PROCEEDINGS

OF THE

CALIFORNIA ACADEMY OF SCIENCES

FOURTH SERIES

Vol. XLI, No. 20, pp. 453–473; 9 figs., 3 tables. January 24, 1979

THE SCORPIONFISH GENUS *MINOUS* (SCORPAENIDAE, MINOINAE) INCLUDING A NEW SPECIES FROM THE INDIAN OCEAN

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Abstract: The scorpionfish genus *Minous*, the only genus in the subfamily Minoinae, is reviewed. The nominal genera *Corythobatus* Cantor, *Decterias* Jordan and Starks, *Lysodermus* Smith and Pope, and *Paraminous* Fowler are treated as synonyms of *Minous* Cuvier. Nine species are recognized, of which *M. dempsterae* is described as a new species occurring from the Gulf of Oman to western India. The genus is known from the western Pacific and the Indian Ocean and the species are found on soft bottoms in depths from about 10 to 420 m. Descriptions, synonymies, figures, and ranges are given for each species, and a key to the species is provided.

Introduction

Scorpionfishes of the genus *Minous* occur only in the Indo-West Pacific faunal region, from Japan to Australia westward to the western Indian Ocean and Red Sea. Species are mostly coastal in distribution and live at depths between about 10 and 420 meters. Most, if not all, live on mud or sand bottom in marine waters and appear to be common in these habitats. They are small, scaleless fishes, rarely exceeding 15 cm in total length; some grow only to about 7.5 cm. Members of the genus are characterized by having the lowermost ray of the pectoral fin separated from the rest of the fin; these free rays are covered distally with a peculiar "cap" (or "glove"), and are evidently used for "walking" on the bottom.

Our knowledge of the species of *Minous* is based on regional studies, and no previous author has attempted to treat all species. Little is known about these fishes, and their higher-category placement among other scorpionfishes is uncertain. They are frequently placed in the stonefish family, Synanceiidae (e.g., as by Herre 1951; Smith 1957; and de Beaufort 1962), but Jordan and Starks (1904), Fowler (1938a), and Matsubara (1943) among others felt that they constituted their own subfamily Minoinae of the Scorpaenidae. We distinguish the subfamily Minoinae from the Synanceiinae and Choridactylinae (*Inimicus* and *Choridactylus*) by the lack of accessory lateralis pores on the body in the Minoinae, among other features (see Eschmeyer and Rama-Rao 1973).

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Some species of the genus *Minous* are interesting because of their presumed commensal relationship with gymnoblastic hydroids. Alcock (1892) recorded a case of commensalism between *Stylactis minoi* Alcock and *Minous inermis* Alcock from India. Franz and Stechow (1908) and Franz (1910) reported *Stylactis minoi* on *Minous* spp. from Japan. Also, at least some species are known to have venomous fin spines.

Acknowledgments

Most of the specimens used in the study were provided by the Smithsonian Oceanographic Sorting Center or were ones available to us in the collections of the California Academy of Sciences (CAS) and the Zoological Survey of India (ZSI). Loans were made by Dr. T. Abe, University of Tokyo (UT); the United States National Museum (USNM); Dr. G. R. Allen, Western Australian Museum, Perth (WAM); Dr. R. M. Bailey, University of Michigan Museum of Zoology (UMMZ); Dr. J. E. Böhlke, Academy of Natural Sciences of Philadelphia (ANSP); Dr. R. K. Johnson, Field Museum of Natural History (FMNH); and Dr. A. D. Welander, University of Washington, College of Fisheries (UWCF). A visiting-scientist fellowship provided by the California Academy of Sciences and a grant from the Smithsonian Institution through the U.S. Foreign Currency Program allowed Rama-Rao to participate in this study. We are grateful to the Zoological Survey of India for permitting him to travel to the United States. A trip to overseas museums by Eschmeyer was supported by National Science Foundation grant GB–15811. We thank the following persons for assistance to Eschmeyer during visits to their museums: Drs. M. L. Bauchot and J. C. Hureau, Muséum National d'Histoire Naturelle, Paris (MNHN); Dr. M. Boeseman, Rijksmuseum van Natuurlijke Historie, Leiden (RMNH); Drs. C. Karrer and K. Deckert, Zoologische Museum, Humboldt University, Berlin (ZMHU); Dr. A. G. K. Menon, Zoological Survey of India, Calcutta (ZSI); Dr. J. Paxton, Australian Museum, Sydney (AMS); and A. Wheeler and staff, British Museum (Natural History), London (BMHN). Lillian J. Dempster helped with literature and translations, and she provided comments on the manuscript. Drawings were made by Katherine Smith, and photographic assistance was provided by Kenneth E. Lucas, Maurice Giles, and Lloyd Ulberg. Franz B. Steiner, CAS Field Associate, made a special effort to collect specimens from India, Thailand, Taiwan, and the Philippines. Others at CAS assisting in the study were M. Barbour, W. I. Follett, J. Gordon, T. Iwamoto, B. Meinhard, S. Poss, B. Powell, C. Ruark, P. Sonoda, and B. Wesemann.

Methods

Methods are those used by Eschmeyer (1969) and differ little from those used to describe teleost fishes. In species of the genus *Minous*, the last element of the dorsal and anal fins is single, separate, and well spaced from the preceding ray, and it is counted as a full ray; all soft rays of the dorsal and anal fins are unbranched. Pectoral fin length is measured from the base of the uppermost ray to the tip of the longest ray.

Subfamily Minoinae

Minoinae Jordan and Starks, 1904:93 (in key; for *Minous* and *Decterias*). Fowler 1938a:51 (in key). Matsubara 1943:398–399 (description; internal features).

Remarks.—Only the genus *Minous*, with its synonyms *Corythobatus*, *Decterias*, *Lysodermus*, and *Paraminous*, belongs to this subfamily. The subfamily is diagnosed under the genus below.

Genus **Minous** Cuvier

Minous Cuvier *in* Cuvier and Valenciennes, 1829:420 (type-species *Scorpaena monodactyla* Bloch and Schneider, 1801, by subsequent designation of Bleeker 1876).

Corythobatus Cantor, 1849:1027 (replacement name for *Minois* Hübner, 1816, Lepidoptera).

Decterias Jordan and Starks, 1904:154 (type-species *Minous pusillus* Temminck and Schlegel, 1843, by original designation).

Lysodermus Smith and Pope, 1906:483 (type-species *Lysodermus satsumae* Smith and Pope, by original designation).

Paraminous Fowler, 1943:68 (type-species *Paraminous quincarinatus* Fowler, by original designation).

Nomenclatural Remarks.—Reasons for including the nominal genera listed above as synonyms of *Minous* are as follows. The genus *Corythobatus* was proposed as a substitute name for *Minous*, which Cantor thought was preoccupied by *Minois* Hübner, but according to Article 56(a) of the International Code of Zoological Nomenclature, *Minous* and *Minois* are both available generic names as they differ in spelling. *Lysodermus* was based on an abnormal specimen of *M. monodactylus*, a specimen with 7 instead of the normal 9–11 dorsal spines. *Dec-*

terias and *Paraminous* were established on characters, such as flexible dorsal spines and short head spines, which do not warrant separate genera. Species may be sorted into groups based on different characters, but no sharp division is noted between groups of species. *Minous monodactylus*, *M. versicolor*, and *M. quincarinatus* have the first dorsal spine long and well separated from the second spine, while the other species have a small first dorsal spine which is situated very close to the base of the second spine; the long first dorsal spine in these three species results from a loss of the first small spine as evidenced by the anterior vertebrae, neural arches, and pterygiophores. *Minous pusillus* is the only species with hairlike dorsal spines; *M. inermis* has thin and flexible dorsal spines, while the others have sharp, firm spines, but in some species the spines are thin and flexible in the young (e.g., *M. trachycephalus*). *Paraminous* was established for two species on the basis of their having short head spines, but this condition also occurs in other species. On the basis of head spination, two groups, one with five species and one with four, are evident: those with long head spines (especially the preopercular and posterior lachrymal spines) and those with short spines. Five species have a gas bladder and four apparently do not, but we can not correlate this with other morphological differences. We therefore conclude that all species belong in the genus *Minous*.

