

Catalogue of American Amphibians and Reptiles.

Lovich, J.E. 1993. *Macrolemys, M. temminckii*.

***Macrolemys* Gray**
Alligator Snapping Turtles

Macrolemys Gray, 1855:48. Type-species, *Macrolemys temminckii* (Troost)(= *Chelonura temminckii* Troost, in Harlan, 1835:158) by monotypy.

Macrochelys Gray, 1856:200. Type-species, *Macrochelys temminckii* (Troost)(= *Chelonura temminckii* Troost, in Harlan, 1835:158) by monotypy.

Gypsochelys Agassiz, 1857:413. Type-species, *Gypsochelys lacertina* Agassiz 1857:414 (= *Chelydra lacertina* Schweigger, 1814) by

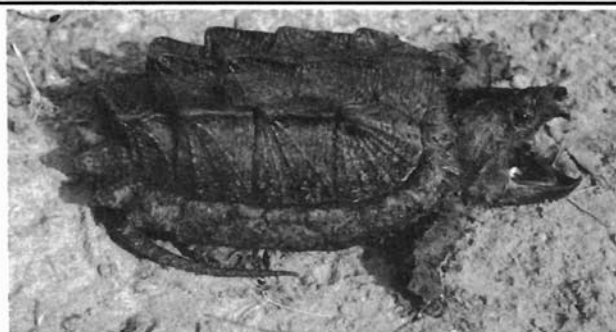
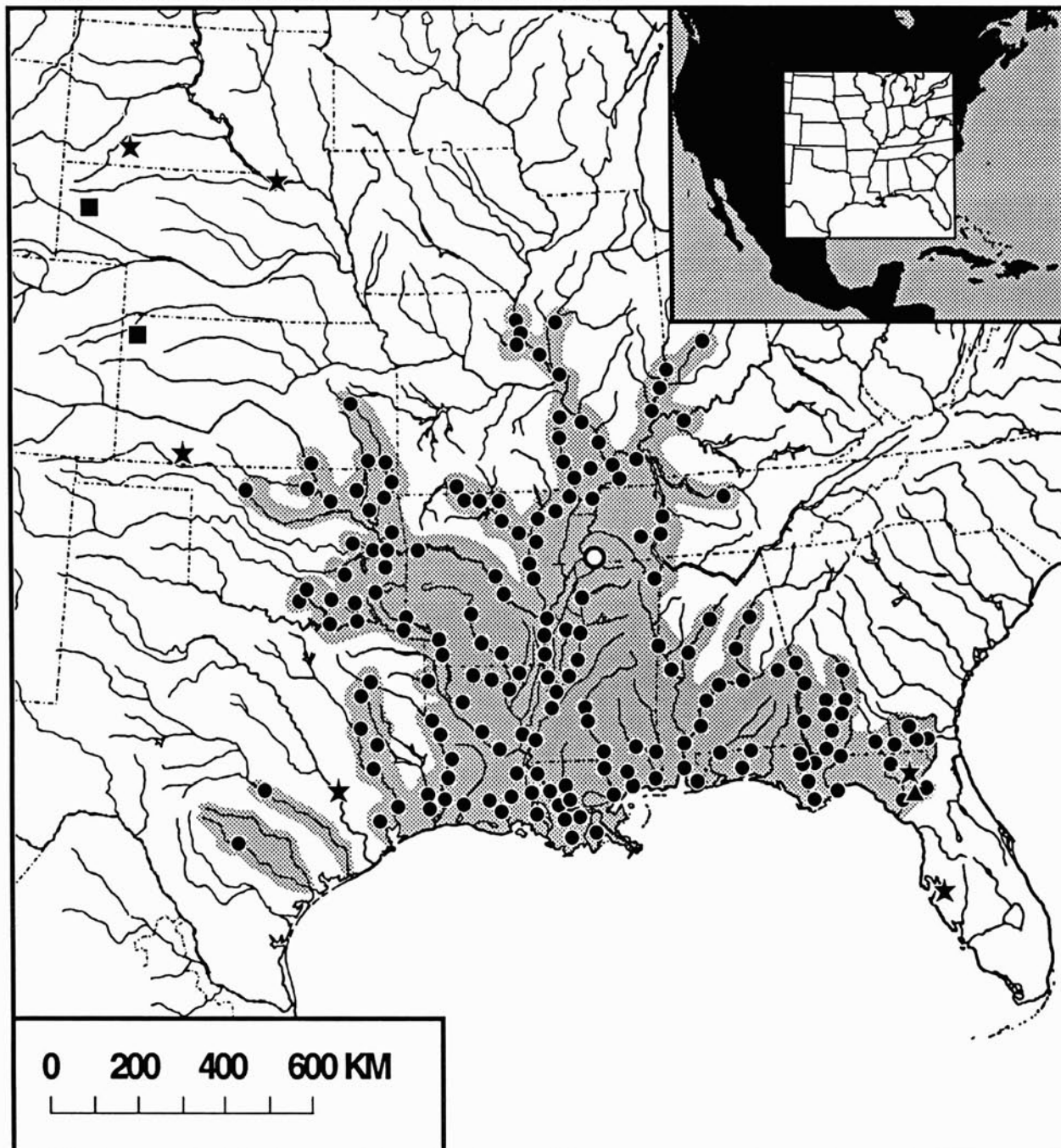


