

Catalogue of American Amphibians and Reptiles.

Wake, Marvalee H. 1988. *Gymnopsis*, *G. multiplicata*.

Gymnopsis Peters

Gymnopsis Peters, 1874: 616. Type-species: *Gymnopsis multiplicata* Peters, 1874.

• **Definition and Diagnosis.** Medium-sized (to 500 mm total length) member of the subfamily Dermophiinae (as characterized by Taylor, 1969) having the eye not visible, covered by bone and skin. Splenial teeth are present, and the tentacle is just anterior to the eye. The vent is simple, lobed, and transverse. The everted male intromittent organ appears fluted, with 8-10 elongate lobes. There are 112-133 primary annuli and 64-117 secondaries. The dermal scales have mineralized denticles embedded in the annuli beginning with approximately the 20th primary annulus behind the head. Two nuchal collars are present, the anterior one complete with a transverse dorsal groove, the second grooved but broadly fused with the first primary annulus. Teeth in adults are monocuspid, slightly arrow-head shaped, slightly recurved, and diminish in height posteriorly. Numbers of teeth increase slowly throughout life; adults have 14-22 on each side in the premaxillary-maxillary arcade, 14-23 each in the vomeropalatine series, 11-18 on each dentary, and a single splenial on each ramus. The taxon is viviparous; fetuses receive maternal nutrition (a 'luteotrophe') after the yolk is exhausted, and metamorphosis occurs while maintained in the oviduct. The shape and arrangement of the fetal teeth is species-specific, with many rows of teeth with small recurved cusps on both upper and lower jaws in *Gymnopsis*. Fetuses are thought to use the teeth to scrape the mother's oviduct wall, stimulating cell turnover and secretion of the nutrient material. During much of development, the fetuses have triramus gills; these are resorbed before birth (Wake, 1967, 1969). The gestation period is approximately 11 months. Two to ten young are born. Females appear to reproduce every two years; males are spermatogenic 10 months of the year, with testes regressed in December-January (Wake, 1968).

The features of the eye, splenial teeth, and tentacle position, distinguish *Gymnopsis* from the closely related and often sympatric *Dermophis*, which has the eye visible, covered by skin, lacks splenial teeth, and whose tentacle emerges mid-way between the eye and nostril.

• **Descriptions, Illustrations, Distribution, Fossil Record, and Pertinent Literature.** See species account.

• **Etymology.** From the Greek *Gymno* (naked, bare) and *Ophis* (snake). The genus was apparently named for its naked (i.e., scaleless) external appearance; gymnophiones were frequently included among snakes in the nineteenth century.

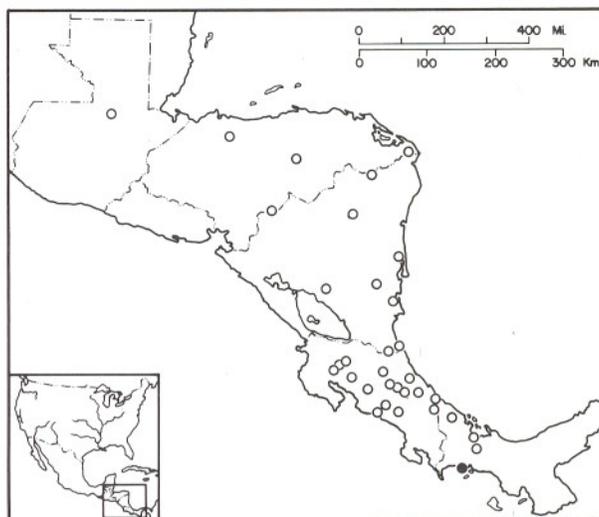
• **Remarks.** The Dermophiinae is not a natural assemblage, in my opinion. Taxa which do not have a natural alliance with members of other families, or with the Caeciliinae, are allocated to this subfamily. The revision by Lescure et al. (1986) did not effectively resolve this issue. Distinction from South American, African, Seychelles, and Indian dermophiines is based on various combinations of characters of eye visibility, presence or absence of dermal scales, tentacle position, annular counts, presence or absence of splenial teeth, etc. A formal diagnosis of all of the members of the unit awaits a more substantive treatment of the taxa.

Gymnopsis multiplicata Peters

Gymnopsis multiplicata Peters, 1874:616. Type-locality, "Veragua, Panama." Holotype, Zoologisches Museum, Berlin, 3704; collected by Joseph Warszewicz (examined by author).

Siphonops mexicanus: Cope, 1875:96 (part).

Siphonops proximus Cope, 1877:90. Type-locality, "Eastern Costa



Map. The solid symbol indicates the type-locality; open circles represent other substantiated records.

Rica" [=Limón]. Holotype, U. S. Nat. Mus. 29762; collected by William Gabb in 1873-4 (examined by author).

Siphonops oligozona Cope, 1877:91. Type-locality unknown.

Holotype, U.S. Nat. Mus. 25187. Said to have been collected in Guatemala by Bernoulli.

Dermophis proximus: Peters, 1879:938.

Cryptosiphis multiplicata: Boulenger, 1883:166.

