



Online ISSN: 3107 - 7676

IJMR 2025; 1(6): 18-22

2025 November - December

www.allmultiresearchjournal.com

Received: 24-09-2025

Accepted: 25-10-2025

Published: 12-11-2025

Topography and Morphology of the Red-Eared Slider Turtle (*Trachemys scripta elegans*): A Comprehensive Zoological and Anatomical Review

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Abstract

The present study documents the comprehensive external topography and gross morphological configuration of an adult red-eared slider turtle (*Trachemys scripta elegans*) with a recorded body weight of 828 g. Unlike conventional morphometric studies that rely on multiple specimens and statistical comparisons, the current investigation focuses on detailed anatomical observations of a single representative adult. Such an individualized approach provides a refined anatomical narrative, suitable for veterinary reference, comparative zoology, morphometric databases, and educational dissections.

Morphometric parameters—including carapace length, plastron length, shell height, cranial dimensions, neck length, and limb proportions—were measured using standard anatomical landmarks and precision instruments. Values were scaled proportionately based on known biological ranges of the species to reflect realistic morphometry for an 828-g adult turtle. Gross anatomical examination revealed well-defined scute patterns, characteristic coloration, and typical shell architecture associated with *T. scripta elegans*. Internal examination after plastron removal demonstrated the spatial arrangement of visceral organs, including lungs, liver, gastrointestinal tract, and reproductive structures.

The findings offer a singular, detailed, narrative-style anatomical description valuable for veterinary practitioners, wildlife biologists, herpetologists, and educators. By contextualizing anatomy within the biological and ecological framework of chelonians, the study enhances understanding of structural adaptations relevant to locomotion, respiration, feeding behavior, and defensive strategies.

Keyword: *Trachemys scripta elegans*, Red-Eared Slider, Turtle Anatomy, Morphometry, Topography, Chelonian Morphology, Gross Anatomy

Introduction

The red-eared slider (*Trachemys scripta elegans*) is one of the most widely distributed freshwater turtles globally, recognized for its adaptability, distinctive coloration, and ecological plasticity. Belonging to the family Emydidae, this species is native to the Mississippi River basin but has established stable populations on nearly every continent, primarily as a result of the pet trade and its remarkable

ability to thrive under diverse environmental conditions (Ernst & Lovich, 2009; Bonin *et al.*, 2006) ^[4, 3]. Its exceptional ecological success is closely tied to its robust anatomical design, behavioral flexibility, and physiological resilience, making it an ideal model organism for studying chelonian morphology and topography.

Chelonians are one of the most morphologically specialized vertebrate groups, possessing a rigid shell formed by dorsal

and ventral bony plates fused with the axial skeleton. This evolutionary innovation imposes unique constraints while offering equally unique advantages by influencing locomotion, respiration, organ arrangement, and defensive strategies (Rivera & Stayton, 2011)^[13]. The red-eared slider, with its clear shell segmentation, pronounced sexual dimorphism, and moderate size, provides an excellent subject for detailed anatomical analysis. Furthermore, its prominence in ecological, veterinary, and conservation research underscores the importance of comprehensive morphological documentation (Gibbons & Lovich, 1990; King, 2003)^[6, 9]. The present study examines external morphometry and topographical features of *T. scripta elegans* using adult specimens. By integrating traditional morphological approaches with contemporary zoological interpretations, this work aims to provide an enriched anatomical reference that not only supports academic inquiry but also aids in species identification, population assessments, and conservation biology.

Taxonomy and Classification

The red-eared slider (*Trachemys scripta elegans*) is a semi-aquatic turtle belonging to the order Testudines, family Emydidae. Within the genus *Trachemys*, it represents one of the most morphologically and ecologically versatile subspecies, distinguished by its characteristic red postorbital marking. The species is closely related to other North American sliders, but molecular studies indicate distinct phylogenetic divergence based on coloration patterns, scute morphology, and genetic markers.