Figure. A juvenile *Macrolemys temminckii* from the Al Redmond collection.



Map. The large open circle marks the type locality for *Macrolemys temminckii*. Other selected localities (modified from Pritchard, 1989 and Iverson, 1992) are designated with solid circles. Fossil localities for the genus are marked as follows: *M. schmidtii* - squares, *M. auffenbergi* - triangle, fossil *M. temminckii* - stars.

monotypy.

Macrolemmys: Strauch, 1862:35. *Nomen substitutum*.

• **Content.** One living monotypic species, *Macrolemmys temminckii*, and two extinct species, *M. auffenbergi* Dobie, 1968a and *M. schmidtii* Zangerl, 1945 are recognized.

• **Definition.** This genus contains the largest freshwater turtle in North America. *Macrolemmys temminckii* attains a carapace length of 80 cm and a weight of 113 kg, possibly more. Males are much larger than females, have longer preanal tail-lengths, the anal opening posterior to the carapacial rim, and have a thicker basal tail diameter. The large, rough, dark carapace is strongly serrated posteriorly and has three prominent keels: a central keel on the vertebrals and two lateral keels on the pleural scutes. Knobs on the keels are elevated and somewhat curved posteriorly. A row of 3-8 supramarginal scutes is located between the marginals and the first three pleural scutes on each side. The bridge is small and the hingeless plastron is reduced, giving a cross-shaped appearance. The plastron is grayish; in juveniles it may be somewhat mottled with small whitish blotches. The skin is dark brown to gray above and lighter below; dark blotches may occur on the head. The tail is about as long as the carapace and has three rows of low tubercles above and numerous small scales below. The huge, pointed head has the eyes placed to the sides, thus the orbits cannot be seen from above. The eye is surrounded by a ring of small fleshy projections that are pointed, broad based, and flattened. Numerous, branching dermal projections occur on the sides of the head, on the chin, and on the neck. A vermiform appendage is present on the tongue and is attached, approximately at its center, to a round muscular base, and both ends are freely moveable.

The massive skull shows little temporal emargination and possesses a symphyseal hook. The squamosal bone contacts the long postorbital but not the parietal. The foramen through which the anterior branch of the facial nerve travels is formed entirely by the pterygoid bone. The maxilla is separated from the quadratojugal, and the quadrate bone completely surrounds the stapes. The vomer possesses a weak medial ridge on its ventral surface. No secondary palate is present. The jaws are large and powerful, and the upper jaw is strongly hooked. Articulating surfaces of the cervical vertebrae are primitive; (2C, (3C, (4, 5), 6), 7), 8) (Williams, 1950).

• **Descriptions and Illustrations.** See species account.

• **Distribution.** See species account.

