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America's First Herpetological Expedition: William BARTRAM's Travels in Southeastern United States (1773–1776)

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Abstract. William BARTRAM (1739–1823), author of the epic *Travels Through North & South Carolina, Georgia, East & West Florida* (1791), was the first native-born American naturalist to gain international recognition. He was trained by his father – John BARTRAM, King GEORGE III's "Royal Botanist in North America" – who took him on his first expedition at the age of 14. Although William, too, was primarily a botanist, he developed a special interst in turtles. He visited Florida in 1765–1767 and North Carolina in 1761–1762 and 1770–1772.

William BARTRAM's expedition of 1773–1776, through eight southeastern colonies, was undertaken with the patronage of British sponsors. It began on the eve of America's War of Independence but, when the Revolutionary War commenced in 1775, it became America's first herpetological (and natural history) survey.

At least 40 different kinds of amphibians and reptiles are recorded in "BARTRAM's *Travels*", most of them identifiable to species. BARTRAM applied Latin names to only two of them (both turtles) but since the nomenclature used in his *Travels* was not uniformly binominal, his authorship is not accepted today for any scientific names. Nevertheless, early naturalists (F.-M. DAUDIN, C. S. RAFINESQUE, J. G. SCHNEIDER) based new species names on BARTRAM's descriptions, of which two are valid today (*Gopherus polyphemus*, *Pituophis melanoleucus*).

BARTRAM's most famous herpetological observations were on the alligator, a species then largely unknown to naturalists in America and Europe. Although his descriptions of this animal's behavior were regarded as exaggerated and even incredulous by later writers, BARTRAM's notes are more credible today, now that the complex social behavior of alligators has become known.

This paper reproduces many previously unpublished BARTRAM drawings of amphibians and reptiles.

Key words. Amphibians, reptiles, drawings, history of herpetology eastern United States.

1. INTRODUCTION

William BARTRAM (1739–1823) (Fig. 1), author of the epic *Travels Through North & South Carolina, Georgia, East & West Florida* . . . (1791) which is widely known today as "BARTRAM's *Travels*", was the first native-born American naturalist to receive international recognition. BARTRAM was not a herpetologist, of course, because no one was so narrowly specialized before the 20th century. He made well-known contributions to literature and to ethnology, but we will deal here with the importance and accuracy of his natural history observations, specifically those on amphibians and reptiles, which were made during a lifetime of exploration in eastern North America. First and foremost, BARTRAM was a botanist, especially a horticulturalist, but he was a keen ornithologist as well and, beginning as a boy, he had a special interest in turtles.

BARTRAM was trained largely by his father, John BARTRAM, an American horticulturist once called the "greatest natural botanist in the world" by Carl LINNAEUS. His Majesty King GEORGE III appointed him "Royal Botanist in North America", in order to explore the natural products of the king's dominions there. In actual fact, John was supported by several English patrons – among them Peter COLLINSON and John FOTHERGILL – who wished to introduce new ornamental plants to the British Isles. William was encouraged and educated in natural history pursuits, including the drawing of natural history objects, by COLLINSON and FOTHERGILL.

William accompanied his father on two expeditions (to the Catskill Mountains of New York in 1753 and to East Florida in 1765–1767) and spent extended periods with an uncle in North Carolina (1761–1762, 1770–1772). The practical experience gained during these trips and an apprenticeship at his father's botanical garden in Philadelphia were put to good use during his celebrated travels during 1773–1776 through eight southeastern colonies, later states (Fig. 2), begun on the eve of America's War of Independence. After the American Declaration of Independence and while BARTRAM was already in the field, his expedition forthwith became an American one, but ironically it was funded by his English patrons. BARTRAM's *Travels*, first published in Philadelphia in 1791, was the most widely-read contemporary account of America and is primarily a work of literature and of history, but it contains numerous observations on plants and animals. It provides the focus for the present analysis of his herpetological acumen. There were also editions of the book published in London and Dublin and translations into French, German, and Dutch.

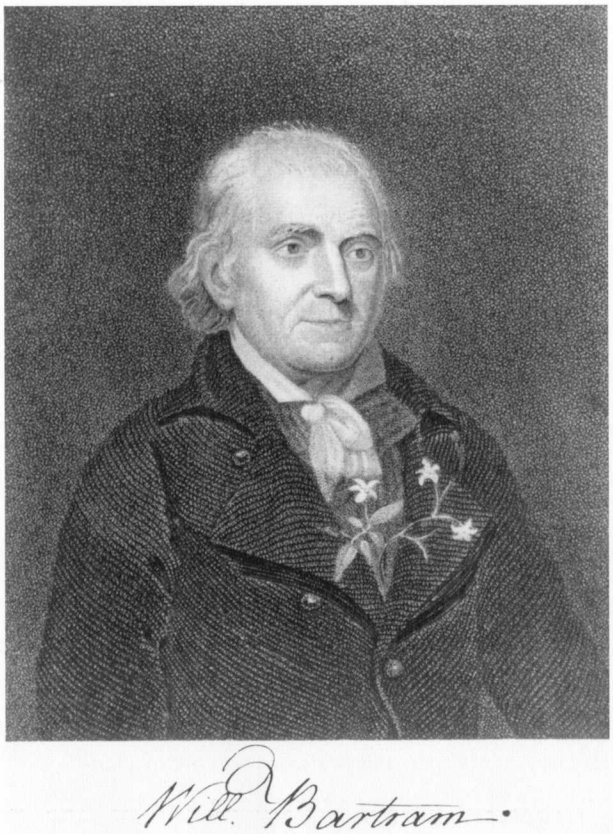


Fig. 1: William BARTRAM (1739–1823). BARTRAM was not a herpetologist per se, but he conducted the first extensive herpetological survey in southeastern United States, coincident with his primarily botanical work.

BARTRAM's observations and drawings of amphibians and reptiles have had mixed reviews over time but deserve wider recognition, both for their insight into life histories and the fact that they provided the first reasonably detailed information on the herpetofauna of southeastern United States. Of necessity, one must evaluate BARTRAM's contributions against the contemporary state of knowledge in herpetology. Not a single scientific paper or book on amphibians or reptiles had yet been published in America. The first Linnaean catalogue of North American animals – that is, in the binomial system introduced by Carl LINNAEUS – was published by John R. FORSTER in 1771 in London, shortly before BARTRAM departed for the Southeast. FORSTER's list of reptiles occupies a scant three pages; there are no descriptions provided and even references to illustrations in CATESBY, EDWARDS, or PENNANT are given for only 17 of the 56 species listed. At that time, reptiles were not separated taxonomically from amphibians, and, together, these two groups comprised the Class Amphibia. Crocodilians were then considered to be a kind of lizard, and the salamanders were not differentiated from lizards and other reptiles until 1800 (ADLER 2003), although the validity of these distinctions was not widely accepted for another generation more. Legless lizards were, not surprisingly, regarded as a kind of serpent. Bartram was not a taxonomist, and the groupings used in his published works simply reflect the commonplace acceptance in America of classifications developed by Europeans (ADLER 1978).

The significance of BARTRAM's observations, especially their influence on his contemporaries and successors, is a complicated matter. When his *Travels* was published, its contents were widely accepted; after all, America was a largely unexplored wilderness and there was little else with which to compare BARTRAM's veracity. William WINTERBOTHAM, in his account of the reptiles and amphibians of America (1796), listed many of the frogs, lizards, and snakes apparently on BARTRAM's authority and extracted a large section about the alligator from his *Travels*. Later authors made occasional reference to BARTRAM's work, including John Edwards HOLBROOK in the two editions of his great *North American Herpetology* (1836–1840, 1842), but thereafter, citations waned. This resulted from two primary reasons. Later writers, particularly HOLBROOK, had provided more comprehensive and authoritative accounts of the Eastern species of amphibians and reptiles. Perhaps equally important, there was a growing consensus that BARTRAM's observations were flawed. Specific accusations (and evaluations) are discussed below, but criticism was primarily directed at BARTRAM's lengthy report on the alligator. TRUE (1893) remarked that BARTRAM's "description [of the alligator] seems overdrawn" and that his recollection of the animal's voice was "most evident hyperbole!" Even HOLBROOK (1840, vol. 4, p. 15), while praising BARTRAM's honesty, saw fit to call him a "somewhat overcredulous naturalist". Later authors were less sparing in their criticism. For example, KELLOGG (1929), referring to BARTRAM's claim as to the maximum length which alligators attain, said "The accumulated testimony of travelers and naturalists does not support BARTRAM's statement".

Yet BARTRAM's good reputation has survived these and other criticisms; indeed, his work deserves greater recognition and acceptance. Although he unquestionably made occasional errors in his observations of amphibians and reptiles and in interpretations of their habits, it is also equally true that biologists had largely underestimated what a complex life history the alligator has. The most detailed modern account of the alligator's habits (MCILHENNY 1935) received a similarly disbelieving reception, but there is now, finally, acceptance of the fact that crocodilians possess the most complicated behaviors of all living reptiles (CARR 1976). Nevertheless, BARTRAM did exaggerate and embellish parts of the alligator account, though, as we now know, not to the degree previously thought. These inaccuracies overshadowed BARTRAM's other observations, and, as a

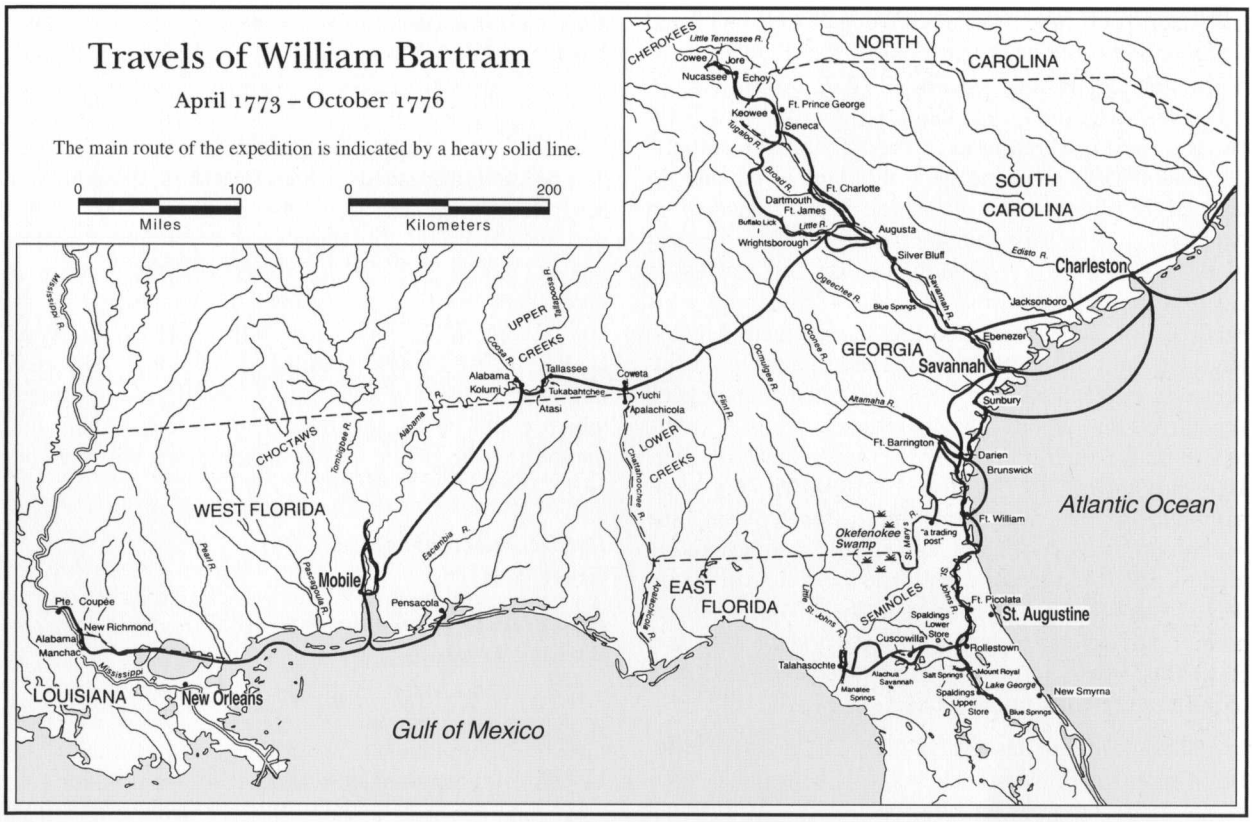


Fig. 2: Main route of William BARTRAM's expedition through southeastern United States (1773–1776) (modified from HARPER 1958).

result, he has not been given proper credit for the information which, for its time, was original, generally perceptive, and largely correct. Doubtless this accounts in part for the fact that BARTRAM has not been accorded the usual tributes given other, and even lesser, naturalists, such as the naming of new forms in his honor. In herpetology, only three such names have been proposed, and one of them in error! *Testudo bartrami* was inadvertently named in 1801 by DAUDIN who mistakenly thought that SCHOEPFF had used it earlier. SCHOEPFF (1792–1801) quotes extensively from BARTRAM but calls the species *Testudo* (*ferox*?) *verrucosa*. DAUDIN's turtle name today is considered a synonym of *Apalone ferox* (SCHNEIDER, 1783), the Florida Softshell (Table 2). RAFINESQUE (1832) gave the name *Mesodeca bartrami* to the same species, based on BARTRAM's description. It is not completely clear whether RAFINESQUE's use of the epithet *bartrami* was independent, but nowhere in his article does he mention DAUDIN. The other patronym, *Pseudacris crucifer bartramiana*, was given by Francis HARPER in 1939 to the Southern Spring Peeper, a frog indigenous to the very parts of Georgia and Florida first explored by BARTRAM. Surely we are more in BARTRAM's debt than this, as I hope this detailed review of his herpetological observations will demonstrate.

