

### 3. HISTORICAL BIOLOGY

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Within a year of Le Conte's formal description of the Wood Turtle, John Edward Gray published *Synopsis Reptilium; or Short Descriptions of the Species of Reptiles* (1831), in which he provided a redundant description of the Wood Turtle under the epithet *Emys speciosa*. Gray was aware of Le Conte's work the year before—but had not read it. Pictured above is OUM 8491, a three year-old juvenile Wood Turtle and one of three syntypes of Gray's *Emys speciosa* in the Oxford Museum of Natural History. KATHERINE CHILD (OXFORD MUSEUM OF NATURAL HISTORY)



## Introduction

Understanding of the fundamental aspects of Wood Turtle biology took shape over a period of about 30 years, from the formal description of the species in 1830 to a series of detailed collections, observations, and treatments in the 1850s. In this way, it mirrored other North American species, which also came into scientific focus in the first half of the 19th century. Still, the Wood Turtle was first described later than other related species such as the Spotted Turtle (*Clemmys guttata*, 1792), Bog Turtle (*Glyptemys mühlenbergii*, 1801), and Eastern Box Turtle (*Terrapene carolina*), the last of which were among the species described by Linnaeus in 1758, 72 years earlier. Some of the earliest technical descriptions of the Wood Turtle included ecological information, forming a valuable record of a fleeting moment before the massive industrialization, degradation, and fragmentation of America's waterways. Early scientific accounts suggest Wood Turtles were more abundant historically, at least in some streams, than they are at any known location today. Wood Turtle densities in some areas may have been artificially elevated in the mid-19th century above a running mean of the previous centuries: widespread predator control and low-intensity agriculture created openings and edge habitat without the high level of turtle mortality caused by today's industrial farm machinery (Saumure 2004; Erb and Jones 2011). But the early accounts provide some basis for comparison and offer a helpful context in the search for a meaningful definition of Wood Turtle baselines.

The 19th-century accounts are interesting and noteworthy for other reasons. In these accounts, we gain perspective on the species in the context of many of the most significant discoveries of the modern era. Two centuries of logical thought were giving way to an avalanche of astonishing discoveries and theoretical frameworks as many curious men and women advanced the cause of reason. Four relevant concepts began to take form, which today frame all studies of the natural sciences in eastern North America: (1) the concept of Uniformitarianism was popularized by Charles Lyell in *Principles of Geology* (1833), stating that Earth's observable, natural processes are subject to immutable physical laws; (2) Charles Darwin's theories of natural selection (*On the Origin of Species*, 1859) led vertebrate anatomists (grudgingly, irreversibly) into the new field of evolutionary biology; (3) Gregor Mendel published the first careful experiments in inherited genetic traits (*Versuche über Pflanzen-hybriden*, 1865); and (4) the basic mechanisms of glacial geology, including the fact of a great North American ice sheet thousands of meters thick, took sharper form (Louis Agassiz, *Études sur les glaciers*, 1840).

The coincidence of the Wood Turtle's range with the highest density of North American academic institutions probably facilitated a disproportionate level of interest and corresponding records at the time. Additionally, the Transcendentalist movement gathered momentum around Boston and Concord, Massachusetts, where Wood Turtles foraged abundantly in the Assabet River, from the 1830s–1850s. As a result, scientists otherwise preoccupied with the great ideas of the day penned accounts of the Wood Turtle in a pre-industrial context.

## Original Description and Nomenclature

### A Specious Terrapin: Le Conte, Gray, and Holbrook

Wood Turtles gained serious scientific attention following the publication of Major John Eatton Le Conte's monograph, *Descriptions of the Species of North American Tortoises*, in 1830. Le Conte's paper, which was read before the Lyceum of Natural History of New York on December

7, 1829 and was printed in the society's Annals the following year, was the first to clearly and accurately describe the species *Glyptemys insculpta* (which he described as *Testudo insculpta*).

Within a year of Le Conte's description, John Edward Gray published *Synopsis Reptilium; or Short Descriptions of the Species of Reptiles* (1831), in which he provided a description of the Wood Turtle under the epithet *Emys speciosa*. Gray was aware of Le Conte's earlier work but had not read it; in fact, in his Preface, Gray includes a very self-aware disclaimer that: "I have to regret that after every inquiry and considerable delay on its account, I have not been able to procure the last part of the Annals of the Lyceum of New York, in which I understand M. Le Conte has given descriptions of the American species of Tortoises."<sup>1</sup> Le Conte's account had primacy over Gray's by more than a year, and so we refer to the Wood Turtle today by the formal epithet *Glyptemys insculpta* (Leconte, 1830).<sup>2</sup>

In the decade following Le Conte's description, some confusion arose as to whether the species had actually been first described by Johann David Schoepff (1801) or August Friedrich Schweigger (1812) as *Emys pulchella*. Some of this confusion originated when Duméril and Bibron (1834) categorized the Wood Turtle as *Emys pulchella*—an epithet used by both Schoepff and Schweigger to refer to the European Pond Turtle (*Emys orbicularis*), but equated it to the species account of *Testudo insculpta* provided by Le Conte. As later demonstrated by Holbrook (1838), the *Emys pulchella* of both Schoepff and Schweigger was clearly in reference to the species today assigned to *Emys orbicularis*, not *Glyptemys insculpta*.

