

MITTLEMAN, M. B. 1967. *Manculus* and *M. quadridigitatus*. Catalogue of American Amphibians and Reptiles, p. 44.

***Manculus* Cope
Dwarf salamander**

Manculus Cope, 1869:95. Type-species by original designation, *Salamandra quadridigitata* Holbrook, 1842.

- CONTENT. A single species, *Manculus quadridigitatus*.
- DEFINITION. *Manculus* is a plethodontid genus primarily differentiated from *Eurycea* (Dunn, 1926:294) by its tetradactyl (rather than pentadactyl) hind feet. It also differs from all *Eurycea*, and all plethodontids except *Hemidactylium* and *Stereochilus*, in that the tail fin of the larva extends onto the body. See also Wake (1966) and the species account.
- DESCRIPTIONS, ILLUSTRATIONS, DISTRIBUTION, FOSSIL RECORD, and PERTINENT LITERATURE. See *Manculus quadridigitatus*.
- ETYMOLOGY. The name *Manculus* is formed from the Latin *manc*, "maimed, infirm, imperfect," in allusion to the lack of a fifth toe on the hind foot, and *ulus*, a diminutive suffix referring to the small size of this salamander.

COMMENT

Because of several characters which *Manculus* shares with the 11 species comprising *Eurycea* (sensu stricto), and because he feels that these similarities between *Eurycea* and *Manculus* outweigh their differences, Wake (1966:64) follows Dunn (1923:40) in combining the two genera, thereby making *Manculus* a junior synonym of *Eurycea*. Mayr (1942:283) has suggested that the gap separating genera should be in inverse ratio to their size (i.e., number of included species). If *Eurycea* is conceived to be a natural phylogenetic taxon which includes 11 pentadactyl species, the chances of a 12th non-pentadactyl species belonging to such an assemblage are less than 1 out of 10 ($P = 0.08$), a disparity which lends support to the recognition of tetradactyl *Manculus* as a monotypic genus. Wake (*loc. cit.*) concluded that *Manculus* is simply a specialized offshoot of the *Eurycea* line. I believe that the differences which set apart *Manculus* from *Eurycea*, though quantitatively few, are highly significant and may be interpreted as those of a relict species derived from a pre-*Eurycea* progenitor, the similarities between *Manculus* and *Eurycea* being a result of generic convergence.

***Manculus quadridigitatus* (Holbrook)
Dwarf salamander**

Salamandra quadridigitata Holbrook, 1842:331. Type-locality, "South Carolina, Georgia, and Florida"; restricted to the vicinity of Charleston, South Carolina (Schmidt, 1953:56). Holotype probably Acad. Nat. Sci. Philadelphia 490, South Carolina, donated (and possibly collected) by J. E. Holbrook in 1842. The specimen, a female, is in poor condition, being soft and partially dissected (E. V. Malnate, personal communication, 2 December 1963).

Manculus quadridigitatus: Cope, 1869:101. Transfer of *S. quadridigitatus* to a new genus, *Manculus*.

Eurycea quadridigitata quadridigitata: Dunn, 1923:40. Transfer of *S. quadridigitata* to *Eurycea*, and new combination.

Manculus quadridigitatus quadridigitatus: Stejneger and Barbour, 1923:14. New combination.

Manculus remifer Cope, 1871:84. Type-locality, "Jacksonville, Florida." Holotype collected by C. J. Maynard, February 1869, and deposited in the Museum of the Peabody Academy of Science, Salem, Massachusetts; now lost.

Eurycea quadridigitata remifera: Dunn, 1923:40. Transfer of *M. remifer* to *Eurycea*, and new combination.

Manculus quadridigitatus remifer: Stejneger and Barbour, 1923:14. New combination.

Manculus quadridigitatus paludicolus Mittleman, 1947:220. Type-locality, "Pollock, Grant Parish, Louisiana." Holotype, male, U. S. Natl. Mus. 123979, collected by Percy Viosca Jr., 6-9 September 1937.

Manculus quadridigitatus vividus Mittleman, 1947:221. Type-locality, "Gayle, Caddo Parish, Louisiana." Holotype, male, U. S. Natl. Mus. 123980, collected by Lorraine S. Frierson and John K. Strecker, date unknown.

• CONTENT. A monotypic species.

• DEFINITION and DIAGNOSIS. This *Eurycea*-like salamander has well-developed eyes and tetradactyl hind feet. The yellow-to-brown dorsal body color, demarcated on each side by a dorsolateral dark stripe, extends from the snout to the tip of the tail. Costal grooves number 14 to 17. Combined vomerine tooth counts total 7 to 22 (3-11 per series). The tail is squarish in section, keeled, and comprises about 45 to 60 percent of the total length. Sexually active males have cirri that project downward from the nostrils, and enlarged, monocuspid, premaxillary teeth. Maximum total length is 90 mm (snout-vent length 37 mm); minimum total length is 32 mm (snout-vent length 17 mm).