Tab. 1: Species Described or Illustrated by William BARTRAM.
"Actual fauna" is equivalent to the common species known today to inhabit the regions in which BARTRAM traveled during his journey (1773–1776). Although he was unable to identify salamanders, he recognized most of the turtle species; perhaps his long interest in turtles enabled him to distinguish them more accurately.

Group	BARTRAM	Actual fauna
Frogs	10	(40%)
Salamanders	0	(0%)
Turtles	14	(74%)
Lizards	5	(50%)
Snakes	18	(49%)
Crocodilians	1	(100%)
Total	48 (40%)	120 species

2. AMPHIBIANS AND REPTILES OBSERVED BY BARTRAM IN SOUTHEASTERN UNITED STATES

BARTRAM recorded at least 40 different kinds of amphibians and reptiles during his southeastern excursion, but, as the following species accounts show, it is difficult to be certain of a few of the identifications. This

task has been greatly facilitated by the published writings of Francis HARPER, himself an excellent naturalist and the leading student of William BARTRAM. HARPER's extensively annotated republication of BARTRAM's *Travels*, referred to as the "naturalist's edition" (HARPER 1958), is an indispensable aid for anyone interested in the history of natural history studies in America. A necessary complement to the *Travels* itself is BARTRAM's two-volume report on his travels in Georgia and Florida during 1773–1774, prepared for his chief patron, John FORTHERGILL, a prominent London physician and amateur botanist. Here again we are indebted to HARPER who, in 1943, published an annotated version of this report. The importance of BARTRAM's report to FOTHERGILL cannot be overestimated since, according to HARPER (1943, p. 172), BARTRAM's original field journal has never been located and the FOTHERGILL report often gives valuable insight into the identification of species mentioned in the *Travels*. Indeed, several species discussed in the FOTHERGILL report are nowhere to be found in *Travels*, suggesting that BARTRAM's field notes were more extensive than either of the two accounts extant today.

In addition to these descriptive accounts, many of BARTRAM's drawings have been published: in the *Gentleman's Magazine* (London) by COLLINSON, by HARPER (1943, 1958), and in the album of drawings sent to FOTHERGILL (EWAN 1968). Several of BARTRAM's herpetological drawings remain as yet unpublished in the collection of the American Philosophical Society and in that of the Earl of DERBY; reproductions of all of these are provided with this paper.

In the following account, references to BARTRAM's *Travels* are taken from the original edition (Philadelphia, 1791). As can be readily noted below, BARTRAM observed and often illustrated many of these species before they had received a formal scientific name. Of the 48 species he found, 21 had not yet been formally described and named. Indeed, had he been better versed in taxonomic procedures, many of our commonest Eastern amphibians and reptiles would bear his authorship.

Amphibians

Frogs and Toads

***Acris gryllus* (Le Conte, 1825)**
Southern Cricket Frog

Travels, p. 278 ("Little grey speckled frog").

The call of this frog, as described by BARTRAM, is unmistakably that of *Acris*, although these tiny frogs more typically inhabit lowlands. HARPER (1943, p. 205) also referred the "striped green and white" frog, mentioned in BARTRAM's report to FOTHERGILL, to *A. gryllus*, but I think it is more likely to be *Pseudacris* (see below).

***Bufo terrestris* (Bonnaterre, 1789)**
Southern Toad

Travels, pp. 195, 279–280 ("land frogs", "red toad", "black toad").

The red and black toads, which BARTRAM thought were separate species, are doubtless both referable to this species which is highly variable in coloration (CONANT & COLLINS 1998, p. 515). Furthermore, the description given does not fit the only other toad known from the coastal regions (*B. quercicus*). In the FOTHERGILL report (vol. 2, p. 59), BARTRAM failed to mention a red variety but instead listed another toad "smaller & speckled" which could be construed as *B. quercicus*, except that the description of the call is inappropriate for that species.

***Hyla cinerea* (Schneider, 1799)**
Green Treefrog

***Hyla gratiosa* (Le Conte, 1856 [1857])**
Barking Treefrog

Travels, p. 277 (*H. cinerea*, "bell frog"; *H. gratiosa*, "beautiful green frog")

I deal with these two species together since it is not always possible to be certain to which species BARTRAM refers in a specific instance. The distinctive calls of both species are well described by BARTRAM. HARPER (1943, pp. 205, 225) referred several of the names in BARTRAM's report to FOTHERGILL to *H. cinerea*, specifically the "large green & Yellow [sic] frog", "little luced green frog", and the "silver col'd treefrog". A BARTRAM painting in the FOTHERGILL album has been referred to *H. cinerea* by HARPER (1943, fig. 36; see also Ewan 1968, pl. 53), but I think this drawing is actually that of a specimen of *Rana clamitans*.

***Hyla squirella* (Bosc. *in* DAUDIN, 1800)**
Squirrel Treefrog

Travels, p. 278 ("less green frog").

The habit of this frog to call before showers, as noted by BARTRAM, gives this species the local name "rain frog" (CONANT & COLLINS 1998, p. 535). BARTRAM's name may refer to the fact that this species is less bright green than is *H. cinerea*.

***Pseudacris ocularis* (Bosc & Daudin *in* SONNINI & LATREILLE, 1801)**
Little Grass Frog

Travels, p. 278 ("savanna crickets").

In spite of BARTRAM's vernacular name, his description of the frog's size and call suggest *P. ocularis* rather than that we call cricket frog today (*Acris*). In the report to FOTHERGILL (vol. 2, p. 59), BARTRAM apparently re-

ferred to this species (". . . not biger then a Creeket & make noise like them . . ." [sic]) but did not give a common name.

***Pseudacris ornata* (Holbrook, 1836)**
Ornate Chorus Frog

Not mentioned in *Travels*.

In the FOTHERGILL report (vol. 2, p. 59), BARTRAM referred to a "striped green & whit[e] frog" which HARPER (1943, p. 205) thought was *Acris*. However, BARTRAM's description of the animal's color pattern, its pine forest and pond habitat, and its call ("like chickens"), taken together, seem better associated with this species; however, the call of *Bufo quercicus* sounds more like baby chicks than any other frog in the Southeast (J. W. GIBBONS, Aiken, pers. comm. 2003).

***Rana clamitans* Latreille *in* SONNINI & LATREILLE, 1801**
Green Frog

Not mentioned in *Travels*.

Although no descriptions in *Travels* or in the FOTHERGILL report are clearly referrable to this species, I believe that a drawing in the FOTHERGILL album (HARPER 1943, fig. 36; also EWAN 1968, pl. 53) probably represents this species because of the large, prominent tympanum, the yellow lips, and especially the rather conspicuous dorsolateral fold.

?*Rana grylio* Stejneger, 1901
Pig Frog

Travels, pp. 276–277 ("largest frog known in Florida").

It is possible that this frog, in BARTRAM's sense, was a composite of several species including also *R. catesbeiana* and *R. heckscheri*, but the coloration generally and especially the call (". . . resembling the grunting of a swine . . .") point to *R. grylio*. In the report to FOTHERGILL (vol. 2, p. 59), this frog was simply referred to as the "largest Species" and a locality was given ("St. Johns River") which is lacking in the *Travels*.

***Rana sphenocephala* Cope, 1886**
Southern Leopard Frog

Travels, pp. 278–279 ("shad frog").

Possibly the "brown & black speckled frog" and the "large dark green & speckled frog", briefly mentioned in BARTRAM's report to Dr. FOTHERGILL, are also referrable to this species, as suggested by HARPER (1943, p. 205). This species was long thought to be a race of the common leopard frog, under the name *R. pipiens sphenocephala*, and then was made a separate species that for a short time was called *R. utricularia*. The drawings of a frog being eaten by a snake in the FOTHERGILL album (EWAN 1968, pls. 22 and 59) may represent this species.

Reptiles

Crocodilians

***Alligator mississippiensis* (Daudin, 1801)**
American Alligator

Travels, pp. 46, 71, 78, 88–90, 106, 117–130, 134–136, 138, 140, 145, 150, 153, 166–168, 174–175, 190, 193, 205–206, 231, 238, 250, 408, 424, 426, 445 ("crocodile", "alligator", "allegator", "crocadiles").

As noted by BARTRAM himself (*Travels*, p. 90, footnote), he used the terms alligator and crocodile interchangeably, claiming that the former was its "country name". BARTRAM probably never saw a true crocodile on his trip, since that species in North America today is confined to the southern tip of the Florida peninsula. In the FOTHERGILL report, alligator references are given in both volume 1 (pp. 63, 76, 80–81, 90–94, 97, and 100) and volume 2 (pp. 2, 4, 11, 13, 18, 21, 23, 29, 31, and 33–34). An early extract from BARTRAM's *Travels* on the alligator was published in Dublin (ANONYMOUS 1793).

There are several BARTRAM drawings of the alligator. In the FOTHERGILL album, there are two: one showing an alligator at a sink hole (HARPER 1943, fig. 30; also EWAN 1968, pl. 47) and the other, a rather dramatic representation (HARPER 1943, fig. 24; also EWAN 1968, pl. 49 and ADLER 1978, fig. 3). The American Philosophical Society possesses another, previously unpublished, drawing which is the best of the three (Fig. 3).

Lizards

***Anolis carolinensis* (Voigt, 1832)**
Green Anole

Travels, pp. 275, 280 ("green lizard", "little green chameleon").

In the FOTHERGILL report (vol. 2, pp. 48, 51, 53, 59), the anole was also referred to as "cammelion".

***Eumeces* sp.**
Skinks

***Cnemidophorus sexlineatus* (Linnaeus, 1766)**
Six-lined Racerunner

Travels, pp. 172, 280–281 ("striped lizard", "scorpion", "copper coloured lizard", "slender [lizard] of a fine blue colour").

