

## REPTILIA: TESTUDINES: EMYDIDAE

## GRAPTEMYS PSEUDOGEOGRAPHICA

## Catalogue of American Amphibians and Reptiles.

Vogt, R.C. 1995. *Graptemys pseudogeographica*.

***Graptemys pseudogeographica* (Gray)****False Map Turtle**

*Emys pseudogeographica* Gray, 1831:31. Type-locality, "America Boreali," restricted to "Wabash River, New Harmony [Posey County], Indiana" by Stejneger and Barbour (1917:117). Holotype unknown. Lectotype, Muséum National d'Histoire Naturelle (MNHN) 9147, a subadult female designated by Bour and Dubois, 1983:45 (examined by author).

*Emys Lesueurii* Gray, 1831:31 (part). Type-locality, "America Boreali," restricted to "Wabash River, New Harmony [Posey County], Indiana" by Schmidt, 1953:98. Holotype not designated.

*Emys geographica*: Duméril and Bibron, 1835:256 (part).

*Emys pseudo-geographica*: Holbrook, 1842:103.

*Graptemys lesueurii*: Agassiz, 1857:436.

*Clemmys pseudogeographica*: Strauch, 1862:33.

*Graptemys pseudogeographica*: Gray, 1863:180. First use of combination.

*Malacoclemmys pseudogeographicus*: Cope, 1875:53.

*Malacoclemmys lesueurii*: Yarrow, 1882:34.

*Malacoclemmys pseudo-graphicus*: Davis and Rice, 1883:32.

*Malacoclemmys lesueurii*: Boulenger, 1889:91. Emendation of ending.

*Malaclemmys pseudo-geographica*: Hay, 1892:573.

*Graptemys pseudogeographicus*: Paulmier, 1902:393.

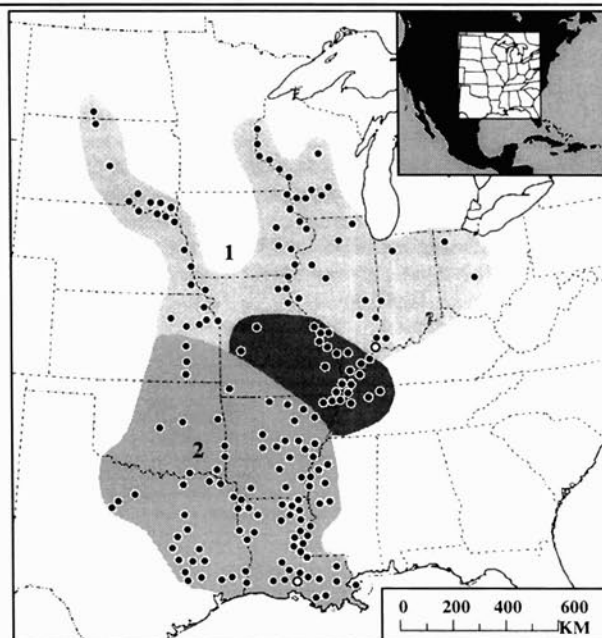
*Malaclemmys lesueurii*: Hurter, 1911:242.

*Malaclemmys pseudogeographica*: McDowell, 1964:274.

• **Content.** Two subspecies (*Graptemys pseudogeographica pseudogeographica* and *G. p. kohnii*) are recognized.

• **Definition.** *Graptemys pseudogeographica* is a small to medium-sized emydid turtle; female carapace length to 277 mm, male to 150 mm. The elevated carapace has low black knobs on the second, third, and fourth vertebrals. The carapace is olive-green, usually with one dark blotch encircled with yellow or orange on the posterior border of each scute. This pattern fades with age. Each scute may have as many as six encircled blotches or may have none, with only an interconnected orange lattice. The hingeless, flat plastron has alternating concentric swirls of yellow and dark green. In adult females this pattern fades to a yellow-brown mottling. Head markings vary from a complete yellow-orange crescent posterior to the orbit, to a broken crescent with as many as six stripes contacting the orbit. The underside of the jaw is marked with longitudinal alternating yellow and green stripes; anteriorly these break into a highly variable pattern. The skull becomes greatly widened in large females in some populations. Adult males have elongate foreclaws and long thick tails, with the cloacal opening posterior to the carapace margin.

• **Diagnosis.** *Graptemys pseudogeographica* is distinguished from *G. ouachitensis* by having narrow head markings which form a complete narrow yellow-orange crescent posterior to the orbit or a broken crescent with as many as six narrow stripes contacting the orbit (Fig. D-G). The underside of the jaw is marked with longitudinal alternating yellow and green stripes which anteriorly break up into a highly variable pattern (Fig. C). The plastral pattern in juveniles and males usually covers



**Map.** Circles represent type-localities; dots indicate other records verified by the author. The darkly shaded area represents regions with a high degree of intergradation between the two subspecies.

more than 75% of the surface, whereas in *G. ouachitensis* it covers less.

