Catalogue of American Amphibians and Reptiles.

SALTHE, STANLEY N. 1973. *Amphiuma means.*

Amphiuma means Garden
Two-toed congo eel

Amphiuma means Garden, 1821, p. 599. *In* Smith, Correspond. of Linn. Type locality not stated, but from context either Charleston, South Carolina or eastern Florida; restricted to Charleston, Charleston County, South Carolina by Schmidt, 1953:27. Holotype possibly rediscovered by Lönnberg, 1896:36, #15 labelled *Siren lacertina* in the Zoological Museum of the University of Upsala (not seen by author).

Sireni simile Linnaeus, 1821, p. 599. *In* Smith, Correspond. of Linn. Refers to an apparently lost letter from Linnaeus to Garden.

Chrysodonta larvaeformis Mitchill, 1822:503. Type locality Savannah, Chatham County, Georgia.

Amphiuma didactylum Cuvier, 1827:4. Substitute name.

Amphiuma tridactylum: Tschudi, 1838:97 (in part).

Sirenoidis didactyla: Fitzinger, 1843:34. New combination.

Amphiuma means: Gray, 1850:55. New combination.

Amphiuma means means: Goin, 1938:128. See Remarks under *A. tridactylum.*

• CONTENT. No subspecies are currently recognized; see Remarks under *A. tridactylum.*

• DEFINITION. This species tends to be unicolored, with the venter only slightly lighter than the dorsum, the change in shade between the two being relatively gradual. The dark patch on the throat is not evident against the relatively dark ventral coloration. No more than two toes are present on any limb and not less than two on most. Forelimb length in body length, 44 (Baker, 1947), 47–50 (data of Hill, 1954); hindlimb length in body length, 35 (Baker, 1947), 31–34 (data of Hill, 1954). The tail base in section is circular, not compressed.

• DESCRIPTIONS. See *Amphiuma* for many references on general anatomy. Good general descriptions are given by Mitchill (1822), Harlan (1823), Cuvier (1827), Bishop (1943), and Baker (1945). The limb and girdle skeletons are described by Parker (1868), Rabl (1901), and Stoudemayer (1949), while limb development is described by Van Pée (1903, 1904), Davison (1895), Low (1929), and Hilton (1947). The male cloaca is described by Davison (1895). Female cloacal structures and spermatophores have not been described. The ova have not been described. Rough descriptions of the eggs can be found in Brimley (1944) and Weber (1944), and the egg capsules are described by Salthe (1963). Developmental stages have not been described. The hatchling (55 mm) is described by Weber (1944). Noble and Brady (1933) comment on the hatching glands. The size at transformation is given as just under 3 inches by Harlan (1825).

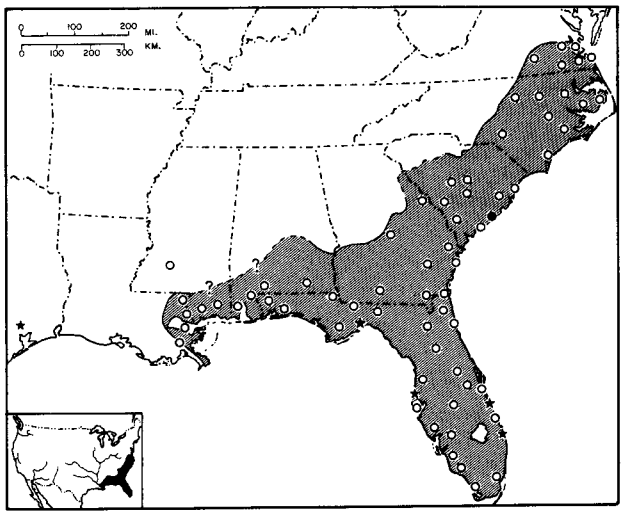
• ILLUSTRATIONS. Excellent paintings of adults may be found in Wagler (1833:plate 19) and Holbrook (1842:plate 30) while Bishop (1943:52) provides photographs. Baker (1947:9) gives a photograph of the ventral view of the anterior part of the body. Stoudemayer (1949:7) presents line drawings of the appendicular skeleton. Spermatophores, eggs, and developmental stages have not been figured, but Salthe (1963: 163) gives a figure of the egg and its capsules. Van Pée (1903:38–39) figures limb development in a series from 40 mm to 127 mm and Low (1929:466–467) gives a figure of the same at 60 mm. A photograph of a female at the nest site with a clutch of eggs is in Neill (1971:70).

