

*Taxonomic
Status and
Genetics*

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Systematics, Taxonomy, Variation, and Geographic Distribution of the Slider Turtle

Abstract

The slider turtle, *Trachemys scripta*, has had a controversial nomenclatural history. Although it was originally separated from the genera *Chrysemys* and *Pseudemys*, subsequent taxonomists at one time considered all three to be congeneric, placing them in the genus *Chrysemys*. The genus has been subdivided more than once to form the *Pseudemys* complex (including slider turtles) and *Chrysemys picta*. Recent work suggests that the slider turtle is indeed different from the other genera, thus warranting resurrection of *Trachemys*. In spite of the nomenclatural stability currently enjoyed by the genus, the presence of 14 presumed subspecies on two continents, coupled with extreme variation in morphology and behavior, suggests the need for more systematic work in this group.

Introduction

The slider, *Trachemys scripta*, is probably the best-known turtle in the world, because of its popularity in the North American and European pet trade and its frequent use as a subject of physiological and ecological studies. Despite this familiarity, it has had a controversial taxonomy, at least at the generic level. In the following chapter, discussion of its systematic position is presented, along with a description and analysis of geographic variation.

Systematics

Trachemys scripta, with many of the other semiaquatic turtles in North America, belongs to the family Emydidae. This family is the largest and most diverse of living turtles, with 33 genera and almost 90 species (the exact number is debatable). Emydids are found in the Americas, Europe,

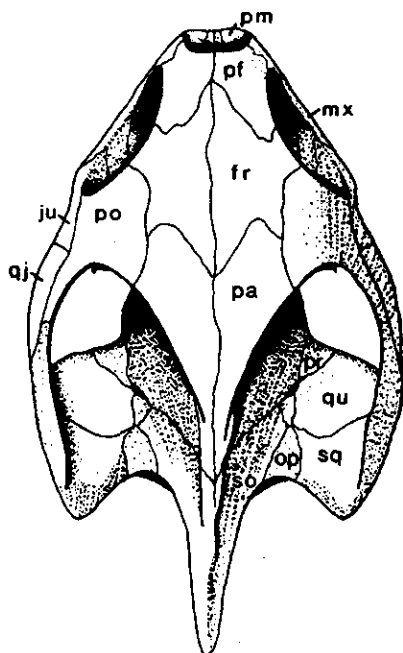


FIGURE 4.1. Dorsal skull bones of *Trachemys scripta*: *fr*, frontal; *ju*, jugal; *mx*, maxillary; *op*, paroccipital; *pa*, parietal; *pf*, prefrontal; *pm*, premaxillary; *po*, postorbital; *pr*, pro-otic; *qj*, quadratojugal; *qu*, quadrate; *so*, supraoccipital; *sq*, squamosal. (Drawing by Evelyn M. Ernst)

northern Africa, Asia, Indonesia, and the Philippines. Fossils indicate that the family was formerly more widespread in Europe and Asia. The oldest known fossils are from Paleocene deposits in Saskatchewan (Russell, 1934) and Eocene deposits in Europe, North America, and Asia (Romer, 1956).

Emydid turtles share several osteological characters. The skull is relatively small and is similar to that of tortoises (Testudinidae). The temporal region is widely emarginated posteriorly, so the squamosal is not in contact with the parietal (Fig. 4.1). The frontal bone enters the orbit, and the postorbital is wider than in the Testudinidae. The maxilla and quadratojugal are separated, and the quadrate is open posteriorly so as not to completely surround the stapes. A splenial bone is usually absent but may be present and vestigial. Additional diagnostic characters and descriptions are given by McDowell (1964) and Bramble (1974).

There is much diversity among members of the Emydidae, but two major groupings are generally recognized: the subfamilies Batagurinae, or Old World pond turtles, and Emydinae, or New World pond turtles, including the slider turtle (McDowell, 1964).

The subfamily Emydinae includes 10 genera and 34 species. With the exception of the genus *Emys*, which occurs in Europe, northern Africa, and the Middle East, emydines range from Canada to central South America and the West Indies. Emydine turtles have the angular

bone of the lower jaw in contact with Meckel's cartilage. The basioccipital is narrow, is separated from the paracapsular sac and pterygoid, lacks a lateral tuberosity, and does not form the floor of the tympanic cavity. Emydines also have a double articulation between the centra of cervical vertebrae V and VI, and the suture between the 12th marginal scutes and 5th vertebral scute lies over the pygal bone, not over the suprapygal.

McDowell (1964) and Bramble (1974) recognized two generic complexes within the subfamily Emydinae. The more primitive of these, the *Clemmys* complex, includes the genera *Clemmys*, *Emydoidea*, *Emys*, and *Terrapene*. The plastron of *Clemmys* is rigid, but that of the other three genera is hinged and movable. *Clemmys* is thought to be ancestral to the hinged forms, of which *Emys* is most primitive, *Emydoidea* intermediate, and *Terrapene* the most derived (Bramble, 1974). These turtles have the triturating surfaces of the jaws narrow and ridgeless, with the upper triturating surface lacking portions of the palatine or the pterygoid bone. The orbitonasal foramen is small. The interorbital region is coarsely sculptured, and the postorbital bar is relatively wide. The jugal bone does not touch the palatine. On the plastron the humeropectoral seam crosses the entoplastron. The cervical vertebrae are not elongated in *Clemmys*, *Emys*, and *Terrapene*, but they are in *Emydoidea*, in which also the cervical extensor muscles are hypertrophied. Musk glands are present in all four genera.