Le Conte's account is also one of the first to provide ecological details for the Wood Turtle. In his original description of the species, Le Conte notes that the species "inhabits the northern states in rivers and ponds: is fonder of leaving the water than any other aquatic species, and will remain uninjured in a dry place for some months."

With the distance of a few more years, in the third volume of his monumental *North American Herpetology* (1838b), John Edwards Holbrook, M.D., provided the most detailed physical description of the Wood Turtle to date. Holbrook's description was accompanied by a color lithograph of a young tannin-stained *G. insculpta*, prepared by George Lehman of Lehman & Duval in Philadelphia from a figure drawn by an artist named J. Sera (3.1). Holbrook repeated Le Conte's observation that the species resides in ponds and rivers and frequently leaves the water. Holbrook somewhat casually remarked on the aggressive tendencies of captive New Jersey *G. insculpta* toward captive Diamondback Terrapins (*Malaclemys terrapin*) and Yellow-bellied Sliders (*Trachemys scripta scripta*) that were kept in the same enclosure. Holbrook further clarified the geographic range of *G. insculpta* to include the "Atlantic states from Maine to Pennsylvania," and noted the large size of an adult from Maine, preserved in collections of the Boston Lyceum of Natural History.

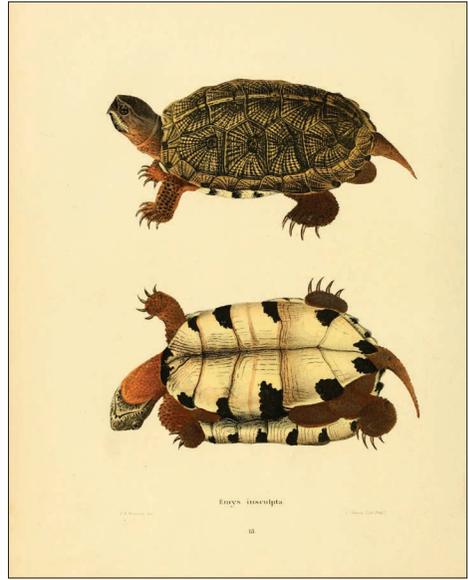
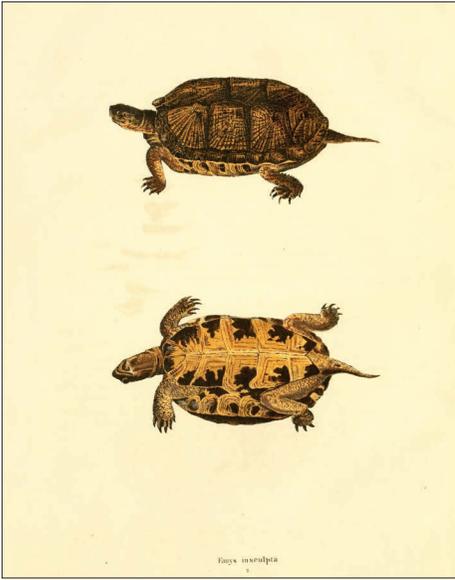
## Storer and De Kay

Following the serial publication of Holbrook's third volume (and an early list of the native turtles of Massachusetts by Smith in 1833), Dr. David Humphreys Storer (1840), a Boston medical

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1 Gray includes a terse footnote to his disclaimer about Le Conte's book. "While correcting this proof Mr. Children has kindly put into my hands the above paper [i.e., Le Conte's book]... his *Test. insculpta* is the *Emys speciosa*."

2 Although Le Conte spelled his last name with a space, as two words, as a taxonomic authority his name is usually spelled, "Leconte." Also, see notes below on the origin of the genus name *Glyptemys*.



3.1—In the third volume of his *North American Herpetology* (1838), Dr. John Edwards Holbrook provided the most detailed early description of the Wood Turtle to date. Holbrook’s description was accompanied by a color lithograph of a young tannin-stained Wood Turtle, prepared by George Lehman of Lehman & Duval in Philadelphia from a figure drawn by an artist named J. Sera. Slightly different versions of the figure were included in the 1838 edition (left) and the 1842 edition (right).

doctor, provided a brief account of the Wood Turtle from Massachusetts based on specimens received from Walpole, Concord, Amherst, and Andover. Storer considered *G. insculpta* “our most beautiful tortoise,” and declared that it was “not uncommon in the ponds” of Massachusetts, but that “this species wanders a great distance from, and remains a long time out of the water, and being oftentimes found in woods and pastures, has received the common name of wood tortoise.” Storer’s report was followed promptly by an account by James E. De Kay (1842), who provided a species description and new observational data from the Adirondack region of northern New York. “Little is known of its habits,” De Kay concluded, although he’d already determined key elements of its life history such as its preference for rivers and a propensity to wander “in woods at some distance from water.”

## Henry David Thoreau

Storer’s brief account from Massachusetts and De Kay’s from New York were followed by a notable flurry of inquiry in Massachusetts in the 1850s led by Henry David Thoreau and Louis Agassiz, who lived only about 20 km apart but very seldom crossed paths.