Diagnosis.—Dorsal spines 8–12, dorsal soft rays 8–14; total dorsal fin elements 19–24. Anal fin with 2 spines and 7–11 soft rays, total 9–13; spines almost indistinguishable from soft rays. Pectoral fin normally with 12 rays in all species; lower pectoral ray completely free from rest of fin, slightly enlarged, and fitted at its tip with a cuticular "cap" (this cap frequently rubbed off in preserved specimens). Pelvic fin with 1 spine and 5 soft rays. Soft rays of all fins unbranched. Second suborbital bone (= third circumorbital bone) becoming wider posteriorly and firmly attached to preopercular bone. Scales absent, except for tubes of lateral line. No accessory lateralis pores on body. Vertebrae 24–27. Gas bladder present or absent. First 2 neural spines point forward; first 2 or 3 dorsal fin pterygiophores (2 if first dorsal spines is lost) interspersed between second and third neural spines. Hypurals coalesced into 2 plates. Teeth in jaws small; palatine teeth absent; vomerine teeth present. Upper part of eyeball and lower jaw with dermal cirri; no tentacles or skin flaps on body.

Species Characters.—The nine species of the genus may be separated with various combinations of characters. Several species can be identified merely by the coloration on the inside of the pectoral fin. As in many other scorpionfishes, display of bright colors in the pectoral fin axil as a fright response probably occurs in species of *Minous*. The first two dorsal spines are either about the same length and normally spaced or the first is very short and close to the base of the second spine. The preopercular spines are either well developed or moderately developed, usually six in number, with the longest (second from top and immediately posterior to suborbital ridge) reaching to the end of the opercle or reaching only about halfway across the opercle. The posterior lachrymal spine lying over the maxillary is very long and bayonet-shaped in some species or it is short and stubby or intermediate in other species. Body coloration was found to be useful in separating some species. One species has the dorsal spines nearly hairlike, while they are flexible or stout in the others. One species has an especially long pectoral fin. Meristic features, particularly of dorsal and anal fin rays and vertebrae, show some differences among the species.

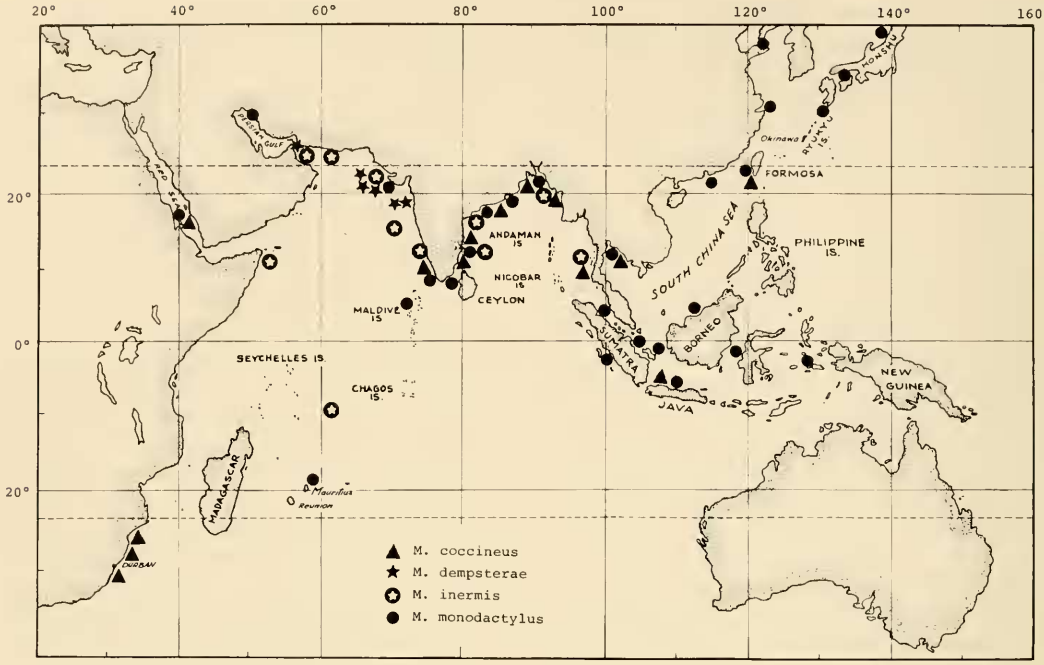
Distribution.—Species of the genus *Minous* are restricted to the Indian Ocean and the western Pacific as presented in Figure 1. We suspect that further trawling will reveal that some species have wider ranges than now known. They can be classified as coastal species, occurring on mud or sand bottom.

Key to the Species of the Genus *Minous*

1a. First dorsal spine equal to or longer than second dorsal spine, well separated from the base of the second spine 2

1b. First dorsal spine shorter than second dorsal spine, usually less than half the second and sometimes extremely small, close to second spine at base 4

2a. Caudal fin without transverse dark bars; inside of pectoral fin with dark brown stripes overlying the rays (Fig. 2c); posterior lachrymal spine moderate, about twice length of anterior spine and not bayonet-shaped (Fig. 2a) ..... *M. quincarinatus* (Fig. 3a)



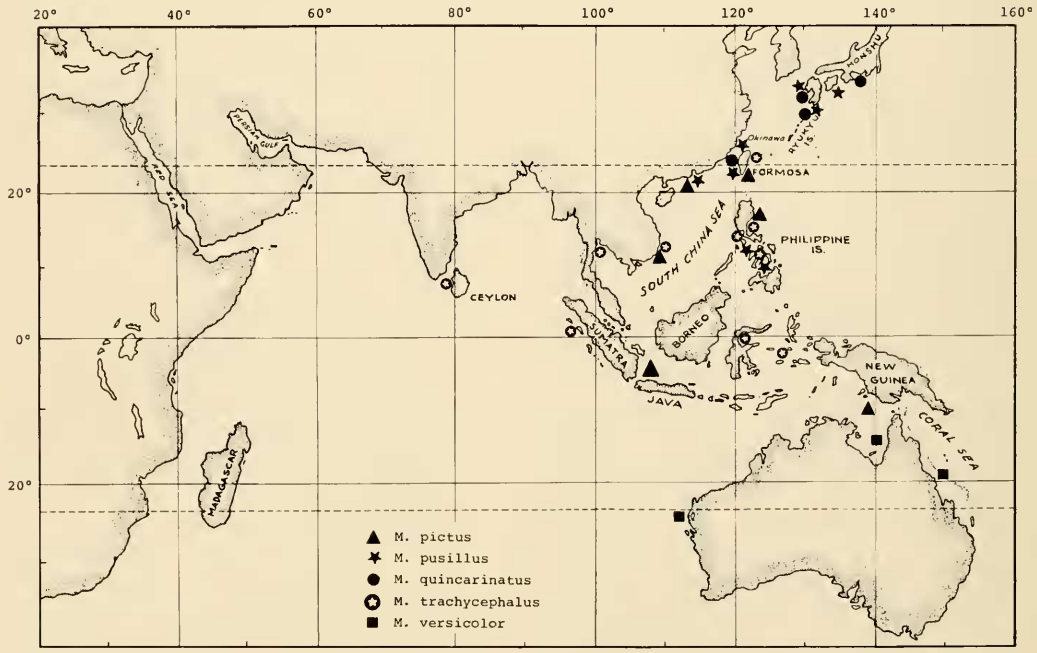


FIGURE 1. Distribution of the species of the genus *Minous*.