Gymnopsis proxima: Cope, 1885:171.

Gymnopsis multiplicata: Dunn, 1928:75.

Gymnopsis multiplicata multiplicata: Dunn, 1941:464.

Gymnopsis multiplicata proxima: Dunn, 1942:464.

• **Content.** No subspecies are currently recognized.

• **Definition and Diagnosis.** See generic account.

• **Descriptions.** Taylor (1952, 1968), Dunn (1942), and Wake (1983) provided descriptions of a number of features of *Gymnopsis multiplicata*. Particular aspects of morphology, etc., are listed below.

• **Illustrations.** Taylor (1968) published a photograph of a preserved specimen and line drawings of a head, teeth, and vent, and an x-ray of an entire specimen. Villa et al. (1988) published a photograph of a living individual. Line drawings are in Peters (1879), Taylor (1952), and Villa (1972). Taylor (1969) has photographs of the skull. Wake (1967, 1969, 1977a) illustrated the fetal gills, Parker and Dunn (1964) and Wake (1976, 1977b) the fetal teeth, Wake and Wurst (1979) adult teeth, Wake the gonads (1968), the kidneys and bladder (1970 a, b), the cloaca (1972), the eye (1985a), and Billo and Wake (1987) tentacle development. Taylor presented photographs of the dermal scales (1972), the mandible (1977a), and the anterior vertebrae (1977b). D. Wake (1970) illustrated some aspects of vertebral development.

• **Distribution.** *Gymnopsis multiplicata* occurs on the Atlantic versant from sea level to 900 m from Alta Verapaz, Guatemala, in Honduras and Nicaragua, Costa Rica, and adjacent Panamá. The species crosses to the Pacific in Costa Rica and is found from sea level to 1400 m south to Veragua, Panamá.

• **Fossil Record.** None.

• **Pertinent Literature.** Most of the literature on *Gymnopsis multiplicata* deals with its systematics and/or morphology. Hence a number of citations listed in the synonymy and in the list of illustrations are referable here as well. In addition, Wake and Case (1975)

reported the karyotype of *G. multiplicata* and Case and Wake (1975, 1977) considered relationships of *Gymnopsis* to other taxa based on electrophoretic and immunological evidence. Wake (1977a, b, 1981, 1982, 1985b) discussed several aspects of the viviparous reproductive mode of many caecilians, including *Gymnopsis*. Wake compared Costa Rican *Gymnopsis* and *Dermophis* (1983), and evaluated the biogeography and relationships of *Gymnopsis* and other Central American caecilians (in press), continuing the work of Savage and Wake (1972), which included a summary of locality reports to that date. Wake (1986) briefly summarized information on gymnophione biology currently available.

• **Etymology.** *G. multiplicata* is so named for the many (Latin, *multi-*) folds (*L. plica*), or annuli, that circle the body.

• **Remarks.** Some of the morphological literature on caecilians that appeared between approximately 1890 and 1968 contains references to *Gymnopsis*, and sometimes even to *G. multiplicata*. However, that was a period of taxonomic instability, and it is my impression that much of the work was actually done on *Dermophis mexicanus*, a taxon frequently included in *Gymnopsis*, and a much more frequently collected species somewhat easily confused with *G. multiplicata*. Hence, I have included only references that clearly consider *G. multiplicata* proper.

