

Catalogue of American Amphibians and Reptiles.

Seidel, M.E. and M.J. Dreslik. 1996. *Pseudemys concinna*.***Pseudemys concinna* (LeConte)
River Cooter**

Testudo concinna Le Conte, 1830:106. Type-locality, "... rivers of Georgia and Carolina, where the beds are rocky," not "below Augusta on the Savannah, or Columbia on the Congaree," restricted to "vicinity of Columbia, South Carolina" by Schmidt (1953:101). Holotype, undesignated, see Comment.

Testudo floridana Le Conte, 1830:100 (part). Type-locality, "... St. John's river of East Florida ..." Holotype, undesignated, see Comment.

Emys (Testudo) concinna: Bonaparte, 1831:355.

Terrapene concinna: Bonaparte, 1831:370.

Emys annulifera Gray, 1831:32. Type-locality, not given, designated as "Columbia [Richland County], South Carolina" by Schmidt (1953:101). Holotype, undesignated, but Boulenger (1889:84) listed the probable type as a young preserved specimen in the British Museum of Natural History (BMNH) from "North America."

Clemmys concinna: Fitzinger, 1835:124.

Clemmys floridana: Fitzinger, 1835:124 (part).

Emys floridana: Duméril and Bibron, 1835:285 (part).

Emys concinna: Duméril and Bibron, 1835:289.

Emys hieroglyphica Holbrook, 1836:47. Type-locality, "... western waters ... Cumberland river." Holotype, undesignated; presumed holotype (ANSP 217) now lost (Adler, *in* Holbrook, 1976).

Emys mobilensis Holbrook, 1838:53. Type-locality, "Alabama ... numerous in the neighbourhood of Mobile [Mobile County] ..." Holotype, Academy of Natural Sciences, Philadelphia (ANSP) 242 (Malnate, 1971) (examined by authors).

[*Emys*] *labyrinthica* Duméril and Duméril, 1851:13. Type-locality, "Wabash-River (États-Unis)." Holotype, undesignated.

Pseudemys concinna: Gray, 1855 (1856a):197. First use of present combination. Nomenclatural priority of Gray (1855 [1856b]) corrected by Webb (1995).

Pseudemys hieroglyphica: Gray, 1855 (1856b):34.

Ptychemys concinna: Agassiz, 1857:432.

Ptychemys mobilensis: Agassiz, 1857:433.

Ptychemys Hoyi Agassiz, 1857:433. Type-locality, "south-western Missouri," restricted to "vicinity of Springfield [Greene County], Missouri," by Schmidt (1953:101). Holotype, undesignated.

Ptychemys hieroglyphica: Agassiz, 1857:434.

Clemmys mobilensis: Strauch, 1862:32.

Clemmys hieroglyphica: Strauch, 1862:33.

Pseudemys mobiliensis: Gray, 1863:182.

[*Emys*] *orthonyx* Wied-Neuwied, 1865:23. Type-locality, "New-Orleans [Orleans Parish, Louisiana]." Holotype, undesignated.

Trachemys annulifera: Gray, 1873:47.

Pseudemys mobilensis: Yarow, 1882:32.

Chrysemys hieroglyphica: Boulenger, 1889:76.

Chrysemys concinna: Boulenger, 1889:83.

Chrysemys mobiliensis: Boulenger, 1889:85.

Clemmys mobiliensis: Strauch, 1890:80.

Chrysemys labyrinthica: Hay, 1892:566.

Pseudemys labyrinthica: Baur, 1893:222.

Pseudemys floridana: Baur, 1893:223 (part).

Pseudemys texana: Brimley, 1907:77 (part).

Chrysemys floridana: Ditmars, 1907:37 (part).

Chrysemys texana: Hurter and Strecker, 1909:21 (part).

Pseudemys vioscana Brimley, 1928:66. Type-locality, "Lake Des Allemands [St. John the Baptist Parrish], La." Holotype, National Museum of Natural History (USNM) 79632, dry adult male collected April 1927 by Percy Viosca Jr. (examined by authors).

