

Redescription of *Synagrops spinosus* (Percichthyidae) with its First Record from the West Pacific

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Abstract The percichthyid fish *Synagrops spinosus* Shultz is recorded for the first time from the West Pacific and is redescribed. Differences between the Pacific and Atlantic specimens are not significant, and they should be classified as the same species. This species is easily distinguished from the congeners by the combination of the following characters: second spine of first dorsal fin, second spine of anal fin and spine of pelvic fin with serration on their anterior margins; spine of second dorsal fin smooth; anal fin II, 7 (rarely II, 8); dorsal fin IX-I, 9; lateral line scales 29-31; lower jaw with two rows of teeth on its middle part, inner row consists of 4-7 large canine-like teeth, and outer row consists of very small teeth; vertebrae 10+15. This is a demersal fish mainly living on the outer parts of the continental shelves and the upper parts of their slopes at depths of 87-544 meters. The distribution in the two separate and greatly distant areas is discussed in relation to the continental drift and climatic changes since the late Cretaceous.

The percichthyid fish *Synagrops spinosus* Shultz, 1940, was described from the Gulf of Mexico as a new species on the basis of a single specimen which was one of the paratypes of *Hypoclydonia bella* Goode et Bean. Subsequently, there was only one publication in which the fish was reported (Fujii, 1983), and the description was very brief there.

The senior author found two specimens of *S. spinosus* from the West Pacific. He also found many specimens of the fish among the collections of the U.S. National Museum of Natural History and the California Academy of Sciences which were all collected from the Gulf of Mexico, the Caribbean Sea and adjacent waters in the middle part of the West Atlantic.

In the present paper, we redescribe the species on the basis of the West Pacific specimens as well as of the West Atlantic specimens. We also present some information on the biology and distribution of the fish.

Abbreviations of the institutes are as follows. FUMT: Department of Fisheries, University Museum, University of Tokyo; USNM: U.S. National Museum of Natural History; CAS: California Academy of Sciences.

In the description, the head length was measured from the tip of the snout to the posterior end of the opercle, and the length of the caudal peduncle was measured from the base of the last soft ray of the anal fin to the center of the base

of the caudal fin. Counts of the vertebrae, rays of unpaired fins, and predorsal bones were done by radiography.

Synagrops spinosus Shultz, 1940
(Japanese name: Nokoba-sumikuiuo)
(Fig. 1)

Synagrops spinosa Shultz, 1940: 417-419.

Synagrops spinosus: Fujii, 1983: 297.

Materials from the West Pacific. FUMT-P 4901, 1 specimen, 101 mm SL, 124 mm TL, off Owase, Kumano Sea, Japan, 150-200 m deep, bottom trawl, Apr. 21, 1979; CAS 49092, 1 specimen, 73 mm SL, off Hainan, South China Sea (19°06'30"N, 112°38'E), July 22, 1958.

Materials from the Gulf of Mexico, the Caribbean Sea, and adjacent seas (the West Atlantic). USNM 74324, holotype (one of the paratypes of *Hypoclydonia bella* Goode et Bean), 104 mm SL, female, Gulf of Mexico (28°38'30"N, 85°52'30"W), 256 m deep, Mar. 14, 1885; USNM 159777, 8 specimens, 77-104 mm SL, the Gulf of Mexico; USNM 186185, 1 specimen, 108 mm SL, off Suriname (07°34'N, 54°50'W), shrimp trawl, 360 m deep, Nov. 6, 1959; USNM 229543, 6 specimens, 67-75 mm SL, off Honduras, Caribbean Sea (16°39'N, 82°45'W), 315 m deep, trawl, Oct. 25, 1970; USNM 229544, 1 specimen, 122 mm SL, female, off Nicaragua (12°23'N, 82°29'W), 360 m deep, Feb. 6, 1962; USNM 229545, 6 specimens, 71-84 mm SL, off Louisiana, Gulf of Mexico (27°55'N, 92°42'W), 198 m deep, shrimp trawl, Jan. 28, 1969; USNM 229546, 1 specimen, 106 mm SL, Caribbean Sea (12°07'N, 82°44'W),

Table 1. Counts and proportional measurements of *Synagrops spinosus* from the West Pacific and from the Gulf of Mexico, the Caribbean Sea and adjacent seas. Results in the left column of the holotype were obtained by the present authors, those in the right from the original description.