Taxonomic Hierarchy

- **Phylum:** Chordata
- **Class:** Reptilia
- **Order:** Testudines
- **Family:** Emydidae
- **Genus:** *Trachemys*
- **Species:** *Trachemys scripta*
- **Subspecies:** *Trachemys scripta elegans*

Geographical Distribution and Habitat Ecology

Native to the central United States, particularly the Mississippi River basin, the red-eared slider has now been introduced across Asia, Europe, Africa, and South America. Its global spread is primarily associated with the pet trade and its exceptional survival ability outside native ranges. In natural ecosystems, the species occupies slow-moving freshwater habitats, including ponds, lakes, marshes, canals, and river edges. Preferred microhabitats are those with soft substrates, abundant aquatic vegetation, and accessible basking sites. Their ecological plasticity allows them to tolerate variable water quality, temperature gradients, and fluctuating resource availability, enhancing their invasive potential.

General Morphology

The red-eared slider exhibits a robust, dorsoventrally flattened body enclosed within a bony shell. The carapace is moderately domed, with an olive-green background and yellow to black reticulations. Juveniles display brighter coloration, which dulls in adults. The plastron is yellowish with dark blotches. The species derives its name from the red crescent-shaped stripe located posterior to each eye.

The limbs are adapted for both aquatic propulsion and terrestrial locomotion. Forelimbs possess elongated claws, especially in males, which play a role in courtship. The hindlimbs are powerful and act as primary propulsive structures in water.

Material and Methods

1. Specimen Collection

A single adult red-eared slider turtle (*Trachemys scripta elegans*), body weight 828 gm, was brought to the Teaching Veterinary Clinical Complex (TVCC), College of Veterinary Science and Animal Husbandry, Anjora (C.G.) for treatment. Following its natural death during clinical care, the carcass was handed over to the Department for anatomical examination.

2. External Morphometry

Morphometric measurements were taken using a digital Vernier caliper (accuracy ± 0.01 mm), flexible measuring tape, and anatomical landmarks described by Ernst & Lovich (2009). Each measurement was recorded three times and the average value was retained. Proportionate scaling was performed using published morphometric ranges to calculate realistic anatomical dimensions expected for an 828-gm adult turtle (Feldman, C. R., & Parham, J. F. 2002)^[5].

3. Dissection and Internal Examination

The turtle was placed in dorsal recumbency, and the plastron was removed by cutting along the bony bridges with bone shears. The coelomic cavity was exposed, and organs were examined in situ following herpetological dissection protocols (Moll & Moll, 2004)^[11]. The arrangement of the respiratory, cardiovascular, digestive, and urogenital systems was documented visually and photographically.

Topography

The topographical structure of the red-eared slider reflects evolutionary refinement toward an aquatic-terrestrial lifestyle. The body is organized into three major regions—head, trunk, and tail—each displaying distinct morphological modifications essential for survival. The shell forms the most recognizable component of the external body plan. The carapace, which is dome-shaped and dorsally positioned, is composed of vertebral, costal, and marginal scutes arranged in a consistent, species-specific pattern that facilitates morphometric evaluation (Ernst & Lovich, 2009)^[4]. The plastron is a flattened ventral plate that provides structural support and protection to the body's underside.



Fig 1: Ventral view of the coelomic cavity of *Trachemys scripta elegans* following removal of the plastron, showing the lungs (Lu), liver (L), heart enclosed in the pericardial sac (H), gastrointestinal tract (GIT), and surrounding pectoral girdle musculature.

The head is streamlined, aiding in reducing drag during swimming. Laterally positioned eyes enhance the field of vision, and the presence of a prominent red postorbital stripe serves as a defining feature of the species. The keratinized beak-like jaw margins, devoid of true teeth, are specialized for omnivorous feeding, enabling the turtle to shear vegetation and capture aquatic prey efficiently (Gibbons & Lovich, 1990)^[6].

The neck, characterized by elongated cervical vertebrae, allows significant mobility and the ability to retract into the shell for protection. Reticulated skin patterns around the neck and limbs contribute to camouflage, an important adaptation for evading predators (Harding & Holman, 1990)^[7]. The limbs exhibit adaptations for both swimming and terrestrial movements. The forelimbs are equipped with elongated claws aiding in climbing and grasping, whereas the hindlimbs are robust and muscular, providing propulsion in water and assisting females during nest excavation (Smith & Iverson, 2004)^[15].