The second generic complex, the *Chrysemys* complex, includes the freshwater genera *Chrysemys*, *Deirochelys*, *Graptemys*, *Pseudemys*, *Trachemys*, and the brackish-water genus *Malaclemys*. All have a rigid plastron with the humeropectoral seam crossing posterior to the entoplastron. The triturating surface of the jaw is usually broad (narrow in *Deirochelys*), with or without ridges, and with the upper surface composed of portions of the palatine or the pterygoid (except in *Deirochelys*). The nasopalatine foramen is usually much larger than the posterior palatine foramen (not as large in *Deirochelys*). Coarse sculpturing is absent from the interorbital region of the skull, and the postorbital bar is narrow. The jugal is in contact with the palatine. Except in *Deirochelys*, the cervical vertebrae are not elongated, nor are the cervical extensor muscles hypertrophied. Musk glands are absent. A good general summary of the *Chrysemys* complex is presented by Obst (1985).

Trachemys Agassiz, 1857 (Slider Turtles)

The slider turtles were first assigned to the genus *Testudo*, a catchall grouping of turtles (Lacépède, 1788-89; Schoepff, 1792), and later placed with other freshwater emydid turtles in the nebulous genus *Emys* by Gray (1831). There they remained until 1857, when Agassiz separated the sliders from the cooters and the painted turtle. He pro-

posed that sliders be placed in the genus *Trachemys* (including the species group *scripta* and all West Indian and neotropical species), the cooters in *Pseudemys* (including the *floridana*, *concinna*, and *rubriventris* species groups), and the painted turtle in *Chrysemys* (*picta*). This arrangement gained little support, and Cope (1875) placed the sliders with the cooters in the genus *Pseudemys*. However, Boulenger (1889) combined sliders, cooters, and the painted turtle under the name *Chrysemys*. Boulenger's designation was not readily accepted, and the designation of *Pseudemys* and *Chrysemys* proposed by Cope (1875) prevailed until 1964.

McDowell (1964) revised the emydine genera on the basis of cranial, lower jaw, and foot morphology and included in *Chrysemys* the painted turtle and the cooter and slider turtles of the genus *Pseudemys* (sensu Cope, 1875). He concluded that the placement of both the cooters and the sliders in the genus *Pseudemys* was unnatural because *Pseudemys* is more divergent from *Trachemys* than is *Chrysemys picta*. He concluded that all of these turtles should either be assigned to the genus *Chrysemys* (sensu Boulenger, 1889) or be placed in three separate genera, *Pseudemys*, *Trachemys*, and *Chrysemys* (as proposed by Agassiz, 1857). McDowell compromised by suggesting subgeneric status for the three groups under the genus *Chrysemys*. Similarities in the choanal structure of *C. picta* and various species of *Pseudemys* upheld both the placement of *Pseudemys* within the genus *Chrysemys* and McDowell's subgeneric distinctions (Parsons, 1968). Zug (1966) found little difference in the penial structure of *C. picta*, *P. nelsoni*, *P. floridana*, and *P. concinna*, strengthening the inclusion of *Pseudemys* in *Chrysemys*.

On the basis of the anatomical data presented by McDowell (1964), Zug (1966), and Parsons (1968), some researchers accepted a polytypic, all-inclusive *Chrysemys* (Weaver and Rose, 1967; Ernst and Barbour, 1972; Conant, 1975; Obst, 1985). However, other investigators sharply criticized this arrangement (Holman, 1977; Legler, pers. com.). There was relatively little opposition to the subgeneric arrangement of McDowell (1964), except by Weaver and Rose (1967), but there was strong disagreement with the treatment of sliders, cooters, and painted turtle as congeners.

Rose and Weaver (1966) and Weaver and Robertson (1967) did not accept the validity of *Trachemys*. Rose and Weaver reported that the Pliocene fossil *Chrysemys carri* (= *P. caelata* Hay) from Florida had a shell like a *Pseudemys* (*P. nelsoni*) but a mandible nearly identical to that of *Trachemys scripta*, thus showing the two groups to be identical. They concluded that the correct generic designation would be the older name *Pseudemys* Gray, 1855. However, Jackson (1976) has shown that the mandible of *C. carri* (= *P. caelata* Hay) more closely resembles that of either *P. floridana* or *P. concinna*. Rose and Weaver (1966) also described another Pliocene fossil, *Chrysemys williamsi*, as

intermediate between *Pseudemys* and *Trachemys*, but its description was based on incomplete shells.

Holman (1977) expressed doubts about the status of McDowell's (1964) all-inclusive genus *Chrysemys*. Holman pointed out that under McDowell's concept, as many as four species may occur in the same water body in the southeastern United States (e.g., Reelfoot Lake, Tennessee), but there are no records of hybridization between *Chrysemys picta* and other species of *Chrysemys* (sensu McDowell, 1964). However, hybrids have been reported within the subgenus *Pseudemys*: *C. floridana* × *C. concinna* (Smith, 1961; Mount, 1975; Fahey, 1980) and *C. floridana* × *C. rubriventris* (Crenshaw, 1965). Recent studies on host-parasite relationships by Ernst and Ernst (1980) and protein electrophoresis by Vogt and McCoy (1980) have indicated that the species of *Pseudemys* (sensu Cope, 1875) and *Chrysemys picta* represent separate evolutionary lineages. Ward (1984), Seidel and Inchaustegui Miranda (1984), and Seidel and Smith (1986) have returned to the three-genus arrangement of Agassiz (1857): *Trachemys*, *Pseudemys*, and *Chrysemys*.

Seidel and Smith (1986) presented a survey table of shared-unshared character states in *Graptemys* (including *Malaclemys*), *Trachemys*, *Chrysemys*, *Pseudemys*, and *Deirochelys* as evidence to support the partitioning of *Pseudemys* (sensu Cope, 1875) into the genera *Pseudemys* (cooters) and *Trachemys* (sliders). As is revealed in the table, many of the shared characters that were previously cited as evidence for recognition of an all-inclusive *Chrysemys* or *Pseudemys*, which includes both sliders and cooters, are also present in *Graptemys*. *Chrysemys* and *Pseudemys* share only 9 character states, and *Graptemys* and *Trachemys* share 19. When all available data sets are considered, divergence among *Trachemys*, *Pseudemys*, and *Chrysemys* appears to be as great as their collective distance from *Graptemys*. Also, the apparently complete reproductive isolation between these groups (see above) supports this conclusion. For these reasons the slider turtle is considered to belong to the genus *Trachemys*, *T. scripta*, by most authors in this book. The reader is referred to Seidel and Smith (1986) and Chapter 5 for a more comprehensive discussion.