• **Fossil Record.** The genus *Macrolemmys* once had a much wider geographic distribution; remains of *M. schmidtii* are known from Miocene (Hemphillian) Hemmingfordian and Marsland deposits in Nebraska (Zangerl, 1945; Whetstone, 1978; Parmley, 1992), and *M. auffenbergi* is known from Pliocene (Hemphillian) deposits in Alachua County, Florida (Dobie, 1968a), a location south of the present distributional limit of the genus. Fossils referable to *M. temminckii* are known from the Pliocene (Clarendonian) of South Dakota (Zangerl, 1945), Pliocene (Blancan?) of Kansas (Hibbard, 1963), presumed Pleistocene (Rancholabrean?) deposits in Hillsborough and Columbia Counties, Florida (Auffenberg, 1957), and late Pleistocene (Rancholabrean) to Recent deposits from the Brazos River, Texas (Hay, 1911).

• **Pertinent Literature.** See species account.

• **Etymology.** The generic name, *Macrolemmys*, is feminine and is derived from the Greek words *macro* (= large) and *klemmys* (= turtle).

Macrolemmys temminckii (Troost) Alligator Snapping Turtle

Testudo planitia Gmelin, 1789:1045. *Nomen rejectum*.

Chelonura temminckii Troost, in Harlan, 1835:158. Type locality "a tributary stream of the Mississippi, which enters that river above Memphis, in West Tennessee," restricted to Wolf River, Shelby County, Tennessee, by Bour (1987). Holotype, Museum National d'Histoire Naturelle, Paris (MNHN-AC A.4540), an adult male collected by Petival ca. 1834 (not examined by author). See comments.

Emysaurus temminckii: A. Duméril, in Duméril and Duméril, 1851:

16.

Macrolemmys temminckii: Gray, 1855:48. First use of present combination.

Macrobelys temminckii: Gray, 1856:200.

Gypobelys lacertina: Agassiz, 1857:414.

Macrolemmys temminckii: Strauch, 1862:134.

Macrobelys lacertina: Cope, 1872:23.

• **Content.** Only one living, monotypic species is recognized.

• **Definition.** See generic account.

• **Descriptions.** In addition to those included in numerous regional guides, general descriptions are in Boulenger (1889), Cahn (1937), Pope (1939), Carr (1952), Ernst and Barbour (1972, 1989), Mount (1975), Pritchard (1979, 1989), Conant and Collins (1991), and Ernst et al. (in press). Sources for other descriptions are: cervical vertebrae (Williams, 1950), choanal structure (Parsons, 1968), penial morphology (Zug, 1966), erythrocyte morphology (Frair, 1977), cranial arteries (Albrecht, 1976), rostral pores (Winokur and Legler, 1974), integumentary appendages (Winokur, 1982), lingual appendage morphology (Spindel et al. 1987), karyotype (Killebrew, 1977; Haiduk and Bickham, 1982; Bickham and Carr, 1983), stapes morphology (Monks, 1878), gonadal and sperm morphology (Dobie, 1971), and eggs and embryos (Allen and Neill, 1950; Dobie, 1971; Powders, 1978; Grimpe, 1987; Drummond and Gordon, 1979; Ewert, 1976, 1979).

• **Illustrations.** This species has been profusely illustrated; a selection of important references follows. Color illustrations of adults and juveniles are found in Barbour (1971), Ernst and Barbour (1972), Pritchard (1975, 1979, 1989), Behler and King (1979), Caldwell and Collins (1981), Ashton and Ashton (1985), Dobie (1986), Gibbons (1987: cover of issue), Christiansen and Bailey (1988), Dundee and Rossman (1989), Conant and Collins (1991), and Ernst et al. (in press). Color photos of skulls, shells, and hatchlings are in Pritchard (1989). Black and white photographs and line drawings are in Boulenger (1889), Cahn (1937), Pope (1939), Allen and Neill (1950, 1951), Carr (1952), Smith (1961), Dobie (1968b, 1971), Barbour (1971), Jackson and Ross (1971), Zappalorti (1976), Mount (1975), Gibbons (1983), Pritchard (1975, 1978, 1979, 1989), Hofstra (1981), Morris and Sweet (1985), Obst (1988), Ernst and Barbour (1972, 1989), and Conant and Collins (1991). Photographs and line drawings of lingual appendage morphology are found in Cahn (1937), Ernst and Barbour (1972), Spindel et al. (1987), and Ernst et al. (in press). Black and white photographs of a corpus luteum, an egg, and a nest are given in Dobie (1971), Pritchard (1989), and Powders (1978), respectively. Black and white photographs of scutes showing annuli are in Dobie (1971). Drawings and photographs of skulls and other bony elements are in Gray (1855), Boulenger (1889), Hay (1907, 1908), Williston (1925), Cahn (1937), Romer (1956), Auffenberg (1957), Dobie (1968a), Feuer (1970), Ernst and Barbour (1972), Gaffney (1979), Bour (1987), Obst (1988), and Pritchard (1989). Black and white illustrations of *Macrolemmys schmidtii* are in Zangerl (1945), and Dobie (1968b) provided similar illustrations of *Macrolemmys auffenbergi*. Illustrations of karyotypes are in Killebrew (1977) and Haiduk and Bickham (1982).

