

A FOSSIL MAP TURTLE (*GRAPTEMYS PSEUDOGEOGRAPHICA*) FROM CENTRAL MICHIGAN.—In the summer of 1962 Robert Hard discovered a right hypoplastron of an emydine turtle in sediment dredged from the mouth of the Saginaw River, Bay County, Michigan. The hypoplastron (Univ. Mich. Mus. Paleo. 51249) is nearly complete, lacking only the posterolateral and posteromedial corners of the plastral plate and the most dorsal portion of the inguinal buttress. The hypoplastron is darkly stained and may be partially mineralized, indicating long burial in the river sediment. The anterior width of the hypoplastron is 76.8 mm, and posterior width is 58.6 mm. The length through the middle of this element is 64.3 mm. The plastral length of the fossil turtle is estimated to have been 225 mm.

Comparison of the element with those of all North American emydine genera shows it to be from a *Graptemys*. Further comparison with five specimens of *G. pseudogeographica* and eight specimens of *G. geographica* in the University of Michigan Museum of Zoology collection shows that the fossil hypoplastron represents the former species. In *geographica* the shell is typically higher anteriorly and depressed posteriorly, whereas the shell of *pseudogeographica* is higher posteriorly. The structure of the inguinal buttress of the hypoplastron clearly reflects these differences in shell height. The inguinal buttress extends laterally forming an obtuse angle with the plastral plate in *geographica*, but in *pseudogeographica* and the fossil element, the inguinal buttress rises nearly per-

pendicularly from the plastral plate. The posteriorly depressed carapace in *geographica* results in the formation of an acute angle in the inguinal notch; in both the fossil and *pseudogeographica* the inguinal notch forms a right angle. A well-developed fossa is present on the posterolateral surface of the inguinal buttress of *pseudogeographica* and the fossil hypoplastron but is poorly developed or absent in *geographica*. The supporting notch, formed in the middle of the hypo-hyoplastral suture, is well developed in *pseudogeographica* and the fossil; it is less prominent in *geographica*.

Graptemys pseudogeographica presently occurs in the Mississippi Basin from southern Wisconsin and southwestern Indiana to Louisiana. This distribution and the ecology of *pseudogeographica* suggest that its requirements are a warm temperate climate, an aquatic habitat, and abundant vegetation (Cahn, 1937). These conditions probably prevailed in the Saginaw Bay region during the hypsithermal period (climatic optimum), approximately 4,000 to 6,000 years ago. The gradual increase in temperature and moisture following the glacial retreat probably allowed *pseudogeographica* to extend its range northeast into eastern Indiana, Ohio, and West Virginia, as evidenced by relict populations in these areas (Conant, Trautman, and McLean, 1964), and into central Michigan. The warm, moist hypsithermal period was followed by a trend toward cooler and more arid conditions (Smith, 1957). This reversion to cooler temperatures and lower moisture levels forced this species south following the hypsithermal period.

Radiocarbon dating of the hypoplastron has not been attempted. However, on the basis of stratigraphic position, ecological requirements, climatic trends following glaciation, and the present relict distribution, the range of *G. pseudogeographica* probably extended into central Michigan approximately 4,000 to 6,000 years ago.

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