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Monomitopus-magnus, A New Species Of Deep-Sea Fish (Ophidiidae) From The Western North-Atlantic

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MONOMITOPUS MAGNUS, A NEW SPECIES OF DEEP-SEA FISH (OPHIDIIDAE) FROM THE WESTERN NORTH ATLANTIC

H. Jacque Carter and Daniel M. Cohen

ABSTRACT

Monomitopus magnus new species is described from slope waters off the southeastern coast of North America. *M. magnus* is most closely related to *M. americanum* from the continental slope of Uruguay and southern Brazil and is more distantly related to the western Pacific *M. pallidus*. *M. magnus* differs from *M. americanum* in having fewer developed gill rakers on the anterior arch (10–11 compared to 14–22) and more precaudal vertebrae (15 compared to 13–14). The 13 nominal species of *Monomitopus* are divided into three groups based on head shape and degree of ossification.

The circumglobal neobythitine ophidiid genus, *Monomitopus* includes long and slender fishes inhabiting depths ranging from about 200–1,870 m beneath tropical and subtropical seas. In this paper we describe a large, distinctive species of *Monomitopus* that first came to notice in photographs taken on the Blake Plateau and later published by Marshall and Bourne (1967), here reproduced as our Figures 1a and 1b. We have subsequently examined 11 specimens of the same species and determined that they represent a new species of *Monomitopus*. The new species is the largest of the genus, reaching a size of 535 mm SL.

MATERIALS AND METHODS

Counts and measurements follow those of Hubbs and Lagler (1958). Measurements were obtained to the nearest 0.1 mm using dial calipers and are expressed as percent standard length. Vertebral and fin-ray counts were taken from radiographs. Anatomical illustrations were drawn with the aid of a camera lucida.

Abbreviations used are USNM, National Museum of Natural History, Smithsonian Institution (Washington, D.C.); BPBM, Bernice P. Bishop Museum (Honolulu); FMNH, Field Museum of Natural History (Chicago); LACM, Los Angeles County Museum of Natural History; MCZ, Museum of Comparative Zoology, Harvard University (Cambridge); UMML, University of Miami, Rosenstiel School of Marine and Atmospheric Science (Miami); VIMS, Virginia Institute of Marine Science (Gloucester Point); BMNH, British Museum (Natural History) (London); ZMUC, Zoological Museum, University of Copenhagen (Copenhagen); ISH, Institut für Seefischerei (Hamburg).

SYSTEMATICS

In order to properly classify our material we have reviewed the 13 nominal species assigned to *Monomitopus* (Cohen and Nielsen, 1978) as well as several that are apparently undescribed. The species are divisible into three phenetic groups recognized by gross morphological similarity.

The *M. nigripinnis* group is characterized by a relatively deep head with a notable downward inflection in the form or a down slung head, beginning at the occiput (Fig. 2A), poorly ossified bones in the opercular series, weak and flexible preopercular armature (flaps rather than spines in some instances). Nominal species include *M. agassizii* (Goode and Bean, 1896), *M. conjugator* (Alcock, 1896), *M. garmani* (Smith and Radcliffe, in Radcliffe, 1913), *M. malispinosus* (Garman, 1899), *M. metriostoma* (Vaillant, 1888), *M. nigripinnis* (Alcock, 1889), and *M. vitiazi* (Nielsen, 1971). In addition, Cohen (1981) has suggested that "*M. metriostoma*" may comprise two species. An unidentified specimen from Hawaii (BPBM) also belongs in this group.

