

# Homoplasy and homology – 1

- ✦ **Homoplasy** – or analogy for a given character – occurs when characters are similar, but are not derived from a common ancestor
- ✦ Instead, **homology** is any similarity between characters that is due to their shared ancestry
  - Homologies reflect the evolutionary history of a family and, if correctly identified, can be useful to organize the species into evolutionary trees
  - Homoplasy often results from **convergent evolution**

# Homoplasy and homology – 2

- ✦ Therefore, homoplasy describes...
  - ...the presence of similar anatomical, genetic or morphological structures in phylogenetically unrelated organisms, as a secondary adaptation to the same environmental conditions
  - For example, the wings of insects and birds represent a homoplastic character, since they derive from a secondary adaptation to the flight function into two phylogenetically distant lines

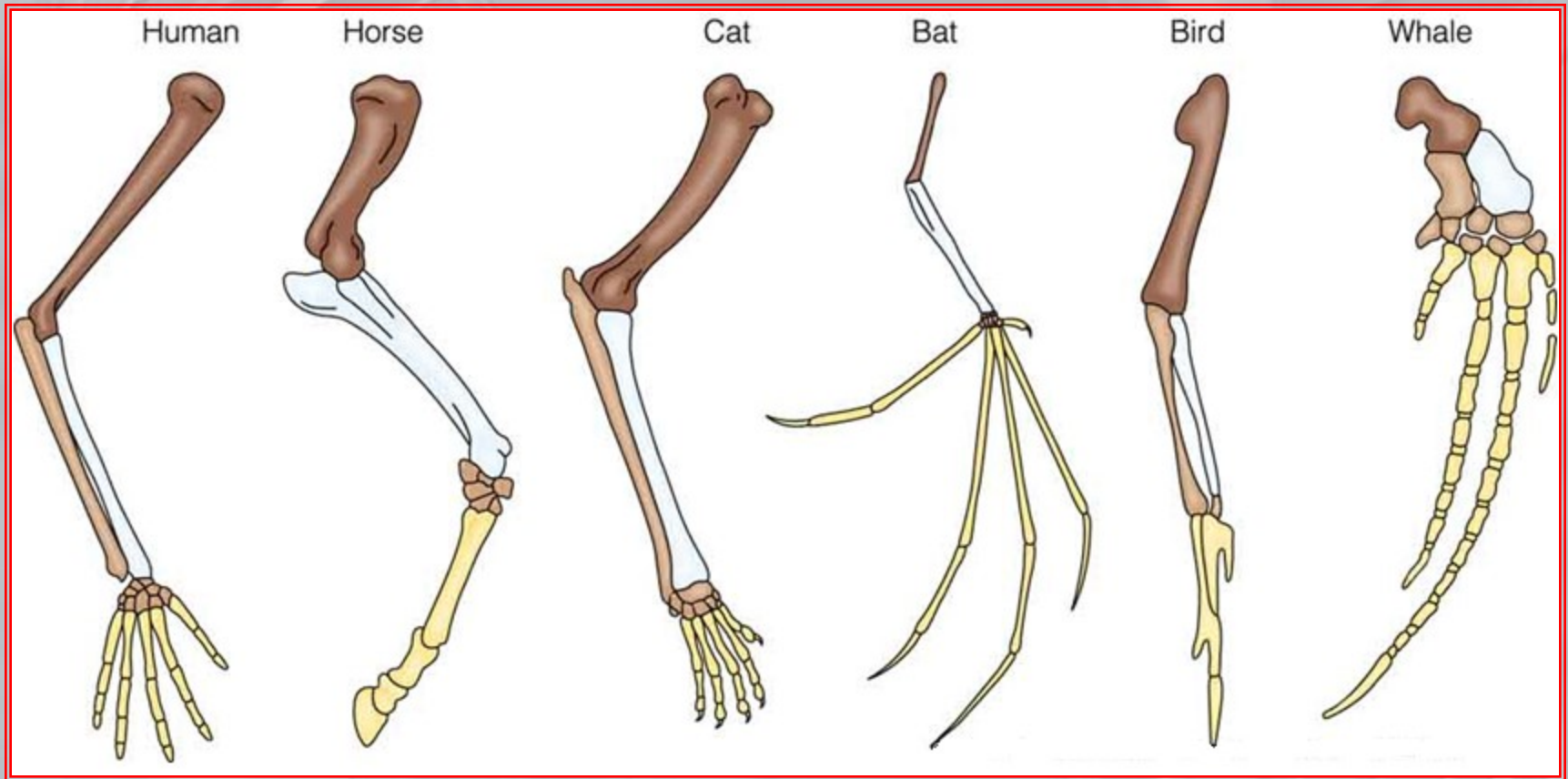


- The presence of homoplasies, therefore, does not imply a phylogenetic relationship between two species

# Homoplasy and homology – 3

- ✦ Conversely, it is obvious that not all homologies are equivalent to similarities: in fact, the horse hooves and the bat wings are homologous, since they derive from some pentadactyl limbs of a distant ancestors, similar to the shrew
- ✦ In terms of evolution, the original limb structure has been modified in order to produce completely different results
- ✦ A situation of this kind, which may be hardly recognized as a *conservation* phenomenon, is frequent in the evolution course and allows us to state that new structures – that are truly such – are rare, and new configurations are produced by the “recombination” of old structures

# Homoplasy and homology – 4



Vertebrate limbs are homologous





# Homoplasy and homology – 5

- ✦ Similarly, it seems likely that the human brain, with its power in generating language, is organized according to a basically analogous scheme to that of the macaque
- ✦ Generally speaking, we can assert that the connections between the diverse parts of the system are similar; however, the relative proportions and the functions of certain parts have changed, causing very different performance of the two systems
- ✦ As in the case of the wings of the bat and the hooves of the horse, the new evolved types can be seen as the result of relatively small adjustments and rearrangements, in a comprehensive, fundamentally conservative, plan