• **Descriptions.** Due to confusion about the differences between this species and *G. ouachitensis*, most descriptions are composites; however, the following are valid: Carr (1952), Pritchard (1967, 1979), Cochran and Goin (1970), Ernst and Barbour (1972, 1989), McKown (1972), Dundee (1974), Conant (1975), Vogt (1981a, 1993), Conant and Collins (1991), and Ernst et al. (1994).

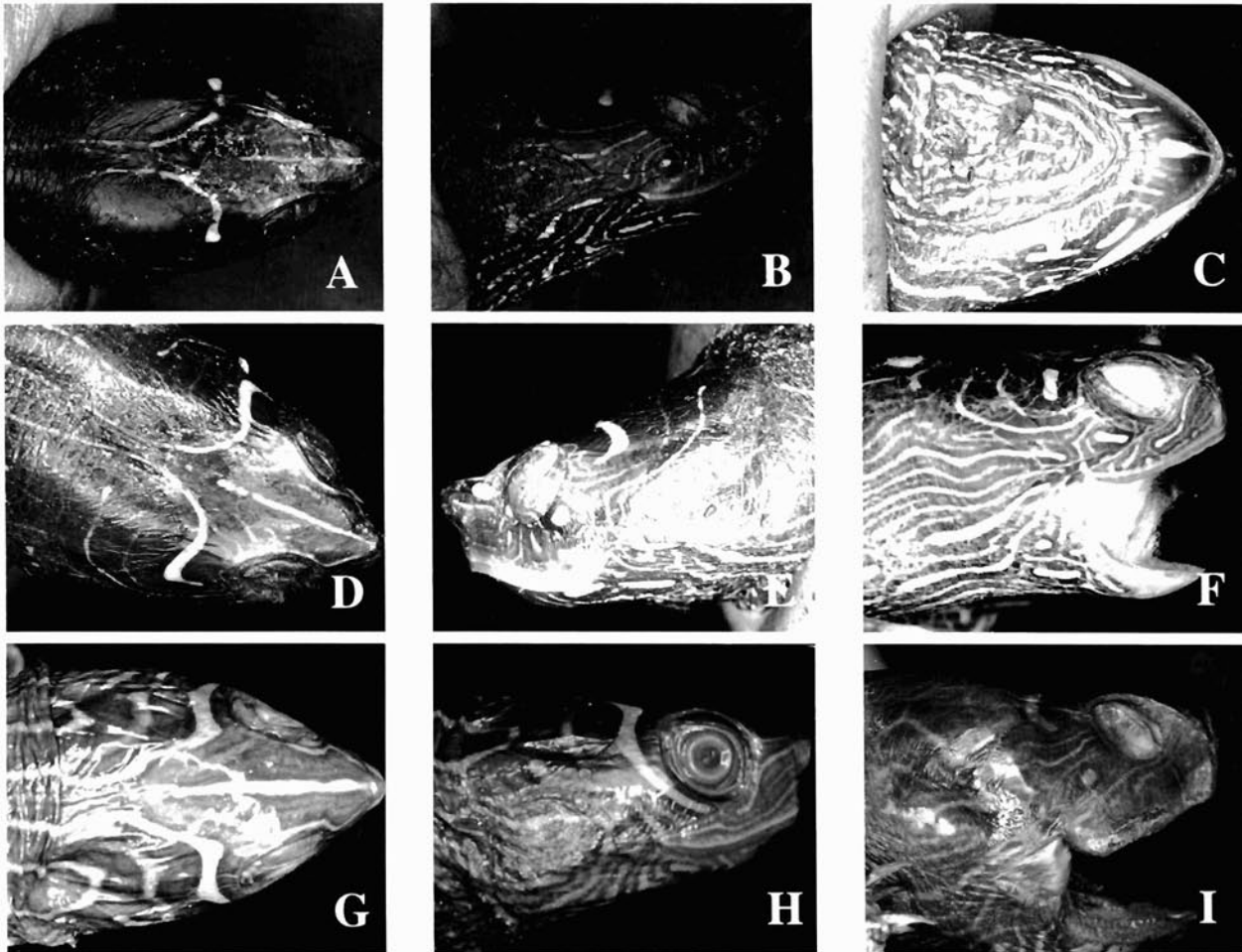
• **Illustrations.** Color photographs are in Pritchard (1979), Caldwell and Collins (1981), Oldfield and Moriarty (1994), and Ernst et al. (1994). Vogt (1981a) has color photographs of adult females, head patterns, plastral pattern, and eggs of *G. p. pseudogeographica*. Conant (1975) and Conant and Collins (1991) have color drawings of adult *G. p. pseudogeographica* (male), *G. p. kohnii* (male and hatchling), and *G. ouachitensis* (female, labeled *G. pseudogeographica*). Black and white photographs of young and adults are in Pope and Dickinson (1928), Pope (1939, *G. p. kohnii* labeled *G. p. pseudogeographica*), Carr (1952), Smith (1956), Smith (1961), Anderson (1965), Cochran and Goin (1970), Ernst and Barbour (1972), and Minton (1972). Line drawings are in Carr (1949, 1952), Anderson (1965), and Minton (1972). Line drawings of head patterns are in Smith (1961), Timkin (1968), Webb (1970), and Vogt (1993); and of the skull in Gaffney (1979). Skull photographs are in Carr (1952) and Ernst and Barbour (1972). Drawings of eggs are in Agassiz (1857).