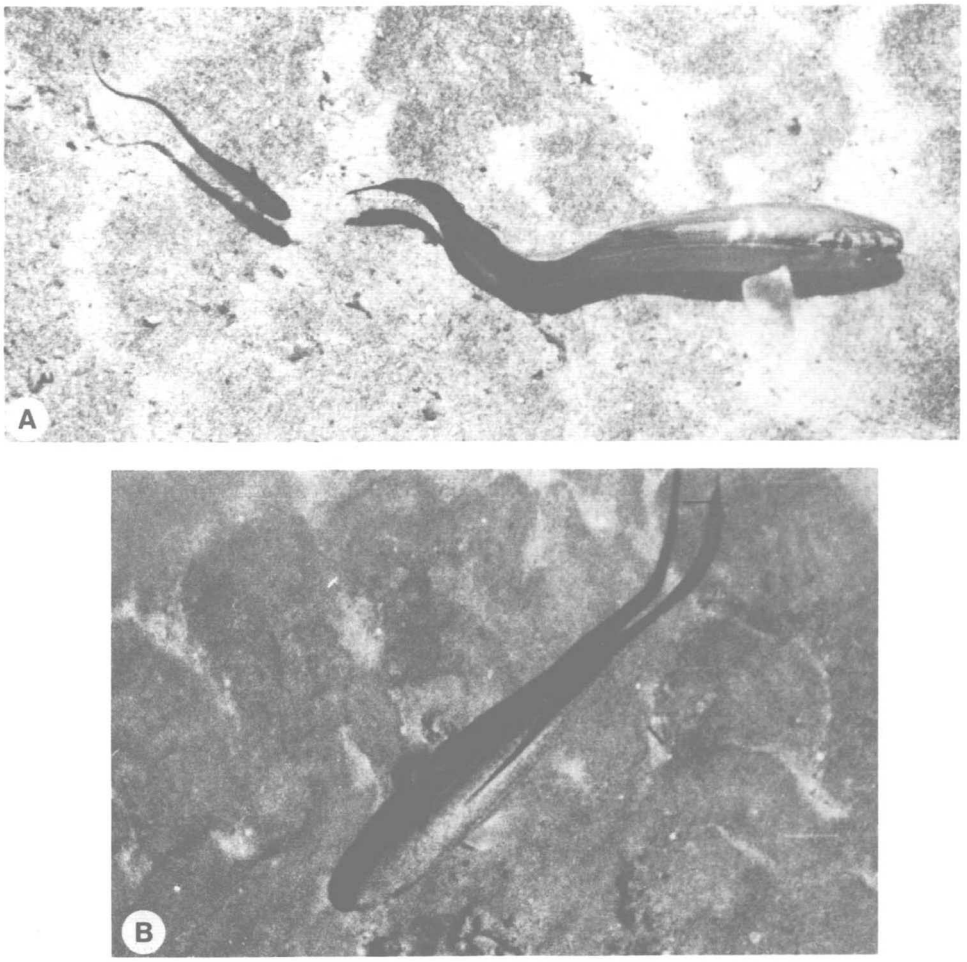

Figure 1. A, *Monomitopus magnus* with a small rattail in close attendance. Blake Plateau, 30°51′N, 78°8′W–30°50′N, 78°3′W, 920–970 m; B, dorsal view of *M. magnus* swimming over bottom in region of Blake Plateau. A from Hersey (1967).

The *M. pallidus* group contains fishes with a relatively slender head with a nearly straight dorsal profile, well ossified bones in the opercular series, and strong spines on the preopercle (Fig. 2B). Species included in this group are *M. americanus* (Nielsen, 1971), *M. magnus* new species, and *M. pallidus* Smith and Radcliffe in Radcliffe, 1913.

Fishes of the *M. torvus* group have a relatively straight dorsal profile and intermediate development of head spines with respect to the previous two groups (Fig. 2C). Species included in this group are *M. kumae* Jordan and Hubbs, 1925, *M. longiceps* Smith and Radcliffe in Radcliffe, 1913, *M. microlepis* Smith and Radcliffe in Radcliffe, 1913, and *M. torvus* Garman, 1899. In addition, an undescribed species from the Bahamas and off West Africa may belong here.

Monomitopus magnus new species
Figures 1–6

Holotype.—USNM 262507 (425 mm SL, male), SILVER BAY, St. 3516, 24°24′N, 80°00′W, 857 m, 9 November 1961.