Pseudemys elonae Brimley, 1928:67. Type-locality, "... pond in Guilford County, North Carolina, not far from Elon College, in the Cape Fear drainage ..." Holotype, USNM 79631, dry adult male collected October 1927 by D.W. Rumbold and F.J. Hall (examined by authors).

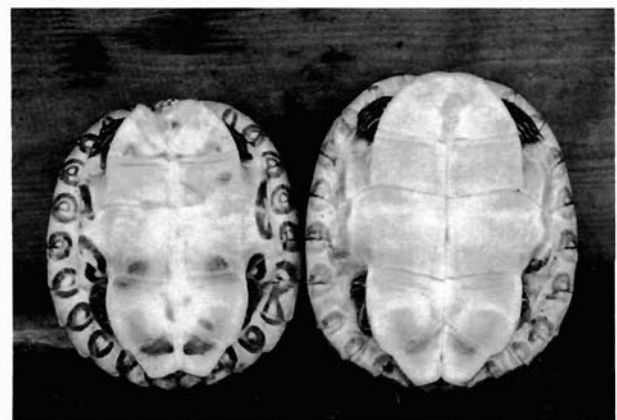
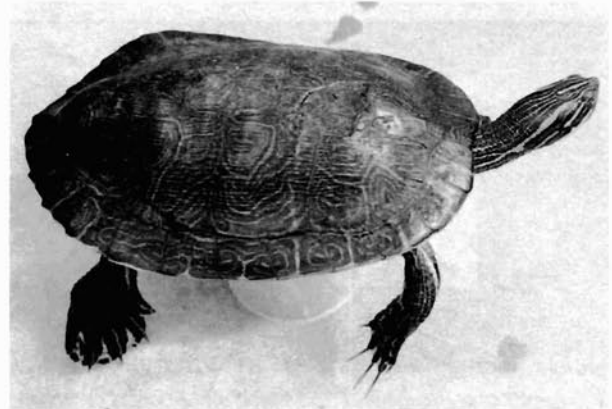


Figure 1. Adult male *Pseudemys concinna* from Lake Cumberland, Franklin County, Kentucky (top); juvenile from Gallatin County, Illinois (center); plastral view of two individuals from Gallatin County, Illinois (bottom).

Chrysemys (Pseudemys) concinna: Lindholm, 1929:280.

Pseudemys virginica: Pasteels, 1957a:219. *Ex errore*.