Turtles of the genus *Trachemys* are predominantly freshwater in habitat preference (Morreale and Gibbons, 1986) but may enter brackish coastal waters. Five extant species are included: *T. decussata*, *T. stejnegeri*, and *T. terrapen* of the West Indies; the South American *T. dorbignii*; and *T. scripta* of the New World mainland from North America to northern South America.

All have elongated oval carapaces (to about 60 cm in greatest straight-line length; Obst, 1985) that are strongly serrated posteriorly. A vertebral keel is usually present, as is also a series of low longitudinal ridges, which give the carapace a rugged appearance. The seams that separate the vertebral scutes alternate with those separating the pleural scutes; they are never aligned, as occurs in some

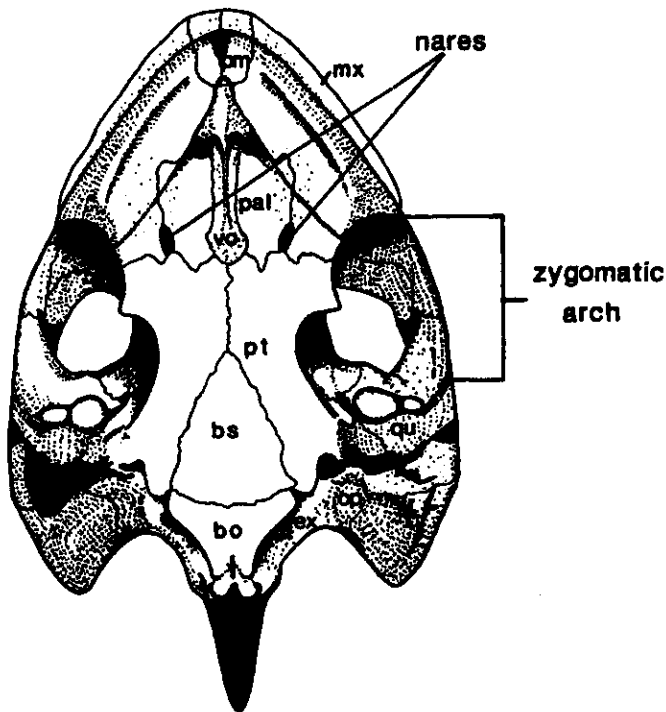


FIGURE 4.2. Ventral skull bones of *Trachemys scripta*: *bo*, basioccipital; *bs*, basisphenoid; *ex*, exoccipital; *mx*, maxillary; *op*, paroccipital; *pal*, palatine; *pm*, premaxillary; *pt*, pterygoid; *qu*, quadrate; *vo*, vomer. (Drawing by Evelyn M. Ernst)

populations of *Chrysemys picta*. The plastron is broad and posteriorly notched, lacks a movable hinge, and is firmly united to the carapace by a well-developed bridge. The cranium is relatively shallow anterior to the basisphenoid (30% to 34% of the condylobasal length), and the zygomatic arch and narial openings are relatively narrow (Fig. 4.2). The orbits are located anterolaterally. The pterygoid often extends posteriorly to near the exoccipital, and the crista praetemporalis is larger than in most emydines. The maxilla does not touch the squamosal. The triturating surface of the maxilla is broad, with a medial ridge that lacks tuberculate denticles. Also, no cusps or serrations occur on the outer cutting edge of the upper jaw, but there is a shallow medial notch. The triturating surface of the lower jaw is also narrow and lacks tuberculate denticles. The lower surface of the dentary is rounded when viewed from the front (it is flat in *Pseudemys*). Three phalanges occur in the fifth toe.

Trachemys scripta (Schoepff, 1792)

DIAGNOSIS

A medium-sized to large emydine (adults have carapaces 20–60 cm; Obst, 1985) with a prominent patch (or patches) of red, orange, or yellow on each side of the head and a

rounded lower jaw. Because the species consists of several subspecies, the following description is general.

The oval carapace is weakly keeled and has a slightly serrated posterior rim. A series of low longitudinal ridges or wrinkles may lie along the pleural scutes. The carapace is highest at the third vertebral scute and broadest at the level of the eighth marginals. The cervical scute is rectangular or slightly triangular in shape; it may be narrow or broad, and the anterior margin is indented past the rims of the adjacent marginal scutes. The first vertebral scute is either longer than broad or as long as broad. The posterior four vertebrae are usually broader than long. Vertebral I has straight parallel sides. The sides of vertebrae II through IV converge to points where they meet the seams separating the pleural scutes; the sides of vertebral V diverge toward the rear. Four pleural scutes are present on each side. Pleural I is the broadest, pleural II the highest, and pleural IV the smallest. Twelve marginal scutes border the carapace on each side. The anterior marginals are flared, those most posterior are serrated, and those lying along the sides are only slightly flared in adults. The marginals above the bridge are the lowest.

The carapace is olive to brown, with yellow markings that vary geographically from stripes and bars to reticulations or ocelli. The markings on the marginal scutes also are variable but usually take the form of a dark blotch partly surrounded by a light band. Melanism is prevalent in the older males of some populations (see Chapter 19).