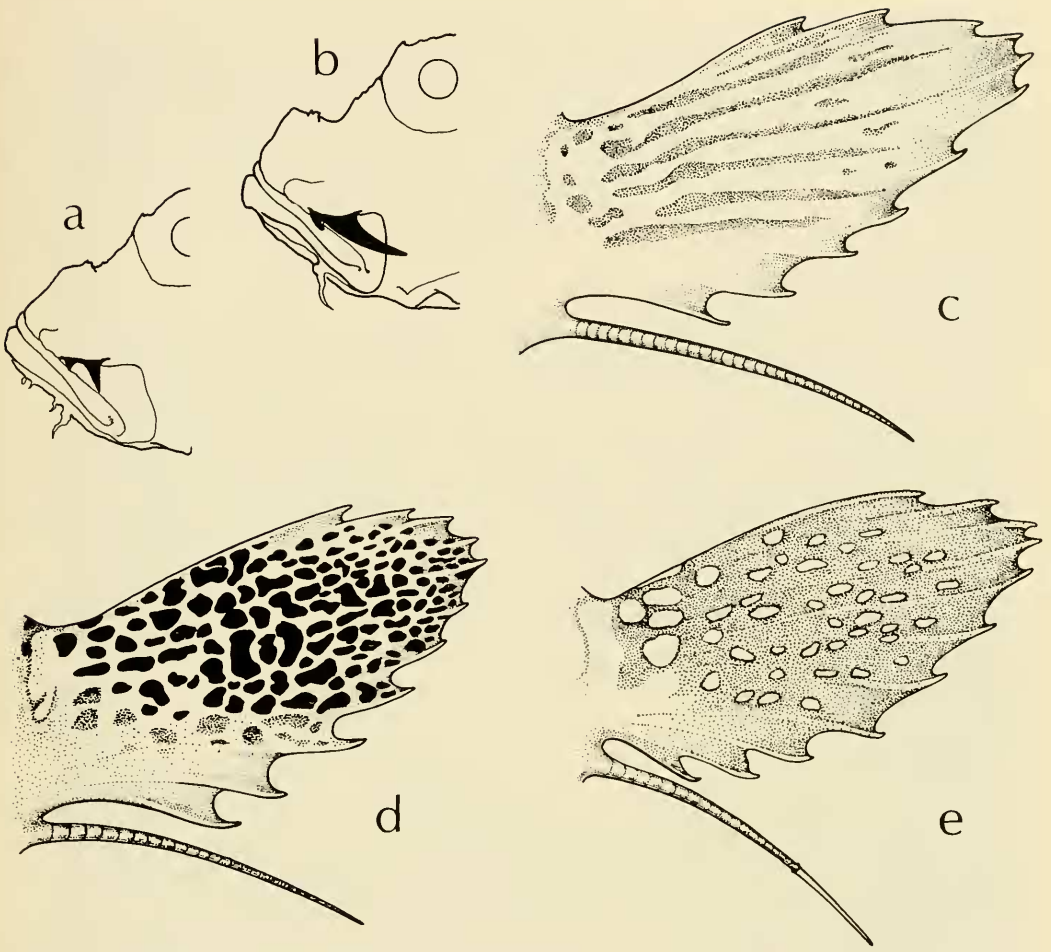


FIGURE 2. Diagram of lachrymal spines (in black) in (*a*) *Minous quincarinatus* and (*b*) *M. monodactylus*; coloration on inside of pectoral fin in (*c*) *M. quincarinatus*, (*d*) *M. coccineus*, and (*e*) *M. dempsterae*.

2b. Caudal fin with transverse dark bars; inside of pectoral fin mostly plain colored, not as in Figure 2c; posterior lachrymal spine long and bayonet-shaped (Fig. 2b) 3

3a. Dorsal spines usually 9; caudal fin usually with 3 or 4 transverse wavy bands; soft dorsal fin with wavy bands ..... *M. versicolor* (Fig. 3b)

3b. Dorsal spines usually 10 or more; caudal fin with 2 broad vertical dark bars; soft dorsal fin intensely black on anterior half ..... *M. monodactylus* (Fig. 3c)

4a. Dorsal spines weak and hairlike ..... *M. pusillus* (Fig. 4)

4b. Dorsal spines strong or moderately strong, or thin and flexible, not hairlike 5

5a. Pectoral fin long (more than 50% SL), reaching to over end of anal fin ..... *M. inermis* (Fig. 5)

5b. Pectoral fin moderate (less than 46% SL), reaching to middle of anal fin as a maximum 6

6a. Soft dorsal fin with 8–10 rays, usually 10; anal fin spines plus soft rays total 9–11, usually 10; lachrymal spines about same length; caudal fin rays usually with alternating dark and pale coloration ..... *M. trachycephalus* (Fig. 6)

Table 1. Dorsal Fin Ray Counts in Species of Genus *Minous*.

Species	VIII	IX	X	XI	XII	8	9	10	11	12	13	14	Total rays 19	20	21	22	23	24
M. quincarinatus	2	13	—	—	—	—	—	—	—	1	12	2	—	—	2	12	1	—
M. versicolor	3	16	—	—	—	—	—	—	3	11	5	—	—	4	12	3	—	—
M. monodactylus[1]	—	2	34	1	—	—	—	6	30	2	—	—	1	6	31	—	—	—
M. pusillus	—	1	8	16	—	—	1	22	2	—	—	—	—	8	17	—	—	—
M. inermis	—	10	9	—	—	—	—	—	—	2	8	9	—	—	—	4	12	3
M. trachycephalus	—	—	1	22	—	1	6	16	—	—	—	—	2	6	15	—	—	—
M. coccineus	—	—	1	21	—	—	—	—	4	18	—	—	—	—	1	4	17	—
M. pictus	—	—	3	22	1	—	—	—	1	23	2	—	—	—	—	2	23	1
M. dempsterae	—	—	3	31	—	—	—	—	7	24	3	—	—	—	—	7	25	2

[1] One abnormal specimen with VII spines.

6b. Soft dorsal fin with 11–13 rays, usually 12; anal fin spines plus soft rays 11–13, usually 12; posterior lachrymal spine much longer than anterior lachrymal spine; caudal fin pale, with no dark markings 7

7a. Inside of pectoral fin with irregular black spots on a pale background (Fig. 2d) ..... *M. coccineus* (Fig. 7)

7b. Inside of pectoral fin without irregular black spots 8

8a. Inside of pectoral fin with stripes radiating distally along course of fin rays (similar to *M. quincarinatus*, Fig. 2c) ..... *M. pictus* (Fig. 8a)

8b. Inside of pectoral fin with pale spots on a dark background (Fig. 2e) ..... *M. dempsterae* (Figs. 8b, 9)

Minous quincarinatus (Fowler)

(Figures 1, 2a,c, 3a; Tables 1–2)

Paraminous quincarinatus Fowler, 1943:69–70, fig. 13 (original description; type locality southern Japan, 30°12′N, 130°44′E, 84 fms [154 m], Albatross dredge sta. 4930, 15 Aug. 1906; holotype USNM 99515).

?*Minous inermis:* Franz and Stechow 1908:753 (Sagami Bay, Japan; infested with hydroid *Stylactis minoi* Alcock).

?*Minous adamsi* var *inermis:* Franz 1910:73, pl. 9, fig. 70 (brief description; hydroids growing on specimens; 2 from Misaki, Japan).

Minous inermis: Jordan, Tanaka, and Snyder 1913:247 (listed; Japan). Matsubara 1943:401, 406–409, fig. 139 (misidentified; good description; comparisons; internal features; Kumano-Nada and Nagasaki, Japan). Kamohara 1952:68 (listed; Japan); 1958a:57 (listed; Japan); 1964:75 (listed; Japan).

Material Examined.—Japan: USNM 99515 (75.0 mm SL, holotype of *M. quincarinatus*), for detailed locality see synonymy.

Taiwan: CAS 13879 (8, 97.0–116), CAS 13880 (1, 79.0, cleared and stained), and USNM 218456 (2, 102–108), Taiwan Strait, about 26°N, 121°E, about 90 m, bottom trawl, F. B. Steiner, 16 June 1971. CAS 13882 (3, 102–108), Taiwan Strait, about 25°N, 120°E, about 90 m, bottom trawl, F. B. Steiner, Apr. 1971. Additional material: CAS 30003 (1), CAS 30308 (6).

Description (See also generic diagnosis; Figs. 2a,c, 3a; Tables 1–2).—Dorsal fin with 8–9 (usually 9) spines and 12–14 (usually 13) soft

Table 2. Anal Fin Ray and Vertebral Counts in Species of the Genus *Minous*.