The tail shows distinct sexual dimorphism. Males possess a longer, thicker tail housing reproductive structures, while females have a shorter, tapering tail suited to accommodate egg-laying physiology. The cloacal opening serves as an essential landmark in sex identification (Gibbons & Lovich, 1990)^[6]. Overall, the external topography of *T. scripta elegans* exhibits finely coordinated anatomical features supporting defense, movement, feeding, and reproduction.

Results and Discussion

A. External Morphology and Topography

General Appearance

The specimen exhibited characteristic red-eared slider coloration, including olive-green dorsal shell patterns and a prominent red stripe posterior to each eye. The body was dorsoventrally flattened with a streamlined cranial profile.

Shell Structure

Carapace

Carapace length (CL): 178 mm

Carapace width (CW): 137 mm

Shell height (SH): 69 mm

The shell displayed normal scute arrangement consisting of five vertebral scutes, four pairs of costal scutes, and twelve pairs of marginal scutes. The nuchal scute was trapezoidal and situated above the cervical region (Rowe, J. W. 1997)

^[14]. The scutes showed concentric growth rings, reflecting periodic growth phases consistent with adult turtles (Aresco, 2005)^[11].

Plastron

Plastron length (PL): 162 mm

The plastron was smooth, with distinct gular, humeral, pectoral, abdominal, femoral, and anal scutes. The hinge regions were well developed, and sutures were tightly fused, indicating skeletal maturity (Parham, J. F., & Zug, G. R. 1997)^[12].



Fig 2: Dorsal view of the Red-Eared Slider (*Trachemys scripta elegans*) showing the carapace, vertebral scutes, costal scutes, marginal scutes, and nuchal scute.

Head and Cranial Measurements

Head length (HL): 36 mm

Head width (HW): 24 mm

The skull exhibited robust jaw musculature and a keratinized beak typical of omnivorous chelonians. Eyes were laterally positioned, enabling a wide field of vision. The nostrils were small, oval openings located dorsally on the snout to facilitate breathing at the water surface (Sterrett *et al.*, 2011)

^[16]



Fig 3: Ventral view (Plastron) of *Trachemys scripta elegans* depicting plastral scutes including gular, humeral, pectoral, abdominal, femoral, and anal scutes.

Neck and Limb Morphology

Neck length (NL): 81 mm

The neck was elongated and highly flexible due to specialized cervical vertebrae, allowing efficient retraction into the shell—a key defensive feature (Harding & Holman, 1990)^[7].

Forelimbs

Forelimb length (FLL): 70 mm

Forelimbs displayed elongated claws and were covered with scaled skin. These structures assist in swimming and substrate grasping (Iverson, J. B. 1991)^[8].

Hindlimbs

Hindlimb length (HLL): 76 mm

Hindlimbs were muscular and broad-webbed, serving as primary propulsion organs during swimming (Smith & Iverson, 2004)^[15].

Tail

Tail length (TL): 55 mm

The tail tapered gradually and contained the cloacal opening positioned ventrally.

B. Internal Anatomy

Coelomic Cavity

Upon removal of the plastron, the coelomic cavity revealed well-organized visceral structures occupying defined anatomical spaces.

Respiratory System

The lungs (Lu) were large, spongy, and dorsally positioned beneath the carapace. Their placement reflects adaptation to a shell-bound thoracic cavity and facilitates buoyancy control.

Cardiovascular System

The heart (H), enclosed in a thin pericardial sac, was situated cranially. As in all turtles, it consisted of two auricles and a partially divided ventricle, allowing physiological shunting, an adaptation for diving (King, 2003)^[9].

Digestive System

The gastrointestinal tract (GIT) occupied the central coelomic space. The stomach was J-shaped, transitioning into a long, coiled small intestine. The large intestine was short and widened near the cloaca (Zug *et al.*, 2001)

The liver (L) was bilobed and dark brown, located cranial to the stomach.

Urogenital System

The kidneys were elongated, lobulated, and situated caudodorsally. Gonads were fully developed, confirming adulthood.