Carapacial bones (Fig. 4.3) consist of 7 to 9 (usually 8) middorsal, hexagonal-shaped neurals with their shortest side anterior (neural I may be tetragonal in some individuals, and occasionally the other neurals may be octagonal or heptagonal); 8 pairs of costals; and 11 pairs of pe-

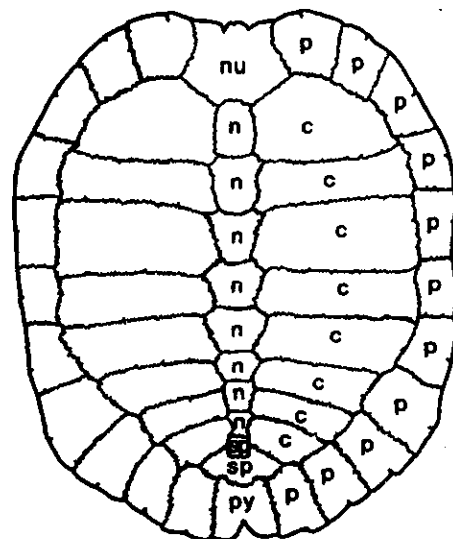


FIGURE 4.3. Carapacial bones of *Trachemys scripta*: *c*, costal; *n*, neural; *nu*, nuchal; *p*, peripheral; *py*, pygal; *sp*, suprapygal. (Drawing by Evelyn M. Ernst)

ripherals. Ten dorsal vertebrae are firmly united dorsally with the carapace, but the two sacral vertebrae are not, although the anterior-most is connected to the ilia of the pelvic girdle via ribs.

The large hingeless plastron is slightly broader anteriorly than posteriorly. It is convex anteriorly but bears a shallow posterior notch. The bridge is broad, usually measuring 33% to 40% of the carapace length. The usual plastral scute formula is

$$\begin{array}{l} \text{abdominal} > \text{anal} > \text{femoral} > < \text{gular} \\ >< \text{pectoral} > \text{humeral} \end{array}$$

but much variation occurs. There are large axillary and inguinal scutes on the bridge. The plastron is yellow in ground color and exhibits a pattern that varies geographically from no pattern or only a single blotch on each scute to an extensive pattern covering most of the plastron. Bridge markings vary from dark blotches to elongated black bars.

The plastron is extensively sutured to the carapace along the broad bridge. The axillary and inguinal buttresses are moderate in length and well developed. The axillary is ankylosed to the first costal bone, the inguinal to the fifth costal. The large entoplastron is situated anterior to the humeropectoral seam and is covered by both the gular and the humeral scutes (Fig. 4.4).

The rounded head is moderate in size, with a protruding snout (more so in males of some tropical subspecies) and a medially notched upper jaw. The dorsal surface is flattened or concave and is covered with smooth skin. The supratemporal and orbitomandibular stripes are conspicuous; a postorbital stripe of red, orange, or yellow is usually present; and a prefrontal arrow is formed as the supratemporal stripes pass forward from the eyes to meet a median saggital stripe on top of the snout. A dark stripe runs through the greenish-to-yellow eye, and the tomia are usually yellow.

The skull is shortened and extensively emarginated posteriorly and behind the maxilla. The supraoccipital is elongated, unflanged, and pointed. The maxilla and quadratojugal are usually separated by the jugal. Nasal bones are absent. The triturating surfaces of the jaws are narrow and lack elaborate serrations, but a median ridge does occur on the maxilla. There is no corresponding ridge on the lower jaw. The orbit has a larger diameter than the tympanum (Fig. 4.5).

The neck is olive to brown, with cream-colored-to-yellow stripes. A Y-shaped mark is usually present on the chin, and ocelli may occur on both the chin and the jaws. The limbs are also olive to brown, and the forelimbs bear a variable pattern of light stripes, whorls, or ocelli, whereas the hind limbs bear stripes or dots. The posterior surface of the thigh usually has a pattern of yellow vertical bars on each side of the tail. The first and fifth toes on all feet have

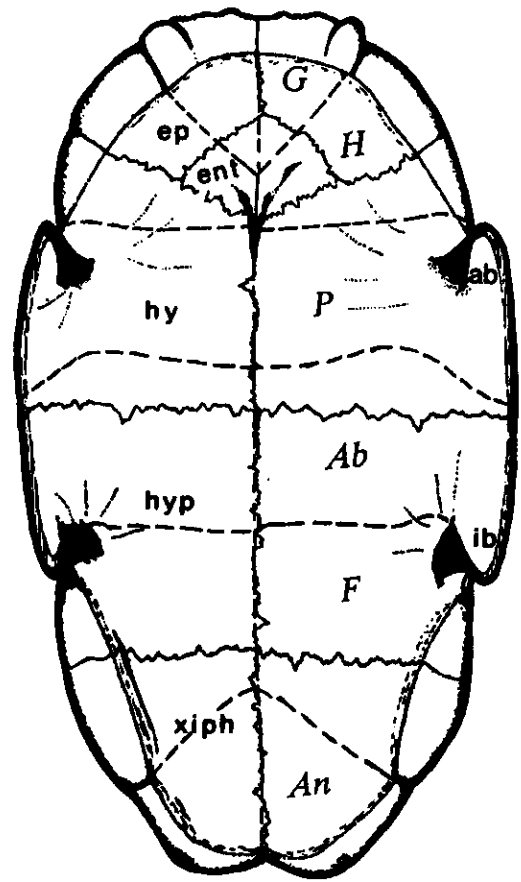


FIGURE 4.4. Plastral bones of *Trachemys scripta* (dorsal view): *ab*, axillary buttress; *ent*, entoplastron; *ep*, epiplastron; *hy*, hyoplastron; *hyp*, hypoplastron; *ib*, inguinal buttress; *xiph*, xiphoplastron. Dashed lines show position of plastral scutes: *Ab*, abdominal; *An*, anal; *F*, femoral; *G*, gular; *H*, humeral; *P*, pectoral. (Drawing by Evelyn M. Ernst)

two phalanges each, whereas the other three toes have three phalanges each. The toes are webbed.