• **Distribution.** The Alligator Snapping Turtle is confined to river systems in the United States that drain into the Gulf of Mexico. The species is widely distributed in the Mississippi Valley from Kansas (Clarke 1981), Illinois (Galbreath, 1961; Morris and Sweet, 1985), and Indiana (Grannan and Anderson, 1992), to the Gulf, and has been reported from almost all river systems from the Suwannee River in Florida (Iverson and Etchberger, 1989) to the San Antonio River in Texas (Iverson, 1992; Pritchard, 1989). Distribution maps are presented in Iverson (1992), Pritchard (1989), and Conant and Collins (1991).

• **Fossil Record.** See generic account.

• **Pertinent Literature.** A review of literature on the Alligator Snapping Turtle was given by Pritchard (1989). Other general accounts are in Allen and Neill (1950, 1951), Carr (1952), Ernst and Barbour (1972), and Ernst et al. (in press). Additional references are listed by topic: phylogenetic relationships (Gaffney, 1975; Mao et al., 1987; Bickham and Carr, 1983), taxonomy (Frair, 1972; Bour, 1987), peripheral distribution (Glass, 1949; Clarke, 1981; Carpenter, 1982;

Morris and Sweet, 1985; Iverson and Etchberger, 1989), movements (Wickham, 1922; Sloan and Taylor, 1987; Shipman et al., 1991), basking (Ewert, 1976), behavior (Brode, 1958; Grimpe, 1987), reactions of *Sternotherus* to *Macrochelys* based on chemical cues (Jackson, 1990), defensive posture (Hayes, 1989), reproduction (Dobie, 1968b, 1971; Ewert, 1976; Powders, 1978; Grimpe, 1987), embryology (Ewert, 1985), egg components and incubation period (Ewert, 1979) luring behavior (Allen and Neill, 1950; Drummond and Gordon, 1979), lingual appendage morphology (Spindel et al., 1987), food habits (Allen and Neill, 1950; Redmond, 1979; George, 1987; Spindel et al., 1987), barnacle infestation (Jackson and Ross, 1971), helminth parasites (Ernst and Ernst, 1977), coccidian parasites (Upton et al., 1992), morphology (Romer, 1956; Zug, 1966; Parsons, 1968; Winokur and Legler, 1974; Winokur, 1982), cranial arteries (Albrecht, 1976), blood collection technique (Powell and Knesel, 1992), blood components (Powell and Knesel, 1993), size (Pritchard, 1980; Pawley, 1987), longevity (Snider and Bowler, 1992), and conservation (George, 1987; Pritchard, 1989).

• **Etymology.** The specific epithet, *temminckii*, is a patronym honoring Coenraad Jacob Temminck, former director of the Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands.

• **Comment.** The taxonomic history of this turtle was reviewed by Bour (1987).