• DESCRIPTIONS. Adults were described by Dunn (1926), Bishop (1943), Neill (1949), and Carr and Goin (1955). For descriptions of the eggs, see Noble (1927); for the larva, see Dunn (1926) and Goin (1951, newly-hatched larva). Various aspects of breeding were discussed by Noble (1927), Carr (1940), and Bishop (1943).

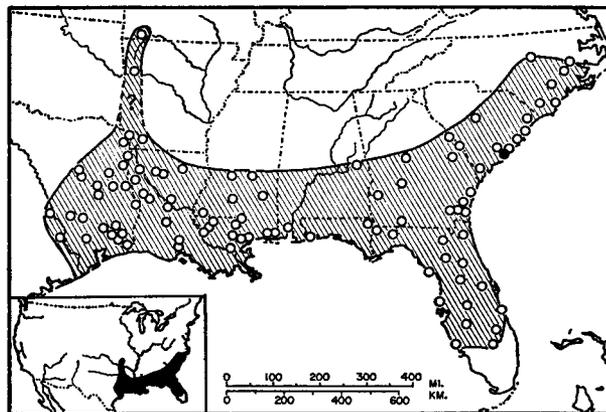
• ILLUSTRATIONS. For photographs of adults and of ova, see Bishop (1943). Conant (1958) provided a colored photograph. Finely detailed drawings of the head, showing the cirri and enlarged premaxillary teeth of the sexually-active male, were presented by Dunn (1926) and Noble (1931:fig. 46). Goin (1951) illustrated the newly-hatched larva. Hilton (1945) illustrated the skeleton.

• DISTRIBUTION. The species occurs from Raleigh, North Carolina, southward through the Coastal Plain to Lake Okechobee, Florida, and westward through Alabama, Mississippi, Louisiana and southwestern Arkansas to Milam and Austin counties, Texas. Populations possibly disjunct occur in Lafayette and Crawford counties, Arkansas (H. M. Smith, 1933), and Barry County, Missouri (Paul Anderson, 1945). The presence of this species in Oklahoma, as suggested by Bishop's (1943:446) map has not been verified.

Comprehensive lists of localities at which the species has been collected are found in works by Dunn (1926) and Mittleman (1947). For additional localities in particular states as well as ecological notes, see the following papers: North Carolina (Eaton, 1953; Funderberg, 1955; Robertson and Tyson, 1950); South Carolina (Bishop, 1927; Freeman, 1955; Jopson, 1940; Pickens, 1927); Georgia (Harper, 1930; Neill, 1949); Florida (Goin, 1943, 1951; Neill, 1954; Telford, 1952; Van Hyning, 1933); Alabama (Chermock, 1952); Mississippi (P. W. Smith and List, 1955; Boyd and Vickers, 1963); Louisiana (P. K. Anderson, Liner, and Etheridge, 1952; Liner, 1954; Walker, 1963); Texas (Brown, 1950; Livezey, 1948; Reese and Firschein, 1950; H. M. Smith and Sanders, 1952).

• FOSSIL RECORD. None.

• PERTINENT LITERATURE. Information on the ecology of *Manculus* is confined largely to casual notes accompanying distributional records (see citations above, also under Descrip-



MAP. The solid symbol marks the type-locality; hollow symbols show other localities.

tions). Reddell (1966) recorded this species in a cave in Texas. Neill (1948) remarked that in Richmond County, Georgia, these salamanders were active all year. Brattstrom (1963) recorded habitat temperatures, and Hutchison (1961) noted that this species had the highest Critical Thermal Maximum of any of a number of salamanders he tested. Hilton (1945) furnished a general description of the skeleton, and (1947) dealt with the hyobranchial apparatus. Highton (1957) compared the correlation between number of costal grooves and number of trunk vertebrae in this and other species of salamanders.

• **REMARKS.** This species formerly was regarded as polytypic (Dunn, 1923; Mittleman, 1947). Subsequently, several authors commented on variation in the species and on the desirability of recognizing subspecies (Neill, 1949; Brown, 1950; H. M. Smith and Sanders, 1952; P. K. Anderson, et al., 1952; Cagle, 1952; Mittleman, 1952; Neill, 1954). Criteria once believed to be diagnostic of various forms are geographically clinal or else of non-correlatable occurrence. Hence, I consider the species to be monotypic.

• **ETYMOLOGY.** The specific name is derived from the Latin *quadri*, "four," *digitus*, "finger" or "toe," and *atus*, "provided with."

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M. B. MITTLEMAN, FANTON HILL, WESTON, CONNECTICUT 06880.

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