IV.—*A Review of the American Species of Thread-fins*
(*Polynemidæ*).

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In this paper I have given the synonymy of the Thread-fins or *Polynemidæ* known to inhabit American waters, and an analytic key by which the species may be distinguished. All the specimens examined by me belong to the Museum of the University of Indiana. Most of them were collected by Dr. Jordan and his assistants.

INDIANA UNIVERSITY, July 8, 1889.

CHARACTERS OF THE POLYNEMIDÆ.

Body oblong, compressed and covered with rather large, loosely inserted, ctenoid scales. Lateral line continuous, continued on the tail, usually forked with a branch on each lobe. Head entirely scaly; snout more or less conical, projecting over the mouth, which is rather large, inferior, with lateral cleft; premaxillary protractile, its spine vertical; maxillary without supplemental bone, extending much beyond the eye, which is anterior, lateral, rather large, with adipose eyelid. Villiform teeth on jaws, palatines, and sometimes on vomer. Pseudobranchiæ concealed. Branchiostegals 7. Gill-membranes separate and free from the isthmus. Gills 4, a slit behind the fourth. Two separate dorsals, somewhat remote from each other, the first of 8 feeble but rather high spines, the first and last spines very short, the third longest; the second dorsal equal to first in height but base somewhat longer, of soft rays only. Anal fin either similar or much longer than soft dorsal; caudal fin rather long, widely forked. Second dorsal, anal, and caudal fins more or less covered with small scales; the first three or four dorsal spines winged. Ventrals I, 5, abdominal, but not far removed from pectorals; pectoral fins moderate, placed low, in two parts, the lower

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and anterior portion of several filiform articulated appendages, free from each other, said to be organs of touch. In the young, the dorsal, caudal, and pectoral fins are dusky, the anal and ventral fins white; all the fins grow darker with age, the pectorals usually becoming black, the operculum blackish. Bones of the skull with a well-developed muciferous system as in *Sciænidae*. "Basis cranii double, with tube; post-temporal bifurcate; scapula with median foramen; superior pharyngeal bones 4. Brachial ossicles divided; two normal, supporting the dorsal fin, one longitudinal without rays, and one a plate on the coracoid, supporting the pectoral filaments." (Cope.) Stomach cæcal, with a few pyloric appendages. Air-bladder various, sometimes wanting. Vertebrae 24. Genera 4, *Galeoides*, *Polistoneumus*, *Polynemus*, and *Polydactylus*, the last two only are found in America; species about 25, of which 5 are found in America. Inhabit tropical seas, and entering rivers. Most of them are valued as food fishes.

This peculiar family constitutes the group or suborder *Rhegnopteri*, characterized chiefly by the peculiarities of structure and attachment of the pectoral fin. Its relations appear to be with the *Sciænidae* on the one hand and with the *Mugilidae* on the other, but these resemblances may be superficial.

ANALYSIS OF AMERICAN GENERA OF POLYNEMIDÆ.

- a. Anal fin much longer than soft dorsal, of about 30 rays; vomer without teeth; preoperculum entire; free filaments of pectorals longer than body. **Polynemus, 1.**

- aa. Anal fin not much longer than soft dorsal, of about 13 or 14 rays; vomer with teeth; preoperculum serrate; free filaments of pectorals mostly shorter than body, **Polydactylus, 2.**

Genus I. **POLYNEMUS.**

Polynemus Gronow, Mus. Ichthyol. 31, 1754 (*quinguaris*).

Pentanemus Artedi, Sebæ Thesaurus, III, 74, 1758 (*quinguaris*).

Polynemus Linnæus, Syst. Nat., Ed. X, 317, 1758 (in part; *quinguaris*; *virgatus*; *paradisæus*).

Pentanemus Gunther (*quinguaris*).

Polynemus Gill, Proc. Acad. Nat. Sci. Phila., 272, 1861 (*quinguaris*).

Type. *Polynemus quinguaris* Linnæus.