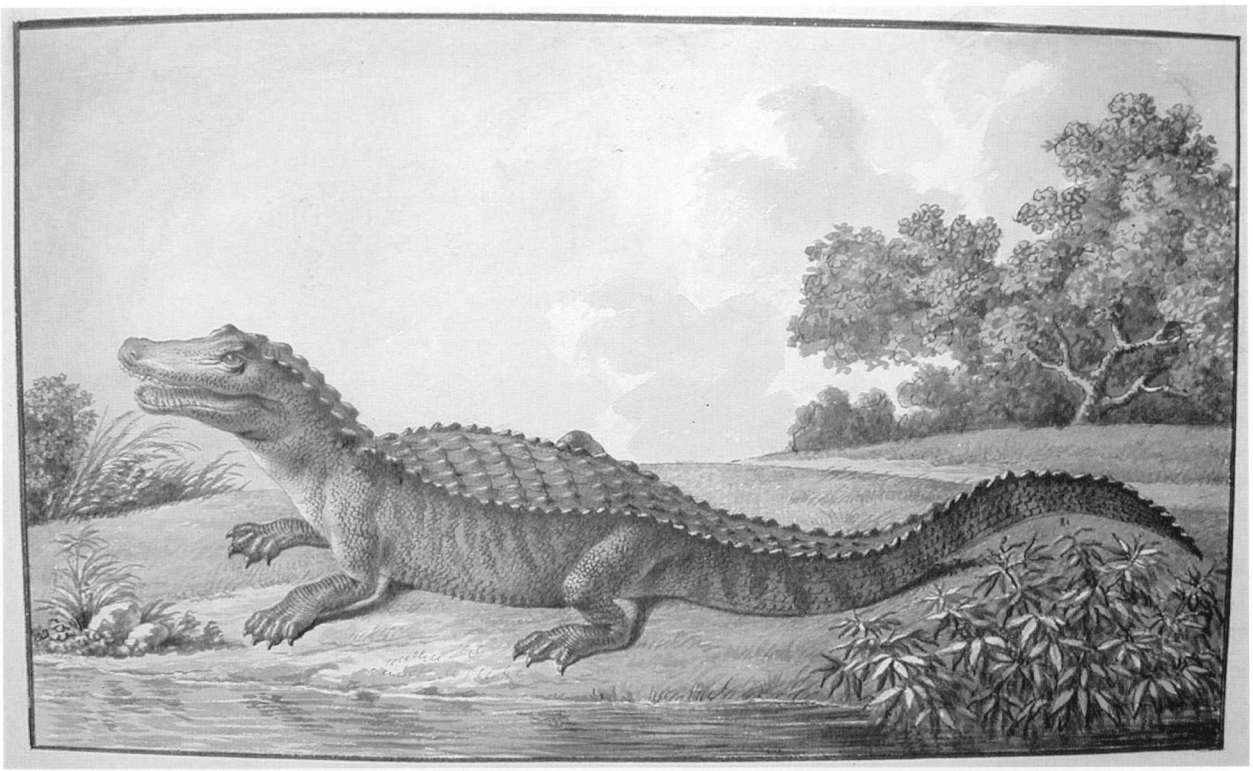


Fig 3: American Alligator, *Alligator mississippiensis*, as drawn by BARTRAM. Although some parts of the animal are stylized, overall it is a remarkably good likeness for its time. The original painting is uncolored. (American Philosophical Society, B. S. BARTON collection [B:B284d]).

As HARPER (1958, p. 554) noted, BARTRAM probably confused several species of skinks (*E. fasciatus*, *E. inexpectatus*, and *E. laticeps*) and the racerunner. The local name scorpion is, at least today, used for skinks in that region, but the swiftness and long tail (*Travels*, p. 172) seem more applicable to the racerunner. The young of all three kinds of skinks are striped and thus superficially resemble the racerunner. It is possible that BARTRAM never actually had the different species in hand at one time to make a careful comparison, especially since skinks and racerunners are found in separate habitats and are all swift and difficult to catch.

In the FOTHERGILL report (vol. 2, p. 51), BARTRAM referred to a "large Red Bellied" lizard; presumably this was a *lapsus* for the large red heads possessed by adult skinks. In the FOTHERGILL album (EWAN 1968, pl. 22), the lizard lurking in the foliage may be a *Eumeces*.

***Ophisaurus* sp.**
Glass Lizard

Travels, pp. 7, 46, 195–196, 280 ("glass snake").

BARTRAM's remarks could refer to any of the three species of glass lizard (*O. ventralis*, *O. compressus*, and *O. attenuatus*) found in the region he visited, although the one reference giving color information (p. 280, "like bluish green glass") is doubtless *O. ventralis*. Glass lizards were also mentioned in the FOTHERGILL report (vol. 1, p. 56; vol. 2, p. 52).

***Sceloporus undulatus* (Bosc & DAUDIN *in* SONNINI & LATREILLE, 1801)**
Eastern Fence Lizard

Travels, p. 280 ("blue bellied squamous lizard").

This species was also mentioned in the report to Dr. FOTHERGILL (vol. 2, p. 51).

Snakes

***Agkistrodon contortrix* (Linnaeus, 1766)**
Copperhead

Travels, pp. 273–276 ("Moccasin").

HARPER (1958, p. 629) referred BARTRAM's "moccasin" to *Lampropeltis triangulum*, yet the size and coloration noted by BARTRAM seem to me to fit the copperhead better. However, BARTRAM stated that they do not possess poison fangs. Either BARTRAM's "moccasin" was in fact a composite of *Agkistrodon* and *Lampropeltis* or, because of the rarity of deaths attributed to copperhead

bites (and possibly related to BARTRAM by residents), BARTRAM assumed that they were non-venomous. BARTRAM remarked that his animal may be the same as the "wampom snake" (=wampum) of Pennsylvania and Virginia, but it is clear that he confused several species under this name (see *Coluber*, below).

In the FOTHERGILL report (vol. 2, p. 52), BARTRAM referred to what is apparently this same species as the "high land Mocazin"; HARPER (1943, p. 213) suggested instead that this might be *Elaphe guttata*.

***Agkistrodon piscivorus* (Lacepède, 1789)**
Cottonmouth

Travels, pp. 273–274 ("Moccasin snake").

In the report to Dr. FOTHERGILL (vol. 2, pp. 51–52), this was called the "Great Mockazin Snake". The head of this species was also illustrated by BARTRAM (HARPER 1943, fig. 41; also EWAN 1968, pl. 50).

***?Coluber constrictor* Linnaeus, 1758**
Eastern Racer

Travels, p. 276 ("black snake").

Since, in *Travels*, this snake was mentioned by name only, it is possible that this reference may in fact be to *Drymarchon couperi*; indeed, the description in the FOTHERGILL report (vol. 2, p. 52) seems more applicable to *Drymarchon* (see below).

BARTRAM illustrated what appears to me to be a juvenile *Coluber* (EWAN 1968, pl. 58, shown swallowing a *Storeria*), although other authorities (*in* EWAN 1968, p. 84) suggested that this snake is *Lampropeltis triangulum* or *Elaphe guttata*. However, the color pattern, especially that on the head, seems more like that in young *Coluber* which are well known for their snake-eating habits.

***Crotalus adamanteus* Palisot de Beauvois, 1799**
Eastern Diamond-backed Rattlesnake

***Crotalus horridus* Linnaeus, 1758**
Timber Rattlesnake

Travels, pp. 7, 46, 260–272 ("Rattle snake").

BARTRAM confounded these two species as one, hence they are here treated together. Specific localities given by BARTRAM allow allocation of some references to one or the other species. That in the Catskills of New York would have been *C. horridus*, but only *C. adamanteus* is today found on Sapelo Island, off the Georgia coast (MARTOF 1963). In the FOTHERGILL report (vol. 2, p. 51), a "great Rattle Snake" was mentioned which may be *C. adamanteus*.

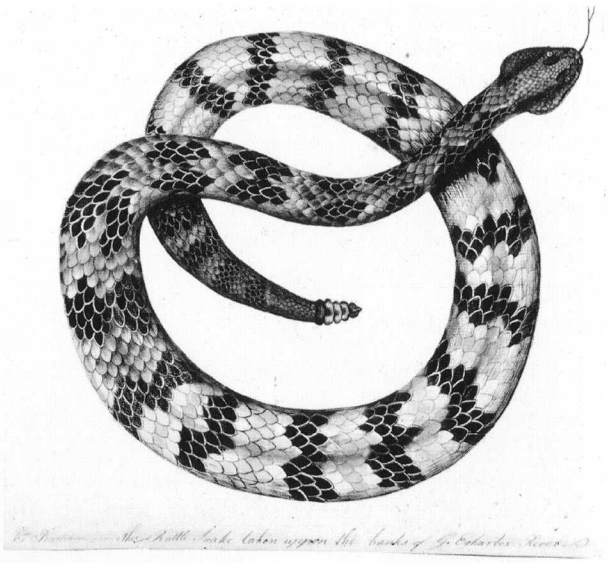


Fig. 4: Timber Rattlesnake, *Crotalus horridus*. The locality referred to in BARTRAM's handwritten caption ("G. Egharber River") is, as noted by EWAN (1968, p. 23), the Great Egg Harbor River in New Jersey. (Lord DERBY's collection, BARTRAM no. 127).

BARTRAM illustrated both species: *C. adamanteus* (HARPER 1943, fig. 41; also EWAN 1968, pl. 50) and *C. horridus* (previously unpublished, in the collection of the Earl of DERBY; see Fig. 4).

***Diadophis punctatus* (Linnaeus, 1766)**
Ring-necked Snake

Travels, p. 276 ("ring neck").

***?Drymarchon couperi* (Holbrook, 1842)**
Eastern Indigo Snake

Apparently not mentioned in *Travels*.

Although HARPER (1943, p. 221) referred the "Great Black Snake" in BARTRAM's report to Dr. FOTHERGILL (vol. 2, p. 52) to *Coluber constrictor*, the description given by BARTRAM seems to more closely fit this species.

***Elaphe obsoleta quadrivittata* (Holbrook, 1836)**
Yellow Ratsnake

Travels, pp. 275–276 ("chicken snake").

BARTRAM also gave a good description of this species, as the "Great Chicken Snake", in the FOTHERGILL report (vol. 2, p. 53). Earlier in that report (vol. 1, p. 82), he discussed a "Rat catcher" which may also refer to this species, although the red sides and venter described by BARTRAM are rarely present. It is possible that BARTRAM had instead a specimen of *E. guttata*, but he probably would have noted the checkered belly and realized its distinctness from *E. obsoleta*.

What appears to be the young of this species was drawn by BARTRAM (HARPER 1942, fig. 36; also EWAN 1968, pl. 53), although by giving it the name "little black & red speckled Snake" (EWAN 1968, p. 81) it is apparent he did not realize that it was the young of the chicken snake. This is an understandable error because, at that time, it was not known that color patterns change so drastically in this snake as it matures.

***Heterodon* sp.**
Hog-nosed Snake

Travels, p. 276 ("two or 3 varieties of vipers").

Although given only the above brief mention in the *Travels*, in his report to FOTHERGILL (vol. 2, p. 52), BARTRAM wrote about two types, a "yellow & brown spotted Viper" and the "black Viper". The latter is probably *H. platirhinos* since a black phase is known in that species, but the other reference could be either *H. platirhinos* or *H. simus*.

***?Lampropeltis triangulum elapsoides* (Holbrook, 1838)**
Scarlet Kingsnake

Travels, p. 275 ("ribband snake").

BARTRAM's description is certainly not applicable to the present-day ribbon snake of the region (*Thamnophis sauritus*). HARPER (1943, p. 222) and EWAN (1968, p. 24) suggested that BARTRAM's "ribband snake" was *Micrurus*, yet BARTRAM emphasized the very small head. Later, HARPER (1958, p. 629) suggested that it may be the scarlet kingsnake, which seems to be the best assignment. Unlike *Cemophora*, which has an unpatterned white belly, that of *Lampropeltis triangulum elapsoides* is banded, and BARTRAM remarked that the bands or rings were "wound round the creature's body".

***Masticophis flagellum* (Shaw, 1802)**
Coachwhip

Travels, pp. 7, 218–220 ("coach-whip snake").

BARTRAM gave a good description of this species in *Travels*, but in his FOTHERGILL report (vol. 2, p. 52) implied that the two color varieties he observed were separate species. HARPER (1958, p. 629) suggested that BARTRAM's "switch snakes" were also referrable to *Masticophis*, but the description is simply too deficient to be sure. BARTRAM drew a beautiful likeness of a juvenile of this species, reproduced by HARPER (1943, fig. 42; also EWAN 1968, pl. 29). It is perhaps the most accurate of all of his drawings of amphibians and reptiles.

***?Nerodia erythrogaster* (Forster, 1771)**
Plain-bellied Watersnake

Travels, p. 276 ("copper belly").

***Nerodia* sp.**
Watersnake

Travels, p. 276 ("water snake").

HARPER (1958, p. 629) suggested *N. fasciata* simply on the basis of probability. BARTRAM's "small species of the Mocazin" (FOTHERGILL report, vol. 2, p. 52) may also be a *Nerodia*. Two BARTRAM drawings include what I believe may be *Nerodia* (EWAN 1968, pls. 22 and 59), although it is suggested in EWAN's report that they may be *Cemophora*. The color patterns and food habits mentioned by BARTRAM seem more applicable to some species of *Nerodia*.