Literature Cited

- Agassiz, L. 1857. Contributions to the natural history of the United States of America, first monograph. Little Brown and Co., Boston, Massachusetts.
- Albrecht, P.W. 1976. The cranial arteries of turtles and their evolutionary significance. *J. Morphol.* 149:159-182.
- Allen, E.R. and W.T. Neill. 1950. The alligator snapping turtle, *Macrochelys temminckii*, in Florida. *Ross Allen's Reptile Inst., Spec. Publ.* (4):1-15.
- . 1951. The snapping turtles. *Florida Wildlife* 5(4):11, 25-26.
- Ashton, R.E., Jr. and P.S. Ashton. 1985. Handbook of reptiles and amphibians of Florida. Part II. Lizards, turtles and crocodilians. Windward Publ., Inc., Miami, Florida.
- Auffenberg, W. 1957. The status of the turtle *Macrochelys floridana* Hay. *Herpetologica* 13:123-126.
- Barbour, R. 1971. Amphibians and reptiles of Kentucky. Univ. Press Kentucky, Lexington.
- Behler, J.L. and F.W. King. 1979. The Audubon Society field guide to North American reptiles and amphibians. Alfred A. Knopf, Inc., New York.
- Bickham, J.W. and J.L. Carr. 1983. Taxonomy and phylogeny of the higher categories of cryptodiran turtles based on a cladistic analysis of chromosomal data. *Copeia* 1983:918-932.
- Boulenger, G.A. 1889. Catalogue of the chelonians, rhynchocephalians, and crocodiles in the British Museum (Natural History). New ed. London.
- Bour, R. 1987. Type specimen of the alligator snapper, *Macrochelys temminckii* (Harlan, 1835). *J. Herpetol.* 21:340-343.
- Brode, W.E. 1958. Prehensility of the tails of two turtles (Family Chelydridae). *Copeia* 1958:48.
- Cahn, A.R. 1937. The turtles of Illinois. *Illinois Biol. Monogr.* 16:1-218.
- Caldwell, J.P. and J.T. Collins. 1981. Turtles in Kansas. AMS Publishing, Lawrence, Kansas.
- Carpenter, C.C. 1982. A new western record for the alligator snapping turtle (*Macrochelys temminckii*) in Oklahoma. *Bull. Oklahoma Herpetol. Soc.* 7:2-3.
- Carr, A. 1952. Handbook of turtles: the turtles of the United States, Canada, and Baja California. Cornell Univ. Press, Ithaca, New York.
- Christiansen, J.L. and R.M. Bailey. 1988. The lizards and turtles of Iowa. Iowa Dept. Nat. Res., Nongame Tech. Ser. 3:1-19.
- Clarke, R.F. 1981. A record of the alligator snapping turtle, *Macrochelys temminckii* (Testudines: Chelydridae), in Kansas. *Trans. Kansas Acad. Sci.* 84:59-60.
- Conant, R. and J.T. Collins. 1991. A field guide to reptiles and amphibians: eastern and central North America. Houghton Mifflin Co., Boston, Massachusetts.
- Cope, E.D. 1872. Synopsis of the species of the Chelydridae. *Proc. Acad. Nat. Sci. Philadelphia* 24:22-29.
- Dobie, J.L. 1968a. A new turtle species of the genus *Macrochelys* (Chelydridae) from the Florida Pliocene. *Tulane Stud. Zool. Bot.* 15:59-63.
- . 1968b. Shelled eggs from the urinary bladder of an alligator snapping turtle, *Macrochelys temminckii*. *Herpetologica* 24:328-330.
- . 1971. Reproduction and growth in the alligator snapping turtle, *Macrochelys temminckii* (Troost). *Copeia* 1971:645-658.
- . 1986. Alligator snapping turtle, p. 49-50. *In* R.H. Mount (ed.), Vertebrate animals of Alabama in need of special attention. Auburn Univ. Agr. Exp. Sta., Auburn, Alabama.
- Drummond, H. and E.R. Gordon. 1979. Luring in the neonate alligator snapping turtle (*Macrochelys temminckii*): description and experimental analysis. *Z. Tierpsychol.* 50:136-152.
- Duméril, A.M.C. and A.H.A. Duméril. 1851. Catalogue méthodique de la collection des reptiles du Muséum d'Histoire Naturelle de Paris. Gide and Boudry, Paris.