By 1857, Thoreau had spent many long springs exploring the Assabet River, which winds through West Concord to meet the sluggish Sudbury River at Egg Rock, where the two form the Concord River. It is clear from Thoreau’s eloquent journal entries that at the time, Wood Turtles were abundant in the Assabet and some of the smaller tributaries. Despite (or because of) their abundance, Wood Turtles were an object of fascination for Thoreau throughout his later years. Throughout his journals, Thoreau vaguely recounts the actual numbers of Wood Turtles he (or his correspondents) observed in the Assabet watershed, mostly elaborating on single encounters with individual turtles. Various descriptive phrases in his journal, like: “a great many

wood turtles on the bank of the Assabet to-day” and “the shores of the Assabet and of ditches are lined with them,” today generate improbable images of an extremely common species.

Henry David Thoreau, in many journal entries between 1854 and 1860, provided some of the most detailed and thoughtful 19th-century observations of Wood Turtle ecology from his sojourns around Concord, Middlesex County, Massachusetts. Thoreau was perhaps the first to notice Wood Turtles’ localized preference for quick-flowing streams and copious amounts of sand, noting their abundance in the quick-flowing Assabet River and their apparent absence from the stagnant Sudbury River immediately to the east. At the time, Wood Turtles were relatively common, and Thoreau reported many observations. Following the convention of Holbrook and Storer, Thoreau referred to the species as “*Emys insculpta*” or, more frequently, following Storer, “wood tortoise.”

Most of Thoreau’s observations were centered on the Assabet River and its tributaries, from West Concord to the confluence with the Sudbury River in Concord, Middlesex County, Massachusetts, between 1854 and 1860. Because of their unique historical value as the earliest direct empirical reports of Wood Turtles *in situ*, we have reproduced most of Thoreau’s Wood Turtle sightings from his journals here in chronological order (Table 3.1). Collectively, Thoreau’s observations from Concord represent the first detailed depiction of the spatial distribution of the Wood Turtle at any scale (3.2), and paint a rare picture of an abundant and ubiquitous animal routinely encountered in the course of normal day-to-day activities. Oddly, Thoreau’s famous account of his adventures in Maine in 1846 (published in 1864 as *The Maine Woods*), as well as the corresponding journal entries, do not reveal any encounters with Wood Turtles. It’s possible that Thoreau encountered none, but it seems more likely—given the abrupt onset of detailed reports in 1855—that he had simply not yet begun to give them much thought.

### Louis Agassiz

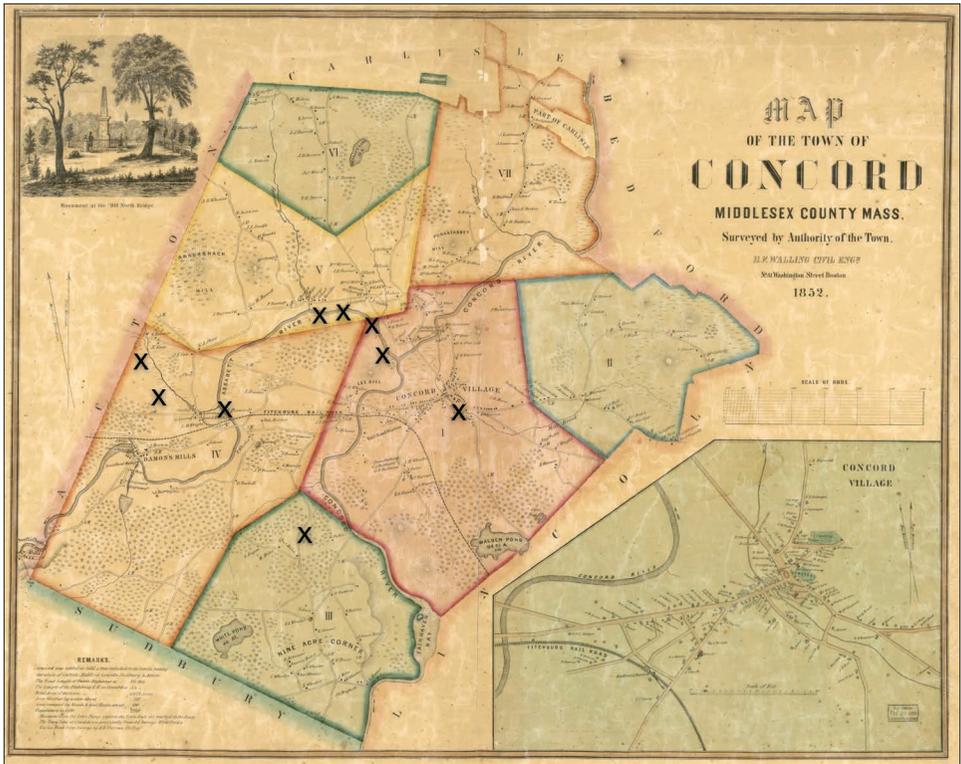
With the possible exception of Thoreau, no other 19th-century scientist or naturalist left a better record of their Wood Turtle investigations than Louis Agassiz.

Agassiz was a Swiss geologist and organismal biologist who emigrated to the United States in 1847 after studying in France, Germany, and Switzerland. Though born and raised in Switzerland (which has no native turtles), Louis Agassiz became quickly fascinated by New England’s native species when he came to Harvard in 1848. Through his current, former, and future students, Agassiz extended a broad network of turtle-collectors who sent him specimens from near and far. Like Thoreau, Agassiz made several intriguing statements concerning the Wood Turtles of Lancaster, Massachusetts in his *Contributions to the Natural History of the United States of America*, including: (1) “*Emys [=Glyptemys] insculpta* is so common in the neighborhood of Lancaster, about forty miles from Boston, that I have at times collected more than a hundred specimens in one afternoon, aided by a few friends,” and (2) “I am indebted to Mr. [Sanborn] Tenney for hundreds of specimens [of *Glyptemys insculpta*] from Lancaster, Massachusetts.”