Etymology. πολυς, many; νημα, thread.

ANALYSIS OF SPECIES OF **POLYNEMUS**.

a. Pectoral filaments 5:

D. VIII—I, 15; A. III, 30; Scales 6—73—17.....**quinquarius**, 1.

1. **Polynemus quinquarius**.

Polynemus Gronow, Mus. Ichthyol., 31, 1754 (Mus. Sebae).

Polynemus Artedi, "Sebae Thesaurus, III, 74, 1758" (Mus. Sebae).

Polynemus quinquarius Linnaeus, Syst. Nat., Ed. X, 317, 1758 (America, after Gronow); Linnaeus, Syst. Nat., I, 621, 1766; and of the copyists; Gronow, Syst. Ed. Gray, 176, 1854 (Oceano America).

Polynemus quinquarius Gunther, Cat. Fish. Brit. Mus., II, 331, 1860 (Asbantee; river Niger; Cuba).

Polynemus artedii Bennett, Proc. Zool. Soc., 146, 1831 (Africa).

Polynemus macronemus Pel, "Bydrage tot de Dierk. 9, 1851" (Africa).

Habitat. Atlantic Ocean; West Indies to coast of Africa.

Etymology. Lat. quinque, five.

This species is known to me only through description.

Genus II. **POLYDACTYLUS**.

Trichodon Klein, Historia Piscium, Miagus. V, 28, 1749 (*Procooda* Margrave = *virginicus*), (non-binomial).

Polynemus Linnaeus, Syst. Nat., Ed. X, 317, 1858 (in part, *quinquarius*; *virginicus*; *paradisicus*).

Polydactylus Lacépède, Hist. Nat. Poiss., VIII, 181, 1832 (*plumieri* = *virginicus*).

Polynemus Gunther, Cat. Fish. Brit. Mus., 319, 1860 (*paradisicus*).

Trichodon Gill, Proc. Acad. Nat. Sci. Phila., 274, 1861 (*plumieri* = *virginicus*).

Type. *Polydactylus plumieri* Lacépède = *Polynemus virginicus* Linnaeus.

Etymology. *πολύς*, many; *δάκτυλος*, finger.

ANALYSIS OF SPECIES OF **POLYDACTYLUS**.

a. Pectoral filaments 6 (rarely 5):

Body rather deep, compressed, the back elevated, anterior profile from snout to spinous dorsal slightly convex; maxillary $2\frac{1}{2}$ in head; snout 7 in head; eye large, less than interorbital space, 5 in head. Scales rather large. Longest dorsal spine $1\frac{1}{2}$ in head; caudal lobes somewhat longer than head; pectoral fin $1\frac{1}{2}$ in head; pectoral filaments longer than head, reaching to front of anal fin in adult. Color yellowish-white, darker above; pectorals black in adult. Head $3\frac{1}{2}$ in length; depth 3; D. VIII—I, 12; A. III, 13 or 14; Scales 6—62—10.....**approximans**, 2.

aa. Pectoral filaments 7:

Body deep, compressed, anterior profile nearly straight; maxillary $2\frac{1}{2}$ in head; length of snout 5 in head; eye large, equal to interorbital space, 5 in head. Scales moderate. Longest dorsal spine equal to longest ray of soft dorsal and $1\frac{1}{2}$ in head; caudal lobes about as long as head; pectoral fin $1\frac{1}{2}$ in head; pectoral filaments somewhat longer than head, reaching to front of anal fin, in adult. Color yellowish-white, darker above; scales on back with dark punctulations on their margins; the young silvery-white. Head $3\frac{1}{2}$ in length; depth $3\frac{1}{2}$; D. VIII—1, 9 to 12; A. III, 13 or 14; Scales 7—71—10.....**virginicus**, 3.

aaa. Pectoral filaments 8 or 9.

