



Adaptations and Fitness

An **adaptation** (adaptive trait), is any heritable trait of an organism that suits it to its natural function in the environment. These traits may be structural, physiological, or behavioural. The idea is important for evolutionary theory because adaptive features promote fitness. **Fitness** is a measure of how well suited an organism is to survive in its habitat and its ability to maximise the numbers of offspring that survive to reproductive age. Adaptations must be distinguished from *properties* which,

although they may be striking, cannot be described as adaptive unless they are shown to be functional in the organism's natural habitat. Genetic adaptation must not be confused with *physiological adaptation* (acclimatisation) – an organisms ability to *adapt* during its lifetime to changing environmental conditions. The physiological changes that occur when a person spends time at altitude provide a good example of acclimatisation. Examples of adaptive features are illustrated below.

Number of Horns in Rhinoceroses

Not all differences between species can be convincingly interpreted-as adaptations to particular environments. Rhinoceroses charge rival males and potential predators, and the horn(s) when combined with the head-down posture, add effectiveness to this behaviour. Horns are obviously adaptive, but it is not clear that two horns, as in the black rhino, are most appropriate for the African savannah, while a single horn, as in the Indian rhino, is best adapted to India.

Great Indian Rhino



African Black Rhino



Ear Length in Rabbits and Hares

The external ear (pinna) of many mammals, including rabbits and hares, are used as important organs to assist in thermoregulation (controlling loss and gain of body heat). The ears of rabbits and hares that are native to hot, dry climates, such as the jack rabbit of south-western USA and northern Mexico, are relatively very large. The arctic hare lives in the tundra zone of Alaska, northern Canada and Greenland, and its ears are relatively short.

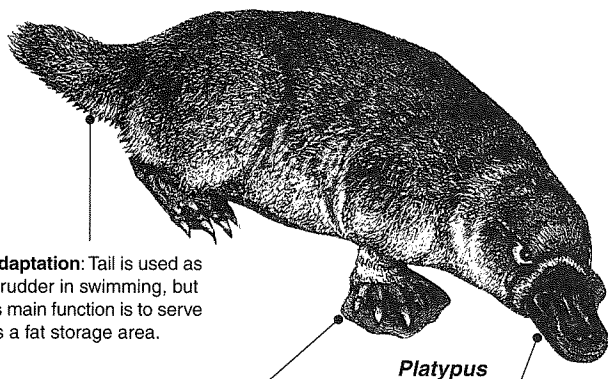
Arctic Hare



Whitetail Jackrabbit



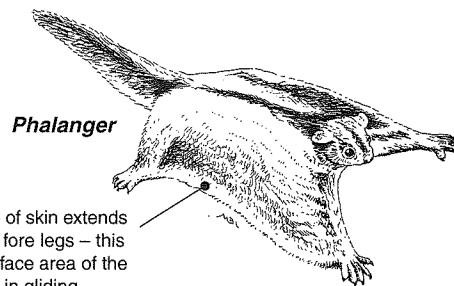
Adaptive Features



Adaptation: Tail is used as a rudder in swimming, but its main function is to serve as a fat storage area.

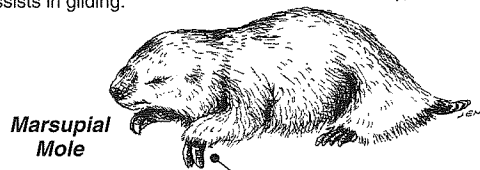
Adaptation: Webbed fore feet are the main propulsive organs in swimming (the webs can be folded back when walking or burrowing).

Adaptation: The soft and leathery bill, which is sensitive to touch, electrical activity, movements and vibrations, is used for navigation and for finding food.



Phalanger

Adaptation: Flap of skin extends from hind legs to fore legs – this increases the surface area of the body and assists in gliding.



Marsupial Mole

Adaptation: The claws of the fore legs are highly modified for digging into soil and thrusting the loosened dirt backwards.

1. Carefully distinguish between adaptive features (genetic) and physiological adaptation:

2. Explain why adaptive features are important for evolutionary theory: _____