Within a decade, by 1857 Agassiz had published a four-volume *Contributions to the Natural History of the United States*. The enormous document is detailed, careful, creative, and painstakingly organized. On page 252 of Agassiz’ first volume, he suggested that Wood Turtles should be removed from the genus *Emys*, where they had been placed by Gray in 1831, and into

Table 3.1—Wood Turtle observations at Concord, Middlesex County, Massachusetts, compiled from the journals of Henry David Thoreau between 1854–1860 provide intriguing insight into the abundance, landscape associations, and behavior of Wood Turtles during New England’s agricultural period.

Date	Thoreau's Wood Turtle Observation
September 16, 1854	Wood Turtle observed in the woods near "Dugan Dessert (sic)," upper Nut Meadow Brook (AKA Dugan Brook).
March 26, 1855	Wood Turtle in "the brook" near "Hubbard's Close," shown by Gleason (1906) to be south of Mill Brook near Concord center.
April 6, 1855	Wood Turtle observed basking on bank of Assabet River.
May 4, 1855	"Yesterday a great many spotted & wood tortoises in the Sam. Wheeler--birch fence mead--pool which dries up..." Note: Samuel Wheeler lived due west of the present-day crossing of Route 2 over the Sudbury River, according to Gleason (1906)
June 19, 1855	Mated pair of Wood Turtles observed in the Assabet River.
September 15, 1855	Mated pair of Wood Turtles observed in the Assabet River.
October 14, 1855	Mated pair of Wood Turtles observed in the Assabet River.
November 9, 1855	Wood Turtle basking along Assabet River near "Merrick's Pasture".
November 11, 1855	Wood Turtle "rustling" on the bank.
April 24, 1856	Wood Turtle observed at "Warren Miles' new mill" in the Dugan Brook watershed.
April 27, 1856	Wood Turtle observed.
May 7, 1856	Wood Turtle observed at "Miles' mill-pond." Note: This observation is interesting because Thoreau discusses the species' abundance: "The water thus suddenly let off, there were many spotted and wood tortoises seen crawling about on the bottom." Note: According to Gleason (1906), this site may be near Nut Meadow/Dugan Brook.
June 3, 1856	Wood Turtle observed southwest or west of Loring's Pond (today the site of Warner's Pond).
July 6, 1856	Wood Turtle eating Wood Sorrel on bank at "Assabet Bath," near the "One Arch Bridge."
March 27, 1857	Wood Turtle observed on the edge of Dodge's Brook along the Assabet River.
May 14, 1857	13 Wood Turtles observed near the "brush fence pond" in young forest near the Assabet River. Note: This pond is referred to by Thoreau as ½ acre; three floodplain pools of roughly this size are still visible in aerial photographs from 1938, present along the right bank upstream of the confluence. Is this the same pond as on May 4, 1855?
October 21, 1857	Mated pairs of Wood Turtles observed along the lower Assabet River.
November 17, 1857	Wood Turtle observed on the "bank" (of the Assabet River?)
April 17, 1858	Wood Turtle observed basking on "shore" (of the Assabet River?)
May 7, 1858	Wood Turtle by Tarbell's along the Assabet River northeast of West Concord.
May 28, 1858	Wood Turtle observed.
June 6, 1858	3 or 4 Wood Turtles nesting on gravel bank south of "Assabet Bath" along the Assabet River.
June 10, 1858	Nesting female Wood Turtle observed, possibly near the "White Cedar Swamp" near Spencer Brook.
June 10, 1858	Wood Turtle nest near the "Assabet Bath" along the Assabet River.
June 11, 1858	6 Wood Turtles nesting near the "Assabet Bath" along the Assabet River.
June 11, 1858	6 Wood Turtles nesting in Abel Hosmer's rye fields, and 2 nests discovered there. Note: Abel Hosmer evidently owned land on both sides of the Union Turnpike's One Arch Bridge (near present-day Route 2), and Wood Turtles nested in Hosmer's rye fields south of the road and on sandy soils north of the road.
June 17, 1858	"...coming across the level pasture west of E. Hubbard's swamp, toward Emerson's, I find a young <i>Emys insculpta</i> ...."
July 19, 1858	3 or 4 nests of Wood Turtle and Musk Turtle on sandbank (of Assabet River?)
May 17, 1859	Individual Wood Turtle observed on the "bank" (of the Assabet River?)
June 10, 1860	Wood Turtles present in Hosmer's sandy field north of Assabet River and near the One Arch Bridge.
June 12, 1860	2 or 3 Wood Turtle nests on a sandbank along the Assabet River.
June 14, 1860	Wood Turtle nest observed at "Dugan Desert."



3.2—Henry David Thoreau’s Wood Turtle observations from Concord, Middlesex County, Massachusetts in the 1850s represent the first detailed description of the species’ ecology and distribution, and paint a rare picture of an abundant animal routinely encountered. Here, some of Thoreau’s Wood Turtle observations are reproduced on an 1852 map of Concord. Thoreau frequently observed Wood Turtles in the lower Assabet River but noted their absence from the adjacent Sudbury River, which had a more sluggish flow.

the new genus *Glyptemys*.<sup>3</sup> In the same volume, Agassiz makes wide-ranging observations on Wood Turtles’ scute morphology,<sup>4</sup> vocalizations,<sup>5</sup> foot morphology, and ease of captive care in dry terrestrial conditions. Agassiz describes the species as “common in the North-eastern States, and is found only as far south as New Jersey.” He notes another specimen from as far north as 47°N in Maine.

