

CONVERGENCE: MARSUPIALS AND PLACENTALS

Marsupials in Australia and placental mammals in North America provide another example of convergent evolution. These two subclasses of mammals have adapted in similar ways to a particular food supply, locomotor skill, or climate. They separated from some common ancestor more than 100 mya, and each lineage continued to evolve independently. Despite this great temporal and geographical separation, marsupials in Australia and placentals in North America have produced varieties of species living in similar habitats with similar ways of life. Their resemblances in overall shape, locomotor mode, and feeding and foraging are superimposed upon different modes of reproduction, the feature that accurately reflects their distinct evolutionary relationships.

Australia, a continent in the southern hemisphere, is the size of North America; 200 mya it was part of Gondwana, the large southern continent that included Africa, Madagascar, New Zealand, Antarctica, and South America. As Gondwana split up, Australia became isolated and has remained so for over 100 million years. Marsupials entered Australia before this separation and have evolved independently from placental mammals ever since. Marsupials had a similar and successful radiation in South America, which was also an island during this same time period. South America joined to North America as recently as 3 mya, through a land bridge, the Isthmus of Panama. Placental mammals invaded South America and replaced many marsupial species.

Over 200 species of marsupials live in Australia, along with many fewer species of placentals. The marsupials have undergone an adaptive radiation to occupy the diversity of habitats in Australia, just as the placentals have radiated across North America.

Color the placental embryo and adult within the map of North America.

Placental mammals are so called because a placenta connects the growing embryo within the uterus to the mother's circulatory system. The placenta provides the pathway for nourishing the fetus. This allows it to reach a higher level of maturity of body and brain prior to birth. Placental mammals invest more time and energy than marsupials in this early stage of growth. Placentals are much more numerous in North America and on most other continents than are marsupials.

Using a shade of the color you used for (a), color the adult marsupial and joey shown within the map of Australia.

Marsupial young begin life in the uterus but leave to enter the marsupium or pouch while they still qualify as embryos. With immature forelimbs they crawl into the pouch where they remain to complete their development. With their well-developed mouth and ability to suckle, they attach themselves to a teat to obtain milk.

Color each pair of animals, marsupial and placental, as they are discussed before moving on to the next pair. Choose two shades of a color for (b) and (b1). Choose two shades of a different color for (c) and (c1). Continue in this manner.

Marsupial mice, like placental mice in North America, are small, agile climbers inhabiting low shrubs. They live in dense ground cover and forage at night for small food items. The two mice exhibit similarities in size and body shape, and each group has numerous species.

Flying phalangers resemble flying squirrels. Both are gliders that eat insects and plants. Both the phalanger and squirrel have skin stretched between forelimbs and hindlimbs to provide greater surface area for gliding from one tree to the next.

Marsupial moles, like common moles in North America, burrow through soft soil to find and eat insects. The streamlined body shape, and the modified forelimbs for digging, facilitate an underground, insect-eating way of life. Velvety fur expedites smooth movement through the soil. The fur is white to orange in the marsupial mole and gray in the North American mole.