***Opheodrys aestivus* (Linnaeus, 1766)**
Rough Greensnake

Travels, p. 275 ("green snake").

Also listed in the FOTHERGILL report (vol. 2, p. 53).

***Pituophis melanoleucus* (Daudin, 1803)**
Pinesnake

Travels, p. 276 ("pine or bull snake", "horn snake").

As noted by HARPER (1958, p. 628), BARTRAM's "ash coloured snake" may also be referrable to this species. In the earlier report to FOTHERGILL (vol. 2, p. 53), BARTRAM noted this snake's loud hissing and the sounds produced by the tail vibrating in dry leaves (see below); here he gave an additional name, "The Thunderer".

***Sistrurus miliarius* (Linnaeus, 1766)**
Pygmy Rattlesnake

Travels, pp. 274–275 ("Bastard rattle snake", "ground rattle snake").

HARPER (1958, p. 609) noted that BARTRAM's description on p. 274 suggested a confusion of *Sistrurus* with the hog-nosed snake, *Heterodon*, as the upturned snout is applicable instead to the latter. The flattening of the body in *Sistrurus* was also mentioned in the report to FOTHERGILL (vol. 2, p. 51).

***Storeria dekayi* (Holbrook, 1836)**
DEKAY's Brownsnake

Not mentioned in *Travels*.

There is a BARTRAM drawing of this species, showing an individual halfway down the gullet of a juvenile *Coluber* (EWAN 1968, pl. 58).

***?Thamnophis* sp.**
Gartersnake

Travels, p. 276 ("garter snake").

HARPER (1958, p. 628) referred BARTRAM's garter snake to *Micrurus*, apparently on the basis of HALTER's (1923) comment that, in Florida, coral snakes are commonly referred to as "garter snakes". Since it is thought that BARTRAM's name "ribband snake" refers to *Lampropeltis* (see above), his name "garter snake" presumably referred to some member of the genus *Thamnophis* which I believe is more likely the case than HARPER's referral to *Micrurus*. It would be difficult to imagine that BARTRAM did not encounter a specimen of *Thamnophis* on such an extensive journey.

Turtles

?*Caretta caretta* (Linnaeus, 1758)
Loggerhead Seaturtle

?*Eretmochelys imbricata* (Linnaeus, 1766)
Hawksbill Seaturtle

?*Lepidochelys kempii* (Garman, 1880)
Kemp's Ridley Seaturtle

Not specifically mentioned in *Travels*.

In the report to FOTHERGILL (vol. 2, p. 51), BARTRAM notes ". . . several Species of Sea Turtle" in addition to the green turtle (see below). Doubtless he was familiar with one or more of the species listed above or, though less likely, with the Leatherback Seaturtle, *Dermochelys coriacea*.

***Chelonia mydas* (Linnaeus, 1758)**
Green Seaturtle

Not mentioned in *Travels*.

Referred to in the FOTHERGILL report (vol. 2, p. 51) as "green turtle".

***Pseudemys concinna floridana* (Le Conte, 1830)**
Coastal Plain Cooter

Travels, p. 281 ("[large] fresh-water tortoises").

BARTRAM's description of a turtle of large size with a high-domed carapace seems to apply best to this species, although there are also other large freshwater turtles in the area surveyed by BARTRAM (*Pseudemys c. concinna*, *P. nelsoni*, and, less likely, *Trachemys scripta*).

***Pseudemys nelsoni* (Carr, 1938)**
Florida Red-bellied Cooter

Not specifically mentioned in *Travels*.

Noted in BARTRAM's report to Dr. FOTHERGILL (vol. 2, p. 51) as "Redbellied Turapin".

?*Pseudemys* sp.
Cooter

?*Deirochelys reticularia* (Latreille *in* SONNINI & LATREILLE, 1801)
Chicken Turtle

Travels, p. 281 ("[small] fresh-water tortoises".)

Although HARPER (1958, p. 647) referred this BARTRAM name to *Deirochelys*, it seems equally likely that it may refer to one or more species of *Pseudemys*.

***Clemmys guttata* (Schneider, 1792)**
Spotted Turtle

Not mentioned in *Travels*.

BARTRAM did not list this species in his report to FOTHERGILL, but he made a beautiful drawing for FOTHERGILL (EWAN 1968, pl. 58). COLLINSON (1758b) published an earlier drawing of this species by BARTRAM (Fig. 5).

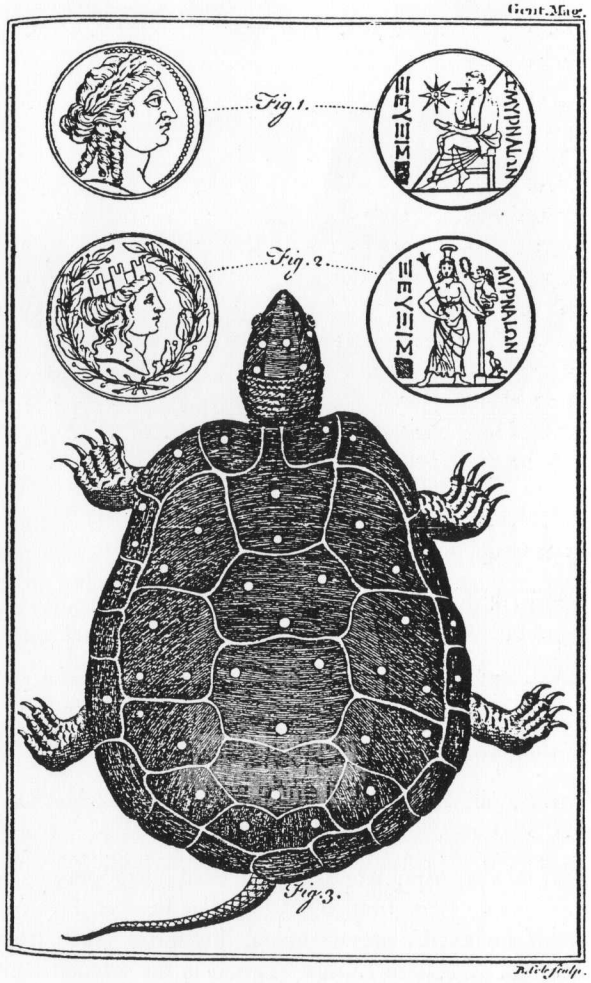


Fig. 5: Spotted Turtle, *Clemmys guttata*. The original from which this drawing was engraved was drawn by BARTRAM when he was probably 18 or 19 years old. (From COLLINSON 1758b.)

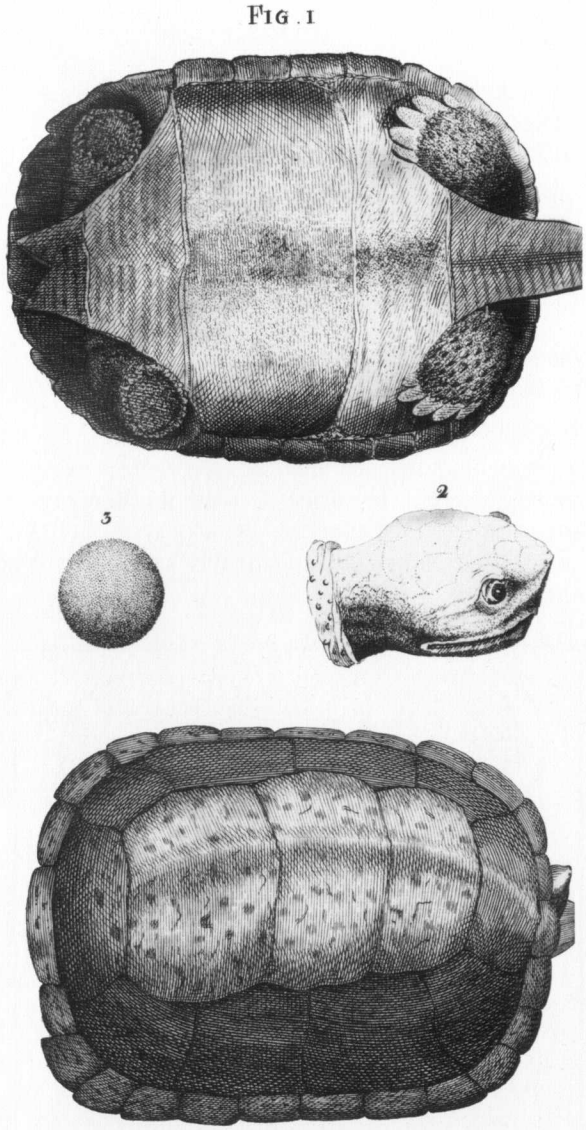


Fig. 6: Gopher Tortoise, *Gopherus polyphemus*. Two "extra" engraved plates inserted into the copy of BARTRAM's *Travels* (Philadelphia, 1791) in the collection of Cornell University Library (Rare Book Collection). The missing part of the gulars is due to unfortunate cropping of the Cornell copy.

Gopherus polyphemus (Daudin, 1802)
Gopher Tortoise

Travels, pp. 18, 182–183 ("Great land-tortoise", "Gopher", "*Testudo Polyphaemus*")

DAUDIN's description and, indeed, even his proposed scientific name came from BARTRAM (see below). Two excellent engraved plates depicting this turtle, taken from drawings by BARTRAM, are inserted in the Cornell University copy of *Travels* (Philadelphia, 1791 edition) but these seem to be lacking in all other copies known to me. These plates were apparently bound into the book at the same time with the others, as indicated by my examination of the binding and the offsetting on adjacent pages and plates. Copies of both engravings are also present in the B. S. BARTON collection in the American Philosophical Society Library, although these have lines at the bottom ("W. Bartram Delin. T[=F?]renchard Sculp".) which are absent on the Cornell copies. These two plates are reproduced here (Fig. 6) and also in ADLER (1978).

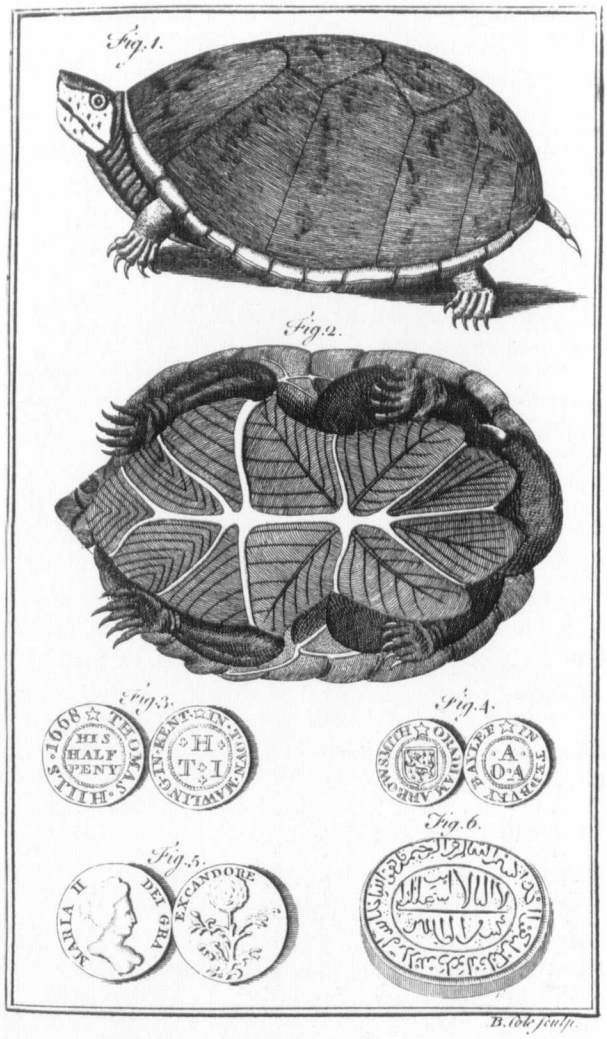


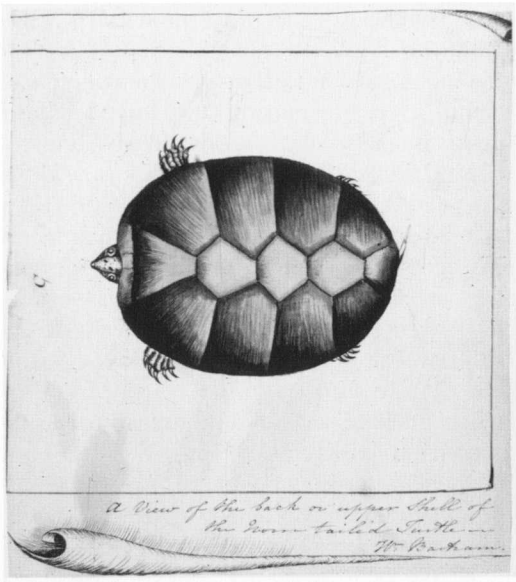
Fig. 7: Mud Turtle, *Kinosternon subrubrum*. Compare to original BARTRAM drawings in Figures 8–10. (From COLLINSON 1758a.)

