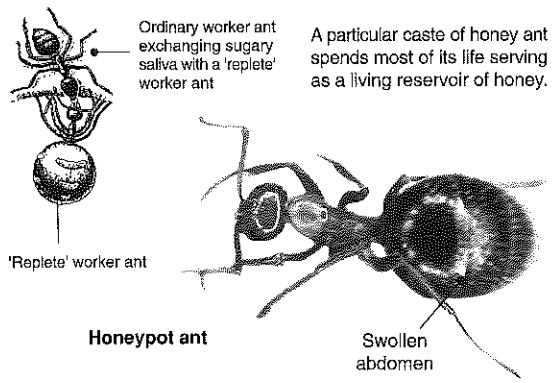
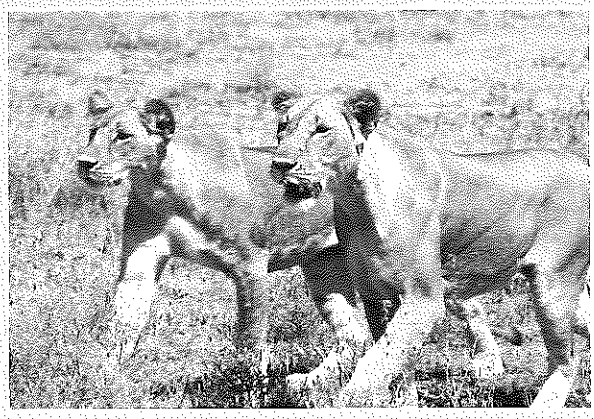
Cooperative Food Gathering

Humpback whales: The two whales pictured above are feeding near the surface. They swim below a school of fishes and confuse them by emitting a stream of small bubbles. They then swim upward in a spiral pattern with the mouth open, closing it as they break the surface. Water is squeezed out of the mouth, through a sieve of baleen plates, trapping the fish. By fishing cooperatively in this way, several whales herd the fish more effectively.

Pelicans fishing: Group hunting behavior in pelicans enables the birds to herd together large quantities of fish and facilitates the scoop-beak fishing method. Groups of 5 to 10 birds gather in shallow water. They swim in a horseshoe formation closing to an almost complete circle to trap the fish. They plunge their beaks into the water exactly at the same time to catch the fish. When pelicans fish alone, their fishing success may not be as good.



Honeypot ants: Honeypot ants of central Australia have a special group of workers called 'repletes'. These never leave the nest, but stay in underground galleries where they serve as vessels for storing a rich food supply. Regular workers that have been foraging for honey-dew and nectar return to the nest where they regurgitate food from their crops to feed the replete. The replete will continue to accept these offerings until its abdomen has swollen to the size of a pea (normally it is the size of a grain of rice). The repletes become so swollen that their movements are restricted to clinging to the gallery ceiling where many hundreds of them hang in a row. When the dry season arrives and food supplies become scarce, workers return to the repletes, coaxing them to regurgitate droplets of honey.



Lions hunting: Lions hunt on the savannah grasslands of East Africa. In this terrain, the sparse distribution of trees creates a great advantage for the fast moving prey of the lions (e.g. antelope). They can detect approaching lions easily, raise the alarm, and escape. Unlike solitary big cats, such as the leopard, that hunt in forest environments, lions must work as a team to use a strategy to trap the prey. Solitary lions have poor hunting success. When lions sight a herd of prey, several lionesses hide downwind. Others circle upwind and stampede the herd towards the lionesses waiting to attack. Lions must be careful not get injured in the hunt. A solitary, injured lion that cannot hunt will almost certainly starve. Cooperative hunting reduces the risk of injury, and enables group support if injury occurs.

1. Describe a benefit of the cooperative interaction for each of the species (described above):

(a) Humpback whales: _____

_____

(b) Pelicans: _____

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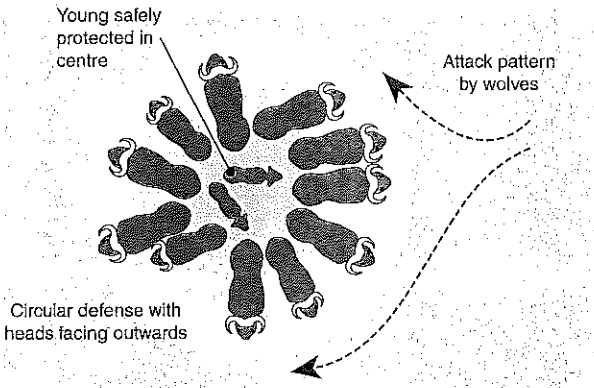
(c) Honeypot ants: _____

_____

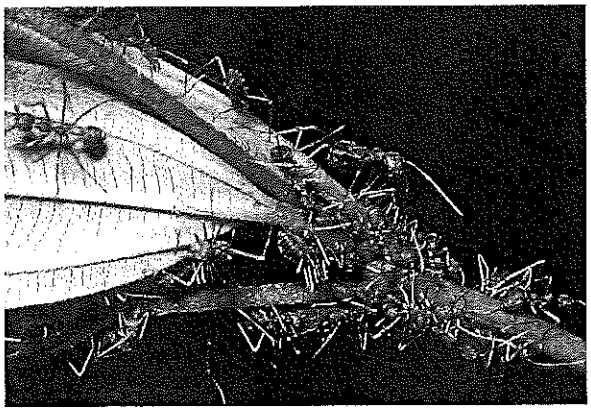
(d) Lions: _____

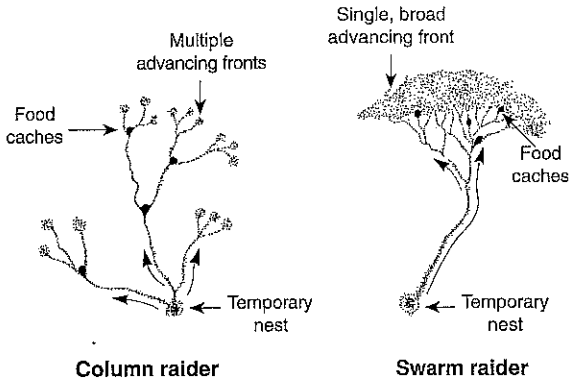
_____

Cooperative Defense and Attack



Group defense in musk oxen: In the Siberian steppes, which are extensive grasslands, large grazing animals, such as musk oxen, must find novel ways of protecting themselves from predators. There is often no natural cover to help with defense, so they must make their own barrier in the form of a defensive circle. When wolves (their most common predator) attack, they shield the defenseless young inside the circle. Lone animals have little chance of surviving an attack as wolves hunt in packs.





Army ants foraging: There are two species of army ant that have quite different raiding patterns: *Eciton hamatum* whose columns go in many directions and *Eciton burchelli*, which is a swarm-raider, forming a broad front. Both species cache food at various points along the way (dark patches above). Through group cooperation, the tiny ants are able to subdue prey much larger than themselves, even managing to kill and devour animals such as lizards and small mammals. This would not be possible if they hunted as individuals.

1. Describe a benefit of the cooperative interaction for each of the species (described above):

   (a) Musk oxen: _____

   _____

   _____

   (b) Army ants: _____

   _____

   _____

2. Sheep need to spend most of their day feeding on grass. They form mobs both naturally in the wild as well as on farms.

   (a) State why sheep form mobs: _____

   _____

   _____

   (b) Explain how this might enhance an individual sheep's ability to feed: _____

   _____

   _____