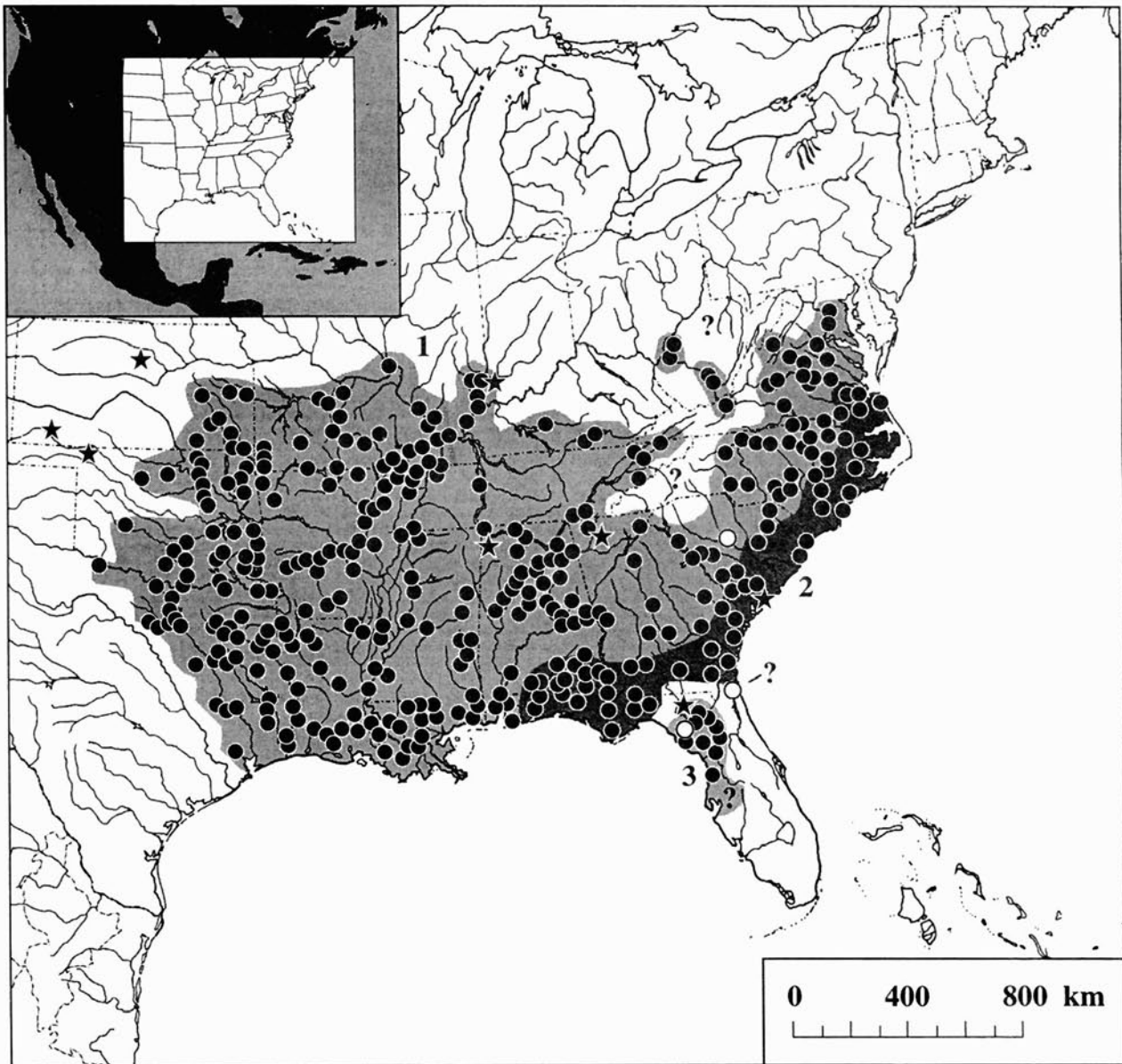
Pseudemys floridana: Battersby, 1958 (1960):92. *Ex errore*.

• **Content.** Three subspecies, *Pseudemys concinna concinna*, *P. c. floridana*, and *P. c. suwanniensis* are recognized here, but alternative interpretations for the taxonomy of *P. concinna* have been published. See Comment.

• **Definition.** *Pseudemys concinna* is a large emydine turtle, adult carapace to 30 cm in males and 43 cm in females. The carapace is oval in dorsal view, with straight or curved sides. Longitudinal rugosities usually are present along the sides, and the posterior border of the carapace is serrated and medially notched. A median keel is pronounced in young individuals, but in adults it is reduced and restricted to the posterior vertebrals

or absent. In dorsal view, the anterior midline is emarginate with the cervical scute not extending as far forward as the adjacent marginals. The cutting edge of the upper jaw is either smooth or slightly notched with short cusps present in some populations. Males have long, thick tails with the vent posterior to the rim of the carapace. Females have shorter tails with the vent anterior to the carapacial rim. The foreclaws of males are elongate compared to those of females.

Carapacial ground color is green to olive or dark brown to black. A pattern of light markings varies from narrow transverse bands to wavy reticulations. The plastron lacks a hinge and has a posterior medial notch. It is pale yellow to light orange and frequently has a symmetrical, wavy, dark figure which generally follows and diffuses outward from the scute seams. Dark markings are also present on the underside of marginal scutes and along the bridge. These markings can be absent,



Map. Distribution of *Pseudemys concinna*: circles mark type-localities, dots indicate other selected records, stars indicate fossil localities, and question marks indicate localities of uncertain validity. Zones of intergradation between *P. c. concinna* (1) and *P. c. floridana* (2) occur in many areas along their line of contact; but in other areas, especially near large rivers in the coastal plain, their ranges may overlap (see discussion in Seidel, 1994, 1995). The ultimate distribution limits of *P. c. floridana* are not presently well-defined.