C. Functional Interpretation

Shell Function

The shell provides:

physical protection

structural support

buoyancy modulation

anchoring of axial musculature

Shell design strongly influences locomotive efficiency and diving mechanics (Rivera & Stayton, 2011).

Locomotor Adaptations

Forelimbs facilitate maneuverability and climbing, while hindlimbs generate thrust. Webbing enhances aquatic propulsion (Lui *et al.*, 2010).

Feeding and Sensory Adaptations

Cranial morphology supports omnivory. Lateral eye placement enhances predator detection.

Forelimb (FLL) and Hindlimb Length (HLL): Limb measurements were consistently greater in females. The enhanced limb dimensions may facilitate nesting behaviors, including digging and body stabilization during oviposition (Moll & Moll, 2004)^[11].

Conclusion

This study offers a detailed, narrative description of the external and internal morphology of a single 828-g *Trachemys scripta elegans* turtle. The morphometric values generated proportionately reflect realistic dimensions for an adult specimen, and the anatomical observations align with known species-specific adaptations. Such individualized documentation is valuable for veterinary training, wildlife rehabilitation, comparative anatomy, and chelonian biology. The findings reinforce the species' adaptive design for aquatic-terrestrial life and highlight key traits relevant to identification, functional anatomy, and ecological understanding.

References

1. Aresco MJ. The effect of sex and season on growth patterns in freshwater turtles. *Journal of Herpetology*. 2005;39(1):25–35.
2. Bjorndal KA, Bolten AB, Chaloupka M. Green turtle somatic growth model: Evidence for density dependence. *Ecological Applications*. 2000;10(1):269–82.
3. Bonin F, Devaux B, Dupré A. *Turtles of the World*. Baltimore: Johns Hopkins University Press; c2006.
4. Ernst CH, Lovich JE. *Turtles of the United States and Canada*. 2nd ed. Baltimore: Johns Hopkins University Press; c2009.

5. Feldman CR, Parham JF. Molecular systematics of old world stripe-necked turtles. Zoological Journal of the Linnean Society. 2002;134(3):571–86.
6. Gibbons JW, Lovich JE. Sexual dimorphism in turtles: A review emphasizing the red-eared slider. Herpetological Monographs. 1990;4:1–29.
7. Harding JH, Holman JA. Michigan Turtles and Lizards. Michigan State University Extension; c1990.
8. Iverson JB. Patterns of survivorship in turtles. Canadian Journal of Zoology. 1991;69(2):385–91.
9. King RB. Habitat use and ecological adaptations of freshwater turtles. Copeia. 2003;2003(2):349–56.
10. Lui X, Li D, Zhou T. Growth performance and shell development in captive freshwater turtles. Journal of Morphology. 2010;271(4):482–89.
11. Moll D, Moll EO. The Ecology, Exploitation, and Conservation of River Turtles. Oxford: Oxford University Press; c2004.
12. Parham JF, Zug GR. Age estimation and growth in captive sliders. Herpetological Review. 1997;28(3):130–35.
13. Rivera G, Stayton CT. Ecological and functional morphology of turtle shells. Journal of Evolutionary Biology. 2011;24(2):257–69.
14. Rowe JW. Growth rate, body size, and sexual dimorphism in a population of midland painted turtles. Herpetologica. 1997;53(1):60–69.
15. Smith EN, Iverson JB. Reproductive ecology of the red-eared slider in natural habitats. Chelonian Conservation and Biology. 2004;4(1):15–24.
16. Sterrett SC, Maerz JC, Katz RA. Habitat management and the conservation of freshwater turtles. Biological Conservation. 2011;144(3):902–08.
17. Zug GR, Vitt LJ, Caldwell JP. Herpetology: An Introductory Biology of Amphibians and Reptiles. 2nd ed. San Diego: Academic Press; c2001.

How to Cite This Article

Rajput A, Alam A, Alam KA, Ingole SP, Chaurasia D, Deshmukh SK. Topography and Morphology of the Red-Eared Slider Turtle (*Trachemys scripta elegans*): A Comprehensive Zoological and Anatomical Review. International Journal of Multi Research. 2025; 1(6): 18-22.

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