• **Distribution.** *Graptemys pseudogeographica* is primarily found in large rivers in the Mississippi River basin, from the St. Croix and Wisconsin rivers in northern and central Wisconsin and the upper Mississippi River in Minnesota south through Louisiana and eastern Texas. The distribution follows the Mis-

souri River basin into North Dakota, extending east to the western edges of Tennessee, Kentucky, Indiana, and central Ohio. *Graptemys p. pseudogeographica* primarily occurs north of 40°N latitude in the northern Mississippi River basin and the entire Missouri River basin, whereas *G. p. kohnii* occurs primarily south of 35°N latitude. A wide zone of intergradation occurs in southern Illinois, southern Missouri, northeastern Arkansas and the western edges of Kentucky and Tennessee. Jones et al. (1991) reported *G. p. kohnii* in the Pearl River, an independent drainage in central Mississippi. McCoy and Vogt (1992) presented evidence that this isolated population resulted from flood-aided dispersal. Published localities are given for the following states: Arkansas (Dellinger and Black, 1938; Parker, 1947), Illinois (Smith, 1961), Indiana (Minton, 1972), Kansas (Clarke, 1953, 1956; Smith, 1956; Clarke et al., 1958; Taggart, 1992; Collins, 1993; Fuselier and Edds, 1994), Louisiana (Cagle and Chaney, 1949; Dundee and Rossman, 1989), Minnesota (Oldfield and Moriarty, 1994), Mississippi (Smith and List, 1952), Missouri (Brumwell, 1951; Anderson, 1965; Johnson, 1987; Johnson and Powell, 1988; Powell et al., 1991, 1994), Nebraska (Loomis and Jones, 1948), North Dakota (Timken, 1968), Ohio (Conant et al., 1964), Oklahoma (Webb, 1970; Black et al., 1987), Texas (Brown, 1950; Peterson, 1950; Tinkle and Knopf, 1964; Raun and Gehlbach, 1972; Dixon, 1987; Harvey, 1992), Wisconsin (Vogt, 1981a), and for the entire range (Iverson, 1992a; Vogt, 1993). The locality records on the map are from specimens whose identifications were verified by the author.

• **Fossil Record.** Wilson and Zug (1966) and Wilson (1967) reported a fossil *Graptemys* from Bay Co., Michigan. It could be either *G. pseudogeographica* or *G. ouachitensis*, but because it is out of the present ranges of both species, it is more likely *Graptemys geographica* (Holman, 1988). The specimen dates from 4000-6000 years ago. Fossil *Graptemys*, probably *G. pseudogeographica*, were in the Trinity River drainage in Dallas and Denton counties, Texas during the Sangamon age (Slaughter et al., 1962) and in Henderson Co., Texas in the Wisconsin age (Stovall and McNulty, 1950). Adler (1968) lists archeological records.

• **Pertinent Literature.** Much of the following literature contains unattributable material on both *G. pseudogeographica* and *G. ouachitensis*. General accounts are in Carr (1952) and Ernst and Barbour (1972, 1989). Other papers are listed by topic as follows: shell morphology (Zangerl, 1969); algal relationships (Proctor, 1958; Dixon, 1960); parasites (Ernst and Ernst, 1977, 1979); courtship (Cagle, 1955; Ernst, 1974; Jenkins, 1979); temperature relationships (Hutchison et al., 1966). The following papers contain data which apply strictly to *G. p. pseudogeographica* or *G. p. kohnii*. General accounts are in Cahn (1937), Smith (1961), Anderson (1965), Minton (1972), Vogt (1981a), and Ernst et al. (1994). Other papers, by topic, are: populations (Cagle and Chaney, 1949; Chaney and Smith, 1950; Tinkle, 1958; Timken, 1968; Vogt, 1981b); courtship (Vogt, 1993); sperm storage (Gist and Jones, 1989); commensals (Vogt,



**Figure.** Head views of *Graptemys pseudogeographica pseudogeographica* (A-E) from Stoddard, Mississippi River, Vernon County, Wisconsin; *G. p. pseudogeographica* x *kohnii* (USNM 1002943) (F) from Reelfoot Lake, Obion County, Tennessee; *G. p. kohnii* (CM 4259) (G-H) from Caddo Parish, Louisiana; and a megacephalic female *G. p. kohnii* (MAZG 1465) (I) from Monroe, Ouachita Parish, Louisiana.