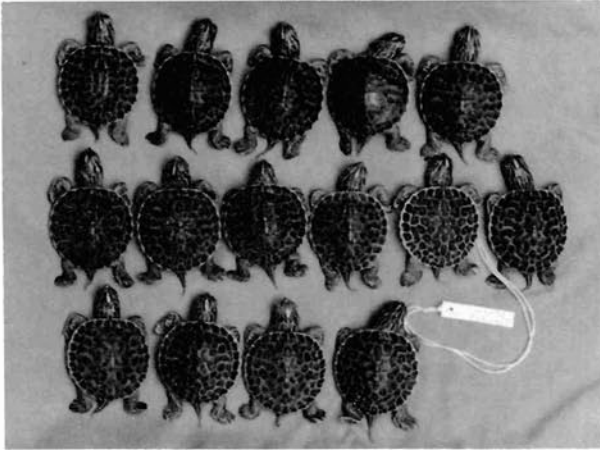


Figure 2. Carapacial (left) and plastral views of hatchlings from a single clutch of eggs from Wake County, North Carolina (North Carolina State Museum 1971). Photographs by Alvin Braswell.

greatly reduced, or highly variable in some populations. The pattern on the head consists of a variable number of longitudinal yellow stripes on a dark olive to black background. The supratemporal stripe is usually broad above and behind the tympanum. The neck, limbs, and tail are also marked with yellow stripes. Old males may be partially melanistic, with markings of the head, limbs, and shell obscured by dark brown to black vermiculations.

• **Descriptions.** Composite descriptions are in Carr (1952) and Seidel (1994). Due to the confusion regarding the taxonomy of this species, many of the descriptions are separated under *Pseudemys concinna* and *P. floridana*: Ernst and Barbour (1972), Mount (1975), Pritchard (1979), Behler and King (1988), Dundee and Rossman (1989), Conant and Collins (1991), Ernst et al. (1994), Mitchell (1994), and Palmer and Braswell (1995). Other descriptions are as follows: egg (Jackson and Jackson, 1968; Ewert, 1979b; Congdon and Gibbons, 1985; Palmer and Braswell, 1995; Jackson, 1996), embryo (Ewert, 1985), nest (Green and Pauley, 1987; Jackson, 1996), hatchlings (Seidel, 1981; Ernst et al., 1994; Palmer and Braswell, 1995; Jackson, 1966), skull (McDowell, 1964; Gaffney, 1979; Seidel, 1981; Ward, 1984), pelvic girdle and hindlimb (Zug, 1971), cervical vertebrae (Williams, 1950), cranial muscles (Ward, 1984), penis (Zug, 1966), external morphology (Seidel and Palmer, 1991; Seidel, 1994), karyotype (Forbes, 1966; Stock, 1972; Gorman, 1973; Bickham, 1975; Killebrew, 1977; Bickham and Baker, 1979; Bickham and Carr, 1983), and courtship (Cagle, 1955; Jackson and Davis, 1972a, b; Petranka and Phillippi, 1978; Carpenter, 1979; Obst, 1985).

• **Illustrations.** Color photographs or illustrations of adults and/or juveniles are in Ernst and Barbour (1972), Pritchard (1979), Martof et al. (1980), Caldwell and Collins (1981), Ashton and Ashton (1985), Green and Pauley (1987), Johnson (1987), Behler and King (1988), Sievert and Sievert (1989), Lehrer (1990), Conant and Collins (1991), Ernst et al. (1994), Mitchell (1994), Seidel (1994), and Palmer and Braswell (1995). Black and white photographs are in Pope (1939), Carr (1952), Smith (1956), Blair et al. (1957), Smith (1961), Barbour (1971), Ernst and Barbour (1972), Minton (1972), Mount (1975), Seidel (1981), Ward (1984), Ernst and Barbour (1989), and Jackson (1995). Line drawings are in Holbrook (1838), Brimley (1928), Wermuth and Mertens (1961), Dundee and Rossman (1989), Seidel and Palmer (1991), and Palmer and Braswell (1995). Line drawings of markings on the head and neck are in Carr (1935, 1952), Carr and Crenshaw (1957), and Obst (1985). Illustrations

of the skull are in Ernst and Barbour (1972) and Gaffney (1979), and photographs of the egg and hatchling are in Jackson and Jackson (1968).