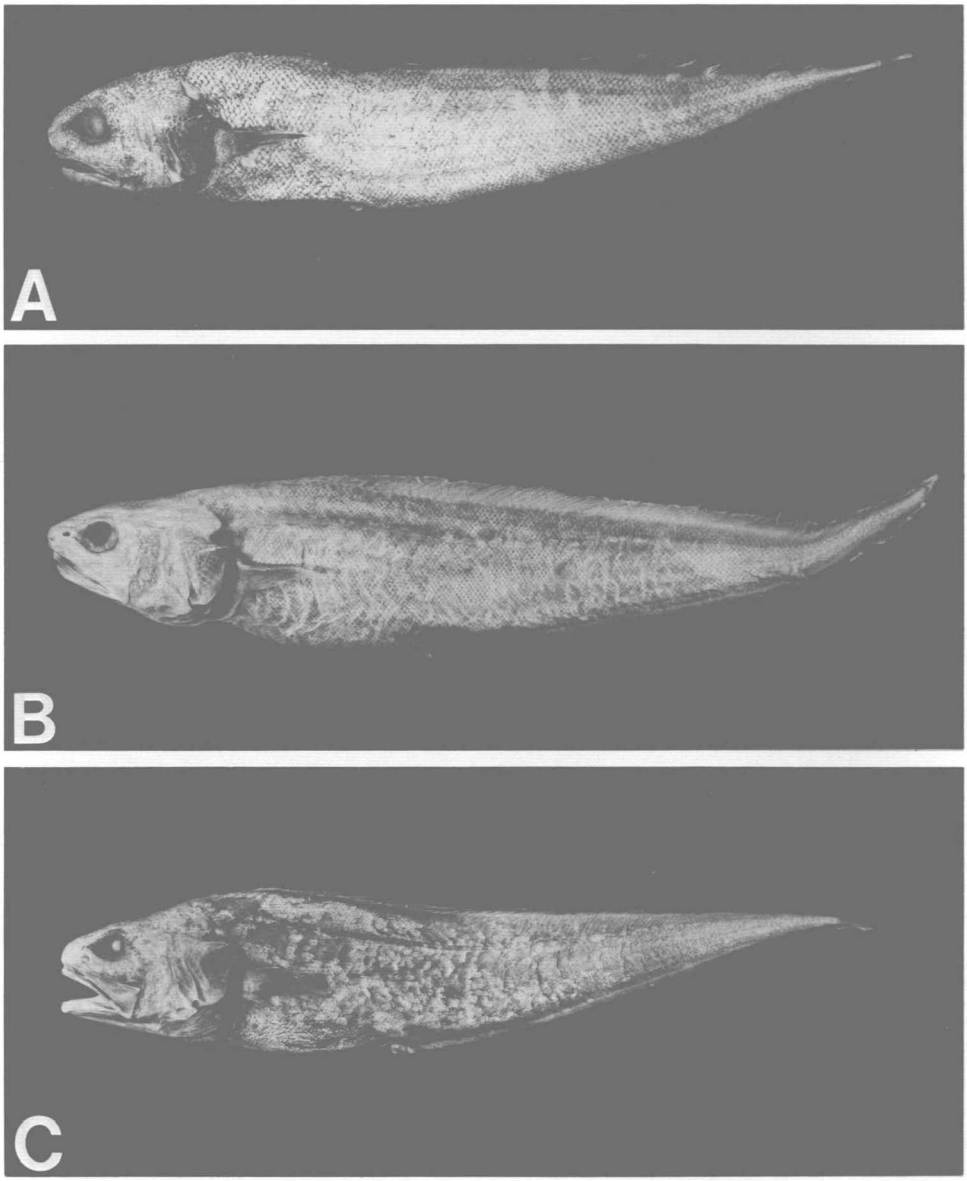

Figure 2. Specimens depicting three distinct morphological groups in genus *Monomitopus*: A, *M. agassizii* 194 mm SL; B, *M. magnus* n. sp. 425 mm SL; C, *M. torvus* 291 mm SL.

Paratypes.—USNM 228226 (4:362–535 mm SL), LACM 43581 (310 mm SL) SILVER BAY, St. 3516, 24°24′N, 80°00′W, 857 m; ZMUC P77754 (388 mm SL), COLUMBUS ISELIN, Cr. CI8007, St. C062, 29°09′N, 77°09′W, 930 m; MCZ 39414 (372 mm SL), ATLANTIS, Cr. Harvard-Havana Exped., St. 2990B, 23°16′N, 80°12′W, 759 m; UMML 13206 (245 mm SL), OREGON, St. 4374, 24°21′N, 83°36′W, 731 m; UMML 12512 (335 mm SL), GERDA, St. 103, 25°17′N, 79°40′W, 822 m; FMNH 94947 (244 mm SL), SILVER BAY, St. 452, 29°54′N, 79°02′W, 786 m.

Diagnosis.—*Monomitopus* with strong spines on preopercle; relatively slender head; nearly straight dorsal profile between eye and origin of the dorsal fin; gill raker formula on anterior arch of 4 short + 10–11 developed + 4 short rakers;

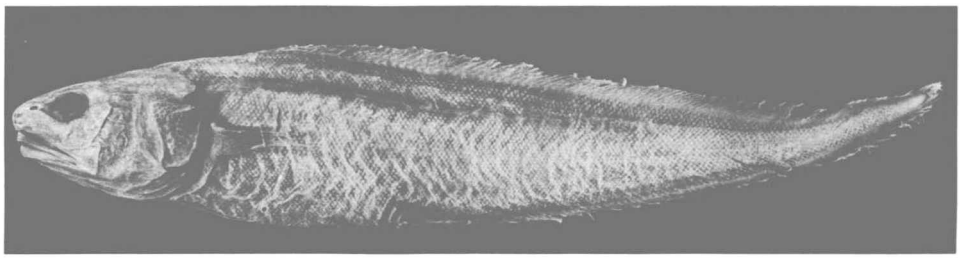

Figure 3. *Monomitopus magnus* n. sp., holotype, USNM 262507. Photographed by J. Russo.