?Kinosternon sp.
American Mud Turtle

?Sternotherus sp.
Musk Turtle

Not listed in *Travels*.

Mentioned by BARTRAM in the FOTHERGILL report (vol. 2, p. 51) as "the little muskey Tortoise", which could refer to one or more species in these two genera. These turtles are all noted for the musky secretion which they



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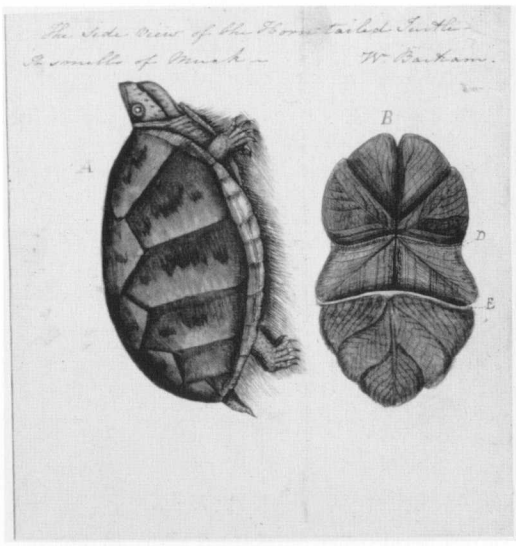

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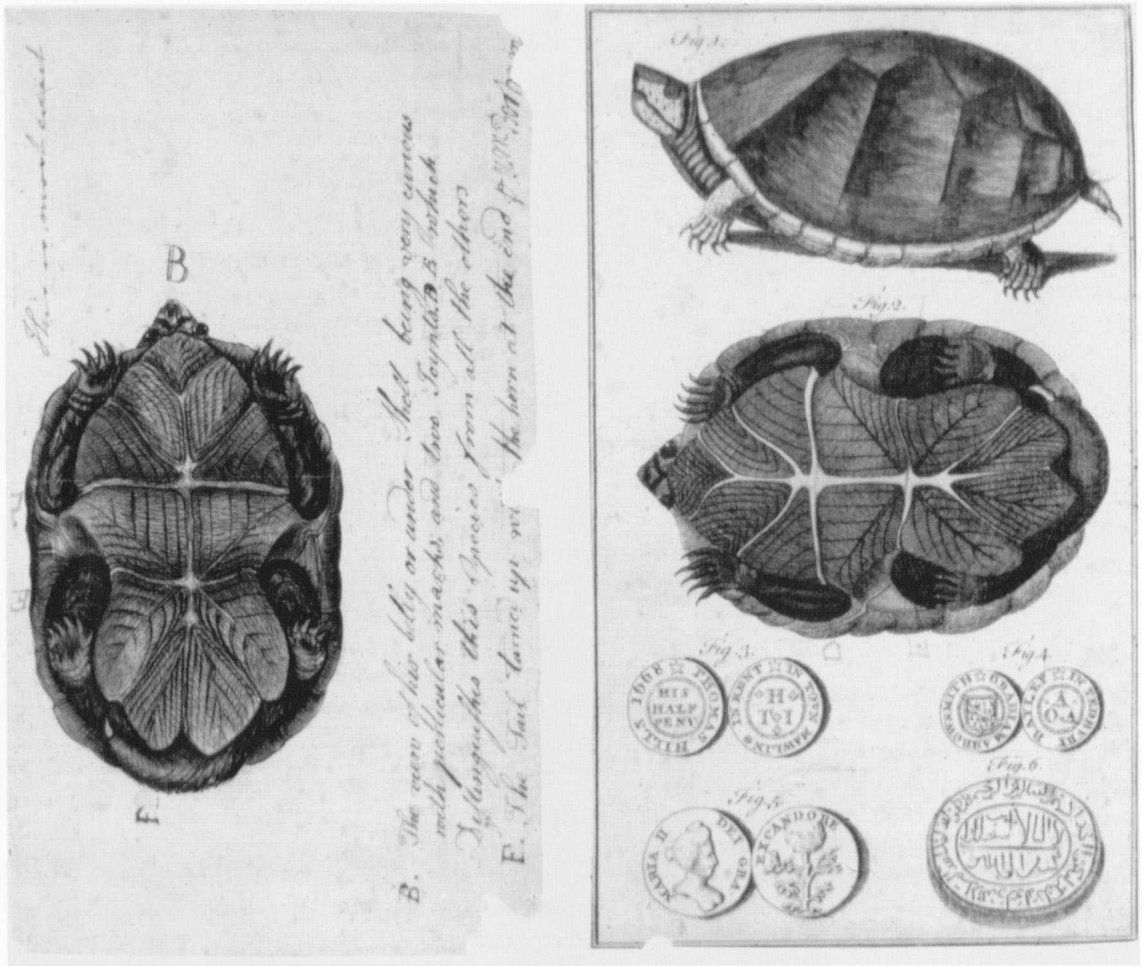

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Figs. 8–10: Mud Turtle, *Kinosternon subrubrum*. The drawings in Fig. 8–9 are rather lifeless, but that in Fig. 10 (left) is quite good; BARTRAM wrote "This is most exact" at the top). These provided the basis for the engraving published by COLLINSON (1758a); see Fig. 7. However, a comparison of the originals to the published version shows that BARTRAM's watercolors were more accurate; note the correct inclusion of webbing between toes on the forefoot in Fig. 9, lacking in both the published version (Fig. 7) and in a curiously nearly-identical copy of the published plate, also in Lord DERBY's collection (Fig. 10, right). That these two copies of the published plate are different is indicated by the positioning of the animal's hind feet in the plastral view, as well as the lettering on some of the coins at the bottom of the plate. (Lord DERBY's collection, BARTRAM nos. 122, 123, and 126, respectively).

often exude on capture. COLLINSON (1758a) published two of BARTRAM's earlier drawings of *Kinosternon* (Fig. 7); the originals of these BARTRAM drawings exist in the collection of Lord DERBY and are reproduced here (Figs. 8–10).

***Terrapene carolina* (Linnaeus, 1758)**
Eastern Box Turtle

Travels, p. 281 ("small land tortoise").

Also listed in the report to FOTHERGILL (vol. 2, p. 51) as "Little land Turapin".

***Apalone ferox* (Schneider, 1783)**
Florida Softshell

Travels, pp. 177–179 ("Great soft shelled tortoise", "*Testudo naso cylindracea elongato, truncato*").

BARTRAM gave a good description of this turtle's habits and anatomy in his *Travels*, including two engraved plates. This distinctive animal was also noted in the FOTHERGILL report (vol. 2, p. 51) and illustrated by BARTRAM in the FOTHERGILL album (EWAN 1968, pls. 24 and 55; the first of these plates was also reproduced in HARPER 1943, fig. 40).

3. ACCURACY OF BARTRAM'S OBSERVATIONS ON AMPHIBIANS AND REPTILES

Considering the dearth of reliable scientific information then available, the observations BARTRAM made during his travels in 1773–1777 are surprisingly good. Up to that time, about half of the animals seen by BARTRAM were largely unknown even to European naturalists, except for a handful of common species minimally described by LINNAEUS only a few years earlier. There was then only one illustrated book covering the fauna and flora of the Southeast, Mark CATESBY's *Natural History of Carolina, Florida and the Bahama Islands*, which had been published in London during the years 1731–1747. CATESBY included only about 30 species of amphibians and reptiles in his classic atlas and it seems clear that BARTRAM was familiar with CATESBY's work, using some of the same species common names in his *Travels* and, moreover, seeming to attempt to complement CATESBY's already-existing drawings with his own watercolors sent to Dr. FOTHERGILL (EWAN 1968, p. 22). So there was very little of a published nature to assist BARTRAM in determining the identities of the forms he encountered, and he was, thus, very much on his own, although doubtless his earlier experience in North Carolina, and especially his expedition to East Florida with his father in 1765–1767, served to introduce him to the fauna and flora of the Southeast.

Despite these handicaps, BARTRAM produced a relatively complete catalogue of the amphibians and reptiles of the region he visited – at least most of the widespread species – and, even by modern standards, provided credible observations on their habits. Indeed, the reprinting of BARTRAM's herpetological notes (*in* ADLER 1978) testifies to their continuing interest and value. To his credit, he did not perpetuate some of the commonest superstitions about snakes, lizards, and toads. He dismissed as a "vulgar fable" the notion that glass lizards can rejoin after being broken into several pieces (*Travels*, p. 196). However, he did (p. 267) repeat the notion that snakes fascinate their prey, but did not claim to have witnessed such an act himself. Actually, the so-called "hypnotizing" ability of certain snakes has been reexamined by behaviorists who think it may be an example of predatory mimicry whereby a snake enhances its attractiveness to the prey and thus lures them within striking range (GOODMAN & GOODMAN 1976). BARTRAM provided especially accurate observations on the habits and appearance of the softshell turtle, the gopher tortoise, and several species of frogs and snakes, especially the pinesnake and coachwhip. He correctly separated the cottonmouth from the non-venomous watersnakes, a distinction not often made by the early naturalists. Furthermore, he had the insight to emphasize vocalizations and was able to distinguish a large proportion of the frog and toad species (no doubt his earlier interest in birds served to point up the usefulness of such calls in species' recognition).

BARTRAM made a number of original and quite accurate observations of snake behavior, as noted in the species accounts above. He observed and illustrated the ophiophagus eating habits of *Coluber constrictor*, noted the sounds produced by the tail of *Pituophis melanoleucus* when it is vibrated in dry leaves, and remarked on the puffing up of *Heterodon* and body flattening behavior in *Sistrurus* when they are disturbed. Surprising as it seems to be, BARTRAM was apparently the first person to describe hissing in print, a phenomenon that is known in at least five families of snakes. He remarked in *Travels* that *Pituophis melanoleucus* had "a terrible hiss, resembling distant thunder" that can be heard from as far away as 150 feet.

BARTRAM also made some errors in identification and interpretation. He gave contradictory information about the common myth that snakes can attain great speed of movement (pp. 219–220, 264). He sometimes confused two separate species as one (as in the rattlesnakes, *Crotalus*) or thought that more than one species was represented when in fact he had observed only color varieties of the same species (as with toads, coachwhips, and probably also with hognosed snakes). In other instances, he got the characteristics of several species rather hopelessly confused (racerunner and probably several spe-

cies of skinks; pygmy rattlesnake, hognosed snake, and probably the cottonmouth), apparently because he was unaware of certain ontogenetic color changes or the existence of melanistic color phases, respectively. He also failed to note that the young of certain snakes (ratsnake, for instance) are patterned differently from the adults. But all of these mistakes are understandable in view of contemporary knowledge and given the fact that BARTRAM was obliged to travel, thus not permitting him to undertake lengthy, detailed studies at a given site.

BARTRAM's description of the softshell turtle, although generally good, included some information that is probably exaggerated. He cited (p. 176) a shell length of up to 30 inches, yet CONANT & COLLINS (1998, p. 199) record the largest *Apalone ferox* at not quite 25 inches. Also, the presence or absence of tubercles or warts on the chin varies greatly in BARTRAM's several drawings of softshells. In general, the earlier drawings (i.e., those drafted for FOTHERGILL during 1773–74) are more accurate than those published years later in the *Travels*. Is it possible that BARTRAM drew those later ones largely from memory after having sent the original drawings to FOTHERGILL nearly 20 years earlier? However, in *Travels*, BARTRAM correctly illustrated the softshell as having five claws on both the fore- and hindlimbs, yet in the FOTHERGILL album (HARPER 1943, fig. 40, also EWAN 1968, p. 24) he showed four claws on the forelimbs and five on the hind.