• **Distribution.** *Pseudemys concinna* occurs from Maryland to northern peninsular Florida and throughout the central and southern United States north to Illinois, Missouri, and Kansas and west to eastern Texas and Oklahoma. The entire ranges of *Pseudemys concinna* and *P. floridana* were presented by Davis and Rice (1883b), Neill (1954), Tinkle (1959), Conant (1958, 1975), Ward (1984), Iverson (1992), Conant and Collins (1991), and Ernst et al. (1994).

Additional distributional data are listed alphabetically by state: Alabama (Haltom, 1931; Mount, 1975), Arkansas (Parker, 1947), Florida (Carr and Goin, 1959; Blaney, 1971; McDiarmid, 1978; Ashton and Ashton, 1985; Iverson and Etchberger, 1989; Boundy, 1994; Jackson, 1995), Georgia (Martof, 1956; Camp et al., 1988; Williamson and Moulis, 1994), Illinois (Davis and Rice, 1883a; Cahn, 1937; Smith, 1961; Dancik, 1974; Moll and Morris, 1990), Indiana (Minton, 1971, 1972), Kansas (Smith, 1956; Clarke et al., 1958; Caldwell and Collins, 1981; Collins, 1993), Kentucky (Barbour, 1971; Stephens, 1985), Louisiana (Liner, 1954; Dundee and Rossman, 1989), Maryland (McCauley, 1945), Mississippi (Smith and List, 1955; Gunter, 1981), Missouri (Anderson, 1965; Nickerson and Krager, 1971; Ward, 1979; Johnson, 1982, 1987), North Carolina (Palmer and Braswell, 1995), Oklahoma (Webb, 1970; McCoy, 1975; Sievert and Sievert, 1989), South Carolina (Martof et al., 1980; Gibbons, 1990), Tennessee (Rhoads, 1895; Parker, 1939, 1948; Huheey and Stupka, 1965; Iverson, 1978; Ewert, 1979a), Texas (Strecker, 1915; Hibbitts and Hibbitts, 1994; Brown, 1950; Smith and Sanders, 1952; Guidry, 1953; Raun and Gehlbach, 1972; Conant, 1977; McAllister, 1982; Myers, 1982; Dixon, 1987, 1993; Garret and Barker, 1987), Virginia (Werler and McCallion, 1951; Buhlmann, 1989; Mitchell, 1994), and West Virginia (Bayless, 1972; Seidel and Green, 1982; Buhlmann, 1985; Green and Pauley, 1987).

• **Fossil Record.** Fossil remains of *Pseudemys concinna* are known from the Pleistocene of Bartow County, Georgia (Holman, 1967), Columbia-Gilchrist County, Florida (Jackson, 1975), Colleton County, South Carolina (Roth and Laerm, 1980), Colbert County, Alabama (Holman et al., 1990), Daviess County, Indiana (Holman, 1995), and Ellsworth, Meade, and Seward counties, Kansas (Holman, 1995). According to Holman (1995), the Pleistocene species *P. hibbardi*, described by Preston (1979) from Harper County, Oklahoma, is probably *P. concinna*. The

extinct Pliocene species, *P. williamsi* from Alachua County, Florida (Rose and Weaver, 1966), presumably is ancestral to *P. concinna* (Jackson, 1976).