Adult males are smaller and may have elongated, curved foreclaws (or an elongated snout in tropical populations) and long, thick tails, with the vent posterior to the

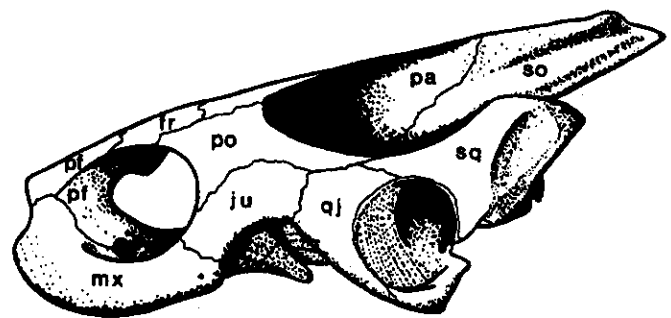


FIGURE 4.5. Lateral skull bones of *Trachemys scripta*: *fr*, frontal; *ju*, jugal; *mx*, maxillary; *pa*, parietal; *pf*, prefrontal; *po*, postorbital; *qj*, quadratojugal; *so*, supraoccipital; *sq*, squamosal. (Drawing by Evelyn M. Ernst)

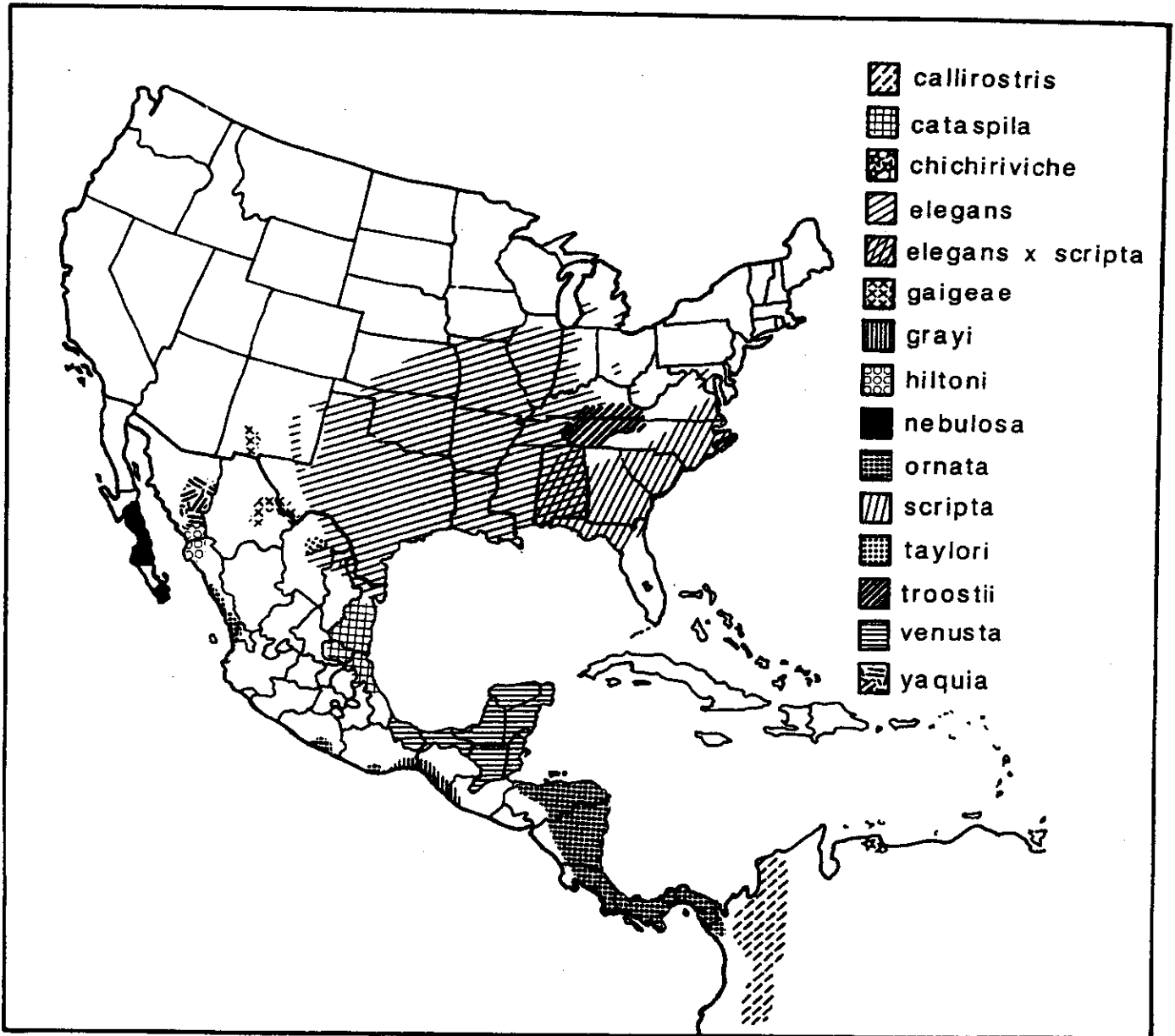


FIGURE 4.6. Distribution of the various subspecies of *Trachemys scripta*.

carapacial rim. The karyotype contains 50 diploid chromosomes, 26 macrochromosomes (16 metacentric, 6 submetacentric, and 4 telocentric), and 24 microchromosomes (Stock, 1972; Killebrew, 1977).

DISTRIBUTION

Trachemys scripta occurs in the United States from southeastern Virginia south to northern Florida and west to Kansas, Oklahoma, and New Mexico; thence it ranges through Mexico and Central America to Venezuela (Fig. 4.6).

