The geological periods mentioned above are usually dated in number of million years ago. R. A. Stirton gives the following as the date in millions of years back, for the periods mentioned above: Cambrian 600 to 515, Ordovician 515 to 458, Devonian 405 to 345, Triassic 225 to 185, Jurassic 185 to 128, Cretaceous 128 to 62.

4. The presence of hereditary barriers which keep the species distinct (See Winchester, 1961, p. 95, or your "Taxonomy Supplement" notes based on this reference.)

Examples of species which can crossbreed, but which produce sterile offspring as a result are: (a) the bullfrog and gopher frog (the larvae die before reaching the tadpole stage) (J. M. Savage, 1963, p. 77); (b) the male Fowler's toad and female Gulf Coast toad (the progeny develop into adults, but are always completely sterile) (J. M. Savage, p. 77); (c) the domestic cow and American buffalo (the progeny, called a "cattalo", are sterile) (Winchester 1961, p. 94). (d) the donkey and horse (the progeny, called a mule, are well known to be sterile.) Savage (1963) points out that there are many other examples of hybrid sterility in nature, and that "in many organisms hybrid nonviability or sterility do not make an appearance until the hybrid produces offspring by backcrossing to one of the parental species" (p. 77). It is of course obvious that any hybrid which could not reproduce could not perpetuate the morphological or physiological characteristics which it possessed, and therefore would be useless in the evolutionary process. (One must not confuse hybrids between two different <u>species</u> with hybrids between two different *varieties within a species; e.g. hybrid varieties of corn, chickens, etc.* Hybrids between varieties produce fertile offspring, since both parents belong to the same species.

5. The discovery that acquired characteristics cannot be genetically transmitted, because the somatic (body) cells of the animal cannot perpetuate their chromosomes beyond the lifetime of the individual organism, as the reproductive cells do. For example, the professional boxer develops large muscles by long training and exercise, but he can not pass this characteristic on to his offspring (because the exercises have affected his muscle cells but not the reproductive cells he produces). Likewise, welders and cooks acquire heat-resistant hands, but their children do not receive any of this characteristic by inheritance.

6. The observation that the improvements achieved by artificial selection carried out by animal and plant breeders are lost within a few generations if the new strain is allowed to return to the wild mode of life. Note that artificial selection is <u>not</u> evolution.

7. The observation that practically all mutations are detrimental to the progress of the species, and even the ones that are not at a disadvantage are usually absorbed in the population. (Most mutations are recessive.) For example, in 1791 a mutant shortlegged lamb appeared in Massachusetts which was carefully bred to produce the present day Ancon breed of sheep which has *the advantage to man of not being able to jump fences.* However, this characteristic would be a definite disadvantage to any sheep living in the wild state, so that such a mutant form would not survive long in nature. The hornless Hereford cattle which were developed from a hornless mutant which appeared in 1889 in the state of *Kansas is another outstanding example of* this type.

8. The fact that morphological similarity in animals or plants can not be taken as proof of their genetic relationship. For example, the fact that the front leg of a dog is similar to the front leg of an elephant does not indicate that elephants evolved from dogs or vice versa. The legs of mammals are somewhat similar to the legs of lizards, but this can not be taken as proof that mammals developed from lizards. Is it not logical that, since