• **Pertinent Literature.** General accounts are in Holbrook (1838), Ditmars (1936), Pope (1939), Carr (1952), Harless and Morlock (1979), Pritchard (1979), Smith and Brodie (1982), Obst (1985), Ernst and Barbour (1989), Conant and Collins (1991), and Ernst et al. (1994). Additional pertinent publications are listed by topic as follows: morphology (White, 1929; Williams, 1950; Chermock, 1952; Parsons, 1960, 1968; Shah, 1962; Tinkle, 1962; Jackson, 1966; Zug, 1966, 1971; Cagle, 1968; Dobie and Jackson, 1979; Ward, 1980; Gibbons and Lovich, 1990; McCoy and Jacobs, 1991; Seidel and Palmer, 1991; Seidel, 1994), systematics (Carr, 1935, 1937, 1938; Crenshaw, 1955; Carr and Crenshaw, 1957; McDowell, 1964; Weaver and Rose, 1967; Holman, 1977; Fahey, 1980; Vogt and McCoy, 1980; Smith and Smith, 1980; Ward, 1980, 1984; Fritz, 1981; Dobie, 1981; Seidel, 1981, 1994, 1995; Seidel and Smith, 1986; Ernst, 1990; Frost and Hillis, 1990; Fritz, 1991; McCoy and Jacobs, 1991; Seidel and Palmer, 1991; Jackson, 1995; Bickham et al., 1996), protein electrophoresis (Rodnan and Ebaugh, 1957; Zweig and Crenshaw, 1957; Crenshaw, 1965; Sullivan and Riggs, 1967b; Olmo et al., 1985; Seidel, 1994), nucleic acids (Bickham et al., 1996), blood chemistry and histology (Goin and Jackson, 1965; Jackson and Legendre, 1967; Sullivan and Riggs, 1967a, b, c; Jackson et al., 1970; Brown, 1971; Holcomb and Jackson, 1972; Frair, 1977), blood sampling (Avery and Vitt, 1984), physiology (Chapman and Brubaker, 1891; Southworth and Redfield, 1926; Bogert and Cowles, 1947; Shellabarger et al., 1956; Hutton et al., 1960; Belkin, 1964, 1968; Jackson and Cantrell, 1964; Hutchison et al., 1966; Brown, 1971; Nothstine et al., 1971; Weathers and White, 1971; Valentinuzzi et al., 1973; Jackson et al., 1974; Kinney et al., 1977; Kinney and White, 1977; Naeije and Crowe, 1977; White, 1978; Grigg et al., 1979; Hutchison, 1979; Bartholomew, 1982; Tracy, 1982; Ultsch, 1985; Gapp and Carraway, 1990; Gapp and Polak, 1990), behavior (Carr, 1940; Marchand, 1944; Allen, 1950; Cagle, 1955; Boyer, 1965; Crawford and Siebert, 1964; Crawford et al., 1966; Gibbons and Smith, 1968; Crawford and Adams, 1968; Ashe, 1970; Davis and Jackson, 1971; Jackson and Davis, 1972a, b; Zug, 1972; Auth, 1975; Burghardt, 1977; Carpenter and Ferguson, 1977; Hennemann, 1979; Carpenter, 1980; Carr, 1983; Gibbons et al., 1983; Fritz, 1989, 1990), general ecology (Marchand, 1945; Neill and Allen, 1954; Crenshaw, 1955; Oliver, 1955; Boyer, 1965; Pritchard and Greenwood, 1968; Gibbons and Coker, 1977; Bury, 1979; Seidel, 1982; Obst, 1985; Fahey, 1987; Wilbur and Morin, 1988; Gibbons, 1990; Buhlmann and Vaughan, 1991; Giovanetto, 1992; Meylan et al., 1992; Jackson, 1994; Buhlmann, 1995; Dreslik, 1996), feeding (Allen, 1938; Brimley, 1942-43; Mahmoud and Klicka, 1979; Lagueux et al., 1995; Teran et al., 1995; Turner, 1995), predation (Laughlin, 1959; Brown, 1979; Delany and Abercrombie, 1986; Tuberville and Burke, 1994), reproduction (Goff and Goff, 1932; Allen, 1938; Thomas, 1972; Thomas and Mount, 1973; Gibbons and Coker, 1977; Iverson, 1977; Gibbons and Nelson, 1978; Carpenter, 1980; Gibbons, 1982; Gibbons et al., 1982; Congdon and Gibbons, 1985; Turner, 1995; Jackson, 1996), development (Pasteels, 1957a, b; Ewert, 1979b, 1985, 1991), sex determination (Ewert and Nelson, 1991), growth (Jackson, 1965, 1968, 1970; Pritchard, 1980; Powell et al., 1982; Dundee, 1994; Forsman and Shine, 1995), longevity (Conant and Hudson, 1949; Snider and Bowler, 1992), biomass (Iverson, 1982; Congdon et al., 1986; Congdon, 1989), trapping (Vogt, 1980; Stone et al., 1993), movements (Gibbons, 1970; Tuberville et al., 1996), conservation (McDiarmid, 1978; Stone, 1980; Morris and Smith, 1981; Moll and Morris, 1990;

Herkert, 1992; Moler and Ashton, 1992), parasites (Jackson and Fulton, 1970; Moser, 1995), and symbionts and diseases (Leidy, 1856; Proctor, 1958; Johnson, 1968; Acholonu, 1969; Ernst and Ernst, 1975, 1977, 1979; Baker, 1987; Teehan and Short, 1989; Thomas et al., 1994; Lovich et al., 1996).