• DISTRIBUTION. The range includes the Atlantic Coastal Plain from easternmost Virginia to the Florida Everglades and continues west in the Gulf Coastal Plain from Florida to the region around New Orleans, east of the Mississippi Valley. Viosca (1923, 1926) suggested that clay soils of alluvial or loess origin in the Mississippi Valley may impose the western limit to the species range, and Baker (1947) emphasized that pH may be a major factor, with alkaline conditions being restrictive. The species is mainly a lowland form, always found below the fall line, although it may occasionally get into low sandy pine hills. It is found in swamps, bayous, along the margins of muddy sloughs, in cypress heads and drainage ditches, in sluggish streams and wet meadows, and in muddy lakes—all waters tending toward acid pH. The presence of crayfish burrows, in which the animals hide and hunt, is an important feature of most habitats. They often burrow deep in the soil (Winslow, 1899; Knepton, 1954), which cannot, therefore, be too dense.

• FOSSIL RECORD. Brattstrom (1953) records this species from three Pleistocene localities in Florida (Pinellas, St. Lucie, and Walkulla Counties). Neill (1957) contested these records, arguing that rapid mineralization occurs in the region, and suggested that none of the records need be more than 2500 years old. Hirschfeld (1969) noted that within a given sink hole *A. means* vertebrae could be dated from any time between late Tertiary or Pleistocene age to 1964. Weigel (1962) reports this species as very common in a bed in Indian River County, Florida that ranges in age from 30,000 years (Sangamonian) to 3500 years ago. He noted that at Redick, much further north, beds of Kansan or even Illinoian age, while containing *Siren* and *Pseudobranchus*, disclosed no *Amphiuma.* Holman (1965) and Slaughter and McClure (1965) report this species from the mid-Pleistocene (Sangamonian) of eastern Texas near Houston, outside its present range. It is not clear to the present author whether or not any of these fossils (consisting of skull fragments and vertebrae) can actually be assigned to any living species.

• PERTINENT LITERATURE. Courtship and mating occur in January in Georgia (Knepton, 1954). In northern Florida and North Carolina eggs can be found in June and July (Brimley, 1910; Davison, 1895), while in southern Florida eggs in early developmental stages have been found in February, and may have been deposited in January (Weber, 1944). The latter author suggested a 5 month incubation period. The female remains with the eggs through most of the period of development coiled under or around them (Brimley, 1910; Weber, 1944). The following nest sites have been described: under large rocks in damp places (Davison, 1895); under logs in the partly dried mud of dried-up pools (Brimley, 1910); in muck at the edge of a dried up pool under a board (Weber, 1944). The snakes *Farancia abacura* and *F. erythrogrammus* are the major predators of this species (Brimley, 1944; Funderberg, 1955; Schwartz, 1957). Other than loose descriptions of habitats (see Distribution) little further seems to be known of the ecology of this animal. See under *Amphiuma* for literature on cytology, cell physiology, and physiology.

• REMARKS. See under *A. tridactylum* a discussion of the possibility of that species being a subspecies of this one.



MAP. Solid symbol indicates type-locality, open symbols mark other localities. Stars locate Pleistocene sites for this species, or *Amphiuma tridactylum* or a common ancestor (see text). Shaded area estimates total range.

• ETYMOLOGY. Garden did not explain the species epithet, and it seems there has been no attempt made to understand what he had in mind. Black and Dellinger (1938) apparently assumed that it referred to a surname and accordingly used the vernacular "Means' congo eel." Assuming that Garden was a mediocre Greek scholar (see Etymology under *Amphiuma*), there are several possibilities such as *meion*, to have too little, to be scant of a thing—referring to the extraordinarily small limbs. There is also *menos*, fierceness, or *mania*, frenzy—possibly in reference to the disposition of the beast when one tries to catch it. There are still other possibilities, some referring to small size (limbs) and some to large size (body).

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