- Dundee, H.A. and D.A. Rossman. 1989. The amphibians and reptiles of Louisiana. Louisiana State Univ. Press, Baton Rouge.
- Ernst, C.H. and R.W. Barbour. 1972. Turtles of the United States. Univ. Press Kentucky, Lexington.
- . 1989. Turtles of the world. Smithsonian Institution Press, Washington, D.C.
- , J.E. Lovich, and R.W. Barbour. In press. Turtles of the United States and Canada. Smithsonian Institution Press, Washington, D.C.
- Ernst, E.M. and C.H. Ernst. 1977. Synopsis of helminths endoparasitic in native turtles of the United States. *Bull. Maryland Herpetol. Soc.* 13:1-75.
- Ewert, M.A. 1976. Nests, nesting and aerial basking of *Macrochelys* under natural conditions, and comparisons with *Chelydra* (Testudines: Chelydridae). *Herpetologica* 32:150-156.
- . 1979. The embryo and its egg: development and natural history, p. 333-413. *In* M. Harless and H. Morlock (eds.), Turtles: perspectives and research. Wiley-Interscience, New York.
- . 1985. Embryology of turtles, p. 75-267. *In* C. Gans, F. Billett, and P. Maderson (eds.), Biology of the Reptilia, Volume 14, Development A. John Wiley and Sons, Inc., New York.
- Feuer, R.C. 1970. Key to the skulls of Recent adult North and Central American turtles. *J. Herpetol.* 4:69-75.
- Frair, W. 1972. Taxonomic relations among chelydrid and kinosternid turtles elucidated by serological tests. *Copeia* 1972:97-108.
- . 1977. Turtle red blood cell packed volumes, sizes, and numbers. *Herpetologica* 33:167-190.
- Gaffney, E.S. 1975. Phylogeny of the chelydrid turtles: a study of shared derived characters in the skull. *Fieldiana: Geol.* 33:157-178.
- . 1979. Comparative cranial morphology of Recent and fossil turtles. *Bull. Amer. Mus. Nat. Hist.* 164:65-376.
- Galbreath, E.C. 1961. Two alligator snappers, *Macrochelys temminckii*, from southern Illinois. *Trans. Illinois St. Acad. Sci.* 54:134-135.
- George, G.A. 1987. The current status of the alligator snapping turtle, *Macrochelys temminckii*, with a review of its natural history, p. 75-81. *In* M. Rosenberg (ed.), Proc. 11th Internatl. Herpetol. Symp. Chicago, Illinois.
- Gibbons, J.W. 1983. Their blood runs cold: adventures with reptiles and amphibians. Univ. Alabama Press, Tuscaloosa.
- . 1987. Why do turtles live so long? *Bioscience* 37:262-269.
- Glass, B.P. 1949. Records of *Macrochelys temminckii* in Oklahoma. *Copeia* 1949:138-141.
- Gmelin, J.F. 1789. Caroli a Linné, Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus differentiis, synonymis locis. Tomus Primus. Editio decima, tertia, aucta, reformata. G.E. Beer, Lipsiae.
- Grannan, L.T., Jr. and R. Anderson. 1992. Geographic distribution: *Macrochelys temminckii*. *Herpetol. Rev.* 23:88.
- Gray, J.E. 1855. Catalogue of shield reptiles in the collection of the British Museum. I. Testudinata (Tortoises). London.
- . 1856. On some new species of freshwater tortoises from North America, Ceylon and Australia, in the collection of the British Museum. *Proc. Zool. Soc. London* 1855:197-202.
- Grimpe, R. 1987. Maintenance, behavior, and reproduction of the alligator snapping turtle, *Macrochelys temminckii*, at the Tulsa Zoological Park. *Bull. Oklahoma Herpetol. Soc.* 12(3-4):1-6.
- Haiduk, M.W. and J.W. Bickham. 1982. Chromosomal homologies and evolution of testudinoid turtles with emphasis on the systematic placement of *Platysternon*. *Copeia* 1982:60-66.
- Harlan, R. 1835. Genera of North American reptiles, and a synopsis of the species, p. 84-163. *In* Medical and physical researches. Lydia R. Bailey, Philadelphia.