In a terse footnote, Agassiz tries to clarify a point that had interested Holbrook nearly twenty years earlier: “This is the *Emys insculpta* of Major LeConte. Duméril and Bibron have erroneously identified it with Schoepff’s *Testudo pulchella*, which is the young of the European *Emys lutaria*.

3 Earlier on the very same page, Agassiz suggested moving the Bog Turtle (*Glyptemys mühlenbergii*) from *Emys* to the new genus *Calemys*, resulting in some minor confusion more than 140 years later when the two species were together determined to form a monophyletic genus and were placed by Holman and Fritz (2001) into the genus *Glyptemys*.

4 Agassiz notes the tendency of some Wood Turtles to become entirely smoothed, and points out that the *Emys speciosa* of Gray (1831) was based on a smooth specimen of *G. insculpta*.

5 In a passage on vocalizations in turtles, Agassiz claims to have heard Wood Turtles and several other emydid turtles “emit a piping note.”

*Emys speciosa*, Bell, is the smooth variety of the old age.<sup>6</sup> Essentially, Agassiz paused to reiterate that Le Conte had properly first identified the Wood Turtle; but Duméril and Bibron incorrectly thought that Schoepff had described the Wood Turtle as *Testudo pulchella*, when actually Schoepff (and subsequently, Schweigger) had used the name *T. pulchella* with reference to the European Pond Turtle (*Emys orbicularis*). It may seem arcane and circular today, but imagine the excitement and confusion as the North American species were catalogued and given scientific names, coupled with the discouraging communication delays and the ambiguity of the written word.

Volume II of Agassiz's *Contributions to the Natural History of the United States* contains additional detailed and careful observations on the biology of Wood Turtles. In Part III of Volume II, a standalone segment titled *Embryology of the Turtle*, Agassiz provides details of the reproductive biology and egg anatomy gleaned from multiple dissections of reproductive females. Some of Agassiz's (and Sanborn Tenney's) Wood Turtle specimens are still at Harvard University in the Museum of Comparative Zoology (3.3) and the *Staatliches Museum für Naturkunde* (State Natural History Museum), Stuttgart, Germany (3.4).

In two passages in Volume I, Agassiz leaves an evocative account of the abundance of Wood Turtles at Lancaster, Worcester County, Massachusetts, which lies about 50 km west of Boston. In one passage he reports, "I am indebted to Mr. S. Tenney<sup>7</sup> for hundreds of specimens from Lancaster, Massachusetts." In another, when describing the generally low detection rates of young Emydid turtles (compared to adults of a species) he reports: "...Nothing could prove more directly this difference in the mode of life of the young and the adult than the fact, that though *Emys insculpta* is so common in the neighborhood of Lancaster, about forty miles from Boston, that I have at times collected over one hundred in an afternoon, aided by a few friends, I have never yet been able to obtain a single young specimen of the first year, even though a whole school of young men were called to aid in the search." Even more than the journal entries of Thoreau, these brief passages suggest that Wood Turtles were an abundant species in the Nashua River watershed of the 1850s. More than 160 years later, we (Jones et al. 2019) returned to Lancaster to examine remaining populations of Wood Turtles, and found suitable habitat (3.5) but only a small, vulnerable population that had significantly larger adult body size, greater sexual dimorphism, and faster growth rates compared to the specimens studied by Agassiz (3.6).

## Return to Lancaster

Collectively, Agassiz's accounts appear to describe population densities unheard of in New England today, but his generalizations are impossible to directly compare to modern populations. While these references provide some historical context and anecdotal value, the information provided is insufficiently quantitative to infer many details. One hundred and fifty-five years later,

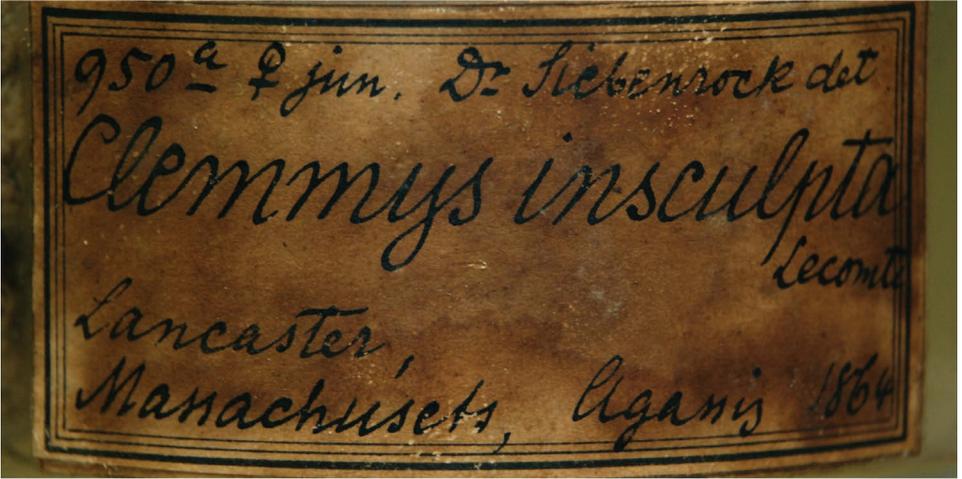
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6 Agassiz's original italics are retained here.