	Total anal spines and rays 9	10	11	12	13	Vertebrae 24	25	26	27
M. quincarinatus	—	1	2	12	—	—	—	3	9
M. versicolor	—	1	17	1	—	—	1	8	—
M. monodactylus	2	3	29	4	—	—	1	14	—
M. pusillus	—	21	4	—	—	—	16	—	—
M. inermis	—	1	6	10	2	—	—	3	16
M. trachycephalus	1	20	2	—	—	1	6	—	—
M. coccineus	—	—	4	18	—	—	—	7	—
M. pictus	—	—	6	19	1	1	2	8	1
M. dempsterae	—	—	11	22	1	—	1	18	1

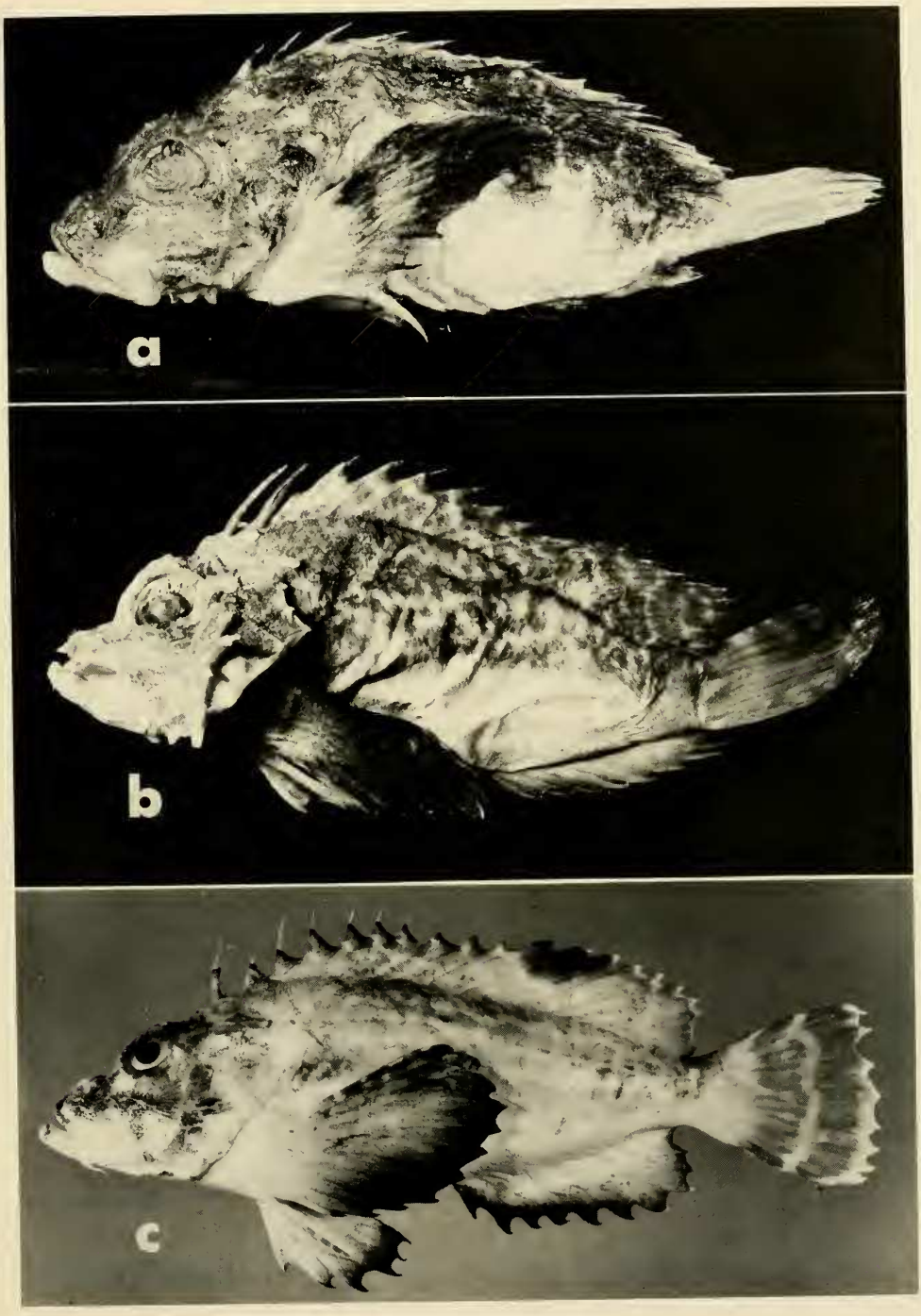


FIGURE 3. (*a*) *Minous quincarinatus*, CAS 30308, 105 mm SL, Taiwan. (*b*) *M. versicolor*, WAM P4397, 84.5 mm Sl, Exmouth Gulf, Australia. (*c*) *M. monodactylus*, BPBM uncat., 88 mm SL, Madras, India (photo by John E. Randall from a fresh specimen.)

rays; total dorsal spines and rays 21–23 (usually 22); dorsal spines sharp and strong; first dorsal spine long, about equal to second and well separated from it. Anal fin with 2 spines and 8–10 (usually 10) soft rays; spines difficult to distinguish from soft rays; total anal fin elements 10–12 (usually 12). Vertebrae 26 (3 specimens) or 27 (9). Gill rakers total 11–16 on outside of first arch, 3–4 on upper arch, 8–12 on lower arch. Lateral line pores 16–18. Gas bladder absent. Pectoral fin reaching to about beginning of anal fin. Head with ridges, spines poorly developed. Lachrymal bone with 2 sharp but short spines over maxillary; first points down and forward, second down and slightly to rear; second spine slightly longer than first.

General body shape and preserved coloration as in Figure 3a. First 4 or 5 dorsal spines with blackish area at distal part of membrane. Body coloration variable. Dorsal half of body brownish or grayish, with blotchy pale spotted areas, and irregular pale stripes. Ventral portion of body pale, lacking markings. Anal fin black anteriorly, pale posteriorly. Pectoral fin base whitish, outside of fin mostly black. Inside of pectoral fin as in Figure 2c; axil pale, usually with 2 or 3 brown spots; dark stripes radiate out along pectoral rays; fin darker distally. Pelvic fin base pale, fin blackish distally. Caudal fin pale.

Measurements for 14 specimens (75.0–116 mm SL) in percent of standard length: head 37–45; orbit 10–12; snout 13–17; interorbital width 8–10; postorbital 15–20; pectoral fin 35–46.

Distribution.—*Minous quincarinatus* is an Oriental species known from southern Japan and Taiwan in depths ranging from 90–154 m.

Minous versicolor Ogilby

(Figures 1, 3b; Tables 1–2)

Minous versicolor Ogilby, 1910:111–113 (original description; type locality Australia, Cape Gloucester, in 26 fms). McCulloch 1915:162–163, pl. 32, (description; comparison with *monodactylus* and *adamsi*); 1929:391 (compiled). Marshall 1965:428–429, fig. 414 on pl. 57 (brief description; figure from McCulloch 1929).

Minous monodactylus: McKay 1964:11 (in text; recorded from Western Australia; sting). Mees 1964:48 (*versicolor* probably a synonym; Australian specimens).

Material Examined.—All from Australia. Syntypes of *M. versicolor:* AMS E2736 (2, 71.4–74.1), AMS E2738 (1, 75), AMS 113603–13604 (2, 75.7 –76.5), all from 7 miles (11 km) NNE off Bowen, Queensland.

Gulf of Carpentaria: WAM P5711 (1, 57), Albatross Bay, E. Gamberg, 20 Jan. 1962. WAM P5712 (1, 54.3), Albatross Bay, E. Gamberg, 22 Jan. 1962. WAM P10827 (1, 55), sta. 1530, R. J. McKay, Oct. 1964.

Western Australia: WAM P4397 (1, 84.5), Exmouth Gulf, R. J. McKay, 19 Oct. 1958. WAM P5714 (1, 79.4), Shark Bay area, W. and W. Poole, June–July 1971. WAM P5735 (1, 47), Dampier Archipelago, about 6–7 miles (ca. 10–11 km) N of Delambre I., B. R. Wilson, 9 June 1960. WAM P7073–75 (3, 77.1–83.9), Shark Bay, R. J. McKay, 1962. WAM P13934–36 (3, 52–80), Shark Bay, W. and W. Poole. WAM P14196–97 (2, 45.8–61.5), Shark Bay, R. J. McKay, June 1962.

