

The land tortoises undoubtedly arose from primitive emydids, probably toward the close of the Late Cretaceous. The primitive forms were probably already well distributed in the Paleocene, but we have no proof of this. By the Middle Eocene they are already found in all the continental areas except Australia and South America. The view of Hay (1908) that North America is probably the ancestral home of the family is not followed here, mainly because tortoises almost as old are now known from other parts of the world. A considerable degree of evolutionary differentiation is indicated even in the earliest members of the family, suggesting a long, completely unknown pre-fossil history in which any continent (other than Australia) might eventually prove to be the ancestral home.

The most primitive fossil and living testudinids approach the Emydidae in the following characters:

- 1) Interval between ventral processes of the prefrontals only moderately widened
- 2) Temporal arcade strong
- 3) Prootic well exposed
- 4) Quadrate not enclosing stapes
- 5) Anterior neurals hexagonal (wide end forward)
- 6) Suprapygal one, anterior to vertebral-subbracaudal sulcus
- 7) Entoplastron anterior to humeropectoral sulcus
- 8) No greatly thickened epiplastral projection, and no excavation at its base
- 9) Carapace not domed, flattened
- 10) Rib ends fit into peripheral pits
- 11) At least prefrontal and frontal scales present
- 12) Scales on forelimb numerous, not greatly enlarged
- 13) Femoral tubercles present
- 14) No tail claw
- 15) Neither carapace nor plastron hinged
- 16) Nuchal scute present
- 17) Vertebrae not greatly convex
- 18) Carapacial keels weak
- 19) Supracaudal scute divided
- 20) Submarginal scute absent
- 21) Gular scutes paired
- 22) Anal notch moderate

The most primitive tortoise group is the subgenus *Manouria* (formerly *Hadrianus*), genus *Geochelone*. Most of the other groups probably evolved from this group (Fig. 10). Extant members of the group are restricted to mesic evergreen forests of southeastern Asia, also the habitat of the early Tertiary forms. Since that time the major evolutionary changes in both morphology and behavior in tortoises have been intimately associated with the development of xeric plant communities and spreading temperate conditions throughout the world.

Those living testudinids that have been designated 'gigantic' tortoises all belong to the genus *Geochelone*. Several extinct genera attained large size, which recurs in many groups. Some gigantic forms, living and