Formerly, juvenile *T. scripta* appeared in great numbers in the baby-turtle trade. In fact, at one time it was the

most popular pet turtle in North America and Europe. It is a hardy species that does well in captivity and, to the chagrin of some pet owners, may grow to be large. Consequently, many have been released into water bodies well beyond the species' natural range, and in those areas that have a sufficiently long summer in which its eggs can fully develop, *T. scripta* has become established. Populations of introduced sliders have been reported from Michigan, Pennsylvania, New Jersey (Ernst and Barbour, 1972; Conant, 1975; Manchester, 1982), and even Great Britain and Japan. A large reproducing colony outside the species' natural range occurs in the ponds of the United States National Arboretum in Washington, D.C. The taxonomy of some of these introduced populations can be



FIGURE 4.7. *Trachemys scripta scripta*. (Photo by Roger W. Barbour)

quite confusing. If more than one subspecies has been released at the same site, the resulting intergradation can produce individuals with unusual pigment patterns (Ernst and Jett, 1969).

Although *T. scripta* prefers quiet waters with soft bottoms, an abundance of aquatic vegetation, and suitable basking sites, the species occupies most freshwater habitats within its range (Morreale and Gibbons, 1986). In the tropics, *T. scripta* occupies fluvial waterways more often than it does in North America.

GEOGRAPHIC VARIATION

Trachemys scripta has been recognized as the most variable of all turtles; 14 subspecies have been described and named. *Trachemys scripta scripta* (Schoepff, 1792), with a maximum size (carapace length) of 28 cm, ranges from southeastern Virginia to northern Florida. It has a wide vertical yellow bar on each pleural scute, a conspicuous yellow postorbital blotch that may join a neck stripe (Fig. 4.7), and a yellow plastron, which usually has ocelli or smudges only on the anterior-most scutes.

T. s. elegans (Wied, 1839), maximum size 28 cm, occupies the Mississippi Valley from Illinois to the Gulf of Mexico. It has a wide red postorbital stripe, narrow chin stripes, a transverse yellow bar on each pleural, and a plastral pattern consisting of a dark blotch or an ocellus on each scute (Fig. 4.8).

T. s. troostii (Holbrook, 1836), maximum size 21 cm, occurs in the upper portions of the Cumberland and Tennessee rivers, from southeastern Kentucky to northeastern Alabama. It has a narrow yellow postorbital stripe (Fig. 4.9), broad chin stripes, a transverse yellow bar on each pleural scute, and a plastral pattern of ocelli or small black smudges.

T. s. gaigeae (Hartweg, 1939), maximum size 22 cm, is



FIGURE 4.8. *Trachemys scripta elegans*. (Photo by Roger W. Barbour)

found in the Rio Grande (Big Bend and above) and Río Conchos drainages of Texas, New Mexico, Chihuahua, and Coahuila. It has a reticulate carapacial pattern, often with small ocelli, and an oval, black-bordered red-to-orange spot behind the eye and well separated from it (Fig. 4.10). The chin is striped medially, with the lateral stripes shortened to ovals that are almost ocelli, and a plastral pattern that varies from a large blotch on each scute to a large dark central figure spreading out along the transverse seams.

T. s. taylori (Legler, 1960b), maximum size 22 cm, occurs only in the Cuatro Ciénegas Basin of Coahuila, Mexico. It resembles *T. s. elegans* and has a supratemporal stripe that terminates abruptly on the neck behind an expanded red, very elongated postorbital stripe; an extensive black plastral pattern with all parts interconnected; small, scattered, elongate or ovoid dark spots on the

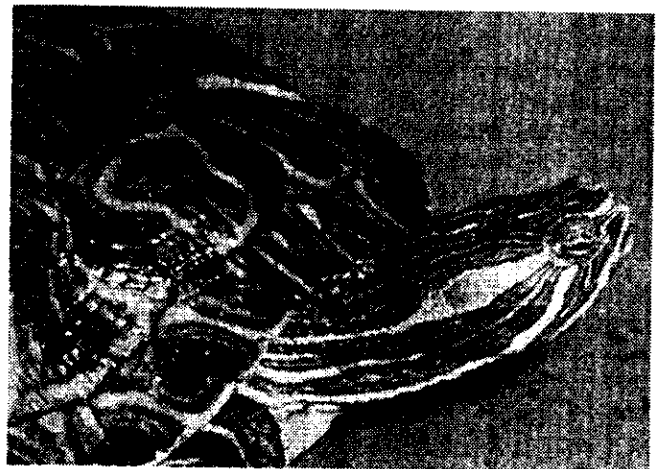


FIGURE 4.9. *Trachemys scripta troostii*. (Photo by Roger W. Barbour)



FIGURE 4.10. *Trachemys scripta gaigeae*. (Photo by Roger W. Barbour)

carapace; and the pectoral midseam longer than that of the gular.

T. s. cataspila (Günther, 1885), maximum size 22 cm, occurs on the Gulf coastal plain of Mexico from northern Tamaulipas to the vicinity of Punta del Morro, Veracruz. The yellow supratemporal stripe is wide on the temples, and it has dark-centered ocelli on the pleurals and marginals, and a medial plastral figure that does not extend along the interanal seam to the rear edge of the anals.

T. s. venusta (Gray, 1855), maximum size 48 cm, ranges from the city of Veracruz, Mexico, through Honduras (including the Yucatán Peninsula) in Atlantic and Gulf drainages. The dark-centered ocelli on the pleural scutes are very large (Fig. 4.11a), its supratemporal stripe reaches the eye, and the seam-following plastral pattern is extensive (Fig. 4.11b).

T. s. yaquia (Legler and Webb, 1970), maximum size 31 cm, inhabits the lower portions of the Sonora, Yaqui, and Mayo drainages in Sonora, Mexico. The postorbital mark is yellowish orange and only moderately expanded, the pleural scutes have only poorly defined ocelli with jagged black centers, and the medial plastral mark is extensive but faded in adults.