Finally, we come to BARTRAM's most controversial claims, those concerning the alligator. Unquestionably, BARTRAM was sometimes wrong in his statements but so, too, are some of his severest critics, including NEILL (1971, pp. 18–27, 35, 54–55, and 257–258). A few of the most criticized misstatements were, I believe, the result of over-zealous writing to which was added some poetic license. This does not excuse BARTRAM's lack of objectivity, but it does help us to understand when we remember that he was also considered a man of literature. Certainly his comments about "clouds of smoke" pouring forth from the nostrils falls into this category. That this is simple hyperbole is obvious from BARTRAM's words 12 pages later, when he says ". . . vapour ascending from his nostrils *like* smoke" (emphasis added). When alligators bellow, smoke-like water vapor can be expelled from the nostrils. BARTRAM's comment that the earth trembled with the alligator's "thunder" is another example, but it is known that the ground can vibrate at considerable distances from a vocalizing alligator due to the pressure waves of their low-frequency calls. So too we might also include those observations that seem merely to be exaggerations – records of BARTRAM's being attacked on all sides and, perhaps, his claim of having personally seen a 20-foot specimen (although CONANT & COLLINS 1998, p. 143, record a maximum length of more than 19 feet and one can presume that large alligators were more common in BARTRAM's day before intensive hunting began). HARPER's (1930) evaluation of BARTRAM's account of the alligator is surely too generous and uncritical.

The more serious claims and counterclaims concern the alligator's nesting habits and their parental behavior. NEILL (1971, p. 18) correctly noted that BARTRAM's observations on the nest are wrong, as MCILHENNY (1935) long ago discovered in his own research on the alligator. The eggs are not laid in mud-and-grass-separated tiers, nor are the eggs nearly so numerous as BARTRAM thought. In *Travels* (p. 127), BARTRAM said that the eggs numbered from 100–200 per nest, yet in his report to Dr. FOTHERGILL (vol. 1, p. 93) this number was increased to 200–300. The largest egg complement noted by MCILHENNY was 88. As NEILL pointed out, BARTRAM apparently transferred some of the legends about nestbuilding in the Nile crocodile to the alligator. Given BARTRAM's fear of the alligator, I suggest that he, in fact, never excavated a nest (which is usually closely guarded by a sometimes belligerent female) and simply guessed. How else can we explain so great an error, both qualitative and quantitative, in an otherwise fairly careful observer?

J. Whitfield GIBBONS (Aiken, pers. comm. 2003) suggests some alternative explanations. Some turtles (*Sternotherus, Pseudemys nelsoni*) lay eggs in alligator nests and, moreover, female alligators sometimes reuse nests which can have old egg shells accumulated around them. Either or both of these phenomena could have resulted in a higher egg count. Moreover, GIBBONS suggests, if alligators did live longer and got larger two centuries ago, the largest females may have laid more eggs than are recorded today.

Parental behavior, however, is highly developed in crocodilians, including the alligator (see MCILHENNY 1935, and the references included in the reprint edition, 1976). The mother alligator does assist the emerging young from the nest, and the hatchlings are cared for by her for several months thereafter. It has even been observed in many species of crocodilians that one of the parents transports the hatchlings in their mouth from their nest to water; in the alligator, this is a maternal behavior. In short, as noted by LANG (1976), "complex and prolonged parental care of the young may well prove to be a universal trait among crocodilians". Consider some of BARTRAM's observations on alligator social behavior: "The monster . . . passed close by the side of my boat, when I could distinctly see a young brood of alligators to the number of 100 or more, following after her in a long train. They kept close together in a column without straggling off to the one side or the other". Two pages later, he goes on: ". . . the young are not left to shift for themselves, . . . the female alligator, leading about the

about the shore her train of young ones, just like a hen does her brood of chickens, and she is equally assiduous and courageous in defending the young, which are under her care. . . With her brood around her, you may hear the young ones continually whining and barking, like young puppies". BARTRAM's observations on parental behavior, made more than two hundred years ago, apparently represent the first *published* record of a sophisticated behavior that is only now being accepted as fact. BÖHME & NICKEL (2000), however, note that the earliest human documentation of parental behavior in crocodilians (and reptiles) are the rock engravings of a mother and juvenile crocodile from Wadi Mathendus in Libya, made by Neolithic inhabitants more than 10,000 years ago. BARTRAM's labors here are, thus, mostly vindicated.

4. AMPHIBIANS AND REPTILES DESCRIBED BY BARTRAM

BARTRAM made uneven attempts to officially describe and name a few reptiles. In his *Travels*, he suggested the binomial name *Testudo Polyphaemus* for the gopher tortoise (p. 18, footnote). He provided a non-binomial name to the softshell turtle, *Testudo naso cylindracea elongato, truncato* (p. 177, footnote). Here as elsewhere in his book, BARTRAM was not uniformly binomial in his application of scientific names in *Travels*, and zoologists have historically declined, therefore, to use any of his names, even though the first of these names satisfies that requirement. COUES (1875) made an empassioned plea on BARTRAM's behalf, noting that he was "systematically binomial on principle, with occasional lapses", but the question of acceptance has been definitively settled by a ruling of the International Commission on Zoological Nomenclature (HEMMING 1957). The Commission has rejected, for nomenclatural purposes, all English-language editions of BARTRAM's *Travels* (*Official Index of Rejected and Invalid Works in Zoological Nomenclature,* 1958, titles 52–54) and, by implication, all translations as well. Neither MEYER (1793) nor WINTERBOTHAM (1796), both of whom extracted from BARTRAM in their own writings, provided valid scientific names which could be construed to give BARTRAM authorship for any of the many new species he first discovered. So dictate the strict rules of taxonomy.

Tab. 2: New Herpetological Taxa Based on BARTRAM's Descriptions.
Bionomial names were introduced by J. G. SCHNEIDER (1799), F.-M. DAUDIN (1801–1803), and C. S. RAFINESQUE (1832). Although DAUDIN (1801) mentions BARTRAM's discussion of the alligator in his description of *Alligator mississippiensis*, DAUDIN's holotype was provided by the French botanist MICHAUX who collected it along the Mississippi River. DAUDIN (1802) also described *Rana grunniens* and incorrectly included BARTRAM's description of a frog called "La plus grande grenouille" in the French edition of BARTRAM's book. DAUDIN's animal is a valid species native to Indonesia, whereas BARTRAM's frog, which he called "the largest frog known in Florida and on the sea coast of Carolina", is now known as *Rana grylio* STEJNEGER, 1901.

Bartram's name	Binomial name (Author, date: page)	Current scientific name (Author, date) Common name
"Red toad" (in the German edition, "Kröten . . . rothe")	*Bufo Rufus** (Schneider, 1799: 267)	*Bufo terrestris* (Bonnaterre, 1789) Southern Toad
Testudo Polyphaemus "Great land-tortoise"	*Testudo polyphemus* (Daudin, 1801: 2: 256)	*Gopherus polyphemus* (Daudin, 1801) Gopher Tortoise
Testudo naso cylindracea elongato, truncato "Great soft shelled tortoise"	*Testudo Bartrami* (Daudin, 1802: 2: 74)	*Apalone ferox* (Schneider, 1783) Florida Softshell
"Pine or bull snake"	*Coluber melanoleucus* (Daudin, 1803: 6: 409)	*Pituophis melanoleucus* (Daudin, 1803) Eastern Pine Snake
Testudo naso cylindracea elongato, truncato "Great soft shelled tortoise"	*Mesodeca bartrami* (Rafinesque, 1832: 65)	*Apalone ferox* (Schneider, 1783) Florida Softshell

* Not equivalent to *Bufo rufus* (Garman, 1877), a valid species native to southern South America. Even though the GARMAN name is a primary junior homonym of SCHNEIDER's name, it is the species name used today (FROST 1985).

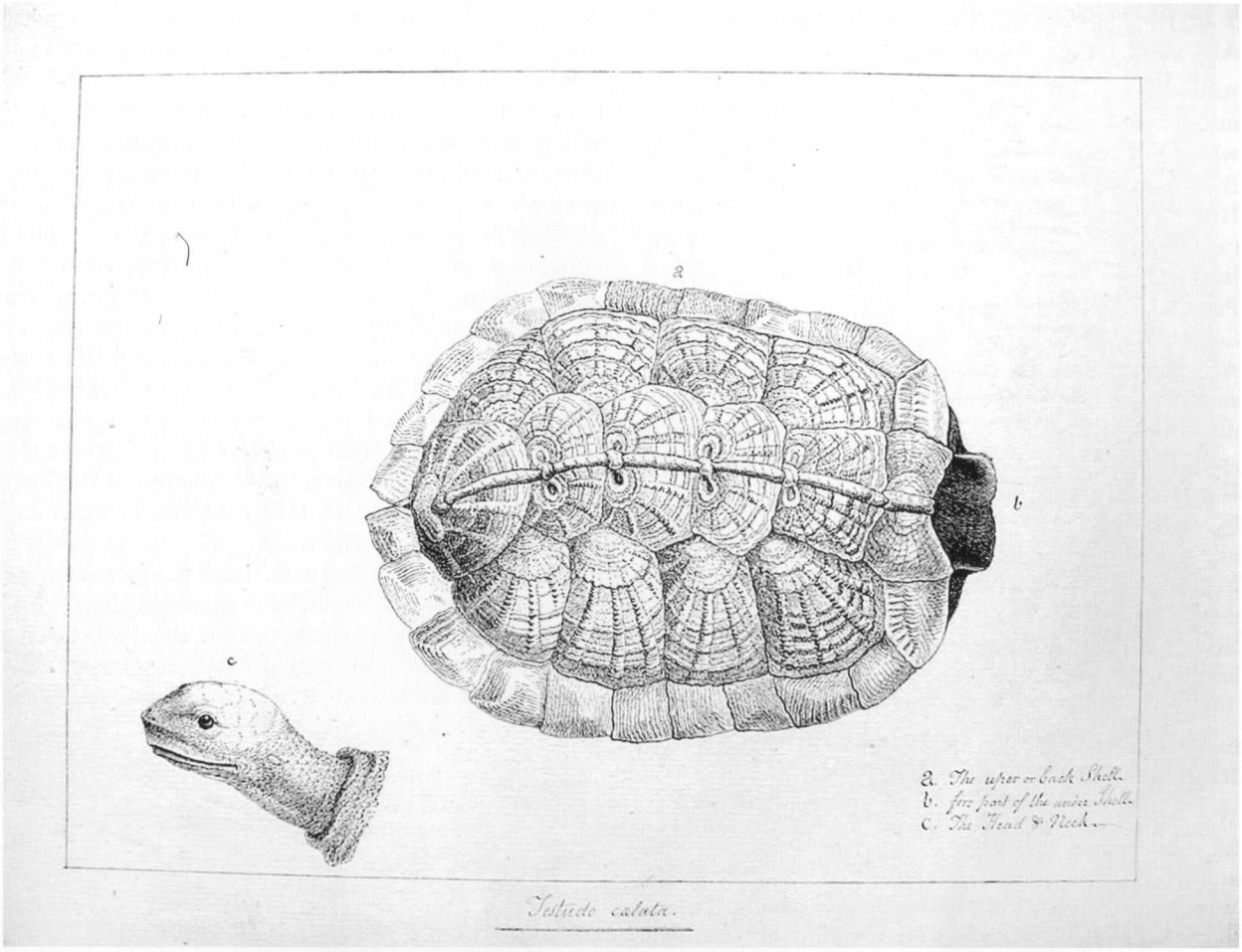


Fig. 11: Wood Turtle, *Clemmys insculpta*. BARTRAM's given name, "*Testudo caelata*", seems never to have been published. The original painting is uncolored. (American Philosophical Society, B. S. BARTON collection [B:B284d]).

