



THE COTTONMOUTH OR WATER MOCCASIN, *AGKISTRODON PISCIVORUS* (LACEPEDE), PART I

Pete Strimple

■ HISTORICAL

The taxonomic history of the cottonmouth is rather confusing, as it has been described with more than seven generic names since 1789. It is beyond the scope of this article to completely review this history, and I have therefore condensed it into a brief review of the more important names.

The cottonmouth was first described by Lacepede in 1789 as *Crotalus piscivorus*, with the type locality being designated as 'Carolina'. The current genus 'Agkistrodon' was first formed by Beauvois in 1799. Beauvois derived this name from the Greek word for 'hook' (ankistron) and 'tooth' (odontus), but in his original spelling he used a 'g' in place of the 'n' thus spelling it 'Agkistrodon'.

In the years that followed some herpetologists believed that the proper spelling should be 'Ancistrodon' and adopted this spelling in their work (Schmidt, 1953; Stebbins, 1954). These authors, as well as others (Stejneger, 1907; Brown, 1954) believed that Beauvois' spelling of 'Agkistrodon' was an error of transliteration, and therefore incorrect. Brown (1954) defined transliteration as

'the somewhat arbitrary process of rendering the letters and sounds of one language into those of another', and cited 'Agkistrodon' for 'Ancistrodon' as an example of this.

Klauber (1956) reviewed this taxonomic problem and cited a rule from the Copenhagen Decision on Zoological Nomenclature that stated that errors of transliteration do not invalidate or make possible a change in an author's original spelling. He then concluded by stating 'Agkistrodon' should stand; only by a specific action of the International Commission on zoological Nomenclature could 'Ancistrodon' be adopted, and this would be undesirable since 'stability would better be served by retention of Beauvois' spelling'. He did admit though, 'that the use of 'nc' in the place of 'gk' might have been preferable.'

In 1836, Troost described *Acontias leucostoma* and gave the type locality as 'Western Tennessee'. In the same publication however, he substituted the name 'Toxicophis' for 'Acontias'. Later, in 1853, Biard and Girard described *Toxicophis pugnax*. In 1859, Cope published the names *Ancistrodon piscivorus* and *Ancistrodon pugnax* in reference to the eastern and western cottonmouth. Then in 1875 he gave these two snakes the status as subspecies *Agkistro-*

don piscivorus piscivorus and *Agkistrodon piscivorus pugnax*. Stejneger (1895) published an account of the water moccasin and only recognised a single species with no subspecies.

Finally, in 1943, Gloyd and Conant published 'A synopsis of the American Forms of *Agkistrodon*' (copperheads and moccasins) in which they separated two subspecies of the cottonmouth as *Agkistrodon piscivorus piscivorus*; the eastern cottonmouth and *Agkistrodon piscivorus leucostoma*; the western cottonmouth, because it was first used in 1836 whereas the name *pugnax* was not used until 1853.

No further subspecific separation was made until 1969, when Gloyd described *Agkistrodon piscivorus conanti*, the Florida cottonmouth. The type specimen was collected on July 6, 1996, 'at the edge of the Rochelle-Cross Creed road, about 7 miles Southeast' of the Gainesville, Alachua County, Florida.

Today, *Agkistrodon piscivorus piscivorus*, *Agkistrodon piscivorus conanti*, and *Agkistrodon piscivorus leucostoma* are the only subspecies of the cottonmouth.

■ ETYMOLOGY

piscivorus:

piscus: Latin for fish,
voratus: Latin for eat greedily.

conanti:

honouring Roger Conant.

leucostoma:

leukos: Greek for white,
stoma: Greek for mouth.

■ HABITAT

Cottonmouths occupy a wide variety of lowland, freshwater habitats including; bayous, lagoons, swamps, sloughs, oxbowlakes, marshes, lakes, ponds, bayheads creeks, streams, rivers, irrigation ditches, rice fields and canals. In some parts of their range they have been found in clear, mountain streams with rocky bottoms (Anderson, 1965; Mount, 1975; Werler, 1978). There are also records for cottonmouths from brackish and saltwater marshes and tidal pools (Wright and Wright, 1957; Burkett, 1966; Blaney, 1971; Werler, 1978). In any of these given habitats, they can be found in the water, at the water's edge partially submerged in the mud, basking on logs, stumps, clumps of grass, etc. that are raised above the surface of the water, or even draped over the low hanging branches or small trees and shrubs at the water's edge.

Typically, cottonmouths are rarely found far from water. Exceptions to this have been recorded, and in one case, a specimen of *Agkistrodon piscivorus piscivorus* was killed at least one mile from the nearest water (Hamilton and Pollack, 1955).

Although primarily a lowland snake, *Agkistrodon piscivorus* have been reported from elevations as high as 2300 feet (Burkett, 1966; Werler, 1978).

■ FOOD

Cottonmouths feed on a large variety of animals such as soft shelled molluscs, insects, fish, amphibians, reptiles, birds and

mammals. Specific examples of these food items can be found in Hamilton and Pollack (1955), Carpenter (1958), Klimstra (1959), Burkett (1966) and Wharton (1969).

The following is a list of many of the genera of reptiles and amphibians that have been recorded as prey for cottonmouths (Allen and Swindell, 1948; Goodman, 1958; Burkett, 1966; Webb, 1970; Mount, 1975; Ashton, 1981).