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Literature Cited

- Billo, Ralph and Marvalee H. Wake. 1987. Tentacle development in *Dermophis mexicanus* (Amphibia, Gymnophiona). *J. Morphol.* 192:101-11.
- Boulenger, George Albert. 1883. Descriptions of new species of reptiles and batrachians in the British Museum. *Ann. Mag. Nat. Hist. ser. 5*, vol. 12:161-167.
- Case, Susan M. and Marvalee H. Wake. 1975. Electrophoretic patterns of certain proteins in caecilians (Amphibia: Gymnophiona). *Comp. Biochem. Physiol.* 528:473-476.
- and —. 1977. Immunological comparisons of caecilian albumins (Amphibia: Gymnophiona). *Herpetologica* 33 (1):93-97.
- Cope, Edward D. 1875. On the Batrachia and Reptilia of Costa Rica. *J. Acad. Nat. Sci. Philadelphia*, ser. 2 vol. 8, 1875(1877):93-157.
- . 1877. Tenth contribution to the herpetology of tropical America. *Proc. Amer. Philos. Soc.* 17:85-97.
- . 1885. Twelfth contribution to the herpetology of tropical America. *Proc. Amer. Philos. Soc.* 22:167-194.
- Dunn, Emmett R. 1942. The American caecilians. *Bull. Mus. Comp. Zool.* 91(6):439-540.
- Lescure, Jean, Sabine Renous, and Jean-Paul Gasc. 1986. Proposition d'une nouvelle classification des Amphibiens Gymnophiones. *Mem. Zool. Soc. France* 43:145-177.
- Parker, H. W. and Emmett R. Dunn. 1964. Dentitional metamorphosis in the Amphibia. *Copeia* 1964(1):75-86.
- Peters, Wilhelm. 1874. Über neue Amphibien (*Gymnopsis*, *Siphonops*, *Polypedates*, *Rhacophorus*, *Hyla*, *Cyclodus*, *Euprepes*, *Clemmys*). *Monatsb. Acad. Wiss. Berlin* 1874:616-624.
- . 1879. Über die Eintheilung der Caecilien und insbesondere über die Gattungen *Rhinatrema* und *Gymnopsis*. *Monatsb. Akad. Wiss. Berlin* 1879:924-943.
- Savage, Jay M. and Marvalee H. Wake. Geographic variation and systematics of the Middle American caecilians, genera *Dermophis* and *Gymnopsis*. *Copeia* 1972(4):680-695.
- Taylor, Edward H. 1952. The salamanders and caecilians of Costa Rica. *Univ. Kansas Sci. Bull.* 34:695-791.
- . 1968. The Caecilians of the World. A taxonomic review. *Univ. Kansas Press, Lawrence.* 848 pp.
- . 1969. Skulls of Gymnophiona and their significance in the taxonomy of the group. *Univ. Kansas Sci. Bull.* 48:585-687.
- . 1972. Squamation in caecilians, with an atlas of scales. *Univ. Kansas Sci. Bull.* 59:989-1164.
- . 1977a. The comparative anatomy of caecilian mandibles and their teeth. *Univ. Kansas Sci. Bull.* 51:261-282.
- . 1977b. Comparative anatomy of caecilian anterior vertebrae. *Univ. Kansas Sci. Bull.* 51:219-231.
- Villa, Jaime D. 1972. Anfíbios de Nicaragua. *Inst. Geogr. Nac. & Banco Central Nic.* 218 p.
- , Larry D. Wilson and Jerry D. Johnson. 1988. Middle American herpetology: a bibliographic checklist. *Univ. Missouri Press, Columbia.* in press.
- Wake, David B. 1970. Aspects of vertebral evolution in the modern Amphibia. *Forma et Functio* 3:33-60.
- Wake, Marvalee H. 1967. Gill structure in the caecilian genus *Gymnopsis*. *Bull. So. Calif. Acad. Sci.* 66:109-116.
- . 1968. Evolutionary morphology of the caecilian urogenital system. Part I. The gonads and fat bodies. *J. Morphol.* 126(3):291-332.
- . 1969. Gill ontogeny in *Gymnopsis*. *Copeia* 1969(1):183-184.
- . 1970a. Evolutionary morphology of the caecilian urogenital system. Part II. the kidneys and the urogenital ducts. *Acta. Anat.* 75(3):321-358.
- . 1970b. Evolutionary morphology of the caecilian urogenital system. Part III. The bladder. *Herpetologica* 26(1):120-128.
- . 1972. Evolutionary morphology of the caecilian urogenital system. Part IV. The cloaca. *J. Morphol.* 136(3):353-366.
- . 1976. The development and replacement of teeth in viviparous caecilians. *J. Morphol.* 148(1):33-64.
- . 1977a. Fetal maintenance and its evolutionary significance in the Amphibia: Gymnophiona. *J. Herpetol.* 11(4):379-386.
- . 1977b. The reproductive biology of caecilians: an evolutionary perspective. pp. 73-102 in *Reproductive Biology of the Amphibia*. S. Guttman and D. Taylor, eds. Plenum Press Publ., New York.
- . 1981. Structure and function of the male Müllerian gland in caecilians (Amphibia: Gymnophiona), with comments on its evolutionary significance. *J. Herpetol.* 15(1):17-22.
- . 1982. Diversity within a framework of constraints: reproductive modes in the Amphibia. Pp. 87-106 in *Environmental Adaptation and Evolution A Theoretical and Empirical Approach*. D. Mossakowski and G. Roth, eds. Gustav Fischer Verlag, Stuttgart.
- . 1983. *Gymnopsis multiplicata*, *Dermophis mexicanus*, and *Dermophis parviceps* (Soldas, Suelda con Suelda, Dos Cabezas, Caecilians). Pp. 400-401 in *Costa Rican Natural History*. D. H. Janzen, ed. University of Chicago Press, Chicago.
- . 1985a. The comparative morphology and evolution of the eyes of caecilians (Amphibia: Gymnophiona). *Zoomorphol.* 105(5):277-295.
- . 1985b. Oviduct structure and function in non-mammalian vertebrates. In *Functional Morphology of Vertebrates*. H.-R. Duncker and G. Fleischer, eds. *Fortschritte der Zoologie* 30:427-435.
- . 1986. A perspective on the systematics and morphology of the Gymnophiona (Amphibia). *Mem. Soc. Zool. France* 43:67-70.
- and Susan M. Case. 1975. The chromosomes of caecilians. *Copeia* 1975(3):510-516.
- and Gloria Z. Wurst. 1979. Tooth crown morphology in caecilians (Amphibia: Gymnophiona). *J. Morphol.* 159(3):331-342.

Marvalee H. Wake, Department of Zoology and Museum of Vertebrate Zoology, University of California, Berkeley, CA 94720.

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