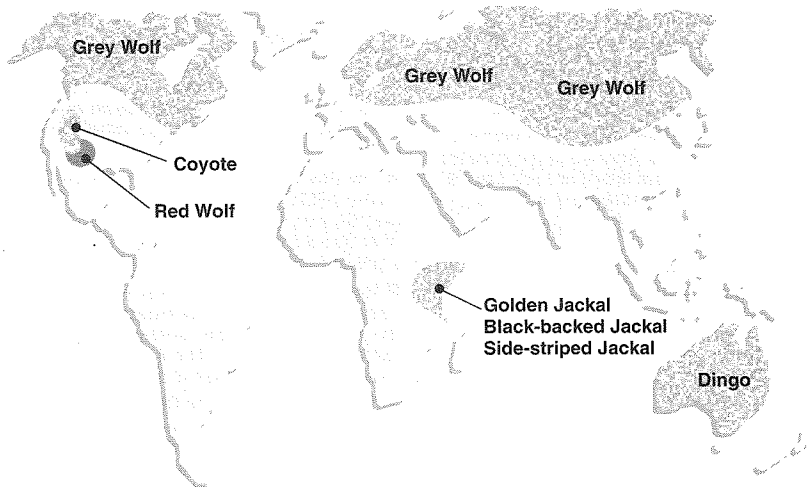
A 2

The Species Concept

The concept of a species is not as simple as it may first appear. Interbreeding between closely related species, such as the dog family below and 'ring species' on the facing page, suggest that the boundaries of a species gene pool can be somewhat unclear. One of the best recognised definitions for a species has been proposed by the respected zoologist, Ernst Mayr: "***A species is a group of actually or potentially interbreeding natural populations that is reproductively isolated from other such groups***". Each species is provided with a unique classification name to assist with future identification.

Geographical Distribution of Selected *Canis* Species

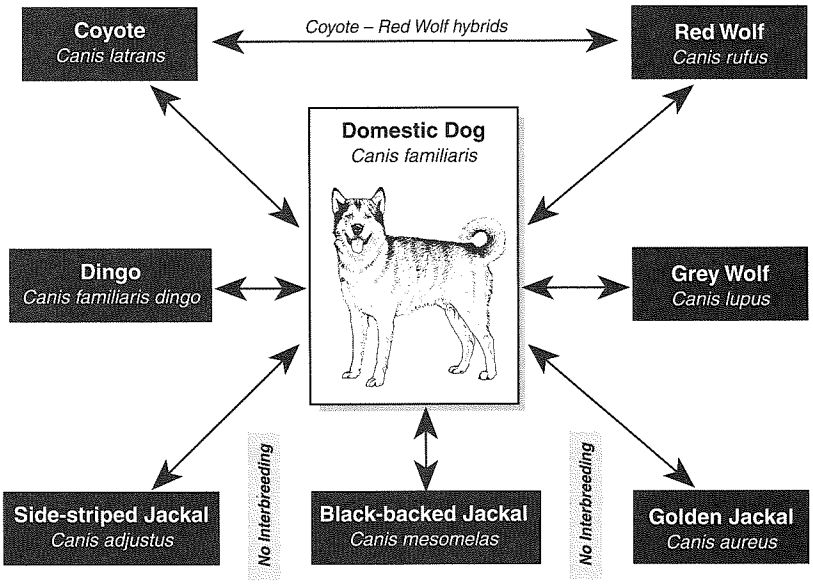
The global distribution of most of the species belonging to the genus *Canis* (dogs and wolves) is shown on the map to the right. The **grey wolf** (timber wolf) inhabits the cold, damp forests of North America, northern Europe and Siberia. The range of the three species of **jackal** overlap in the dry, hot, open savannah of Eastern Africa. The now-rare **red wolf** is found only in Texas, while the **coyote** is found inhabiting the open grasslands of the prairies. The **dingo** is found widely distributed throughout the Australian continent inhabiting a variety of habitats. As a result of the spread of human culture, distribution of the domesticated **dog** is global. The dog has been able to interbreed with all other members of the genus listed here, to form fertile hybrids.



Interbreeding Between *Canis* Species

Members of the genus to which all dogs and wolves belong present problems with the species concept. The domesticated dog is able to breed with numerous other members of the same genus to produce fertile hybrids. The coyote and red wolf in North America have ranges that overlap. They are also able to produce fertile hybrids, although these are rare. By contrast, the ranges of the three distinct species of jackal overlap in the Serengeti of Eastern Africa. These animals are highly territorial, but simply ignore members of the other jackal species and no interbreeding takes place.

For an excellent discussion of species definition among dogs see the article "The Problematic Red Wolf" in Scientific American, July 1995, pp. 26-31. This discusses whether or not the red wolf is a species or a long established hybrid of the grey wolf and coyote.