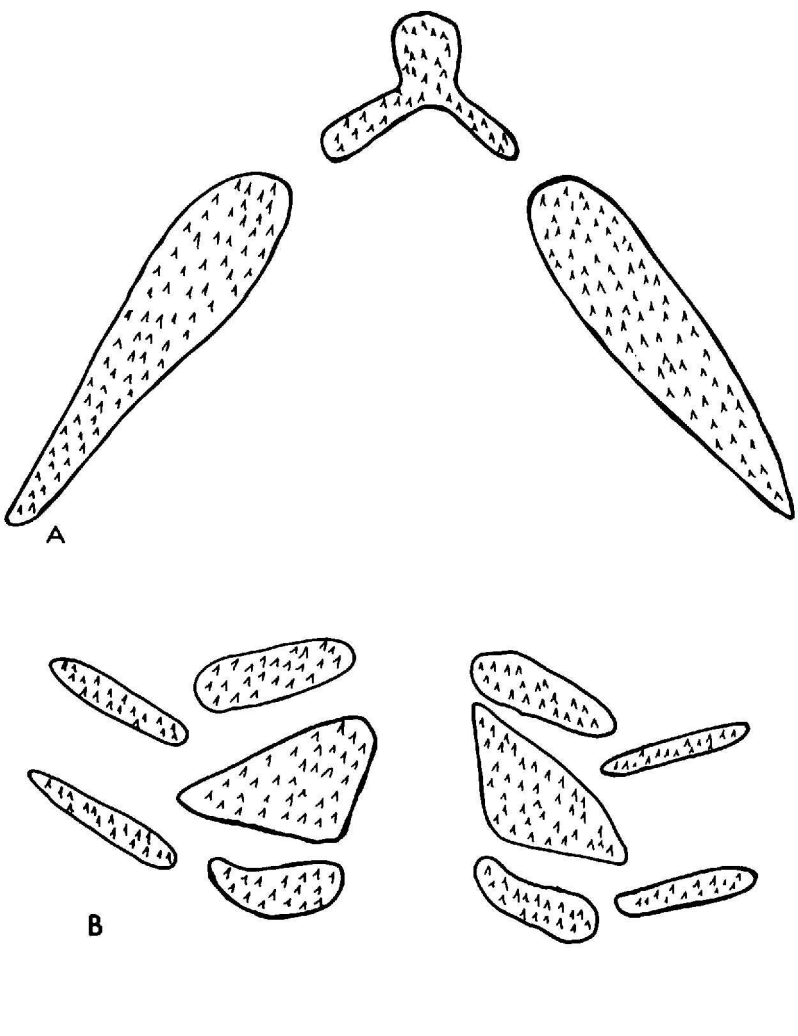

Figure 4. Arrangement of dentigerous plates in oral branchial cavity of holotype of *M. magnus*; A, vomer and palatine; B, upper pharyngeal patches. Basibranchial plate not shown.

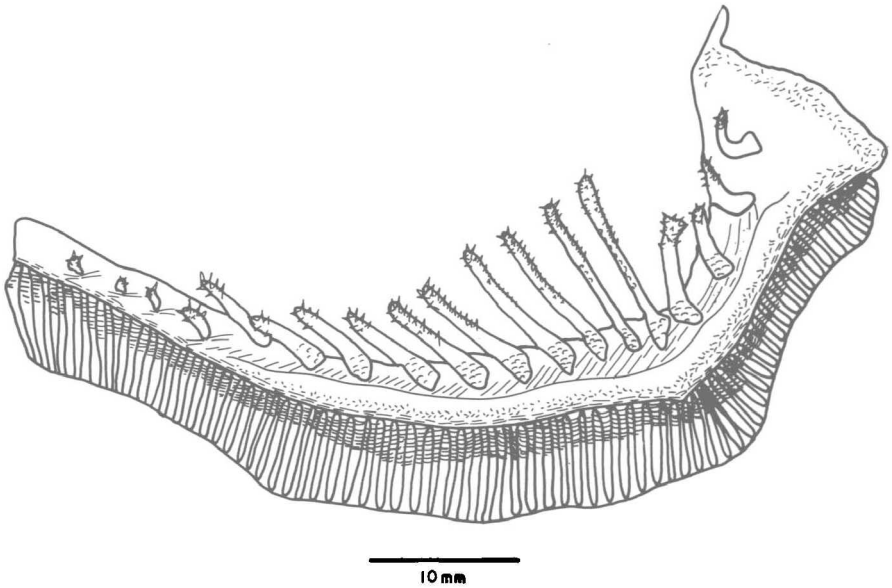

Figure 5. First branchial arch from right side of holotype of *Monomitopus magnus*.