• **Etymology.** The specific name is derived from the Latin *concinus*, meaning neat or elegant, presumably in reference to the markings on the carapace. The subspecific name *floridana* is a toponym for Florida, the state in which the purported type-locality is located. The subspecific name *suwanniensis* is also a toponym, and refers to the Suwannee River, Florida.

1. *Pseudemys concinna concinna* (Le Conte)

Testudo concinna Le Conte, 1830:106. See species synonymy.
Emys annulifera: Gray, 1831:32. See species synonymy.
Emys hieroglyphica Holbrook, 1836:47. See species synonymy.
Emys mobilensis Holbrook, 1838:53. See species synonymy.
[Emys] labyrinthica Duméril and Duméril, 1851:13. See species synonymy.
Ptychemys Hoyi: Agassiz, 1857:433 (part). See species synonymy.
[Emys] orthonyx Wied-Neuwied, 1865:23. See species synonymy.
Pseudemys vioscana Brimley, 1928:66. See species synonymy.
Pseudemys elonae Brimley, 1928:67. See species synonymy.
Pseudemys floridana concinna: Carr, 1935:147.
Pseudemys floridana mobilensis: Carr, 1937:1.
Pseudemys concinna hoyi: Stejneger, 1938:175.
Pseudemys floridana hieroglyphica: Carr, 1938:108.
Pseudemys floridana mobilensis: Pope, 1939:210.
Pseudemys concinna concinna: Stejneger and Barbour, 1939:163. First use of present combination.
Pseudemys concinna hieroglyphica: Stejneger and Barbour, 1939:164.
Pseudemys concinna mobilensis: Stejneger and Barbour, 1939:164.
Pseudemys floridana hoyi: Brown, 1950:240 (part).
Pseudemys concinna mobilensis: Pritchard, 1967:96.
Chrysemys concinna concinna: Weaver and Rose, 1967:63.
Chrysemys concinna hieroglyphica: Weaver and Rose, 1967:63.
Chrysemys floridana hoyi: Cochran and Goin, 1970:155.
Chrysemys concinna mobilensis: Cochran and Goin, 1970:155.
Pseudemys concinna metterii Ward, 1984:34. Type-locality, "Old Fort Cobb, Caddo County, Oklahoma." Holotype, USNM 7173, dry shell and fluid-preserved head and limbs, adult female collected 1 June 1868 by E. Palmer (examined by authors).

• **Definition.** Head and neck stripes are numerous, usually numbering more than eleven. A "C"-shaped mark is often present on the second pleural scute, and the plastron usually has a dark figure which nearly always fades in adults. The cutting surface of the upper jaw (tomium) is irregular or slightly notched at the midline.

2. *Pseudemys concinna floridana* (Le Conte)

Testudo floridana Le Conte, 1830:100 (part). See species synonymy.
Pseudemys floridana floridana: Carr, 1938:108.
Chrysemys floridana floridana: Cochran and Goin, 1970:154.
Pseudemys concinna floridana: Ashe, 1970:151. First use of present combination.

• **Definition.** Head and neck stripes number fewer than eleven.

Pleural scutes have one or more narrow, wavy transverse bars, and the plastron usually lacks dark markings. The cutting surface of the upper jaw is rounded and without any evidence of a notch.

3. *Pseudemys concinna suwanniensis* (Carr)

Pseudemys floridana suwanniensis Carr, 1937:4. Type-locality, "Suwannee River at Manatee Springs, Levy-Dixie County line, Florida." Holotype, University of Michigan Museum of Zoology (UMMZ) 81673, adult male, collected by A. Carr, on 12 March 1934 (not examined by authors).