Description (See also generic diagnosis; Fig. 3b; Tables 1–2).—Dorsal fin with 8–9 (usually 9) spines and 11–13 (usually 12) soft rays; total dorsal spines and rays 20–22 (usually 21); dorsal spines sharp and strong; first dorsal spine long, about equal to second in length and well separated from it. Anal fin with 2 spines and 8–10 (usually 9) soft rays; spines difficult to distinguish from soft rays; total anal fin elements 10–12 (usually 11). Vertebrae 25 (1 specimen) or 26 (8). Gill rakers total 10–14 on first gill arch, 2–4 on upper arch, 7–11 on lower arch. Lateral line pores 17–19. Gas bladder absent. Pectoral fin reaching to middle of anal fin as a maximum. Head spines well developed. Lachrymal bone with 2 sharp spines over maxillary; first long, about half length of second; second very long and curved to rear.

General body shape and preserved coloration in Figure 3b. Lower half of body whitish, upper half with stripes and oblique bars. Irregular stripes extend along lateral line, above and below. More or less regular oblique bars cross the dorsal fin and usually extend onto body. Dorsal fin membranes blackish distally. Outer surface of pectoral fin dark distally; inner surface of pectoral fin mostly dark gray or black with one or two paler areas, without spots or stripes. Pelvic fin and anal fin dusky, black distally. Caudal fin usually with 4 cross bars.

Measurements for 19 specimens (45.0–84.5 mm SL) in percent standard length: head 37–46; orbit 11–16; snout 9–12; interorbital width 7–12; postorbital 13–21; pectoral fin 35–41; first dorsal spine 16–21; second dorsal spine 12–17.

Distribution.—*Minous versicolor* is the only Australian species of the genus and occurs from Shark Bay, Western Australia, across northern Australia and south on the east coast to Queensland. Few depths of capture are known and are between 12–64 m.

Minous monodactylus (Bloch and Schneider)

(Figures 1, 2b, 3c; Tables 1–2)

Scorpaena monodactyla Bloch and Schneider, 1801:194 (original description; no type locality).

Apistus minous CUVIER, 1829:167–168 (listed; based on Russell 1803, pl. 159A).

Apistus monodactylus CUVIER *in* CUVIER AND VALENCIENNES, 1829: fig. 2 on pl. 95 (figure).

Minous woora CUVIER *in* CUVIER AND VALENCIENNES, 1829:421–424 (original description; based in part on Russell 1803:44, pl. 159A, as 'Woora-minoo' from Vizagapatam, India, and on specimens from Isle-de-France [Mauritius]). RICHARDSON, 1846:213 (specimens from China). BLEEKER 1852a:251–252 (description; Sumatra).

Scorpaena biaculeata: CUVIER *in* CUVIER AND VALENCIENNES 1829:424 (nomen nudum [unpublished name from Kuhl and Van Hasselt]; as synonym of *M. monodactylus*).

Minous monodactylus: CUVIER *in* CUVIER AND VALENCIENNES 1829: 424–426 (description based on specimen from Batavia; figured on pl. 95 under name of *Apistus monodactylus*). BLEEKER 1849:9 (listed; Java); 1851:19 (listed; Indian Archipelago); 1852b:720 (listed; Banka); 1854a:57 (listed; Sumatra). GÜNTHER 1860: 148–149 (synonymy; British Museum specimens from India, China, and Borneo; *M. adamsi* as a synonym). BLEEKER 1861:31, 49 (listed; Singapore); 1874:87 (listed; Mauritius); 1876b:6, 10–12, 61, 63–65 (synonymy; description; specimens from Sumatra, Pinang, Singapore, Bangkok, Java, Borneo, and Celebes). DAY 1875:159, fig. 7 on pl. XXXVIII (synonymy; description; range India to China). BLEEKER 1879a:fig. 2 on pl. CCCCXII (color plate); 1879b:16 (listed; Mauritius). DAY 1889:70–71, fig. 29 (compiled from Day 1875). REGAN 1905a:20 (*M. adamsi* and *M. echigonius* as synonyms; Japan); 1908:237 (listed; Maldives in 30 fathoms [55 m]). JORDAN AND THOMPSON 1914:276–277, fig. 47 (listed; Japan; figure from Jordan and Starks, 1904). JORDAN AND HUBBS 1925:275 (*M. adamsi, M. echigonius,* and *M. satsumae* as synonyms; Japan). MACHAN 1930:437 (brief description; Padang). KAMOHARA 1930:49 (listed; Japan; common name). TANAKA 1931:36 (synonymy; Japan). HERRE 1932:437 (3 specimens from China). WANG 1935:471–473, fig. 46 (synonymy; good description; a specimen from Chefoo; *M. adamsi, M. echigonius,* and *M. satsmae* (sic) in synonymy). TORTONESE 1937:53 (description; 1 specimen from Massaua, Red Sea). HERRE AND MYERS 1937:34 (2 specimens from Singapore). FOWLER 1938b:36 (brief description; 1 specimen from Hong Kong). MATSUBARA 1943:401–404, fig. 138 (synonymy; good description; variation; internal features; specimens from Japan). BLEGVAD 1944:191 (description; 3 specimens from Iranian Gulf; figure from Day 1875; distribution). KAMOHARA 1952:68 (compiled; Japan). MUNRO 1955:251, fig. 728 (synonymy; brief description; Gulf of Mannar). KAMOHARA 1958a:56 (compiled; Japan); KAMOHARA 1958b: 9 (listed; Japan). DE BEAUFORT *in* WEBER AND DE BEAUFORT 1962:111–113 (synonymy; description; compiled range). KAMOHARA 1964:74–75 (compiled).

Apistes monodactylus: SWAINSON 1839:265 (included in *Apistes; Minous* in synonymy).

Apistes Russellii: SWAINSON 1839:265 (replacement name based on *woora-minoo* A of Russell 1803).

Minous adamsii RICHARDSON, 1848:7–8, figs. 4–5 on pl. II (original description; type locality Sea of China).

Corythobatus woora: CANTOR 1849:45 (as type-species of *Corythobatus*).

Minous Blochi: KAUP 1858:333 (replacement name for *Scorpaena monodactyla* Bloch and Schneider).

Corythobatus monodactylus: BLEEKER 1865:286 [as 282 misprint] (listed).

Minous oxycephalus BLEEKER 1876b:65–66, fig. 2 on pl. 1 (original description; type locality Sumatra and Amboina).

Minous oxyrhynchus BLEEKER 1879:fig. 4 on pl. CCCCXVII (presumably an incorrect subsequent spelling of *Oxycephalus* Bleeker, 1876).

Minous echigonius JORDAN AND STARKS 1904:151, 153–154, 174, fig. 14 (original description; type locality Niigata, Japan; holotype SU 7380).

Lysodermus satsumae SMITH AND POPE, 1906:483–485, fig. 7 (original description; type locality Kagoshima, Japan; holotype USNM 55615). JORDAN, TANAKA, AND SNYDER 1913:246, fig. 181 (compiled from Smith and Pope 1906).

Minous adamsi: JORDAN AND STARKS 1904:151–153 (description; specimens from Japan). SNYDER 1912:428 (specimens from Japan). JORDAN, TANAKA, AND SNYDER 1913:247 (*M. echigonius* in synonymy; range).

MATERIAL EXAMINED.—Pakistan: CAS 33895 (2, 46.0–53.0), 12 miles (ca. 19 km) from Karachi, 32 m, bottom trawl, sandy bottom, F. B. Steiner, 19 June 1975.

India: CAS 13912 (4, 49.8–59.2), NW India, 21°23′N, 69°46′E, 18 m, trawl, soft green clay and mud bottom, ANTON BRUUN cruise 4B, sta. 211A, 16 Nov. 1963. SU 14666 (1, 51.6), Puri Beach, Orissa, 20 Mar. 1909. SU 14670 (2, 75.3–83.8), Ennur Fisheries Station, Madras, A. W. Herre, Jan. 1941. Additional material: SU 14667 (1), SU 14668 (6), SU 14669 (3), USNM 218445 (5), USNM 218446 (1), USNM 218447 (2), CAS 33954 (43), FMNH 75583 (1), ZSI 3421/1 (2), ZSI 2347/2 (2).