Character	Pacific specimens		Atlantic specimens			
	FUMT-P 4901	CAS 49092	USNM 74324 (holotype)		Min.-Max. (Mean)	(No. of specimens)
Standard length in mm	101	73	104	105	65-122	(26)
Counts						
Dorsal fin rays	IX-I, 9	IX-I, 9	IX-I, 9	IX-I, 9	IX-I, 9	(26)
Anal fin rays	II, 7	II, 7	II, 7	II, 7	II, 7-8 (II, 7)	(25)
Pectoral fin rays	18	16	16	16	15-16 (16)	(26)
Pelvic fin rays	I, 5	I, 5	I, 5	I, 5	I, 5	(26)
Branched caudal fin rays	8+7	8+7	8+7	8+7	8+7	(26)
Lateral line scales to hypural end	30	30	30	31	29-31 (30)	(26)
Transverse scales (above/below lateral line)	3/10	—/—	3/—	—/—	3/—	(8/—)
Gill rakers	3+1+12	4+1+12	4+1+14	5+14	3-4+1+11-14 (3+1+13)	(26)
Branchiostegals	7	7	7	7	7	(26)
Vertebrae	10+15	10+15	10+15	10+15	10+15	(26)
Predorsal bones	3	3	3	3	3	(26)
Measurements in standard length						
Head length	2.69	2.70	3.06	2.84	2.78-3.12 (2.93)	(26)
Body depth	3.54	3.48	3.47	3.44	3.35-4.05 (3.72)	(25)
Body width	6.52	7.30	6.93	—	7.00-8.75 (7.87)	(26)
Snout to origin of first dorsal fin base	2.46	2.43	2.60	2.71	2.37-2.72 (2.55)	(26)
Snout to end of first dorsal fin base	1.68	1.70	1.68	—	1.63-1.75 (1.69)	(26)
Snout to origin of second dorsal fin base	1.52	1.59	1.53	—	1.46-1.57 (1.51)	(25)
Snout to end of second dorsal fin base	1.26	1.28	1.27	—	1.23-1.28 (1.26)	(25)

Snout to origin of anal fin base	1.46	1.55	1.49	1.47	1.39–1.51 (1.46)	(26)
Snout to end of anal fin base	1.25	1.30	1.25	—	1.20–1.32 (1.25)	(25)
Snout to pectoral insertion	2.77	2.70	2.81	2.84	2.59–3.09 (2.74)	(26)
Snout to pelvic insertion	2.77	2.61	2.54	2.64	2.47–2.84 (2.69)	(26)
Snout to anus	1.53	1.59	1.55	1.55	1.47–1.67 (1.55)	(25)
Length of dorsal fin base	2.38	2.43	2.31	—	2.28–2.54 (2.38)	(25)
Length of anal fin base	8.42	8.11	6.50	—	6.80–9.45 (7.82)	(25)
Measurements in head length						
Snout length	3.95	3.86	3.78	4.11	3.30–4.60 (4.02)	(26)
Eye diameter	3.13	3.38	3.40	3.42	2.88–3.60 (3.15)	(26)
Interorbital space	3.95	3.86	3.09	3.98	3.00–4.25 (3.54)	(26)
Upper jaw length	2.08	2.08	1.79	—	1.83–2.09 (1.96)	(26)
Caudal peduncle depth	3.13	3.38	2.62	3.11	2.67–3.29 (2.97)	(26)
Caudal peduncle length	1.60	1.69	1.48	1.48	1.32–1.71 (1.54)	(25)
Second spine length of first dorsal fin	—	—	—	—	1.79–2.07 (1.93)	(3)
Third spine length of first dorsal fin	1.97	—	—	2.18	1.47–1.69 (1.58)	(2)
Second spine length of anal fin	4.69	4.50	3.78	3.85	3.11–4.44 (3.75)	(22)
Length of pectoral fin	1.47	1.43	—	1.42	1.17–1.28 (1.23)	(23)
Length of pelvic fin spine	2.50	2.25	—	—	1.67–2.33 (2.07)	(13)