Nevertheless, the French naturalist François-Marie DAUDIN based his descriptions of two turtles and a snake on BARTRAM's notes published in one of the French editions (1799 or 1801) of *Travels*. These species are as follows: *Testudo Bartrami* Daudin, 1801 [=*Apalone ferox* (Schneider, 1783)]; *Testudo polyphemus* Daudin, 1801 [=*Gopherus polyphemus* (Daudin, 1801)]; and *Coluber melanoleucus* Daudin, 1803 [=*Pituophis melanoleucus* (Daudin, 1803)] (see Table 2). HARPER (1940) provided further details. In addition, an earlier German naturalist, J. G. SCHNEIDER, based his name *Bufo rufus* (=*Bufo terrestris* [Bonnaterre, 1789]) on a description of the red-colored variety of a toad, as given in the 1793 German edition of BARTRAM's book. RAFINESQUE (1832) based his description of a new turtle, *Mesodeca bartrami* (=*Apalone ferox* [Schneider, 1783]), on a description in BARTRAM. Strictly speaking, no credit need be given to BARTRAM in the formal names for any of these species, yet I suggest that herpetologists might follow a solution taken by the American Ornithologists' Union (1957) to restore proper recognition to BARTRAM for several bird names. tion to BARTRAM for several bird names. Following the technical name *Vultur atratus* (Bechstein, 1793), a line has been added: "Based on *Vultur atratus*, the black vulture or carrion crow of Bartram, *Travels*, p. 289". I think this format would be a fitting way to record the fact that these herpetological descriptions also originated with BARTRAM.

There is one other herpetological name that originated with BARTRAM, although I can find no evidence that it was ever published. There is a fine BARTRAM drawing of a turtle in the B. S. BARTON collection, American Philosophical Society, labelled "*Testudo caelata*" (Fig. 11). This depicts the shell and, separately, the head of a turtle now known as *Clemmys insculpta* (Le Conte, 1830); notes on the verso give the locality as Philadelphia. What leads me to think that this name might have been published in some obscure and as-yet unlocated place is the use of the name (twice) in a letter from Henry MUHLENBERG to William BARTRAM, dated 1792 (DARLINGTON 1849, p. 474).

5. BARTRAM'S SPECIMENS OF AMPHIBIANS AND REPTILES

Although inquiries to the likely museums have been made, no herpetological specimens have been located which originated from William or, for that matter, John BARTRAM. The collections checked include the Natural History Museum in London, the Liverpool Museum (which received the Earl of DERBY's natural history collections), the Muséum National d'Histoire Naturelle in Paris, and in Philadelphia, the American Philosophical Society, the Historical Society of Pennsylvania, and Academy of Natural Sciences. In BARTRAM's day, there simply were no public museums, and what materials he did supply were sent to private collectors and correspondents for their gardens or specimen cabinets. In the BARTRAM correspondence, happily saved from oblivion by DARLINGTON (1849), there are numerous remarks about specimens of turtles and frogs and possibly other herpetological items being sent to English correspondents (Peter COLLINSON, John FOTHERGILL, and George EDWARDS), yet none of these specimens has been located, if they survive at all.

6. AMPHIBIANS AND REPTILES ILLUSTRATED BY BARTRAM

William BARTRAM's drawings were not the first of reptiles and amphibians from North America. Two other artist-naturalists preceded him. In 1585–1587, John WHITE accompanied Sir Walter RALEIGH on a visit to the West Indies and to the ill-fated Roanoke Colony along the coast of Virginia. White was a keen observer and an accomplished artist, but his herpetological watercolors (three turtles, one snake, one lizard) were presumably unknown to BARTRAM and, indeed, they remained unpublished until the 20th century (HULTON & QUINN 1964). Mark CATESBY spent the years 1712–1719 in eastern Virginia, and, during his second visit to America in 1722–1726, he accumulated the sketches and observations that were to comprise his classic *Natural History of Carolina, Florida and the Bahama Islands*, published over the period 1731–1747. As noted earlier, William BARTRAM was familiar with CATESBY's atlas and, in his own work, even attempted to supplement what CATESBY had already illustrated.

With the guidance of his father, William BARTRAM made his first drawing (a bird) at the age of 14 (EWAN 1968, p. 34); later he preferred to sketch plants, but, at least by 1756, he also drew some turtles. "Terrapins", as the English call freshwater turtles, became a primary object of William's artistry, largely because John BARTRAM's English patron, Peter COLLINSON, had a special interest in them. COLLINSON had earlier asked John to send him live turtles, the first such request of record being in 1735 (DARLINGTON 1849, p. 70). John obliged by sending live turtles and their eggs, which COLLINSON placed in his private garden. COLLINSON's interest in turtles continued to occupy a prominent place in his regular correspondence with John (DARLINGTON 1849), thus it was only natural that he asked to have "Billy" draw some for him. Apparently William's first drawings were sent to COLLINSON in 1753 (DARLINGTON 1849, p. 193), although there is no information about the kind of subjects drawn. In 1755, John proposed to have William, now age 16, draw all the local Philadelphia turtles, and also some frogs and lizards, a proposition which COLLINSON accepted. On one occasion, in 1756, COLLINSON asked to have one turtle redrawn: ". . . I wish he would paint the Pond Turtle [painted turtle, *Chrysemys picta*] over again. It is the most indifferently performed; the shell is made almost white, – whereas it is black" (DARLINGTON 1849, p. 205). This drawing still exists, in the collection of Lord DERBY (Fig. 12); COLLINSON was quite correct about its inaccuracies. But, in the same letter, COLLINSON gave the helpful advice to also include drawings of the plastron, "for there is always something remarkable there". This long-distance tutelage by COLLINSON increased BARTRAM's clarity of observation and perhaps also his abilities to discriminate species.

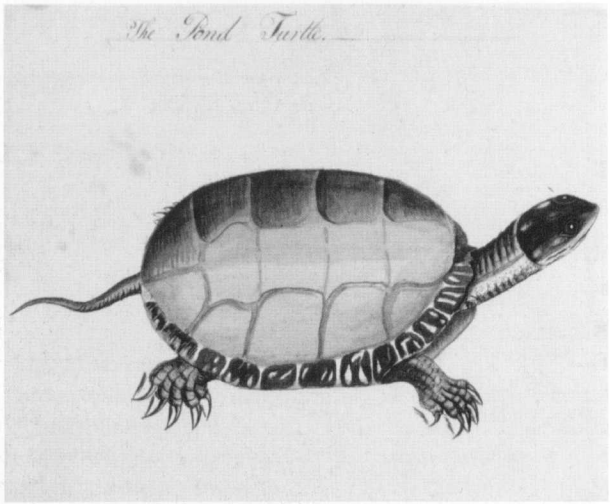


Fig. 12: Painted Turtle, *Chrysemys picta*. Probably drawn about 1756 (see text). (Lord DERBY's collection, BARTRAM no. 125.)

COLLINSON published three of William's turtle drawings in *Gentleman's Magazine* (COLLINSON 1758a, 1758b). COLLINSON gave each species a technical name, but neither was binomial, and, therefore, they have not been adopted. The first he called *Testudo Pennsylvanica cauda cornu armata*, and represents the mud turtle (*Kinosternon subrubrum*, officially described by LACEPÈDE in 1788). By the standards of the day, these drawings (Fig. 7) are excellent, clearly showing the main diagnostic features of this species. The overall shape of the shell

and of the various plates is quite accurate, and the relative proportions of the head, limbs, and tail are correct. However, the shape of the animal's head is not accurate and, particularly, the sculpturing of the ventral scutes is too stylized. A comparison of the published version with the original watercolors drawn by BARTRAM, however, shows that, although BARTRAM's originals were sometimes rather simply drawn, most of the inaccuracies were introduced by the artist who copied BARTRAM's figures in order to engrave them for publication in *Gentleman's Magazine* (see Figs. 8–10).

George EDWARDS, the contemporary English artist-naturalist, promptly criticized BARTRAM's published mud turtle drawings as ". . . a very incorrect figure" (EDWARDS 1760, p. 165) and then proceeded to illustrate the same kind of turtle even more incorrectly. EDWARDS's specimen came from BARTRAM, via COLLINSON, but was dead and, apparently, badly dried when EDWARDS first laid eyes on it, perhaps accounting for the improper inclusion of two additional rows of tiny marginal scutes. In my opinion, BARTRAM's original drawings are closer to the mark than are EDWARDS's, the originals of which are also present in Lord DERBY's collection. EDWARDS was a correspondent of William who sent him birds, snakes, and other natural history objects. In addition to the mud turtle, EDWARDS illustrated a snake ("Little Black and Red Snake", which I identify as *Storeria occipitomaculata*) sent to him alive by William about 1759.

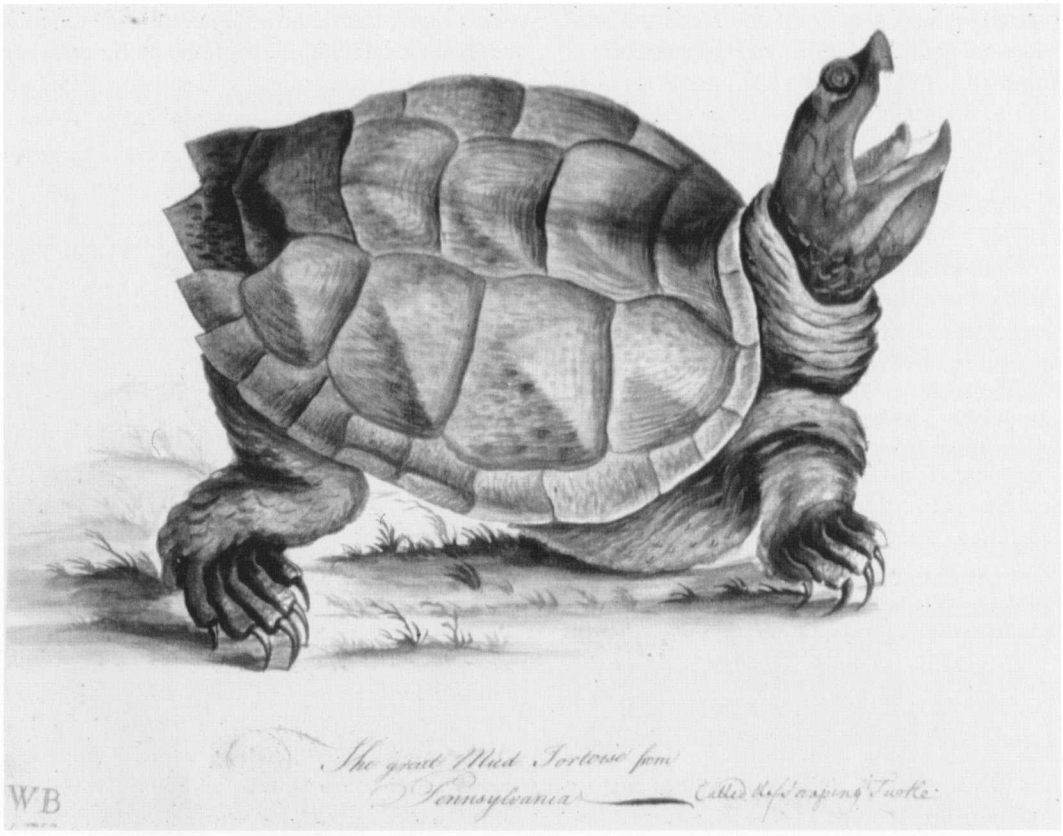
The other turtle drawing published by COLLINSON is that of the spotted turtle (*Clemmys guttata*), which COLLINSON called the "golden studded tortoise of Pennsylvania, or *Testudo Pensylvanica* [sic], *clavis aureis ornata*". The drawing (Fig. 5) is also excellent, although the number of marginal scutes is a little too low and the nuchal scute is depicted incorrectly as being fused with the first vertebral scute, although abnormalities of this sort are not unknown in turtles. Unfortunately, BARTRAM's original drawing of this turtle has not been located and a comparison to the published version cannot be made, although BARTRAM correctly illustrated these features of this species in the figure prepared for Dr. FOTHERGILL (EWAN 1968, plate 58). Otherwise, this first published drawing of the spotted turtle is quite accurate, being superior to many of those of the same species published by others years later.

The only other BARTRAM reptile drawings published during his lifetime are those of turtles included in his *Travels* (1791). Two of them are of softshells (*Apalone ferox*) and, as mentioned earlier in the systematic section, include some inaccuracies. These bizarre turtles were unknown to CATESBY and the first illustrations of an American species were apparently those given by PENNANT (1771). Thus, BARTRAM may not have known of this kind of turtle prior to his travels in the Southeast, and, if so, his drawings are all the more remarkable.