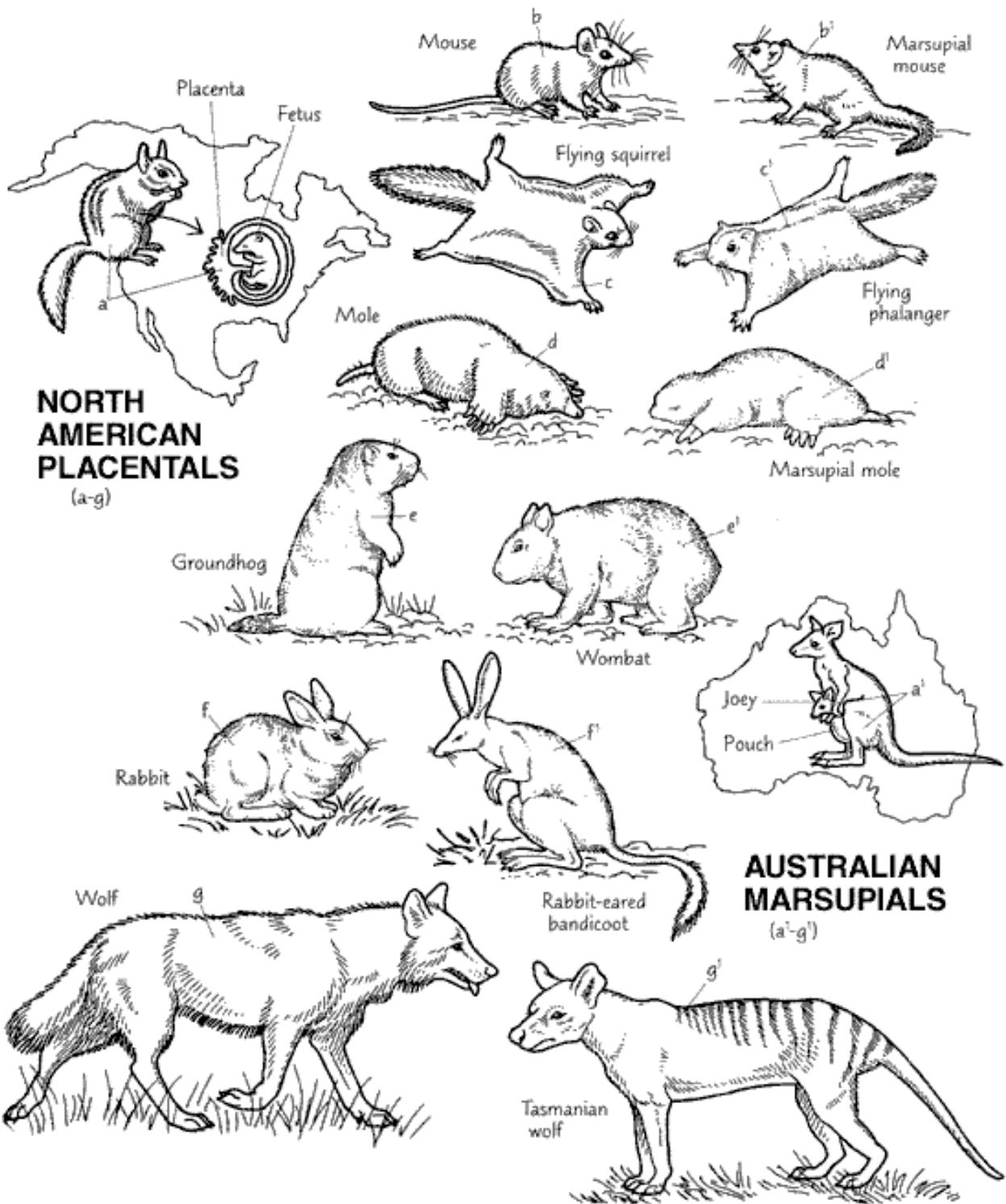
The wombat, like the North American groundhog, uses rodentlike teeth to eat roots and other plants. Both animals excavate burrows.

Rabbit-eared bandicoots resemble rabbits in North America. Both these animals have well-developed hindlimbs, which reflect their hopping form of locomotion, and their long ears emphasize the important role of hearing. The bandicoots have varied diets - some eat insects and plants; rabbits are exclusively vegetarian.

The Tasmanian wolf, a carnivorous marsupial resembling the placental wolf, inhabited mainland Australia as well as Tasmania. Its limb bones were long and adapted for running, and the skull and sharp teeth were adapted for tearing meat. Because it sometimes preyed on sheep and cattle, ranchers started a campaign to exterminate it (about 1900). The last Tasmanian wolf died in the Hobart Zoo in 1936.

Marsupial and placental mammals of Australia and North America illustrate one example of evolutionary convergence, where species not closely related resemble each other because they fill similar niches in each continent. In rain forest habitats of West Africa and South America, for example, or in the deserts of North America and Africa, other convergences in animal and plant life can be found.

MARSUPIALS AND PLACENTALS



– adapted from *The Human Evolution Coloring Book*, 2d ed., by Adrienne L. Zihlman.
Produced by Coloring Concepts Inc. New York: HarperCollins, 2001.