



Taxonomic assessment of Alligator Snapping Turtles (Chelydridae: *Macrochelys*), with the description of two new species from the southeastern United States

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Abstract

The Alligator Snapping Turtle, *Macrochelys temminckii*, is a large, aquatic turtle limited to river systems that drain into the Gulf of Mexico. Previous molecular analyses using both mitochondrial and nuclear DNA suggested that *Macrochelys* exhibits significant genetic variation across its range that includes three distinct genetic assemblages (western, central, and eastern = Suwannee). However, no taxonomic revision or morphological analyses have been conducted previously. In this study, we test previous hypotheses of distinct geographic assemblages by examining morphology, reanalyzing phylogeographic genetic structure, and estimating divergence dating among lineages in a coalescent framework using Bayesian inference. We reviewed the fossil record and discuss phylogeographic and taxonomic implications of the existence of three distinct evolutionary lineages. We measured cranial (n=145) and post-cranial (n=104) material on field-captured individuals and museum specimens. We analyzed 420 base pairs (bp) of mitochondrial DNA sequence data for 158 *Macrochelys*. We examined fossil *Macrochelys* from ca. 15–16 million years ago (Ma) to the present to better assess historical distributions and evaluate named fossil taxa. The morphological and molecular data both indicate significant geographical variation and suggest three species-level breaks among genetic lineages that correspond to previously hypothesized genetic assemblages. The holotype of *Macrochelys temminckii* is from the western lineage. Therefore, we describe two new species as *Macrochelys apalachicola* sp. nov. from the central lineage and *Macrochelys suwanniensis* sp. nov. from the eastern lineage (Suwannee River drainage). Our estimates of divergence times suggest that the most recent common ancestor (MRCA) of *M. temminckii* (western) and *M. apalachicola* (central) existed 3.2–8.9 Ma during the late Miocene to late Pliocene, whereas *M. temminckii*-*M. apalachicola* and *M. suwanniensis* last shared a MRCA 5.5–13.4 Ma during the mid-Miocene to early Pliocene. Examination of fossil material revealed that the fossil taxon *M. floridana* is actually a large *Chelydra*. Our taxonomic revision of *Macrochelys* has conservation and management implications in Florida, Georgia, and Alabama.

Key words: *Macrochelys*, Chelydridae, Morphology, Conservation, Fossil, Genetics, Phylogeography, Suwannee River, Apalachicola River

dataset with additional field-captured animals. Svetlana Nikolaeva and Doug Yanega provided nomenclature recommendations. We thank Brian Bowen, F. Wayne King, John Iverson, Max Nickerson, Robert H. Robins, Savanna Barry, and Brian I. Crother for comments on a draft of this paper.

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APPENDIX. Specimens examined.

- Western lineage*.—TU 1245–46, 10872, 12506, 13011, 13221, 13223, 14667, 15204, 15205, 15208 (1, 2), 15209, 17991, 18073–75, 18076 (1, 2), 18077–78, 18080–81, 18083–9, 18088, 18090–91, 18093–99, 18103, 18106, 18108–12, 18114–30, 18132–62, 18164–65, 24206–07; UF 6607, 18146, 21746, 117204, 155555–61, 156987; MNHN-AZ-AC-A4540.
- Central lineage*.—CRI 1565–73, 1575–78, 1580–84, 1586, 1601–05, 2133–39, 2344–47, 2350–51, 2354–55, 2357, 6880; TU 18163; UF 3998, 6801, 25047, 52676, 57968, 67782, 67784, 74780, 115414, 140993, 152479, 152939, 155267, 156975, 156978–79.
- Eastern lineage = Suwannee*.—UF 12694–95, 22267, 48437, 49967, 57967, 65903, 89890–91, 93476–77, 115413, 155551–53, 155562–63, 156980–81, 156983–86, 156988–91, 166146.