In addition to the two plates of *Apalone* included in copies of BARTRAM's *Travels*, there exist in the Cornell University Library copy two additional turtle plates, of the gopher tortoise (*Gopherus polyphemus*), as noted earlier. These renderings (Fig. 6) are generally excellent, showing the elephantine hind feet and the flattened claws on the forelegs, characteristic of this species, but the drawing of the head is somewhat crude and the nose is too pointed. The scutes on the carapace do not exhibit the conspicuous growth rings typically found in these tortoises, although the shell is that of an adult male (note the elongate gular buttress) and these rings are often worn down in old adults. Why BARTRAM (or his publishers) chose to omit these plates from most copies of his *Travels* is not known. Ironically, these are more accurately drawn than are those of the softshell turtle which have resulted in so much criticism.

The only other BARTRAM drawings that have been published are those included in the FOTHERGILL album (published by HARPER 1943 and EWAN 1968). Eleven of these drawings include herpetological subjects. The snake drawings are generally good, with special attention given to color patterns, although scutellation is sometimes sketchy. Clearly, BARTRAM's best drawing of a serpent is that of a young coachwhip (EWAN 1968, plate 29), the artistry and accuracy of which being quite the equal of the fine illustrations commissioned by HOLBROOK in the 1830s. BARTRAM's frogs, on the other hand, are generally a sorry lot, but the subtle contours of these scaleless animals present a special challenge to artists even today (ADLER 2000). The alligator drawings in the FOTHERGILL collection are really poor, despite their notoriety, and none of them is as accurate as a heretofore unpublished drawing by BARTRAM (Fig. 3). The FOTHERGILL illustrations do not properly portray the alligator's body proportions, nor do they show the teeth, plated skin, or feet as they truly are.

The remainder of BARTRAM's drawings of reptiles and amphibians is unpublished. Several are present in the collection of the Earl of DERBY and are included with this report (Figs. 13–15). Those of the snapping turtle are both excellent, but the two figures of the pond slider are rather simple and lacking in detail. The American Philosophical Society possesses three other unpublished drawings containing herpetological subjects. One of these is of an alligator (Fig. 3) and is an excellent likeness, better in fact than any of the others by BARTRAM previously published. The body proportions are good and the details of the head, feet, and skin are excellent, although the scutes on the animal's back appear to be somewhat stylized. A second drawing is of the wood turtle (*Clemmys insculpta*) which BARTRAM named "*Testudo caelata*". The highly sculptured shell, charac-



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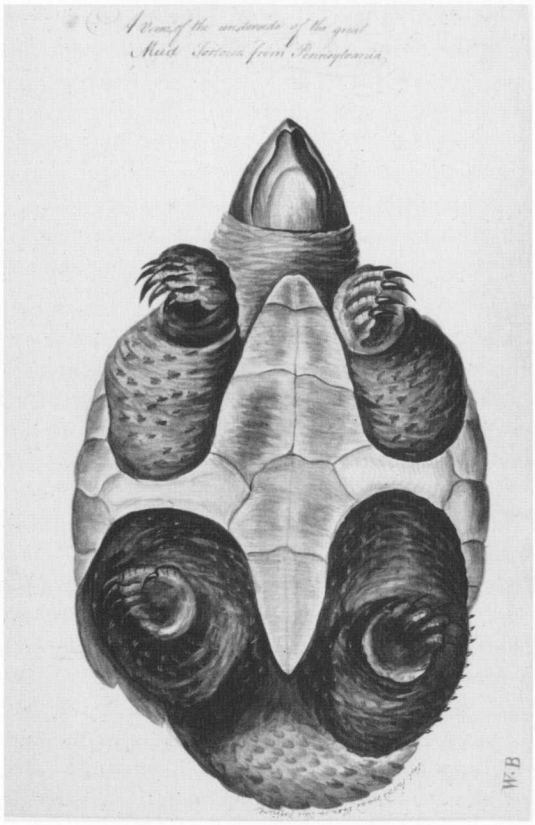
Figs. 13–14: Snapping Turtle, *Chelydra serpentina*. (Lord DERBY's collection, BARTRAM nos. 117 and 119, respectively.)



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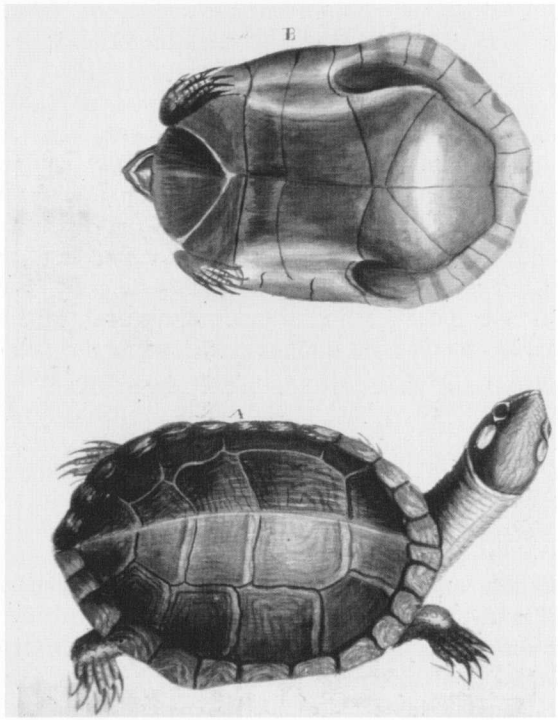

Fig. 15: Pond Slider, *Trachemys scripta*? As the drawings are rather plain and lacking in detail, the identification is provisional. (Lord DERBY's collection, BARTRAM no. 124.)

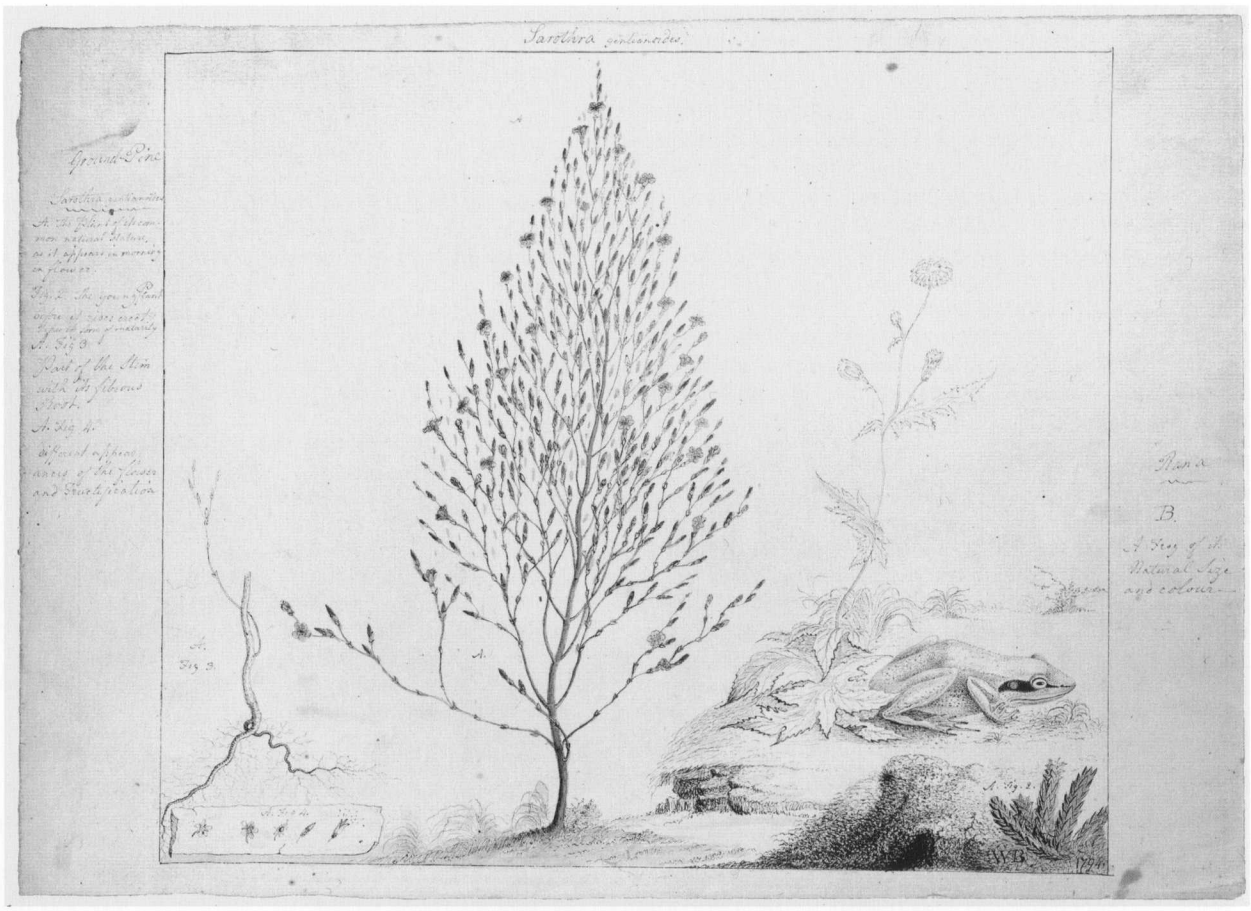

Fig. 16: Wood Frog, *Rana sylvatica*. The drawing is dated 1794, thus representing BARTRAM's artistry in its maturity. He would then have been about 55 years old. (American Philosophical Society, B. S. BARTON collection [B:B284d]).

teristic of this species, is well illustrated (Fig. 11), and, in the notes accompanying the drawing, BARTRAM correctly describes the ". . . red or vermilion [sic] colour . . ." of the skin. The drawing of the head, however, is poor; the contours are wrong and the external ear is incorrectly drawn. The third drawing depicts a wood frog (*Rana sylvatica*) (Fig. 16). This illustration, which BARTRAM drafted in 1794 at the age of about 55, is the best of BARTRAM's frogs, showing the proper shape of the head and body, although the hind legs are disproportionately small and the toes seem somewhat shrivelled.

It is possible that other BARTRAM drawings of reptiles and amphibians exist. EWAN (1968, p. 31 et seq.) discusses the fate of BARTRAM's drawings generally. Several drawings were apparently sent to Miss Jane COLDEN, an accomplished American artist and friend of John BARTRAM (DARLINGTON 1849, p. 401); there is no indication in the letter to COLDEN from John BARTRAM as to the nature of the drawings but this letter was written during the time (1757) when William was busily drawing turtles for COLLINSON. Perhaps some of the drawings sent to George EDWARDS were of reptiles, since that naturalist was then in the process of publishing his illustrated compendium of animals.

In summary, William BARTRAM's drawings of snakes and turtles were generally good when compared to those of his contemporaries; at his best, he was almost unmatched for accuracy and artistry, but he had occasional lapses. His frogs, on the other hand, are generally poor and are not comparable to the best drawings of the day (for example, those of European frogs by Roesel VON ROSENHOF published in the 1750s). BARTRAM's reptilian and amphibian drawings, however, represent a distinct improvement over the crude, rather two-dimensional artistry of CATESBY, yet they still do not match the lifelike qualities of those done by John WHITE two centuries before. His drawings of fish were sufficiently accurate to allow CASHNER et al. (1992) to identify species and use this information as early evidence for a Tennessee River–Savannah River faunal exchange. BERRA (1997) regarded all of BARTRAM's fish illustrations as identifiable to species. One gets the impression that BARTRAM's artistic talents were limited, that he was capable of faithful, even accomplished likenesses, but

that he was simply too busy with more important matters to develop his artistic skills further.

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The Earl of DERBY has kindly supplied photographs and colored slides of the BARTRAM drawings of reptiles kept in the library at Knowsley, his seat in Prescot, England. I am indebted also to Lord DERBY's librarian, Diana KAY, for notes on the drawings. Hobart M. SMITH provided comments on the availability of BARTRAM's scientific names, the late Joseph EWEN gave commentary on BARTRAM, Robert G. WEBB provided information on softshell turtles, and George R. ZUG and Robert M. PECK read and commented on the manuscript. Esteban O. LAVILLA kindly brought to my attention SCHNEIDER's use of BARTRAM's description to name *Bufo rufus*.

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