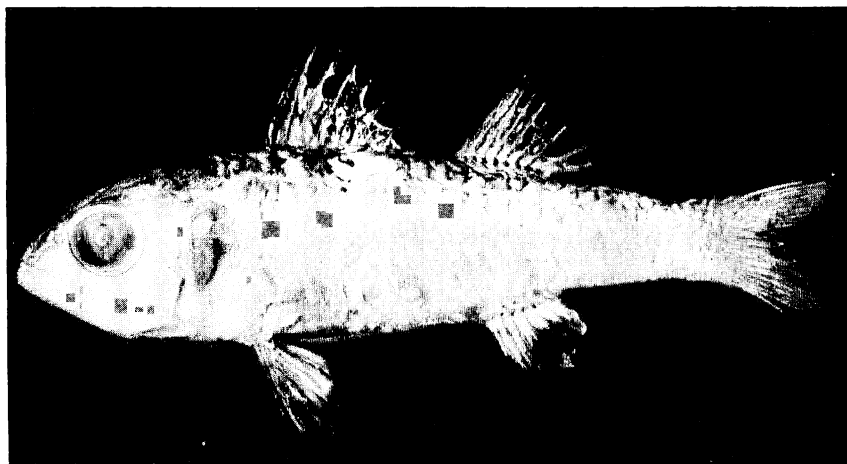


Fig. 1. *Synagrops spinosus* from Japan, FUMT-P 4901, 101 mm SL.

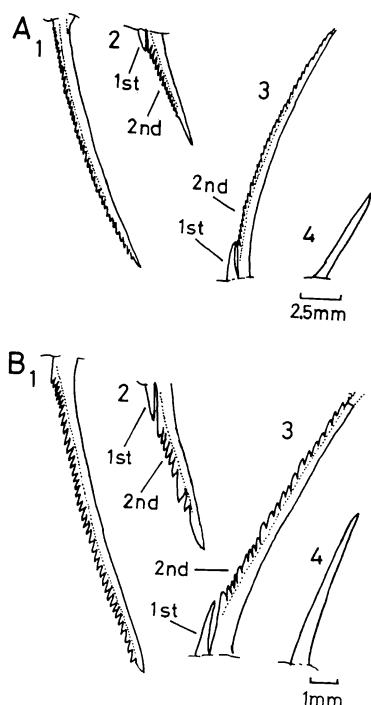


Fig. 2. Pelvic spine (1), first and second spines of anal fin (2), first and second spines of first dorsal fin (3), and spine of second dorsal fin (4) in *Synagrops spinosus*. A, FUMT-P 4901 from Japan; B, USNM 157977 from the Gulf of Mexico.

189 m deep, shrimp trawl, Feb. 7, 1967; USNM 229547, 1 specimen, 87 mm SL, off Texas-Mexico border, Gulf of Mexico (26°00'N, 96°19'W), 180 m deep, shrimp trawl, Apr. 6, 1964; CAS 31997, 2 specimens, 63, 98 mm SL, 36°38.8'N, 74°44.1'W, 87 m deep, otter

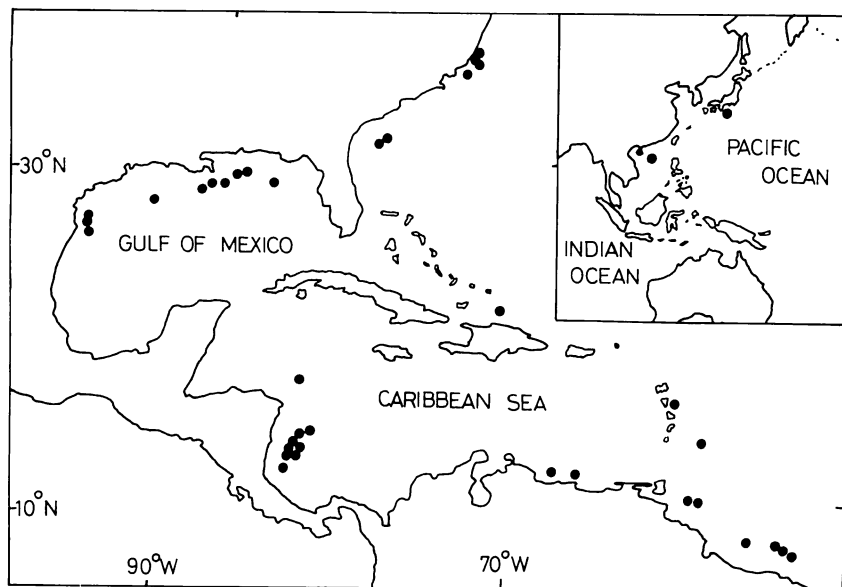
trawl, June 8, 1973.

Materials from the West Atlantic examined only for their scientific name and collecting data. USNM 156812, 11°27'N, 83°11'W, 247 m deep; USNM 156952, 07°44'N, 56°52'W, 366 m deep; USNM 179852 (included among specimens of *Synagrops* (= *Hypoclydonia*) *bellus*), 28°46'N 89°18'W, 110 m deep; USNM 185085, 09°45'N, 59°45'W; USNM 185699, 07°27'N, 54°27'W, 233 m deep; USNM 186046, 28°30'N, 89°22'W, 156 m deep; USNM 186106, 29°38'N, 87°16.5'W, 205 m deep; USNM 186108, 29°20'N, 87°42'W, 185 m deep; USNM 186128, 07°34'N, 54°50'W, 366 m deep; USNM 186450, 09°41'N, 59°47'W, 275 m deep; USNM 197481, 12°31'N, 82°21'W, 366 m deep; USNM 229559 (included among specimens of *S. bellus*), 31°41'N, 79°30'W, 137 m deep; about 250 uncatalogued specimens of USNM.

