

Thought Lab 4.4: Homologies of Hair Answer Key

Answers to Analysis Questions

1. a) The structure of the organism's hair is related to its survival in its environment. For example, the hair of a polar bear is hollow, trapping air inside, providing extra insulation and warmth. This helps the polar bear survive in the Arctic.

b) You should hypothesize that all hair shares a characteristic that points to a shared common ancestor.

2. Presentation of findings:

Porcupine: porcupines cannot run fast nor are they big, so they use quills to defend against predators. Quills are modified hairs with modified barbs on the end that can be driven into the muscle of predators.

Sea Otters: Sea otters have more hair follicles per square inch than any other mammal. Unlike whales and walruses, sea otters do not have thick blubber to keep them warm; their thick fur coats protect them from cold temperatures. The fur consists of two layers, a protective outer layer and a fine "underfur." The underfur remains dry by trapping air bubbles in the oily fibres.

Cat Whiskers: Cats have long, specialized hairs that have nerve endings in them. They are very sensitive, increasing the cat's sense of touch and helping cats feel their way around at night.

Mane of a Lion: Only male lions have manes. The mane develops at sexual maturity, and then the lion is removed from the pride by the dominant male. In terms of social structure within a pride, the mane is very important, making the lion larger in appearance and adding to his display in front of females. Dark manes are preferred by females; however, this presents a disadvantage for the male regarding temperature control. In the hottest climates, males have very small manes, or no mane at all.

Thick hair of a Woolly Mammoth: The woolly mammoth was adapted to the Ice Age climate. The coat of a mammoth was similar to that of muskox. The hair was long (90 cm) and thick, with dark guard hairs and fine underwool. The mammoth likely moulted in the summer.

Horn of a Rhinoceros: The function of the horn of a rhino is not fully understood; however, removal can be detrimental. The horn is made of tightly packed hairs called keratin (this is what our fingernails are made from).

Scales of a pangolin: This animal looks like a pine cone-textured lizard. When attacked, it can curl up into an armoured ball (it is said that it can deflect a .303 bullet from 100 m), and it can harm an enemy with the sharp scales on its tail.

Qiviut of the Muskox: The coat of the muskox has two layers; the qiviut is the soft underwool found underneath the longer outer wool. This is the layer that is shed each spring. Qiviut is stronger than sheep's wool, eight times warmer than sheep's wool, and does not shrink in water no matter what the temperature. In addition, it is considered to be softer than cashmere or vicuna.

3. A comparison/contrast of similarities and differences between organisms studied by your group could be set up as a chart or some other visual organizer. It should include comparison in both form (structure) and function.