- b. Maxillary less than $\frac{1}{2}$ length of head; pectoral filaments 8; body somewhat compressed, elongated, anterior profile nearly straight, little declined. Head much compressed, gape oblique; snout 5 in head; eye less than interorbital space, $4\frac{1}{2}$ in head. Scales rather small. Longest dorsal spine $1\frac{1}{2}$ in head; longest ray of soft dorsal $1\frac{1}{2}$ in head; caudal lobe slightly longer than head, $3\frac{1}{2}$ in body; pectoral fins $1\frac{1}{2}$ in head; pectoral filaments reaching to vent in adult (*octofilis*), longer in young (*octonemus*). Color light olivaceous, tinged with dark punctulations; belly whitish; pectoral black in adult, pale in young. Head $3\frac{1}{2}$ in length; depth $3\frac{1}{2}$; D. VIII—1, 12 or 13; A. III, 13 to 16; Scales 6—70—10.

octonemus, 4.

66. Maxillary more than $\frac{1}{2}$ length of head; pectoral filaments usually 9; body elongate, compressed, outline from spinous dorsal to snout slightly convex, and little declined. Head much longer than high; snout conical, 7 in head; eye rather large, about 5 in head. Scales of small size. Longest dorsal spine $1\frac{1}{2}$ in head; longest ray of soft dorsal $1\frac{1}{2}$ in head; caudal lobes slightly longer than head; pectoral fin as long as head behind pupil; pectoral filaments reaching near front of anal fin in adult. Color greenish-brown above and yellowish-green below. Head $3\frac{1}{2}$ in length; depth $3\frac{1}{2}$; D. VIII—1, 12; A. III, 13; Scales 8—69 or 75—13.

opercularis, 5.**2. Polydactylus approximans.**

- Polymerus approximans* Lay & Bennett, Beechey's Voyage, Zool. Fish., 57, 1849 (Mazatlan). Gunther, Fish. Centr. Amer., 423, 1869 (Chiapas, Panama); Jordau & Gilbert, Proc. U. S. Nat. Mus., 366, 376, 1882 (Panama); Jordan & Gilbert, Bull. U. S. Fish. Com., 107, 111, 112, 1882 (Mazatlan; Panama; Pontas Arenas); Steindachner, Ichthyologische Beiträge, IV, 8, 1875 (copied); Jordan, Proc. U. S. Nat. Mus., 372, 1885 (Mazatlan; Panama); Jordan, Cat. Fish. N. Amer., 66, 1885; Jenkins & Evermann, Proc. U. S. Nat. Mus., 1888 (Guaymas).
Trichidion approximans Gill, Proc. Acad. Nat. Sci. Phila., 258, 1862 (Cape San Lucas); 169, 1863 (Panama).

Polynemus californiensis Alexandre Thomblot, Bulletin de la Société Philomathique de Paris, Séance du 27 Juin, 1886 (California).

Habitat. Pacific coast of Tropical America, from Guaymas to Pauama.

Etymology. Latin, *appropinans*, approaching.

This species is a common food fish of the Pacific coast of Mexico. The specimens examined by me are 11 inches in length, taken by Jenkins & Evermann at Guaymas.

3. *Polydactylus virginicus*.

Procoiba Margrave, Hist. Nat. Brazil, 176, 1648 (Brazil).

Polynemus virginicus Linnæus, Syst. Nat., Ed. X, 317, 1768 (America); Linnæus, Syst. Nat., 521, 1766, and of copyists; Jordan, Proc. U. S. Nat. Mus., 118, 1884 (Key West); Jordan, Proc. U. S. Nat. Mus., 36, 1886 (Havana).

Polynemus paradiseus Bloch, Ichthyologia, XII, 28, taf. 402, 1793; Bloch & Schneider, Syst. Ichthyologia, 18, 1801 (not of Linnæus).

Polydactylus plumieri Lacépède, Hist. Nat. Poiss., V, 419, 1803 (Martinique, from a drawing by Plumier).

Polynemus plumieri Günther, Cat. Fish. Brit. Mus., II, 321, 1860 (San Domingo); Jordan & Gilbert, Synop. Fish. North America, 413, 1883.