Pseudemys concinna suwanniensis: Stejneger and Barbour, 1939:164. First use of present combination.

Pseudemys concinna suwanniensis: Rhodes, 1964 (1966):55. *Ex errore*.

Chrysemys concinna suwanniensis: Weaver and Rose, 1967:63.

Pseudemys suwanniensis: Dadd, 1971 (1974):86. *Ex errore*.

Pseudemys suewanniensis: Nothstine et al., 1971:726. *Ex errore*.

Pseudemys suwanniensis: Seidel, 1994:128.

• **Definition.** The second pleural scute usually has a "C"-shaped mark, and the plastron has a dark figure. The ventral surface of the cervical scute is short, less than 35% of its dorsal length. The epiplastral lip is often curved, especially in females, and the ground color of the carapace, legs, and head is sooty black with light green or yellow lines.

• **Comment.** The taxonomy of *Pseudemys concinna* and that of its synonym *P. floridana* has undergone considerable revision since Le Conte's (1830) original descriptions of cooters from the southeastern United States. During the last century, the defined range was extended westward. Le Conte's original two species were partitioned into several additional species: *Emys mobilensis*, *E. hieroglyphica* (Holbrook, 1838), *Ptychemys Hoyi* (Agassiz, 1857), and *Pseudemys texana* (Baur, 1893).

More recently, Carr (1935, 1940, 1952) concluded that these forms represent a single wide-ranging polytypic species, classified them all as subspecies of *P. floridana*, and described two additional forms from Florida, *P. f. suwanniensis* (Carr, 1937) and *P. f. peninsularis* (1938). Crenshaw (1955), Carr's doctoral student, followed with a taxonomic analysis that examined *Pseudemys* primarily in Florida. He proposed that *P. floridana* and *P. concinna* be recognized as separate species. In spite of the fact that his results were not published, several popular and influential texts adopted Crenshaw's revision (e.g., Conant, 1958).

Numerous reports of intergradation or hybridization between *P. floridana* and *P. concinna* followed (Smith, 1961; Anderson, 1965; Webb, 1970; Barbour, 1971; Ernst and Barbour, 1972; Minton, 1972; Conant, 1975; Mount, 1975; Pritchard, 1979; Smith and Smith, 1980; Martof et al., 1980).

Wermuth and Mertens (1961, 1977), without explanation, listed *Trachemys scripta hiltoni* from México as a subspecies of *P. concinna*.

Fahey (1980) reported a taxonomic study of *Pseudemys* in Louisiana which concluded that *P. concinna* and *P. floridana* are conspecific (*sensu* Carr, 1952). Ward (1984) described two additional subspecies of *P. concinna* (*P. c. metterii* and *P. c. gorzugi*), elevated *P. c. texana* to species level, placed *P. c. mobilensis* and *P. f. hoyi* in synonymy, and restricted the range of *P. floridana* to east of the Mississippi River. Subsequently, *P. c. gorzugi* was elevated to a full species (Ernst, 1990).

The most recent revision (Seidel, 1994), based on a broad geographic and comprehensive analysis of morphological and molecular data, elevated *P. f. peninsularis* and *P. c. suwanniensis* to species, relegated *P. f. floridana* to a subspecies of *P. concinna*,

and placed *P. c. hieroglyphica* and *P. c. metterii* in the synonymy of *P. c. concinna*.

The present taxonomic arrangement of *P. concinna* follows Seidel (1994), except for retention of *P. suwanniensis* as a subspecies. Other taxonomic interpretations are discussed in Jackson (1995) and Seidel (1995). Regardless of classification, the variable levels of divergence observed among populations of *P. concinna* do not easily fit the traditional concepts of biological species or subspecies.

Roger Bour recently located several specimens of *P. concinna* in the Muséum National d'Histoire Naturelle, Paris. These individuals were donated to the museum by John E. Le Conte and may be part of his (1830) type series. As noted by Carr (1935), Ward (1984), and Seidel (1994), a particular problem exists regarding the type-location for *P. c. floridana*. Le Conte's (1830) type-locality, "St. John's river of East Florida," without designation of a type specimen, is in a region of parapatry or sympatry for *P. c. floridana* and *P. peninsularis*, and is therefore questionable.

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