- Hay, O.P. 1907. Descriptions of seven new species of turtles from the Tertiary of the United States. *Bull. Amer. Mus. Nat. Hist.* 23:847-863.
- . 1908. The fossil turtles of North America. Carnegie Inst. Washington Publ. (75):1-568.
- . 1911. A fossil specimen of the alligator snapper (*Macrochelys temminckii*) from Texas. *Proc. Amer. Phil. Soc.* 50:452-455.
- Hayes, F.E. 1989. Defensive stances in turtles. *Herpetol. Rev.* 20:4-5.
- Hibbard, C.W. 1963. The presence of *Macrochelys* and *Chelydra* in the Rexroad Fauna from the upper Pliocene of Kansas. *Copeia* 1963:708-709.
- Hofstra, J. 1981. De Alligator- of Gierschilpad *Macrochelys temminckii*. *Lacerta* 39:126-127.
- Iverson, J.B. 1992. A revised checklist with distribution maps of the turtles of the world. Privately printed, Richmond, Indiana.
- , and C.R. Etchberger. 1989. The distributions of the turtles of Florida. *Florida Sci.* 52:119-144.
- Jackson, C.G. and A. Ross. 1971. The occurrence of barnacles on the alligator snapping turtle, *Macrochelys temminckii* (Troost). *J. Herpetol.* 5:188-189.
- Jackson, J.F. 1990. Evidence for chemosensor-mediated predator avoidance in musk turtles. *Copeia* 1990:557-560.
- Killebrew, F.C. 1977. Mitotic chromosomes of turtles. V. The Chelydridae. *Southwest. Nat.* 21:547-548.
- Mao, S.-H., W. Frair, F.-Yi Yin, and Y.-Wen Guo. 1987. Relationships of some cryptodiran turtles as suggested by immunological cross-reactivity of serum albumins. *Biochem. Syst. Ecol.* 15:621-624.
- Monks, S.P. 1878. The columella and stapes in some North American turtles. *Proc. Amer. Phil. Soc.* 17:335-337.
- Morris, M.A. and M.J. Sweet. 1985. Size, age, and growth of an alligator snapping turtle, *Macrochelys temminckii*, from Illinois. *Trans. Illinois Acad. Sci.* 78:241-245.
- Mount, R.H. 1975. The reptiles and amphibians of Alabama. Auburn Univ. Agr. Exp. Sta., Auburn, Alabama.
- Obst, F.J. 1988. Turtles, tortoises and terrapins. St. Martin's Press, New York.
- Parmley, D. 1992. Turtles from the late Hemphillian (latest Miocene) of Knox County, Nebraska. *Texas J. Sci.* 44:339-348.
- Parsons, T.S. 1968. Variation in the choanal structure of Recent turtles. *Can. J. Zool.* 46:1235-1263.
- Pawley, R. 1987. Measurements of a large alligator snapping turtle, *Macrochelys temminckii*, in the Brookfield Zoo. *Bull. Chicago Herpetol. Soc.* 22:134.
- Pope, C.H. 1939. Turtles of the United States and Canada. Alfred A. Knopf, New York.
- Powders, V.N. 1978. Observations on oviposition and natural incubation of eggs of the alligator snapping turtle, *Macrochelys temminckii*, in Georgia. *Copeia* 1978:154-156.
- Powell, S.C. and J.A. Knesel. 1992. Blood collection from *Macrochelys temminckii* (Troost). *Herpetol. Rev.* 23:19.
- and —. 1993. Preliminary analysis of peripheral blood components of *Macrochelys temminckii*. *Herpetol. Rev.* 24:81-82.
- Pritchard, P.C.H. 1975. Alligator snappers. *Florida Nat.* 48:14-17.
- . 1978. Alligator snapping turtle, p. 69-71. In R.W. McDiarmid (ed.), Rare and endangered biota of Florida. Vol. III. Amphibians and reptiles. Univ. Press Florida, Gainesville.
- . 1979. Encyclopedia of turtles. T.F.H. Publ., Inc., Neptune, New Jersey.
- . 1980. Record size turtles from Florida and South America. *Chelonologica* 1:113-123.