104–108 dorsal fin rays; 85–92 anal fin rays; 15 precaudal vertebrae, 46–49 caudal vertebrae; and 56–59 lateral line scales to level vent. Table 1 compares *M. magnus* with its two most similar congeners, *M. americanum* and *M. pallidus*.

Description.—Body compressed, pale brown, opercular flap dark, almost bluish black. Orobranchial cavity lining dark brown. Dorsal and anal fin rays short, tipped in dark brown along posterior margins. Opercle with prominent, strong, bifurcated spine, rounded in cross-section; preopercular margin deeply emarginate with two flattened spine-like projections at lower angle. Pectoral fin margin entire, length equal to distance from tip of snout to posterior orbit of eye. Head compressed; nostrils widely separated, posterior naris close to eye, anterior naris with tube-like flap. Mouth large, slightly oblique, maxilla length about twice into head length; lower jaw slightly inferior. Eye large about four times into head length,

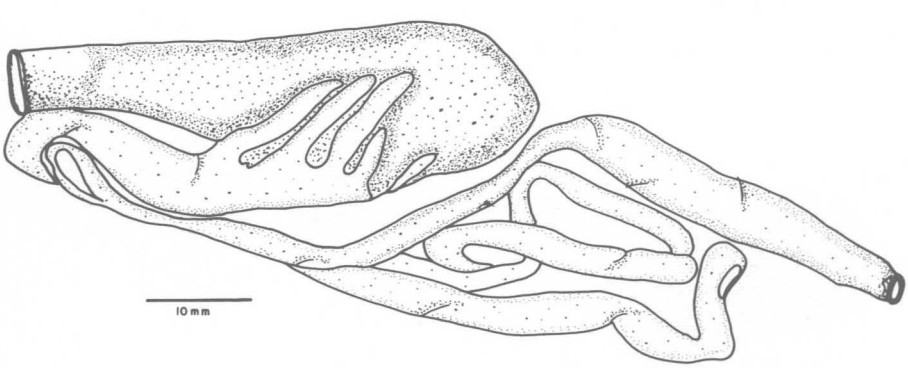

Figure 6. Lateral view of the alimentary tract of holotype of *Monomitopus magnus*.

Table 1. Meristic and morphometric characters of *Monomitopus magnus* new species, *M. americanum* and *M. pallidus*

	M. magnus new species				*M. americanum**				*M. pallidus*
Standard length (mm)	Holotype 425	Range 244–535	Mean 354	# 11	Holotype 235	Range 185–250	Mean	# 20	Paratype 175
Counts									
Dorsal fin rays	108	104–108	105	9	102	100–108	103	20	96
Caudal fin rays	8	8–8	8	9	8	8–8	8	17	8
Anal fin rays	92	85–92	89	9	83	82–89	85.3	19	77
Pectoral fin rays	29	27–31	29		29	28–32	29.6		28
Pseudobranchial filaments	2	2–2	2	9	2	2–2	2	20	2
Gill rakers on first arch	4/10/7	3/10/7–4/11/7	3/10/7	9	1/22/6	—	—	—	4/14/4
Branchiostegal rays	8	8–8	8	9	8	8–8	8	15	8
Precaudal vertebrae	15	15–15	15	9	14	13–14	13.9	20	13
Caudal vertebrae	49	46–49	48	9	48	45–49	48	20	44
Anterior anal ray below dorsal ray No.	21	20–21	21	9	23	21–23	22	20	20
Anterior anal ray below vertebrae No.	17	17–17	17	9	17	16–18	18	20	16
Anterior dorsal ray above vertebrae No.	6	6–6	6	9	5	5–6	5	20	5
Lateral line scales to level of vent	58	56–59	57	9	—	—	—	—	31
Anterior most dorsal fin pterygiophore originates between neural spines	4–5	—	3–4	9	—	—	—	—	3–4
Measurements as % of SL									
Head	23.5	23–24	23.2	9	21	20–22.5	21.5	20	21.2
Snout	5.8	5.3–6.0	5.6	9	5.5	5.2–6.0	5.6	20	5.4
Upper jaw	11.4	7–12	11.3	9	11	10–11.5	11	20	10.5
Horizontal eye diameter	4.7	4.7–5.0	4.7	9	5.6	5.2–6	5.5	20	5.6
Preanal	45.1	40–47	43.6	9	41.5	40–45	43.5	20	43.1
Predorsal	26.5	25–28	26.7	9	24.0	23–27	25	20	24.2
Distance from base of pelvics to vent	26.2	22–28	26.3	9	27.5	26–29	27.5	20	24.5
Body depth at level of vent	19.1	16–19	17.4	9	14.5	14–17	15.5	19	18.4
Maxilla width	3.6	3–4	3.5	9	—	—	—	—	3.3
Pelvic fin length	9.6	7–10	8.8	9	—	—	—	—	10.9
Interorbital width	5.6	5–5	5.4	9	—	—	—	—	3.8
Postorbital length	13.2	14–15	13.4	9	—	—	—	—	11.4