Diagnosis. Anterior margins of second spine of first dorsal fin, second spine of anal fin, and spine of pelvic fin serrated; spine of second dorsal fin smooth (Fig. 2). Anal fin II, 7 (rarely II, 8); dorsal fin IX-I, 9. Scales on lateral line 29-31. Lower jaw with two tooth rows on its middle part; inner row consists of 4-7 large canine-like teeth of which the anterior ones smaller, and outer row consists of very small teeth. Vertebrae 10+15.

Description of the West Pacific specimens. Counts and proportional measurements are shown in Table 1.

Body compressed, with large scales, most of which rubbed off; several scales on anterior part of lateral line and behind bases of pectoral and pelvic fins cycloid. Head compressed, with no scales except on opercular region and nape.

Fig. 3. Distribution of *Synagrops spinosus*.

Mouth large, oblique. Lower jaw slightly projected. Posterior end of maxillary reaches below posterior margin of pupil. Eye large. Interorbital region slightly convex. Supramaxillary single. Opercle with two weak spines. Subopercle elongate beyond posterior tip of opercle; lower part of the margin weakly serrated. Upper margin of interopercle with weak serration. Posterior margin of preopercle serrated; median part of posterior margin of its flange overhanging preopercular sensory channel with small strong spines. Pseudobranchii well developed. Anus just in front of anal fin.

First dorsal fin naked; first and last spines short; the second long, with a row of small spines on its anterior margin; the third longest, smooth. Spine of second dorsal fin smooth; soft dorsal with small scales at least near its base. First spine of anal fin very short, smooth; the second with a row of small spines on its anterior margin, about half of length of longest anal fin ray. Pectoral fin long, reaches to anus. Spine of pelvic fin serrated on its anterior margin (Fig. 2A). Caudal fin forked.

Upper jaw with villiform teeth on its length, with a large canine-like tooth near symphysis. Lower jaw with one or two large recurved canine-like teeth near symphysis, and with patch of villiform teeth on both anterior and posterior

parts of the jaw; two rows of teeth on middle part of the jaw, inner row consists of 4–5 canine-like teeth, of which the anterior ones smaller, and outer row consists of very small teeth. A triangular patch of very small teeth on prevomer. Palatine with a very narrow band of small teeth. Tongue smooth.

Color in alcohol: Head and body uniformly brownish; numerous melanophores scattered on head. Posterior part of skin in each scale pocket around first and second dorsal fins blackish brown; skin of most scale pockets rubbed off. Membrane near tip of first dorsal fin blackish, those of the other fins transparent. Dorsal surface of tongue with scattered melanophores. Branchial cavity blackish brown. Peritoneum black.

Descriptions of the West Atlantic specimens.

The specimens from the West Atlantic closely resemble the West Pacific specimens except in some characters. In the following description those characters are mainly described.

Counts and proportional measurements are shown in Table 1.

Body with large scales rubbed off except on some parts; in holotype, scales on anterior part of lateral line, on posterior part of lateral line on caudal fin, and behind base of pelvic fin all cycloid; in specimens (USNM 229544, 229547)

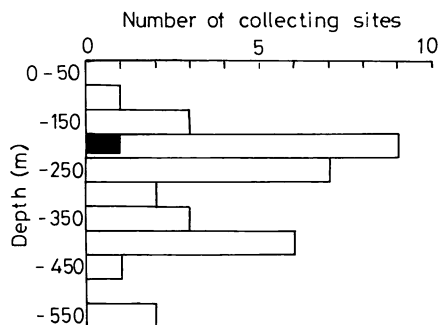


Fig. 4. Frequency distribution of collecting depths of *Synagrops spinosus* from the West Atlantic (□) and from Japan (■).

some scales on lateral line and just behind base of pelvic fin cycloid. Posteroventral parts of preopercle, subopercle and interopercle with weak serration. Second spine of first dorsal fin, spine of pelvic fin and second spine of anal fin with a row of small spines on its anterior margin; spine of second dorsal fin smooth (Fig. 2B). Teeth of inner row on middle part of lower jaw 4-7 in number. Pyloric caeca 5 in holotype.