Singapore: SU 30871 (1, 59.1), A. W. Herre, Mar. 1934. Additional material: SU 39470 (4).

Indonesia: RMNH 5920 (3, 52.7–67.0, syntypes of *M. oxycephalus*), Sumatra and Amboina. Additional material: CAS 36065 (3).

Gulf of Thailand: CAS 13902 (3, 73.5–81.8), about 25 miles (40 km) offshore, 11°58′–12°05′N, 99°56′30″–100°00′30″E, 18 m, trawl, sandy bottom, 11–15 Mar. 1961. CAS 13903 (4, 64.7–72.2), 15–30 miles (24–48 km) offshore, 12°12′N, 100°14′–30′E, 26–27 m, trawl, sand and mud bottom, 23–25 July 1960. CAS 13906 (5, 55.5–79.4), 11°25′–45′30″N, 99°43′–53′E, 12–22 m, trawl, mud and sand bottom, 6–11 May 1961. CAS 13907 (4, 15.7 and 50.2–76.9), 13°21′45″N, 100°32′43″E, 14 m, trawl, mud bottom, 14 Dec. 1960. CAS 13910 (10, 43.9-73.9) and CAS 13908 (2, 67–72, cleared and stained), 11°40′–51′N, 100°34′–39′E, 40–42 m, trawl, sand and shell bottom, 10–16 Jan. 1961. Additional material: CAS 13913 (2), CAS 13914 (4), CAS 13916 (1), CAS 13948 (1), CAS 13949 (1), CAS 13950 (1), CAS 13951 (1), CAS 14490 (4), CAS 14495 (2), and CAS 14498 (4, cleared and stained).

Hong Kong: CAS 13911 (1, 48.4), 22°24′30″N, 113°53′30″E, 15 m, trawl, mud bottom, 14 Aug. 1958. SU 61474 (1, 85.1), 22°24′N, 114°25′E, 22 m, R. L. Bolin, 7–8 Jan. 1958.

Mainland China: BMNH 1848.3.16.37 (1, 48.4, holotype of *M. adamsii*), China Seas, Belcher, no other data. SU 32941 (1, 84.7), Tinghai, Chusan Is., Chekiang Province, A. W. Herre, May 1937. Additional material: SU 28177 (2).

Taiwan: CAS 13952 (10), CAS 27740 (9), CAS 30002 (3), CAS 30310 (40), and SU 49444 (1).

Japan: CAS 11243 (2, 76.2–87.0), Kobe, Settsu, D. S. Jordan and J. O. Snyder. CAS 11244 (3, 50.6–69.7), Onomichi, Bingo, D. S. Jordan and J. O. Snyder. SU 7370 (1, 86.3, holotype of *M. echigonius*), Niigata, Echigo, D. S. Jordan and J. O. Snyder. USNM 55615 (1, 103, holotype of *L. satsumae*), Kagoshima, H. M. Smith, 16 June 1903. Additional material: SU 7173 (23), UMMZ 191787 (1), and UT 41826 (1), 51122 (1), 51341 (1), 51408 (1), 51611 (1), 51612 (1), 51698(1), 51701 (1).

Description (See also generic diagnosis; Figs. 2b, 3c; Tables 1– 2).—Dorsal fin normally with 9–11 (usually 10) spines and 10–12 (usually 11) soft rays; total dorsal spines and rays 19–21 (usually 21); dorsal spines sharp and strong; first dorsal spine equal to or longer than second, well separated from second. Anal fin with 2 spines and 7–10 (usually 9) soft rays; spines difficult to distinguish from soft rays; total anal fin elements 9–12 (usually 11). Vertebrae 25 (1 specimen) or 26 (14). Gill rakers total 11–16 on outside of first arch, 3–4 on upper arch, 8–12 on lower arch. Lateral line pores about 18–20. Gas bladder present. Pectoral fin reaching to middle of anal fin as maximum. Head spines well developed. Lachrymal bone with 2 spines over maxillary, first pointing down and forward, second down and back; second spine at least twice length of first and slightly bayonet shaped.

General body shape and preserved coloration in Figure 3c, Color variable; dorsal portion of body with pale bars and stripes; ventral surface usually pale, without markings. Dorsal fin membranes dark distally. Anterior portion of soft dorsal fin with a large black area or spot, usually followed by oblique pale bars. Inside of pectoral fin and pectoral fin axil pale, without distinctive markings; outside of pectoral, pelvic, and anal fins blackish distally. Caudal peduncle crossed by a dark band, followed by 2 broad vertical bars across caudal fin.

Measurements for 10 specimens (50.2–79.4 mm SL) in percent standard length: head 36–44; orbit 10–12; snout 13–16; interorbital width 7–9; postorbital 15–19; pectoral 36–45; first dorsal spine 7–12; second dorsal spine 7–11.

Distribution.—*Minous monodactylus* is a shallow-water species occurring from near shore to about 55 m. It is known from the western Indian Ocean and Red Sea to Indonesia and Japan. It is the most widespread species of the genus.

Minous pusillus Temminck and Schlegel

(Figures 1, 4; Tables 1–2)

Minous pusillus Temminck and Schlegel, 1843:50 (original description; type locality Nagasaki, Japan). Günther 1860:149 (compiled). Steindachner and Döderlein 1884:197 (description; Kagoshima Bay, Japan). Matsubara 1943:409–412, fig. 140 (good description; comparisons; variability; internal features; specimens from Japan). Boeseman 1947:60 (Von Siebold specimens as types of *M. pusillus*; lectotype designation). Kamohara 1952:68 (listed; Japan); 1958a:57 (Japan; compiled distribution); 1964:75 (Japan; compiled distribution).

Aploactis pusillus: Bleeker 1859:6–7 (description; 2 specimens from Japan).

Minaus pusillus: Bleeker 1879c:12 (misspelled generic name; listed; Japan).

Decterias pusillus: Jordan and Starks 1904:154–155 (as type of new genus *Decterias:* description; good figure; Japanese specimens). Smith and Pope 1906:483 (specimens from Susaki and Kagoshima, Japan). Jordan and Seale 1906:38 (2 specimens from Panay, Philippines). ?Franz 1910:74 (2 specimens; Japan; specimens with hydroids on body). Jordan and Richardson 1910:52 (listed; Philippines). Jordan, Tanaka, and Snyder 1913:247, fig. 182 (listed; Japan; figure from Jordan and Starks 1904). Schmidt 1931:111 (3 specimens from Nagasaki, Japan). Tanaka 1931:36 (listed; Japan). Roxas and Martin 1937:180 (listed; Panay, Philippines). Herre 1951:473–474 (synonymy; description; range; Philippine localities; compared with Japanese specimens); 1953:575 (listed; Philippines).

Material Examined.—Japan: RMNH 713a (1, 43.5 mm SL, lectotype of *M. pusillus*) and RMNH 713b-1 (11, 32–45, paralectotypes of *M. pusillus*), Von Siebold collection. SU 7397 (11, 32.4–53.2), Wakanoura, Jordan and Snyder.

East China Sea: CAS 27742 (47, 24–48), N of Taiwan, about 26°–27°N, 121°–122°E, trawled, F. B. Steiner, 15 Oct. 1972.

Taiwan Strait, collected by F. B. Steiner: CAS 13863 (12, 33.8–51.1), 25°N, 120°E, in 90 m, Apr. 1971. CAS 13865 (1, 47.8), 27°30′N, 121°30′E, in 80–100 m, 17 June 1971. CAS 13866 (14, 35.6–53.8), 26°N, 121°E, in about 90 m, trawled, 16 June 1971. CAS 13867 (6, 35.1–46.0), between Pescadores Is. and Taiwan, in 55-73 m, 7 Apr. 1971. CAS 14492 (9, 26.0–43.0) and CAS 14493 (36.5–48.2, cleared and stained), trawled in about 60 m, Feb. 1972. Additional material: CAS 15615 (37), CAS 28128 (15), CAS 28181 (15), CAS 30311 (5), CAS 30582 (1), CAS 34215 (1).