- . 1989. The alligator snapping turtle: biology and conservation. Milwaukee Pub. Mus., Milwaukee, Wisconsin.
- Redmond, A. 1979. Observations on the alligator snapping turtle. *Bull. Georgia Herpetol. Soc.* 5:5-6.
- Romer, A.S. 1956. Osteology of the reptiles. Univ. Chicago Press, Chicago, Illinois.
- Schweiger, A.F. 1814. Prodrömi monographie cheloniorum. Regiomonte, Königsberg.
- Shipman, P., D. Edds, and D. Blex. 1991. Report on the recapture of an alligator snapping turtle (*Macrochelys temminckii*) in Kansas. *Kansas Herpetol. Soc. Newsl.* 85:8-9.
- Sloan, K.N. and D. Taylor. 1987. Habitats and movements of adult alligator snapping turtles in Louisiana. *Proc. Ann. Conf. Southeast Assoc. Fish Wildl. Agencies* 41:343-348.
- Smith, P.W. 1961. The amphibians and reptiles of Illinois. *Illinois Nat. Hist. Surv. Bull.* 28:1-298.
- Snider, A.T., and J.K. Bowler. 1992. Longevity of reptiles and amphibians in North American collections. *S.S.A.R. Herpetol. Circ.* No. 21.
- Spindel, E.L., J.L. Dobie, and D.F. Buxton. 1987. Functional mechanisms and histologic composition of the lingual appendage in the alligator snapping turtle, *Macrochelys temminckii* (Troost) (Testudines: Chelydridae). *J. Morphol.* 194:287-301.
- Strauch, A. 1862. Chelonologische Studien, mit besonderer Beziehung auf die Schildkrötensammlung des kaiserlichen Akademie der Wissenschaften zu St. Petersburg. *Mém. Acad. Imper. Sci. St.-Petersbourg*, 7th Ser., 5(7):1-196.
- Upton, S.J., C.T. McAllister, and S.E. Trauth. 1992. Description of a new species of *Eimeria* (Apicomplexa: Eimeriidae) from the alligator snapping turtle, *Macrochelys temminckii* (Testudines: Chelydridae). *J. Helminthol. Soc. Washington* 59:167-169.
- Whetstone, K.N. 1978. Additional record of the fossil snapping turtle *Macrochelys schmidtii* from the Marsland Formation (Miocene) of Nebraska with notes on interspecific skull variation within the genus *Macrochelys*. *Copeia* 1978:159-162.
- Wickham, M.M. 1922. Notes on the migration of *Macrochelys lacertina*. *Proc. Oklahoma Acad. Sci.* 2:20-22.
- Williams, E.E. 1950. Variation and selection in the cervical central articulations of living turtles. *Bull. Amer. Mus. Nat. Hist.* 94:505-562.
- Williston, S.W. 1925. The osteology of the reptiles. Harvard Univ. Press, Cambridge, Massachusetts. *S.S.A.R. Facs. Repr. Herpetol.*, 1971.
- Winokur, R.W. 1982. Integumentary appendages of chelonians. *J. Morphol.* 172:59-74.
- and J.M. Legler. 1974. Rostral pores in turtles. *J. Morphol.* 143:107-120.
- Zangerl, R. 1945. Fossil specimens of *Macrochelys* from the Tertiary of the plains. *Fieldiana, Geology* 10:5-12.
- Zappalorti, R.T. 1976. The amateur zoologist's guide to turtles and crocodilians. Stackpole Books, Harrisburg, Pennsylvania.
- Zug, G.R. 1966. The penial morphology and the relationships of cryptodiran turtles. *Occ. Pap. Mus. Zool. Univ. Michigan* (647):1-24.

Jeffrey E. Lovich, United States Department of the Interior, National Biological Survey, Palm Springs Field Station, National Ecology Research Center, 63-500 Garnet Avenue, P.O. Box 2000, North Palm Springs, California, USA 92258-2000.

Primary editor for this account, Carl H. Ernst.

Published 30 November 1993 and Copyright © 1993 by the Society for the Study of Amphibians and Reptiles.