7 Sanborn Tenney was a particularly ambitious student of Agassiz'. Following his graduation from Amherst College in 1853, Tenney took an entry-level teaching position at the New England Normal School in downtown Lancaster before later studying under Agassiz at Harvard. The Normal School is situated directly across the street from a meandering, sandy section of the Nashua River, at the confluence of the North Nashua River and the Stillwater River in the Merrimack River drainage of Worcester County. It is very likely that his post at the Normal School on Main Street was Tenney's base of operations as he collected Wood Turtles for Agassiz, although the exact site isn't known.



3.3—The Museum of Comparative Zoology at Harvard University maintains a series of Wood Turtles collected in the 1850s at Lancaster, Worcester County, Massachusetts, USA by Louis Agassiz and Sanborn Tenney. MUSEUM OF COMPARATIVE ZOOLOGY, HARVARD UNIVERSITY



3.4—Two of the Wood Turtles collected in the 1850s at Lancaster, Worcester County, Massachusetts, USA by Louis Agassiz and Sanborn Tenney are juveniles preserved at the State Museum of Natural History Stuttgart (SMNS), Germany. *Top*: SMNS 3794.1; *Bottom*: SMNS 3794.2. GÜNTER STEPHAN (STATE MUSEUM OF NATURAL HISTORY STUTTGART)



3.5—More than 160 years after the explorations of Louis Agassiz and Sanborn Tenney, the current authors returned to their general study area in Lancaster, Worcester County, Massachusetts, and found plentiful, suitable stream habitat—much of it seemingly unoccupied by the species. MIKE JONES

in 2009, we tried to rediscover the Agassiz-Tenney site in Lancaster and to document what had become of it.

Harvard University's sample of Wood Turtles from Lancaster in 1854 represents a collection of animals from an entirely different context than today. In the mid-1800s, the landscape of southern New England was on the verge of industrialization, mostly deforested and lined from the Atlantic to the Hudson River with agricultural fields and small town centers, but farms were rapidly being abandoned as mill communities like Holyoke and Lowell were on the rise. Lancaster itself and the surrounding areas were largely cleared for agriculture.<sup>8</sup> It was in this agricultural context that 19th-century New England biologists began to generate a thorough account of the region's reptile and amphibian fauna, including some of the earliest such accounts in the country.

A century and a half later, not only has the landscape changed, but the abundance of turtles has also changed. We spent 30 days surveying the streams throughout the Lancaster area to find Agassiz and Tenney's population. We began our search by surveying the Nashua River itself, focusing heavily on the area within walking distance of the Normal School. After seven days of searching in March and April by canoe and on foot, we hadn't found a single Wood Turtle. Casting a wider net, we examined aerial photos for likely sites throughout the rest of Lancaster. We found several and explored most of them through May, June, September, and October. In the end, 120 hours of searching yielded exactly 31 Wood Turtles in the entire town of Lancaster and vicinity in 2009, a capture rate about 100 times worse than Agassiz and Tenney's inferred rate.

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8 Lancaster, Massachusetts struck Thoreau (1842) as similar to his own native Concord, Massachusetts: "...we found ourselves almost at home again in the green meadows of Lancaster, so like our own Concord, for both are watered by two streams which unite near their centres, and have many other features in common. There is an unexpected refinement about this scenery; level prairies of great extent, interspersed with elms and hop-fields and groves of trees, give it almost a classic appearance... a couple of miles brought us to the southern branch of the Nashua, a shallow but rapid stream, flowing between high and gravelly banks..."

The limited number of Wood Turtles we encountered in 2009 suggests that either: (1) Agassiz and his friends were 100 times better at finding Wood Turtles than we are; (2) Agassiz exaggerated the number he had seen; or (3) in the 155 years following Agassiz's collections, the population had collapsed. While some combination of these might be true, we evaluated each in turn. Our population estimates based on recapture rates from the Lancaster streams suggest that there are, indeed, very low Wood Turtle densities on these rivers. Population decline appears to be the most likely cause for the discrepancy between our numbers and Agassiz's. It is a sobering fact that the populations of these rivers, once consisting of hundreds, or perhaps even thousands of turtles, have collapsed to only a few individuals in the span of fewer than four turtle generations.



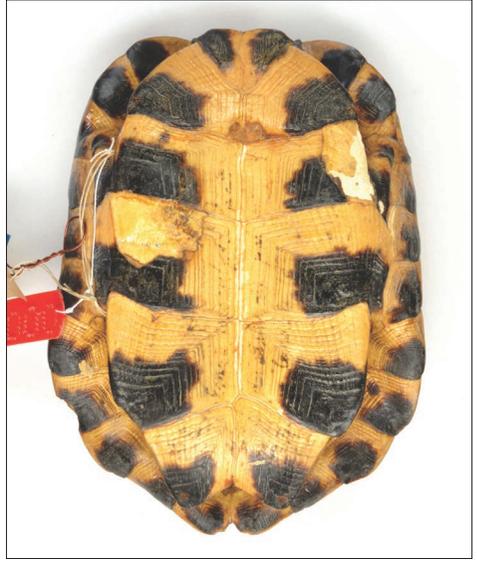
3.6—Despite abundant, suitable stream habitat, Wood Turtles are very rare today in Lancaster, Worcester County, Massachusetts. Pictured is male #481, captured within the same watershed as Louis Agassiz' and Sanborn Tenney's likely collection areas. MIKE JONES

