Gathering the Evidence...

Darwin’s theory tied together a seemingly unrelated set of facts concluded by others, but after its publication, people from many scientific fields brought forward their own information in support of it.

1. The fossil record:
   Is the massed collection of prehistoric life we’ve uncovered in sedimentary rock strata.

   It shows that fossils that are younger are more similar to the species we have today (make sense...they have had less time to change), and really old fossils are remarkably different.

   The fossil record also provides a chronological timeline for when species appeared. (we can make statements about their “relative ages” and “absolute ages”)...  

   Ex. Relative age
       Bacteria existed before birds. Birds existed before mammals.

   Ex. Absolute age
       Stromatolites....ring structures left behind by ancient blue-green algae on the shores of Lake Superior........1, 900, 000, 000 years old.

   The fossil record also proves that not all creatures were alive at the same time. That supports the idea that one group evolved out of another group.

   “Transitional fossils” have been discovered....these “in-between” links have characteristics of two groups, and support the idea that one group can give rise to another.

(Ex. Archaeopteryx)
Dating fossils........
   Relative dating.....acknowledging their position in the rock strata.

   Absolute dating......radioisotope decay tests.

2.  Biogeography : (page 663)
   The study of how species are distributed around the globe. Darwin noted that species on islands resembled populations on nearby mainlands (like the Galapagos finch example)
   - suggests organisms on islands (endemic species especially) evolved from mainland migrants...examples on page 664 - Australia, Madagascar, and Canary Islands
   - similar environments may often have similar species

3.  Comparative Anatomy :
   Study of how different species are similarly built. Similarity of design hints that there is a shared evolutionary past......a variety of descendants from an ancestral species......demonstrates “modification with descent”

   Evidence examples would include....
   - homologous structures : body parts of different species that are similar in their design or how they work.
   - vestigial organs : body parts that don’t have a modern function
   - analogous structures : body parts that have similar jobs in different species (ex. Wing for flight), but did NOT come about as a result of a common past, but rather a common NEED.
4. Comparative Embryology : (665)
Looking for similarity when embryos of various species develop, which point to a common origin. Embryos that develop in similar ways are thought to share a common evolutionary past.

5. Comparative Biochemistry : (666)
Similarities in DNA or resulting body proteins hints at an ancestral relationship if there is common processes, products, etc.

Ex. Human vs chimp....... 1 or 2 % DNA difference
    Human vs lemur......... 42 % difference

Ex. Cytochrome C protein found in mitochondria (just over 100 amino acids long)......evolutionary changes in mitochondrial DNA is used to create paradigms of evolutionary relationships....page 667

Chloroplast DNA , connection with old cyanobacteria