T. s. hilloni (Carr, 1942), maximum size 28 cm, is restricted to the Río Fuerte drainage in Sonora and Sinaloa, Mexico. The orange postorbital portion of the supratemporal stripe either is isolated anteriorly and posteriorly or is connected posteriorly with a narrow orbital stripe; there are black smudgelike spots on the upper and lower surfaces of each lateral and posterior marginal scute and some pleural scutes; and the plastron has a dark central blotch surrounding a narrow yellow medial area.

T. s. nebulosa (Van Denburgh, 1895), maximum size 37 cm, occurs in freshwater bodies in southern Baja California, Mexico. The orange or yellow supratemporal stripe does not reach the eye and ends as a large oval postorbital spot well behind the eye; the carapace usually lacks ocelli but may have a pattern of black spots and

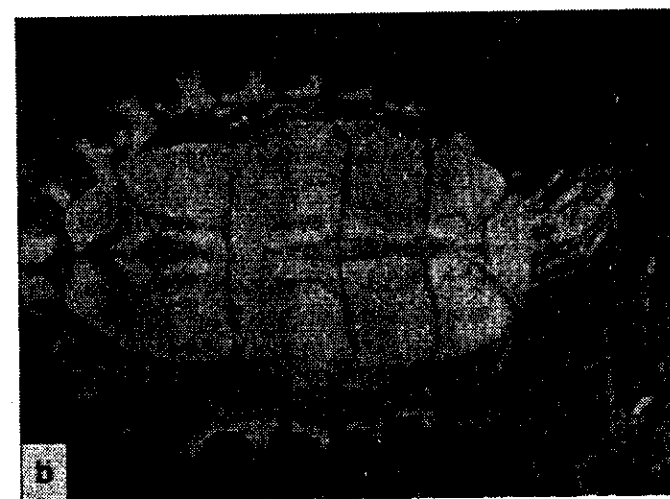


FIGURE 4.11. *Trachemys scripta venusta*.

irregular light marks; and the plastron bears a series of smudgelike medial blotches.

T. s. ornata (Gray, 1831), maximum size 38 cm, occurs on the Pacific coastal plain of Mexico from northern Sinaloa to central Oaxaca at low altitudes, and from Guatemala through Central America to Colombia. The orange postorbital stripe usually starts at the orbit, is expanded over the temple, and continues to the neck; the carapace has dark-centered ocelli on the pleurals; and the plastral pattern consists of four concentric, faded medial lines that do not extend to the anal notch.

T. s. grayi (Bocourt, 1868), maximum size 60 cm (Obst, 1985), occurs from the Pacific coastal plain of Tehuantepec, Mexico, southeastward to Departamento La Libertad, Guatemala (Fig. 4.12a). The yellow supratemporal stripe reaches the eye, all head stripes are narrow, the carapace has dark-centered ocelli on the pleurals and marginals, and the plastral figure is diffused, fragmented, and faded in adults (Fig. 4.12b).

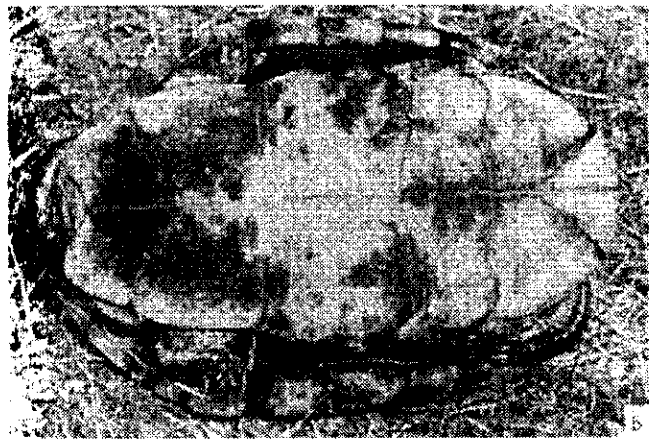


FIGURE 4.12. *Trachemys scripta grayi*: a, male with elongated snout; b, plastron.

FIGURE 4.13. *Trachemys scripta callirostris*. (Photos by Roger W. Barbour)

T. s. callirostris (Gray, 1855), maximum size 25 cm, lives in the Caribbean drainages of Colombia and Venezuela. It is easily recognized by these characters: the large number of ocelli on the underside of the snout and on the upper and lower jaws; the broad, reddish, parallel-sided supratemporal stripe well separated from the orbit (Fig. 4.13a); the pattern of ocelli on the carapace; and the extensive pattern of dark lines that cover most of the plastron (Fig. 4.13b).

T. s. chichiriviche (Pritchard and Trebbau, 1984), maximum size 32.5 cm, inhabits the small coastal drainages between the Río Tocuyo and Morón in northern Venezuela. It also has ocelli on the chin but has a brownish red wedge-shaped supratemporal stripe well separated from the orbit (Fig. 4.14a), oval or irregular black pleural blotches, and a narrow dark pattern along the plastral midseam (sometimes diffuse in adults, Fig. 4.14b).

Several additional populations may eventually be designated as subspecies. Moll and Legler (1971) reported the following areas with populations that represent unnamed forms: (1) Río Nazas drainage of Durango and

Coahuila, Mexico; (2) aguadas and cenotes in the northern half of the Yucatán Peninsula; (3) region of Cabo Gracias a Dios, Nicaragua, to the Isthmus of Panama and the Río Atrato of Colombia; (4) Lakes Managua and Nicaragua and their tributaries; and (5) Río Terraba of Costa Rica to the Río Bayano and Chucunaque drainages of eastern Panama. (See Chapter 7.)