### Thoreau and Agassiz Share Dinner at Emerson's

On March 20, 1857 Thoreau and Agassiz—two of the most peculiar and noteworthy men of the century—met at Ralph Waldo Emerson's house in Concord, Massachusetts, where the discussion ranged from puffball fungi to the ability of fish and caterpillars to freeze and thaw without injury. A large portion of the conversation, however, focused on the variety of turtles that inhabited 19th-century Concord and nearby Cambridge. The account of that evening, as recorded by Thoreau in his journal, indicates that the two men discussed Painted, Snapping, and Blanding's Turtles, but it's not hard to imagine that they also discussed the abundant "wood tortoises" that inhabited the clean rivers of eastern Massachusetts. It may be surprising to some that two thinkers of such stature and intellect (Thoreau's *Walden; or, Life in the Woods* had been published three years earlier, and Agassiz, the father of glacial theory, was busy completing his sprawling and detailed *Contributions to the Natural History of the United States*) would focus on turtles, of all topics. Of course, anyone who has spent time in the field with New England's turtles can understand why both men were enamored and fascinated by turtles.

### Other Significant Contributions

After the landmark contributions of Agassiz (1857) followed a period of detailed syntheses and a few noteworthy local accounts. Strauch (1865) prepared a detailed synthesis, borrowing heavily from Holbrook, Agassiz, Storer, and De Kay. An early local account to follow Agassiz was J. A. Allen (1868), who reported on the abundance and feeding habits of Wood Turtles near Springfield, Massachusetts. Charles Conrad Abbott published *A Naturalist's Rambles About Home* in 1884, providing some light details about the Wood Turtle's ecology in central New Jersey. Abbott was familiar with and heavily quoted from Agassiz, but he referred to the Wood Turtle as the "Rough-backed Terrapin," or "Diamond-back," without addressing the other species commonly called by that name in New Jersey (i.e., *Malaclemys terrapin*). Abbott notes that the Wood Turtle was "considered a great delicacy by epicures, and has been so persistently



3.7—A designated lectotype for John Le Conte’s *Testudo insculpta* is a young male specimen in the *Muséum national d’histoire naturelle* (MNHN), Paris, France (MNHN-RA-0.9452), pictured here. *Shell*: ANTOINE FRAYSSE; *Head and limbs*: ROGER BOUR (MUSÉUM NATIONAL D’HISTOIRE NATURELLE)



3.8—Within a year of John Le Conte’s description of the Wood Turtle as *Testudo insculpta*, John Edward Gray described the species as *Emys speciosa*—the Specious Terrapin. Three syntypes of Gray’s *Emys speciosa* are preserved in the Oxford University Museum, Oxford, United Kingdom. The Oxford specimens include, from top to bottom: the dry shell of an adult female (OUM 8489), a taxidermied adult male (OUM 8490), and a taxidermied juvenile (OUM 8491). KATHERINE CHILD (OXFORD MUSEUM OF NATURAL HISTORY)

hunted that now it is quite scarce.” Abbott goes on to describe the behavior of Wood Turtles near a “bubbling spring,” where they reportedly would burrow in the mud around the spring in search of invertebrates. Abbott’s account is interesting, but includes questionable details that aren’t easily substantiated elsewhere, such as the occurrence of Blanding’s Turtles in central New Jersey in the 1880s.

A significant, highly detailed, and interesting account of Wood Turtles in Pennsylvania was provided by H.A. Surface (1908) in his *First Report on the Economic Features of Turtles of Pennsylvania*. Surface lists seven regional or local names for the species (including Sculptured Tortoise, Fresh Water Terrapin, Wood Terrapin, Red Bellied Turtle, Rough Back Terrapin, Water Terrapin, and Wood Tortoise), and provides a brief description and a line-art figure. He also provides more than 30 county-level occurrence records and indicates that they have become scarce as the result of collection for food. Surface reported that the species “is liable to be found in any habitat or haunt throughout its range where the conditions are suitable, or where there are damp leaves in rather secluded woods.” He presents contrasting information on their overwintering habitat, suggesting (as is most likely) that Wood Turtles hibernate in streams and ponds, and elsewhere stating that he has seen them hibernate in dry woods in Centre County (near a temporary pool). Perhaps the terrestrial turtles were early to emerge or late to brumate. Surface also provides a quantitative summary of the stomach contents collected during dissections, which are described more thoroughly in Chapter 6.

## Type Specimens

A designated lectotype for Le Conte’s *Testudo insculpta* is a young male specimen in the *Muséum national d’histoire naturelle* (MNHN), Paris (MNHN-RA-0.9452) (3.7). The type locality for *G. insculpta* is the northern United States (Stejneger and Barbour 1923), further narrowed down to the vicinity of New York City by Schmidt (1953).