Trichodon plumieri Gill, Proc. Acad. Nat. Sci. Phila., 279, 1861 (Caribbean Sea); Poey, Synopsis Piscum Cubensium, 387, 1868 (Havana); Poey, Enumeratio Piscum Cubensium, 334, 1875 (Porto Rico).

Polynemus mango Lacépède, Hist. des Poiss., V, 413, 417, 418, 1803 (based on *P. virginicus* Linnæus).

Polynemus americanus Cov. & Val., III, 393, 1829.

Polynemus oligodon Günther, Cat. Fish. Brit. Mus., II, 322, 1860 (Rio Janeiro; Jamaica).

Habitat. West Indian fauna, north to the Florida Keys.

Etymology. Latin, from *virginia*.

The specimens examined by me were taken by Dr. Jordan, two at Key West $1\frac{1}{2}$ inches in length, and six at Havana $4\frac{1}{2}$ inches in length.

4. *Polydactylus octonemus*.

Polynemus octonemus Girard, Proc. Acad. Nat. Sci. Phila., 167, 1858 (Brazos Santiago; Galveston); Günther, Cat. Fish. Brit. Mus., II, 320, 1860 (copied); Goode & Bean, Proc. U. S. Nat. Mus. 128, 1879 (Pensacola, Fla.); Jordan & Gilbert, Synop. Fish. North America, 413, 1883.

Trichodon octonemus Gill, Proc. Acad. Nat. Sci. Phila., 280, 1861.

Trichodon octofilius Gill, Proc. Acad. Nat. Sci. Phila., 280, 1861 (New York).

Polynemus octofilius Jordan & Gilbert, Proc. U. S. Nat. Mus., 590, 1882 (Charleston, S. C.); Jordan & Gilbert, Synop. Fish. North America, 413, 1883.

Habitat. South Atlantic and Gulf coast of North America.

Etymology. *lávó*, eight, *ῥῆμα*, thread.

Following the suggestion of Dr. Jordan, I have regarded *Poly-nemus octofilis* Gill as the adult form of *Polydactylus octonemus*, from which it differs only in having darker pectoral fins and shorter pectoral filaments, differences which occur in other species of *Polydactylus* with age and no doubt in this one also.

The specimens examined by me were taken by Dr. Gilbert at Charleston, S. C., where it is very rare, entirely unknown to the fishermen.

5. *Polydactylus opercularis*.

Trichidion opercularis Gill, Proc. Acad. Nat. Sci. Phila., 168, 1863 (Cape San Lucas).

Polynemus opercularis Günther, Proc. Zool. Soc., 148, 1864 (copied); Günther, Fish. Centr. Amer., 424, 1869 (copied); Steindachner, Ichthyologische Beiträge, IV, 9, 1875 (copied); Jordan & Gilbert, Bull. U. S. Fish. Com., 107, 111, 1882 (Mazatlan; Panama); Jordan, Proc. U. S. Nat. Mus., 372, 1885 (Mazatlan; Panama); Jordan, Cat. Fish. North America, 66, 1885.

Polynemus melanopoma Günther, Fish. Centr. Amer., 421, 1869 (San José).

Habitat. Pacific coast of Tropical America.

Etymology. Latin, *opercularis*, from its dusky blotch on the operculum, found also in most other species.

This species is known to me from specimens dredged by the "Albatross" in the ocean south of Panama.

RECAPITULATION.

The following is the list of the genera and species of the family of Thread-fins (*Polynemidae*) recognized in this paper as occurring in American waters:—

1. *Polynemus* (Gronow) Linnæus.
 1. *Polynemus quinquarius* Linnæus.
2. *Polydactylus* Lacépède.
 2. *Polydactylus approximans* (Lay & Bennett).
 3. *Polydactylus virginicus* (Linnæus).
 4. *Polydactylus octonemus* (Girard).
 5. *Polydactylus opercularis* (Gill).