Color in alcohol: In most specimens surface layer of skin and scales rubbed off; body and head light brown, dorsal side darker. Inside mouth blackish brown, sometimes light brown or whitish. Branchial cavity blackish or light brown. Peritoneum brown or blackish brown.

Distribution and biological notes. *Synagrops spinosus* was originally described from the Gulf of Mexico on the basis of a single specimen which was one of the paratypes of *Hypoclydonia bella*. Subsequently, this fish has not been recorded except by Fujii (1983), although it is not a rare species. Many specimens of the fish have been collected in the Gulf of Mexico, the Caribbean Sea, and adjacent seas between 07°27'N and 36°38'N, and between 54°27'W and 74°44.1'W. Outside these areas, it has been collected only from the West Pacific, i.e. the coastal area of Japan and the South China Sea near Hainan (Fig. 3).

This species has been collected at depths of 87-544 meters, mainly of 150-400 meters, in the Caribbean Sea, the Gulf of Mexico, and adjacent waters (Fig. 4), and the specimen from Japan was collected at a depth of 150-200 meters. All specimens examined in the present study were collected by several kinds of bottom trawl. The

information on fishing gear implies that the fish is demersal and lives in sandy or muddy areas mainly on the outer parts of the continental shelves and the upper parts of their slopes.

One specimen of 122 mm SL, USNM 229544, had many eggs in its ovary, which were about 0.3-0.4 mm in diameter.

Discussion

The specimens of *Synagrops spinosus* from the West Pacific closely resemble those from the Caribbean Sea, the Gulf of Mexico, and adjacent waters in most characters, and any significant differences were not found between them. Therefore, they should be classified as the same species. They were easily identified as *S. spinosus* in having the characters shown in the diagnosis of the present paper.

This fish is distributed in two greatly distant and isolated areas, i.e. in the middle part of the West Atlantic and in the West Pacific. As an explanation for the distribution pattern, the following hypothesis is probably the most acceptable.

The distributional area of this fish had greatly expanded at some stages, probably during earlier stages, of its geographical distribution and the fish was distributed extensively in tropical and/or temperate areas such as the Tethys Sea in the early and/or middle Tertiary. Then the distributional area was divided into several parts by geographical events such as the collision between Africa and Eurasia in the middle Tertiary and by climatic changes in the Tertiary, i.e. decreasing temperature in the high latitudes. As a result, the fish remains in the present two reduced areas.

One specimen of 122 mm SL, USNM 229544, was matured because it had a developing ovary and eggs of 0.3-0.4 mm in diameter. It was caught in February, and its spawning season probably includes that month at least in the Caribbean Sea.

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permission and assistance to examine the specimens in their collections. We also thank Mr. Shojiro Fukui of Nachi-Katsuura, Wakayama Pref. and people at the Owase Fish Market, Mie Pref., Japan, for their assistance in collecting fish specimens.

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スズキ科ノコバスキウオの再記載と西部太平洋からの初記録

望月賢二・Solomon Gultneh

熊野灘および南シナ海で採集された標本をもとにスズキ科 Percichthyidae のノコバスキウオ *Synagrops spinosus* を西部太平洋から初めて記録した。本種はこれまでメキシコ湾からの原記載とスリナム沖からの標本によって知られているだけであった。そこでこれらをつくむ西部大西洋で採集された標本を調べ、西部太平洋産の標本と比較した。その結果、両者の間に重要な違いはなく、同一種であるとの結論を得た。本種の形態的特徴は以下の通りである。腹鰭棘、臀鰭第2棘、および第1背鰭第2棘の各前縁に明瞭な1小棘列を有する。第2背鰭棘に小棘列がない。臀鰭が2棘7軟条（稀に8軟条）である。第1背鰭が9棘、第2背鰭が1棘9軟条である。側線鱗数は29–31である。下顎側部に4–7本の犬歯状歯列があり、そのすぐ外側に1列の微小歯列がある。脊椎骨は10+15である。本種はこれらの形質の組合せにより本科の他種と容易に区別できる。本種は底魚類の一種で、主に100–500 m 水深の大陸棚および同斜面上部から底曳網類により採集されている。また、本種の西部大西洋と西部太平洋という大きく隔たった分布について、第三紀における海洋構造の変遷や気候の変化との関係で議論した。

(望月: 113 東京都文京区本郷 7-3-1 東京大学総合研究資料館; Gultneh: 150 東京都渋谷区広尾 国際協力事業団青年海外協力隊)