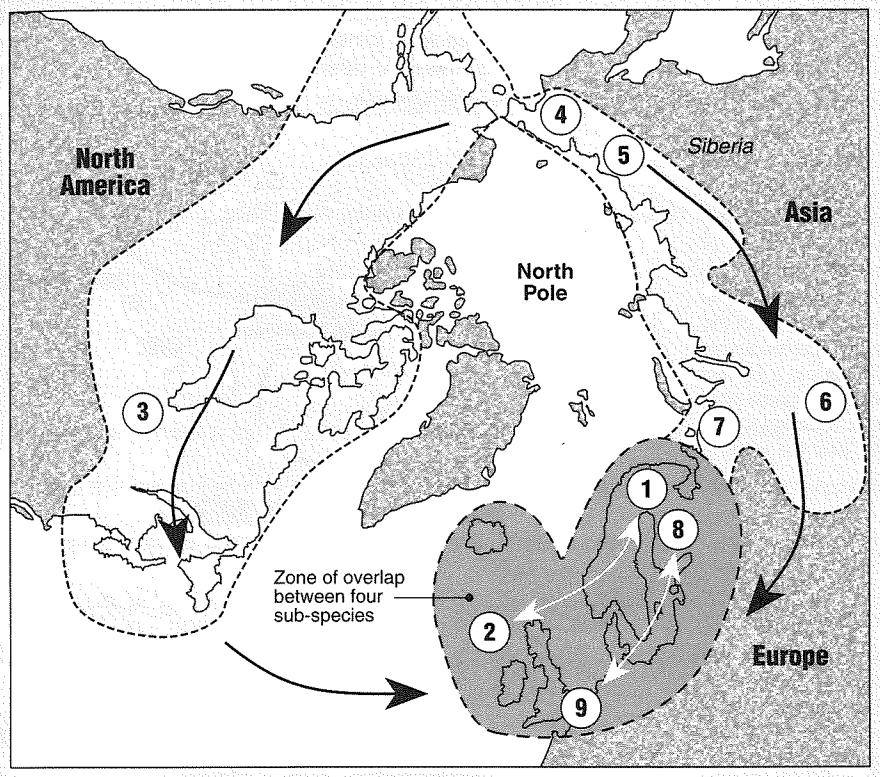
1. Describe the type of barrier that prevents the three species of jackal from interbreeding:

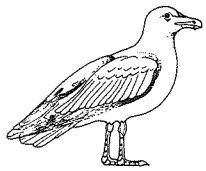
2. Describe the factor that has prevented the dingo from interbreeding with other *Canis* species (apart from the dog):

3. Suggest a possible contributing factor to the occurrence of interbreeding between the coyote and red wolf:

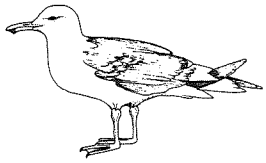
4. The grey wolf is a widely distributed species. Give a reason why the North American population is considered to be part of the same species as the northern European and Siberian populations:

Gene Pool of the Lesser Black-Backed Gull and the Herring Gull





Herring Gull
Larus argentatus
1 *Larus argentatus omissus*
2 *Larus argentatus argentatus*
3 *Larus argentatus smithsonianus*
4 *Larus argentatus vegae*
5 *Larus argentatus birulaii*



Lesser Black-Backed Gull
Larus fuscus
6 *Larus fuscus heuglini*
7 *Larus fuscus antellus*
8 *Larus fuscus fuscus*
9 *Larus fuscus graellsi*

No clear line of demarcation exists between the species and subspecies of the herring gull and the lesser black-backed gull. These differences blend into each other in a gradual series, to form what is known as a **ring species**. Ring species typically have a circular or looped geographical distribution. Adjacent populations can interbreed, but not where the arms of the loop overlap. Five subspecies of the former, and four of the latter are recognised - forming a chain that goes around the North Pole. Each subspecies can breed with those on either side of it. The evidence strongly suggests that all are derived from a single ancestral population that originated in Siberia. Members of this ancestral population have migrated in opposite directions, and at the same time evolved so that at various stages new subspecies can be identified. It would seem that all subspecies belong to the same species except that the two ends of the chain overlapping in northern Europe ***do not interbreed*** except on very rare occasions. Numbers next to the name of each sub-species are used to indicate geographical distribution on the map. For example: 9 and 8 interbreed, as does 1 and 2 (indicated by the white arrows); but 2 and 9, and 1 and 8 cannot interbreed.

5. Give a clear and concise definition of species: _____

_____

_____

_____

6. The **ring species** illustrated above do not fit comfortably with the standard definition of a species. Describe the aspects of the population of gulls that:
   (a) Supports the idea that they are a single species: _____

   _____

   _____

   _____

   (b) Does not agree with the standard definition of a species: _____

   _____

   _____

7. Explain what a 'ring species' is: _____

_____