* Data from Nielsen (1971).

ovoid and very well developed. Lateral line broad, distinct anteriorly, disappearing beyond the midpoint of the body (Figs. 1–3).

Dentition.—Teeth minute, numerous and villiform, no enlarged outer row in jaws. Palatine tooth patch elongate, rounded anteriorly, tapering posteriorly; vomerine tooth patch with anterior section rounded and narrow diverging arms. Dentition interrupted across upper and lower jaw symphyses. Single narrow median basibranchial tooth patch. There are five upper pharyngeal tooth plates in each side (Fig. 4).

Gill Cavity.—Anterior first gill arch with four short rakers on upper limb, one developed at angle plus nine developed rakers and 2–4 short rakers on lower limb (Fig. 5); two rudimentary pseudobranchial filaments.

Integument.—Scales small (ca. 0.5 mm diameter), cycloid, completely covering the head and body and forming a sheath along base of dorsal and anal fins. Scales frequently missing on trawled specimens; however, scale pockets distinct.

Viscera.—Esophagus short with muscular walls. Stomach tube-like, longer (11.0% SL) than wide (4.1% SL), slightly swollen posteriorly; nine well developed pyloric caeca (Fig. 6). Intestine very long (70% SL) convoluted, thin-walled with a compact S-shaped coil immediately following the pylorus. Liver yellowish, extremely large, ending just in front of anus; highly variable in length in other specimens examined. Pancreas diffuse, occurring as nodules scattered throughout mesentary.

Swimbladder.—Swimbladder large, longer (17% SL) than wide (7% SL), thick-walled, overlying anterior portion of stomach. Well developed gas-gland and rete mirabile (5.1% SL). Anterior end of swimbladder with two protuberances. Nielsen (1971) notes a similar condition in the swimbladder of *M. americanum.* The anterior portion of the swimbladder contains a thick cream colored spongy foam (Wittenburg et al., 1980); its inner surface silvery in appearance. In males, a pair of extrinsic drumming muscles originates on the otic capsules and extend posteriorly to insert on the anterior ribs. A similar condition is present in *Monomitopus metriostoma* (Marshall, 1971) and *M. agassizii* (pers. observ.).

Axial Skeleton.—Well ossified skeleton with spindle shaped vertebral centra. First neural spine half the length of the second; anterior neural spines pointed and decreasing in length from 3–8, subsequent spines longer; neural arches become progressively smaller. Parapophyses long and broad on centra 1–4, poorly developed on centra 5–7, remainder of precaudal vertebrae with increasingly well developed parapophyses. First two vertebrae without pleural ribs. Vertebrae 3–12 with pleural ribs; epipleural ribs present on vertebrae 4–10. The caudal skeleton has two, separate hypural plates, each supporting four caudal rays.

Gonads.—Testes 35–50 mm long and 2.5–6.0 mm wide in four specimens (310–425 mm SL); milky-white in color, ribbon-shaped, coalesced along mid-line, borders slightly scalloped. Ovaries 20–23 mm long in a 372-mm SL specimen and 10–13 mm long in a 396-mm SL specimen; ova diameters between 0.3–0.5 mm; ovaries horseshoe-shaped, completely coalesced along mid-line and closely attached to abdominal wall. Remaining three specimens undeveloped.

