distribution of the species reflects the now fragmented nature of Australian forests - it is disjunct and broken into a number of populations that are isolated by areas of unsuitable habitat and cleared land [1].

Koalas are more abundant in the forests and woodlands in the south of their distribution (e.g. 600-900 animals / km^2 on French Island, Victoria), compared to the northern areas (e.g. 40 animals / km^2 in south-eastern Queensland) [1]. Consequently, most of the research on koalas comes from areas in Victoria, and data on populations in the northern and western parts of the distribution are less comprehensive. This variation in abundance of koalas has been attributed to different food availability [1]. Koalas can be found in forests and woodlands of arid, temperate, sub-tropical and tropical areas; yet, their numbers are dependent on the *Eucalyptus* trees, which can vary in many

aspects determining their productivity and palatability to koalas.

Diet & Behaviour

The koala feeds almost exclusively on eucalypt (gum tree) foliage (~400 g per day) [3]. Although only a small proportion of *Eucalyptus* species are utilised by koalas, the preferred tree species vary between localities. Eucalypt leaves are poor quality food, and koalas rely on behavioural, physical and anatomical adaptations to survive. For instance, koalas have specialised digestive system to deal with the poor quality and potentially toxic diet. Most of their energy comes from efficient mastication, as they use their powerful jaws and ridged teeth to cut the leaves into very small pieces, thereby releasing the leaf cell contents [3]. Koalas are hindgut fermenters, and have a caecum (appendix) that is proportionally the largest of any mammal. This enables them to retain and ferment part of their food for long periods, which aids the retention and cycling of nitrogen. Koalas produce dry faecal pellets to conserve water, as they only seldom drink [1].

In addition, koalas have low metabolic rates, and spend much of the day resting [3]. Most feeding occurs in the latter part of the day (17:00 – 24:00 hours), when individuals feed in a series of ~20-minute bouts [1]. Some koalas will eat at other times of the day. Wet and cold weather will often influence the feeding behaviour as individuals remain curled in a tight ball instead, thereby keeping warm and conserving energy.

Koalas will move between trees on average once a day, and will generally feed in every tree they occupy. However, some studies suggest that the link between tree use and feeding preference is more complex [1].

Breeding & Life Cycle

Koalas reach sexual maturity when they are around 2 years old, and the breeding season is October-May. They are generally solitary animals, but in areas of high density there is a male dominance hierarchy. Males will fight and bellow frequently during the breeding season to advertise their presence to each other and receptive females [3].

After a gestation of about 35 days, the females give birth to one small young (weighing <0.5 g; rarely twins) between November and March. The relatively undeveloped young then climbs from the urogenital opening into the pouch, where it attaches to one of the two teats and then spends the next 6-8 months growing and developing. At about nine months it emerges permanently out of the pouch and becomes independent from its mother at one year.

Koalas can live to over 15 years in the wild, but most are believed to die between 10-14 years of age. Males generally do not live as long as females.


Photography: G. Frankham

Diseases

Koalas are susceptible to infectious retroviruses that may compromise their immune system, which can then lead to other diseases including leukaemia and lymphatic cancer. One of the main pathogens that affect koalas are the bacteria from the Chlamydia strain.

Koalas infected with Chlamydia often suffer from the following:

- an acute form of conjunctivitis, that can lead to blindness,
- reproductive tract disease, which can cause infertility in females,
- respiratory tract disease, that can lead to pneumonia
- urinary tract disease, mainly found in females and causing wet, matted and bad-odour fur around the rump of the animal ('dirty tail' 'wet-bottom'). This infection can spread to the kidneys and eventually causes death [1].

Furthermore, the low genetic variation found in koalas in some locations may pose an additional threat, as it may exacerbate the risk of disease. This means that a new disease could impact a high proportion of individuals in the population.

Conservation Status

Koalas are cryptic animals that live in a series of isolated populations across a large area of Australia, and so it is not possible to accurately determine the total number of individuals present across their entire distribution. *Chlamydia* infections, which often cause infertility in females, coupled with habitat loss and degradation pose major threats to koala populations and lead to local extinctions. Urban development is also a major threat as it leads to tree loss and exposes koalas to predation by dogs and being killed by cars. Conversely, in some areas (e.g. southern Australia), lack of natural predators and relatively high fecundity causes overpopulation of koalas, which can be detrimental to the environment due to high levels of browsing on their preferred feed trees [3]. Hence, in some areas of Australia koala populations are declining, while in others they are increasing, making management strategies for the species complex.

The Conservation Status of the koala varies across Australia: in New South Wales koalas are listed as vulnerable under the *Threatened Species Conservation Act 1995*, in Queensland they are listed as vulnerable in south-east parts of the state (but are common elsewhere) under the *Nature Conservation Act 1992*, in South Australia they are protected under the *National Parks and Wildlife Act 1972*, and in Victoria they are not listed under the *Victorian Flora and Fauna Guarantee Act 1988*, but are protected under the *Wildlife Act 1975*. Internationally, the koala is listed as 'of least concern' on the 2012 IUCN Red List of Threatened Species [5].

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