Reptiles:

Alligator Kinosternon, *Pseudemys*, *Anolis*, *Eumeces*, *Lygosoma*, *Agkistrodon*, *Crotalus*, *Heterodon*, *Masticophis*, *Nerodia* and *Thamnophis*.

Amphibians:

Ambystoma, *Siren*, *Acris*, *Hyla*, *Microhyla*, *Rana* and *Scaphiopus*.

I have observed captive specimens of *conanti* and *piscivorus* to feed upon *Xenopus laevis*, *Rana tadpoles*, *Phyllorhynchus decurtatus* ssp., and *Sistrurus m. barbouri*.

Cannibalism has been recorded for *Agkistrodon piscivorus*, and so has carrion feeding (Conant, 1934; Allen and Swindell, 1948; Smith, 1961; Wharton, 1969; Mount, 1975).

■ **REPRODUCTION**

Cottonmouths have been recorded to follow both annual and biennial reproductive cycles. Annual reproduction has been recorded for *Agkistrodon piscivorus* in Virginia (Blem, 1966) as well as cottonmouths from the southern portion of their range (Army, 1948; Burkett 1966; Wharton, 1966; Kofron, 1979). Annual reproductive cycles in male

Agkistrodon piscivorus leucostoma (S. Weidensaul, *Snakes of the world*, pag. 117).



Agkistrodon piscivorus from Alabama were suggested by Johnson, Jacobs and Torrance (1982) as a result of spermatogenesis studies on these snakes. Biennial reproduction has been recorded for cottonmouths from mainland Florida and some of the Cedar Keys (Burkett, 1966; Wharton, 1966).

Mating in *Agkistrodon piscivorus* generally occurs in the spring (March-May), although there are records for summer and fall matings in both captive and wild cottonmouths (Stejneger, 1895; Arny, 1948; Allen and Swindell, 1948; Wright and Wright, 1948). There is even a record from the Berlin Zoo of a breeding on January 21, 1873, with the young being born on July 6, 1874 (Stejneger, 1895).

Pairing of cottonmouths has been observed in the wild and was recorded for *Agkistrodon piscivorus conanti* by Wharton (1966) during every month of the year except January on the Cedar Keys.

The size and age of mature water moccasins has been discussed by various authors. Generally, females are capable of breeding at total lengths of 609-762 mm (2-2.5 ft). Occasionally females under this length have proven to be reproductive. Burkett (1966) stated that the smallest *leucostoma* that he had found to be mature had a total length of 455 mm (18 inch). Wright and Wright (1957) gave the minimum length for adult female *piscivorus* as 635 mm (25 inch) and for *leucostoma* as 671 mm (26.5 inch). In the Cedar Keys however, Wharton (1966) suggested that the minimum length

for females in his study area was 800 mm (31.5 inch), and on Sea Horse Key in particular, he reported that the smallest gravid female of a group of 50 *conanti* measured 870 mm (34.5 inch). In a study on *piscivorus* from Virginia, Blem (1982) only found gravid females at lengths over 600 mm (24.5 inch).

Male *conanti* from Wharton's study area are reportedly mature at lengths over 650 mm (25.5 inch). Wright and Wright (1957) listed 650 mm as the minimum length for male *piscivorus*, and 806 mm (31.8 inch) for male *leucostoma*, although the latter measurement seems a little high for that subspecies.

Water moccasins, at least the males, have been found to be sexually mature at the age of approximately 2-2.5 years (Wharton, 1966). Females seem to mature a little later at 3 and possibly 4 years of age. Exceptions to this do occur, as Conant (1933) reported on a female *leucostoma* that gave birth to two young at the age of 2 years and 10 months.

The gestation period for cottonmouths has been as anywhere from 2.5-6 months. Literature records include, 3 months or under (Kofron, 1979), 3.5-4 months Burkett, (1966), and 5 months or more (Stejneger, 1895; Beyer, 1898; Wright and Wright, 1957).

Female water moccasins generally give birth in August or September, although there are records for July (Stejneger, 1895; Conant, 1933) and October (Burkett, 1957). Captivity, often times will alter the

reproductive cycles in snakes so that births during other times of the year are entirely possible.

Litter size varies from 1-16 young, although the average seems to be between 6-10 (Ditmars, 1945; Allen and Swindell, 1948; Wright and Wright, 1957). Allen and Swindell (1948) recorded an average of 6.5 young from a series of 31 female *conanti* from the Everglades, and Wright and Wright (1957) have an average of 7.2 young from the eight references they cite. Wharton (1966) reported an average of 5.5 young from a series of 24 females *conanti* from Snake Key and Sea Horse Key.

Literature records for the size of the new-born cottonmouths show a range of be-

tween 165-330 mm (6.5-13 inch), the average however, is probably between 203-279 mm (8-11 inch) (Beyer, 1898; Allen and Swindell, 1948; Wright and Wright, 1957). Wharton (1960) reported on a new-born male *piscivorus* (actually *conanti*) with a total length of 337 mm (13.3 inch) and a weight of 32.5 g. In 1966, Wharton recorded an average total length of 332 mm (13 inch) for 19 juveniles from two broods of cottonmouths collected in the wild. He did not however, indicate whether or not he had witnessed the actual births, thereby giving the exact age of these snakes at the time they were measured.

Part one of four.

References after part IV.