Hong Kong: CAS 13868 (1, 50.7), off Lema I., 21°57′N, 114°20′E, in 38–40 m, R. L. Bolin, 25 July 1958. SU 27995 (5, 30.4–40.9), A. W. Herre, Oct. 1931.

Philippines: CAS 29371 (1, 38), Mindanao, Agusan Province, Buena Vista, F. B. Steiner, 14 Apr. 1973. CAS 29407 (1, 48.0), Mindanao, Agusan Province, Nasipit, F. B. Steiner, 15 Apr. 1973.

Description (See also generic diagnosis, Fig. 4; Tables 1–2).—Dorsal fin with 9–11 (usually 10 or 11) spines and 9–11 (usually 10) soft rays; total dorsal spines and rays 19–21 (usually 21 or 20); dorsal spines weak and hairlike, difficult to distinguish from soft rays; first dorsal spine usually less than ⅔ of second (0.5–0.75 length of second), and close together. Anal fin with 2 spines and 8–9 (usually 8) soft rays; spines difficult to distinguish from soft rays; total anal fin elements 10–11 (usually 10). Vertebrae 25 (16 specimens). Gill rakers total 14–17 on first arch, 3–4 on upper arch, 10–14 on lower arch. Lateral line pores 14–18. Gas bladder absent. Pectoral fin reaching to middle of anal fin as maximum.

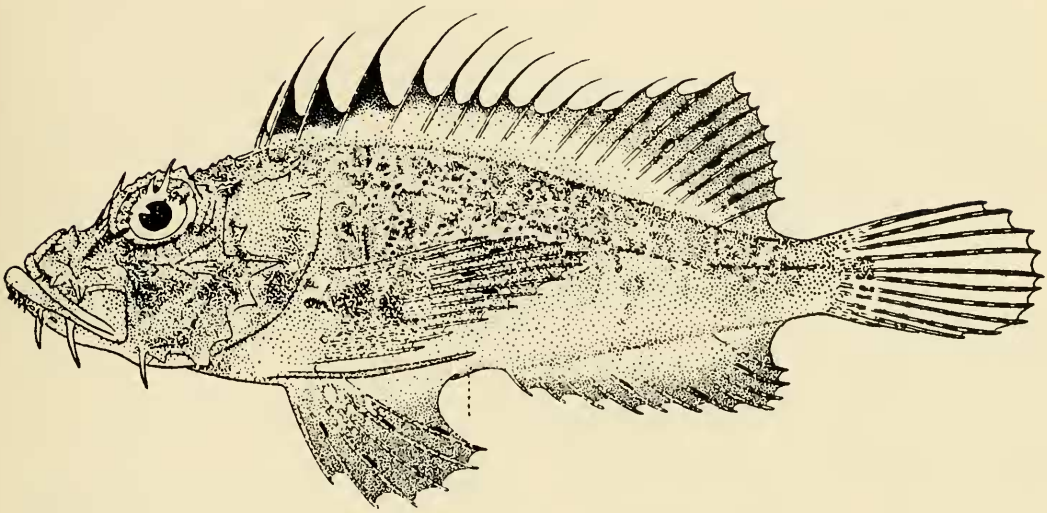


FIGURE 4. *Minous pusillus*, about 41 mm SL, Japan. (From Matsubara, 1943, fig. 140a, but modified by addition of more dusky pigment.)

Head spines poorly developed; lachrymal bone with 2 short spines over maxillary, first pointing forward and down, second down and back; second spine slightly longer than first.

General body shape and preserved coloration in Figure 4. Dorsal portion of body brownish or grayish, marbled slightly with paler areas. Ventral portion of body white, without markings. Dorsal fin membranes between anterior spines blackish distally. Outside of pectoral fin black; axil of pectoral fin grayish, fin becoming blackish distally. Anal and pelvic fins dusky. Caudal fin rays with alternating dark and pale color, giving effect of several narrow vertical dark bars.

Measurements for 6 specimens (47.9–54.7 mm SL) in percent standard length: head 41–44; orbit 12–14; snout 12–13; interorbital width 6–8; postorbital 16–18; pectoral fin 37–45; first dorsal spine 6–11; second dorsal spine 14–18.

DISTRIBUTION.—*Minous pusillus* is a small species occurring from Japan south to Hong Kong and the Philippines. Depths of capture range from about 30 to 110 m.

Minous inermis Alcock

(Figures 1, 5; Tables 1–2)

Minous inermis ALCOCK, 1889:299–300, fig. 4 on pl. XXII (original description; type locality Bay of Bengal, E of Sacramento Shoal on Godavari coast, in 70 fms [128 m]; 2 syntypes as ZSI 12444 and 12445); ALCOCK 1892:210–212 (symbiosis between hydroid and *M. inermis;* additional specimens from India); ALCOCK 1894:116 (specimens from off Madras, Bay of Bengal, in 133 fms [243 m]; commensal hydroid on body). GOODE AND BEAN 1896:524 (Bay of Bengal, 70–150 fms [128–274m]; compiled). ALCOCK 1896:314 (compiled); 1898:fig. 3 on pl. 18 (good illustration); 1899:30–31 (specimens from off Coromandel and Malabar coasts, India; depths, description). REGAN 1905b:329, 331 (listed; Gulf of Oman). NORMAN 1939:96 (listed specimens from Gulf of Aden, JOHN MURRAY sta. 37 and 194). SMITH 1958:175, fig. m on pl. 8 (compiled).

Minous longimanus REGAN, 1908:236–237, fig. 2 on pl. 28 (original description; type locality Saya de Malha Bank, in 47 fms [86 m]; holotype BMNH 1908.3.23.178). SMITH 1958:175, fig. j on pl. 8 (compiled from Regan).

Minous longipinnis LLOYD 1909:162, fig. 3 on pl. 47 (original description; type locality Gulf of Oman, 230 fms [420 m]; INVESTIGATOR sta. 341; compared with *M. inermis*). SMITH 1958:175, fig. i on pl. 8 (compiled from Lloyd; suggested may be synonym of *M. longimanus*).

Paraminous inermis: FOWLER 1943:68 (placed in genus *Paraminous;* compared with *Paraminous quincarinatus*).

NOMENCLATURAL REMARKS.—*Minous inermis* as treated by Matsubara (1943:406–409, fig. 139) is referable to *M. quincarinatus* Fowler, a species that was described in the same year as Matsubara's treatment of the Japanese fauna. Other identifications of Japanese specimens (e.g., Franz, Kamohara) are referred questionably to *M. quincarinatus*. *Minous inermis* Alcock was not treated by de Beaufort (in Weber and de Beaufort 1962) in his treatment of Indo-Australian fishes. *Minous inermis* of Herre (1951: 475–476) is referred to *M. trachycephalus* (Bleeker).

Material Examined.—Burma: SU 14658 (1, 51.0), Mergui Archipelago, in 119 m, R.I.M.S. Investigator sta. 535, 17 Apr. 1913.

Bay of Bengal: SU 67200 (1, 38.2), mouth of Hughli River, Lower Bengal, Sandheads, A. W. Herre, 6 Jan. 1928. ZSI 12444 (1, 47.0, syntype of *M. inermis*) and ZSI 12445 (1, 48, syntype of *M. inermis*), Godarvari coast, Sacramento Shoal, in 128 m [both syntypes now in poor condition; no counts or measurements taken]).