Three combinations of sexually dimorphic characters occur in male *T. scripta* from the various subspecies (see Moll and Legler, 1971). Males of the North American races *scripta*, *elegans*, and *troostii* have elongated foreclaws but lack an elongated snout. Male *gaigeae* and *taylori* have neither the snout nor the foreclaws elongated. Males of the other nine subspecies have elongated snouts but lack elongated foreclaws. In view of this variability in dimorphic characters, as well as the differences in size and in carapace, plastron, and head patterns, it is possible that two or more species are involved in this variable group. In addition, two courtship patterns exist, depending on whether the males possess elongated foreclaws. If elongated foreclaws are present, as in subspecies like *T. s.*

elegans, the male swims to a position in front of the female, turns to face her, extends his forelegs with palms outward, and strokes her face with his foreclaws (Jackson and Davis, 1972). If the male lacks elongated foreclaws, as in subspecies like *T. s. taylori*, he does not swim in front of the female but instead pursues her and vigorously bites the posterior rim of her shell, her hind legs, and her tail (Davis and Jackson, 1973). No courtship function has been ascribed to the long snout of the neotropical forms, but it could be assumed that such a function might exist in such a sexually dimorphic character.

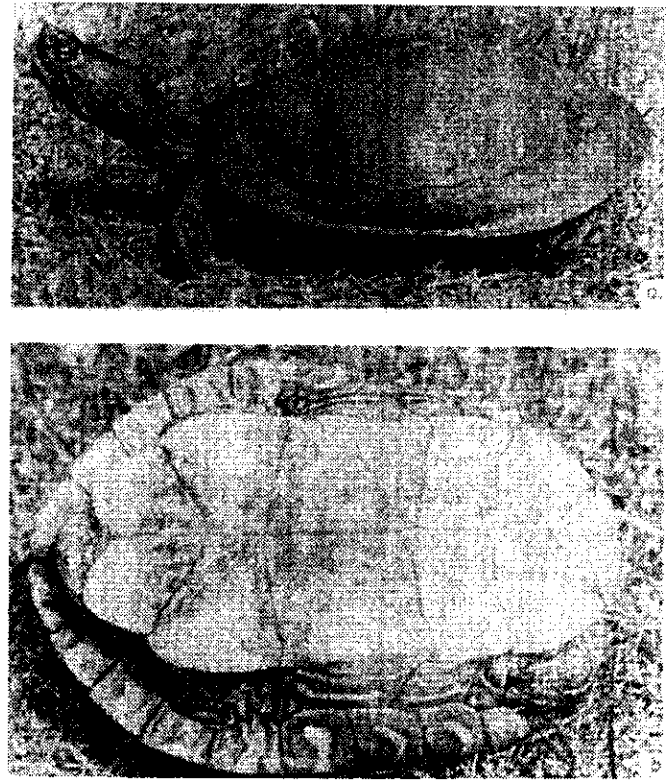


FIGURE 4.14. *Trachemys scripta chichiriviche*.

Key to the Subspecies of *Trachemys scripta*

- 1a. Supratemporal light stripe does not reach the orbit → 2
- b. Supratemporal light stripe reaches the orbit → 6
- 2a. Pleural scutes with reticulate pattern of light lines; large, black-bordered orange postorbital spot → *gaigeae* (Fig. 4.10)
- b. Pleural scutes with pattern of ocelli or dark spots; postorbital orange or red mark either small and isolated or large and elongated → 3
- 3a. Postorbital blotch small and isolated → *hiltoni*
- b. Postorbital blotch large and elongated posteriorly → 4
- 4a. Each pleural scute with a dark spot → *nebulosa*
- b. Each pleural scute with a dark-centered ocellus → 5
- 5a. Plastral figure a broad series of concentric dark lines; postorbital red stripe approximately parallel-sided → *callirostris* (Fig. 4.13)
- b. Plastral figure narrow, clustered tightly about midline; postorbital red stripe strongly wedge-shaped with the pointed end anterior → *chichiriviche* (Fig. 4.14)
- 6a. Pleural scute pattern consisting predominantly of transverse light bars → 7
- b. Pleural scutes with ocelli → 9
- 7a. A conspicuous yellow postorbital blotch that turns downward anteriorly; a mostly immaculate plastron with dark marks restricted to the anterior scutes → *scripta* (Fig. 4.7)
- b. Red or yellow postorbital stripe does not turn downward anteriorly; each plastral scute with a dark ocellus or blotch → 8
- 8a. Wide red postorbital stripe; narrow chin stripes → *elegans* (Fig. 4.8)
- b. Narrow yellow postorbital stripe; broad chin stripes → *troostii* (Fig. 4.9)
- 9a. Broad red postorbital stripe ending abruptly on the neck → *taylori*
- b. Red, yellow, or orange postorbital stripe continuing along neck → 10

- 10a. Dark-centered ocellus in posterolateral corner of second pleural; medial chin stripe interrupted before forking posteriorly → *cataspila*
- b. Ocellus on second pleural positioned posterocentrally or posteromedially; medial chin stripe may not be interrupted before forking posteriorly → 12
- 11a. Pleural ocelli large and light-centered → *venusta* (Fig. 4.11)
- b. Pleural ocelli small and dark-centered → 12
- 12a. Pleural ocelli poorly developed, with irregularly shaped dark centers; plastral pattern indistinct → *yaquia*
- b. Pleural ocelli well developed, with round dark centers; plastral pattern distinct → 13
- 13a. Postorbital stripe orange to red, expanded over the temple; pleural ocelli with branching interconnections; plastral pattern consisting of four concentric medial lines; medial chin stripe interrupted posteriorly → *ornata*
- b. Postorbital stripe yellow, little expanded over the temple; pleural ocelli without branching interconnection; plastral pattern diffuse and fragmented in older individuals; medial chin stripe forked posteriorly → *grayi* (Fig. 4.12)

Conclusion

Although the taxonomic status of the genus *Trachemys* appears to have stabilized for now, much work remains to determine the validity of present subspecific designations. The extreme variation exhibited by this adaptable group of turtles, both morphologically and behaviorally, surely warrants further investigation.