Gut Contents.—The stomachs and alimentary tracts of nine specimens were examined. Five specimens contained euphausiid shrimp, gammaridean amphipods, fish scales, and a midwater myctophid probably of genus *Lampadena.* A moderate to heavy infestation of nematodes and digene trematodes was present in the stomach and intestinal tract of each specimen examined. *M. magnus* probably

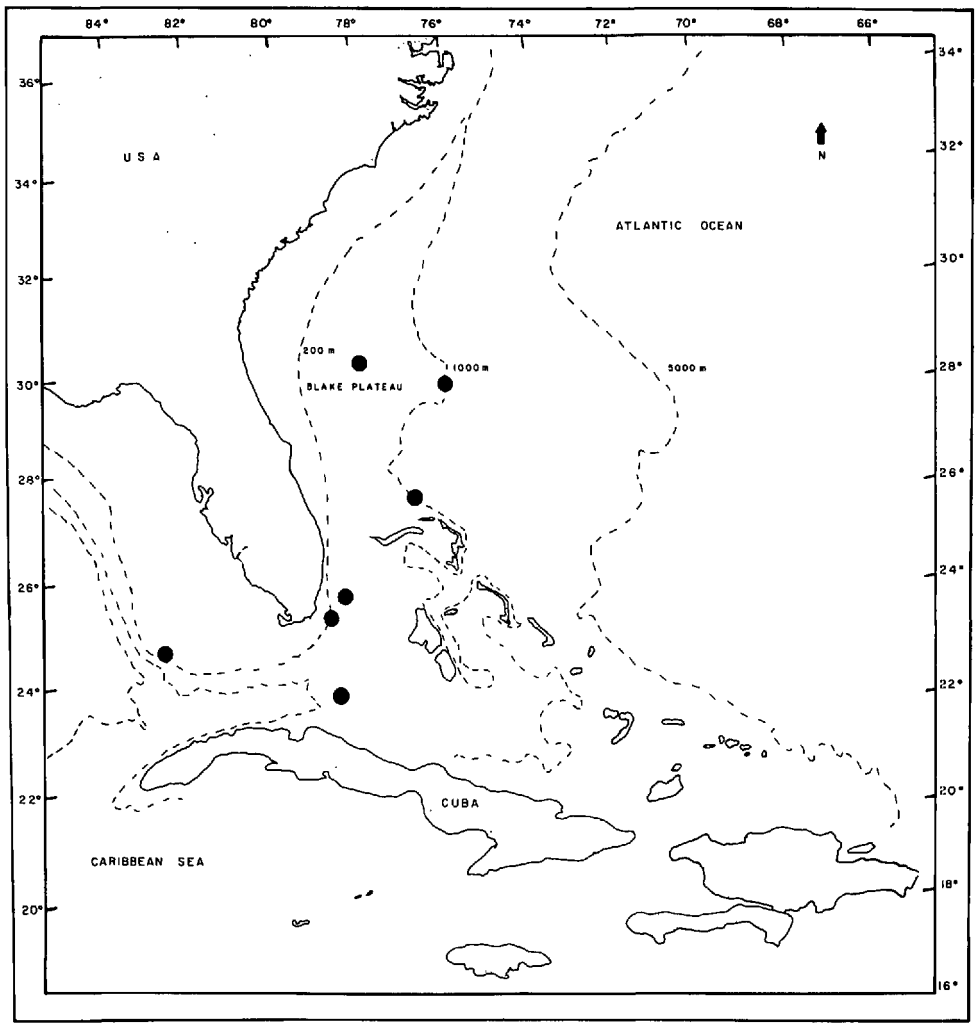

Figure 7. Known distribution of *Monomitopus magnus*.

feeds on or just above the bottom, utilizing both benthic and benthopelagic crustaceans and fishes.

Distribution.—All specimens of *M. magnus* were collected in the western North Atlantic between latitudes 23–30°N, and longitudes 77–84°W in depths of 731–930 m (Fig. 7). Estimated water temperatures range between 4.6–9.6°C. *M. magnus* appears restricted to the continental slope of Blake Plateau and Straits of Florida. Bottom sediments of these regions consist predominantly of soft, compacted, calcareous, globigerina ooze (Emery and Uchupi, 1972). The species may be restricted geographically to such sediment or an associated factor.

Etymology.—From the Latin "magnus" (large) referring to the fact that this species reaches a larger size than any known species in the genus.