1979); predation (Goodpaster and Hoffmeister, 1952; Vogt, 1981c); taxonomy (Stejneger, 1925; Carr, 1949; Dundee, 1974; Haynes and McKown, 1974; Vogt, 1974, 1993; Lamb et al., 1994); karyotype (McKown, 1972; Stock, 1972; Killebrew, 1977); blood lipids (Emerson, 1967); blood proteins (McKown, 1972; Vogt, 1993); myoglobin (Seidel and Adkins, 1989); parathyroid (Clark, 1965, 1970); orbital glands (Cowan, 1971); choanal structure (Parsons, 1960); carapacial seams (Tinkle, 1962); scute abnormalities (Newman, 1906); longevity (Snider and Bowler, 1992); sexual size dimorphism (Gibbons and Lovich, 1990); trapping (Vogt, 1980a); feeding habits and habitat (Moll, 1976; Vogt, 1981b; Shively and Vidrine, 1984; Fuselier and Edds, 1994); temperature controlled sex determination (Bull and Vogt, 1979, 1981; Bull et al., 1982; Vogt and Bull, 1982, 1984; Bull, 1985; Ewert and Nelson, 1991); egg and embryology (Ewert, 1979, 1985; Vogt, 1980b; Iverson, 1992b); winter kill (Christiansen and Bickham, 1989); aposematic coloration (Briston and Gutzke, 1993); and basking behavior (Janzen et al., 1992; Lindeman, 1993).

• **Etymology.** The trivial name *pseudogeographica* comes from the Greek *pseudo*, meaning false, and the Greek *geographica*, meaning map; and refers to the resemblance of the carapacial pattern to that of *G. geographica*. The subspecific name *kohnii* is a patronym for Gustav Kohn, who collected the type-specimens.

#### 1. *Graptemys pseudogeographica pseudogeographica* (Gray)

*Emys pseudogeographica* Gray, 1831:31. See species synonymy.

*Graptemys pseudogeographica pseudogeographica*: Stejneger and Barbour, 1917:117. First use of combination.

*Malaclemys pseudogeographica pseudogeographica*: Cochran and Goin, 1970:149.

• **Definition.** Populations are characterized by having individuals with 3-6 temporal stripes in contact with the orbit. Megacephalic females are rare in populations of this subspecies.

#### 2. *Graptemys pseudogeographica kohnii* (Baur)

*Malacoclemmys kohnii* Baur, 1890:263. Type-locality, "Bayou Lafourche, La.; Bayou Teche, St. Martinsville, La.; Pensacola, Fla." Holotype not designated; specimens collected by G. Kohn.

*Graptemys pseudogeographica kohnii*: Stejneger and Barbour, 1917:117. First use of combination.

*Graptemys pseudogeographica kohnii*: Schmidt, 1953:98. Emendation of ending.

*Graptemys kohnii*: Cagle, 1953:9.

*Graptemys kohnii*: Wermuth and Mertens, 1961:108.

*Malaclemys kohnii*: McDowell, 1964:274.

• **Definition.** Populations are characterized by having individuals with complete postorbital crescents (the postorbital spots are joined with the subocular spots), or with 1 to 3 temporal stripes entering the orbit. Megacephalic females are common in many populations.

• **Comment.** The relegation of *Malacoclemmys kohnii* to *Graptemys pseudogeographica kohnii* (Stejneger and Barbour, 1917) and the elevation of *Graptemys pseudogeographica kohnii* to *G. kohnii* (Cagle, 1953, 1954) were done without presentation of data. From examination of about 4000 specimens in the *G.*

*pseudogeographica* complex, *G. kohnii* appears to be a subspecies of *G. pseudogeographica* (Vogt, 1993). Skulls of *G. pseudogeographica*, which Dundee (1974) distinguished from sympatric *G. (p.) kohnii*, are now interpreted to be *G. ouachitensis*. *Graptemys ouachitensis* is sympatric with *G. p. pseudogeographica* and *G. p. kohnii* throughout much of its range from Louisiana through Wisconsin.

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