Principle of Parsimony: the best explanation is the one requiring the fewest evolutionary changes.

The most parsimonious explanation minimizes homoplasy and assumes that most similarity is due to common ancestry.

Example: a hypothesis of wing evolution in insects that has wings only evolving once in the common ancestor of all winged insects (and therefore homologous) is a more parsimonious explanation than a hypothesis that has wings evolving separately (and therefore homoplastic) in every lineage of winged insects. Remember that parsimony seeks to minimize homoplasy.

Problems for Parsimony:

1.) Homoplasy: character states that recurrently evolve can present problems for character state reconstruction using parsimony.

2.) Continued transformation of a trait: this will make it difficult to determine whether two traits are homologous.

Solutions to problems:

In order to recognize that character states are homologous or homoplastic we need good homology criteria.

Homology criteria:

Similarity in 1.) structure

2.) position

3.) connectivity

4.) development

* Notice that similarity in function is not a homology criterion. Similarity in function can often be due to parallelism.

Correlations between traits could be due to:

1.) Adaptive relationship between traits.

ie. webbed feet have repeatedly evolved in lineages that live in aquatic environments.

2.) Traits were inherited together from an ancestor.

ie. although there is a tight correlation between animals with feathers and animals that can fly, this by itself doesn't provide evidence for feathers as an adaptation for flight. All animals with feathers (birds) have feathers and can fly because the common ancestor of birds had feathers and could fly. A different approach would have to be taken in order to determine the adaptive value of feathers.