Comparative Material Examined.—*Monomitopus conjugator,* syntypes (2) BMNH, F56/1 (18 mm SL) F57/1 (213 mm SL), INVESTIGATOR, St. 201, 08°44'N, 81°20'E, 592–640 m; USNM 231713 (158 mm SL); *Monomitopus longiceps,* holotype, USNM 74134 (305 mm SL), U.S.S. ALBATROSS, St. 5299, 20°5'N, 116°5'E, 958 m; *Monomitopus pallidus,* holotype, USNM 74133 (175 mm SL), U.S.S. ALBATROSS, St. 5259, 11°57'N, 121°42'E, 570 m; *Monomitopus americanus,* paratype USNM 205095 (235 mm SL), FFS WALTHER HERWIG, St. 64/68, 30°03'S, 47°44'W, 800 m; *Monomitopus torvus,* paratype, USNM 135354 (300 mm SL), U.S.S. ALBATROSS, St. 3384, 07°31'N, 79°14'W, 837 m; *Monomitopus kumae,* holotype, FMNH 58844 (363 mm SL), Misaki, Japan; *Monomitopus microlepis,* holotype, USNM 74156 (230 mm SL), U.S.S. ALBATROSS, St. 5410, 10°28'N, 124°5'E, 770 m; *Monomitopus garmani,* holotype, USNM 74135 (265 mm SL), U.S.S. ALBATROSS, St. 5610, 00°36'S, 122°01'E, 1,350 m.

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LITERATURE CITED

Alcock, A. 1889. Natural history notes from H. M. Indian Marine Survey Steamer "Investigator," Commander Alfred Carpenter, R.N., D.S.O., commanding.—No. 13. On the bathybial fishes of the Bay of Bengal and neighboring waters, obtained during the seasons 1885–1889. Ann. Mag. Nat. Hist., Ser. 6, 4: 376–399.

———. 1896. A supplementary list of the marine fish of India, with descriptions of two new genera and eight new species. J. Asiatic Soc. Bengal 65: 301–338.

Cohen, D. M. 1981. New and rare ophidiiform fishes from the eastern Atlantic: Canary Islands to the Cape of Good Hope. Proc. Biol. Soc. Wash. 94: 1085–1103.

——— and J. G. Nielsen. 1978. Guide to the identification of genera of the fish order Ophidiiformes with a tentative classification of the order. NOAA Tech. Rep., NMFS Circ. 417. 72 pp.

Emery, K. O. and E. Uchupi. 1972. Western Atlantic Ocean: topography, rocks, structure, water, life and sediments. Am. Ass. Petro. Geol. Mem. 17. 532 pp.

Garman, S. 1899. Reports on an exploration off the west coasts of Mexico, Central America and South America and off the Galapagos Islands, in charge of Alexander Agassiz, by the U.S. Fish Commission steamer "Albatross," during 1891, Lieut. Commander Z. L. Tanner, U.S.N. commanding. XXVI. The fishes. Mem. Mus. Comp. Zool. Harvard Coll. 24. 431 pp.

Goode, G. B. and T. H. Bean. 1896 (1895). Oceanic Ichthyology. U.S. Natl. Mus. Spec. Bull. 2. 553 pp.

Hubbs, C. L. and K. F. Lagler. 1958. Pages 19–26 *in* Fishes of the Great Lakes Region. Cranbrook Press, Bloomfield Hills, Michigan.

Jordan, D. S. and C. L. Hubbs. 1925. Record of fishes obtained by David Starr Jordan in Japan, 1922. Mem. Carnegie Mus. 10: 93–346.

Marshall, N. B. 1971. Explorations in the life of fishes. Harvard University Press, Cambridge. 204 pp.

——— and D. W. Bourne. 1967. Deep sea photography. Johns Hopkins oceanographic studies, J. B. Hersey, ed., No. 3. 254 pp.

Nielsen, J. C. 1971. Redescription of the genus *Selachophidium* (Pisces, Brotulidae) with two new species. Arch. Fischereiwiss. 22: 17–33.

Radcliffe, L. 1913. Description of seven new genera and thirty-one new species of fishes of the families Brotulidae and Carapidae from the Philippine Islands and the Dutch East Indies. Proc. U.S. Natl. Mus. 44: 135–176.

Vaillant, L. 188. Expéditions scientifiques du "Travailleur" et du Talisman pendant les années 1880, 1881, 1882, 1883. Poissons. G. Masson, Paris. 406 pp.
Wittenberg, J. B., D. E. Copeland, R. L. Haedrich and J. S. Child. 1980. The swimbladder wall is a lipid-rich barrier to oxygen diffusion. J. Mar. Biol. Ass. U.K. 60: 263–276.

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