Three syntypes of Gray’s *Emys speciosa* and the holotype of Gray’s *Emys speciosa*, var. *levigata*, are preserved in the Oxford University Museum (Nowak-Kemp 2009; Nowak-Kemp and Fritz 2010) (3.8). The Oxford specimens include the dry shell of an adult female (OUM 8489) (holotype of Gray’s *Emys speciosa*, var. *levigata*), a taxidermied adult male (OUM 8490), and a taxidermied juvenile (OUM 8491). According to Gray (1831), further syntypes of *Emys speciosa* are in the *Muséum national d’histoire naturelle* (MNHN), Paris (Nowak-Kemp and Fritz 2010).

## Etymology

The etymology of *Glyptemys* is based upon the Greek γλύφειν or *glyphhein* (“to carve”) and the Classical Latin *emys*, from the Greek ἐμύς (“freshwater tortoise”) (Brown 1956). Thus *Glyptemys* refers to the somewhat “carved [or engraved]” appearance of the carapace (Ernst and Lovich 2009). The species name *insculpta* is from the Latin to carve or engrave, again referring to the appearance of the carapacial scutes (Brown 1956; Ernst and Barbour 1972; Ernst and Lovich 2009).

## Genus *Glyptemys*

The Wood Turtle was first assigned to the genus *Glyptemys* by Agassiz (1857). Agassiz provided the first full description of the genus *Glyptemys*, as follows:

“III. *Glyptemys*, Ag. The upper jaw projects in the form of a bill, arched downward, notched at the tip, and so compressed sidewise that the margin of the mouth is narrower than the top of the

forehead over the nose. The edge of the lower jaw is straight, except the tip, which is greatly arched upward. The horny sheath of the horizontal, alveolar surface is narrow in both jaws. The margin of the shield is very thin and spreading in the young, and the surface of the scales is coarsely granular. In the adult they have radiating ridges, which in very old age are sometimes entirely smoothed down.”

The genus *Glyptemys* is described by Holman and Fritz (2001; combined from Ernst 1972; Ernst and Bury 1977; Ward 1980; Ernst et al. 1994 and unpublished data of Holman and Fritz) as follows:

*Glyptemys* Agassiz, 1857. Small to medium-sized turtles (shell length 8.0–22.5 cm), with an elongated, keeled carapace which may be serrated posteriorly. Premaxillary notch with adjacent tomiodonts. Foramen carotico-pharyngeale located anteriorly of articular condyles. Alveolar shelf with lateral ridge. Horney seams between submarginals and pectoral and abdominal scutes located on the hyo- and hypoplastron. Entoplastron elongated to bell-shaped. Xiphiplastral notch moderate to well-developed.

## Synonymy

Synonyms for *Glyptemys insculpta* are provided in Table 3.2 (adapted and revised from Jones 1865; Boulenger 1889; Fowler 1906; Babcock 1919; Ernst 1972; McCoy 1982; Vogt 1981; Bowen and Gillingham 2004).<sup>9</sup>

## Summary

The Wood Turtle was described as *Testudo insculpta* by John Eatton Le Conte in 1830. Le Conte’s description narrowly superseded a careful description (as *Emys speciosa*) by John Edward Gray in 1831. In retrospect, given the species’ apparent abundance in the mid-19th century, Le Conte’s and Gray’s descriptions came several decades after the formal descriptions of most other related emydid taxa such as *Terrapene carolina*, *Clemmys guttata*, and *Glyptemys mublenbergii*.

Within 20 years—by the 1850s—the Wood Turtle had risen to a prominent position in the published works of Louis Agassiz and the journals of Henry David Thoreau. Agassiz and Thoreau were both based in eastern Massachusetts, and coincidentally provided unusually detailed records

Table 3.2—Selected synonyms of the Wood Turtle’s correct scientific binomial epithet, *Glyptemys insculpta*.

Synonym	Author
<i>Testudo insculpta</i>	Le Conte 1830
<i>Terrapene scabra</i>	Bonaparte 1830
<i>Emys speciosa</i>	Gray 1831
<i>Emys speciosa</i> , var. <i>levigata</i>	Gray 1831
<i>Emys inscripta</i>	Gray 1831
<i>Emys insculpta</i>	Harlan 1835
<i>Clemmys insculpta</i>	Fitzinger 1835
<i>Geoclemys pulchella</i>	Gray 1856
<i>Glyptemys insculpta</i>	Agassiz 1857
<i>Clemmys insculpta</i>	Strauch 1862
<i>Glyptemys pulchella</i>	Gray 1869
<i>Chelopus insculptus</i>	Cope 1875
<i>Clemmys insculpta</i>	McDowell 1964
<i>Glyptemys insculpta</i>	Holman and Fritz 2001

<sup>9</sup> Storer (1840) and Ernst (1972) report that Say’s (1825) *E. scabra* synonymy is erroneous (misidentified and placed with *Testudo scabra* L.). Holbrook (1838) determined that Schweigger’s (1812) *Emys pulchella* is actually *Emys orbicularis*.

of the Wood Turtle's ecology and abundance in the Nashua River and Assabet River watersheds. Unlike Thoreau, who rarely collected live reptiles for scientific collections, Agassiz preserved many of his specimens at Harvard's Museum of Comparative Zoology. These specimens, coupled with the written works of both Agassiz and Thoreau, provide a unique glimpse into the Wood Turtle's status during the height of the agricultural period in the northeastern United States.

**BIOLOGY & CONSERVATION**  
*of the* **WOOD TURTLE**

Michael T. Jones  
Lisabeth L. Willey

Editors

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