Arabian Sea area: ZSI 1158/1 (1, 72.6, syntype of *M. longipinnis*), and ZSI 1159/1 (1, 73.9, syntype of *M. longipinnis*), Gulf of Oman, in 420 m, R.I.M.S. Investigator sta. 341. BMNH 1908.3.23.178 (1, about 67, holotype of *M. longimanus*), Saya de Malha Bank, 86 m, Gardiner Expedition. CAS 13859 (18, 35.2–75.7), CAS 13860 (2, 65–79, cleared and stained), and ZSI F7402/2 (3, 42.0–67.0), western India, 17°25′–21′N, 71°39′–41′E, 96–106 m, Anton Bruun cruise 4B, sta. 202A, 13 Nov. 1963. CAS 13861 (1, 102), Somali coast, 11°04′N, 51°15′E, 76–80 m, Anton Bruun cruise 9, sta. 451, 17 Dec. 1964. CAS 13862 (1, 61.0), 25°00′–24°59′N, 63°30′–33′E, 35–37 m, Anton Bruun cruise 4B, sta. 242A, 27 Nov. 1963. CAS 14496 (3, 42.8–61.5), western India, 21°11′–08′N, 69°16′– 13′E, 70–72 m, Anton Bruun cruise 4B, sta. 213A, 17 Nov. 1963. USNM 218449 (8, 35.0–65.8), western India, 17°41–45′N,71°33′–32′E, 90 m, Anton Bruun cruise 4B, sta. 202B, 14 Nov. 1963. USNM 218450 (2, 65.7–66.4), western India, 21°52′–55′N, 68°06′E, 115–117 m, Anton Bruun cruise 4B, sta. 219A, 18 Nov. 1963.

Description (See also generic diagnosis; Fig. 5; Tables 1–2).—Dorsal fin with 9–10 spines and 12–14 (usually 13–14) soft rays; total dorsal fin spines and rays 22-24 (usually 23); dorsal spines thin and flexible; first dorsal spine short, usually less than ⅓ (0.2–0.4) of second and close to base of second. Anal fin with 2 spines and 8–11 (usually 10) soft rays; spines difficult to distinguish from soft rays; total anal fin elements 10–13 (usually 11–12). Vertebrae 26 (3 specimens) or 27 (16). Gill rakers total 14–18 on outside of first arch, 4 on upper arch, 10–14 on lower arch. Lateral line pores 16–18. Gas bladder present. Pectoral fin very long, reaching to over end of anal fin. Head spines moderately developed. Lachrymal bone with two sharp spines over maxillary; first points down and forward, second down and slightly back; spines about equal in length.

General body shape and preserved coloration as in Figure 5. First 5–6 dorsal fin spines with dark skin flap at end. Body coloration variable. Smaller specimens with pale spots on a light background on the sides of body; spots not present on one larger specimen. Ventral portion of body pale, lacking markings. Anal fin black distally. Pectoral fin base light brown, the fin increasing in darkness distally; inside of pectoral fin light gray; axil with white spots on a gray background, uniform gray distally. Pelvic fins with pale spots on a gray background. Caudal fin mostly pale, dark distally.

Measurements for 16 specimens (52.9–102 mm SL) in percent of standard length: head 41–48; orbit 10–13; snout 14–15; interorbital width 6–7; postorbital 19–23; pectoral fin 50–60; first dorsal spine 4–9; second dorsal spine 11–18.

Distribution.—*Minous inermis* is known from the northern Indian Ocean in coastal areas from the Bay of Bengal west to the Gulf of Oman, Somalia, and from the Saya de Malha Bank. Depths of capture range from 35 to 420 m.

Minous trachycephalus (Bleeker)

(Figures 1, 6; Tables 1–2)

Aploactis trachycephalus Bleeker 1854b:449, 451–452 (original description; type locality Celebes, Dutch East Indies).

Corythobatus trachycephalus: Bleeker 1865: 282 [286] (listed).

Minous inermis (not of Alcock): Herre 1951:475–476 (10 specimens from Manila Bay, Luzon, 17–25 fms [31–46 m]; description; provisional identification).

Minous trachycephalus: Günther 1860:149 (compiled). Bleeker 1876b:9–13, 61–63, fig. 3 on pl. 2 (description; good figure; specimens from Nias, Celebes, and Amboina); 1879a:fig. 4 on pl. 415 (figure from Bleeker 1876b). Fowler and Bean 1922:63 (Takao, Formosa; brief description). Herre 1936:367 (1 from Subic Bay, Philippines). Roxas and Martin 1937:181 (compiled). Herre 1951:477–478 (compiled). de Beaufort *in* Weber and de Beaufort 1962:108–109 (wrongly included *M. superciliosus* in synonymy; description).

Nomenclatural Remarks.—Bleeker (1854b) mentions one specimen of 75 mm in length from the type locality Celebes. This specimen is apparently now mixed in RMNH 5901 containing five specimens. Two of these specimens are of about 75 mm in total length, and presumably one is the type.

The single specimen from Japan identified as this species by Matsubara (1943) seems referable to *M. pictus* as do some subsequent listings of *trachycephalus* from Japan (e.g., Kamohara 1958a, 1960, 1964). The specimen from the Malabar Coast of India that Alcock (1896) identified as *trachycephalus* is *M. coccineus*.

Material Examined.—Ceylon: USNM 218448 (1, 35.0), Gulf of Mannar, 8°39′–53′N, 79°37′–46′E, 11–18 m, T. R. Roberts, 3–7 Apr. 1970.

Gulf of Thailand: CAS 13871 (1, 48.9), 12°19′15″N, 100°43′40″E, 33m, 13 Dec. 1960. CAS 13872 (1, 53.4), 12°12′N, 100°17′E, about 28 m, 8–10 Sep. 1960. CAS 13873 (1, 42.1), 12°19′15″N, 100°43′40″E, in 33 m, 18 Dec. 1960. CAS 13874 (2, 46.9–56.3), about 12°23′N, 100°33′E, about 36 m, 17–21

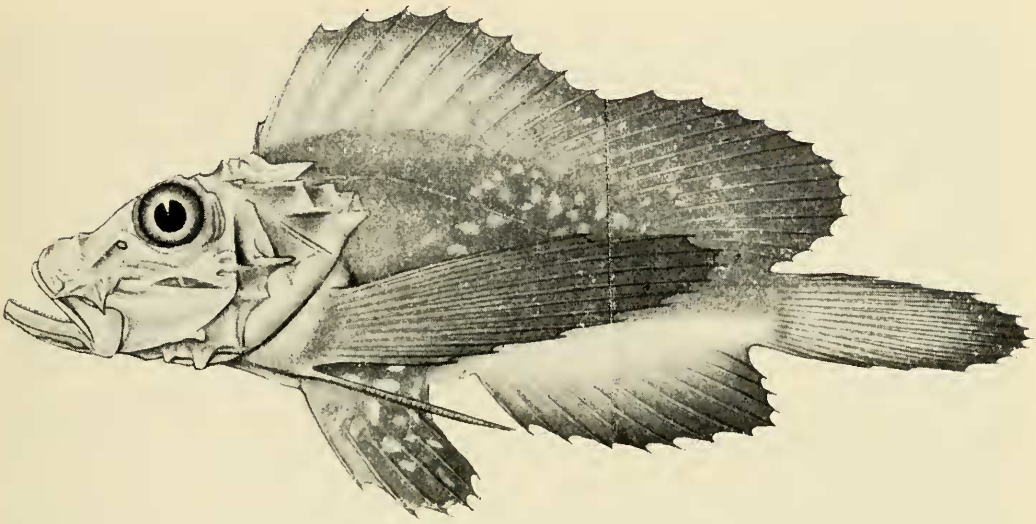


FIGURE 5. *Minous inermis*, ZSI 1158–9/1, about 73 mm SL, Gulf of Oman. (From Lloyd 1909; fig. 3 on pl. 47.)

Dec. 1960. CAS 13875 (2, 56.9–57.0), and CAS 14494 (1, 60, cleared and stained), 11°40′–51′N, 100°34′–39′E, about 40–42 m, 10–16 Jan. 1961. CAS 13876 (1, 64.8), 12°08′–20′N, about 100°14′–22′E, about 26–28 m, 30 July–1 Aug. 1960. CAS 13877 (1, 65.7) and CAS 13878 (1, 57.9, cleared and stained), 12°05′–19′N, 100°21′– 41′E, 27–35 m, 2–6 Apr. 1961.

Viet Nam: CAS 13870 (1, 35.3), 12°09′30″N, 109°14′15″E, 15 m, R. L. Bolin, 23 Feb. 1960.

Philippines: SU 9664 (2, 30.0–36.1), Iloilo I., Panay, G. A. Lung. SU 29784 (1, 54.6), Subic Bay, Zambales Prov., J. C. Thompson, 1906. UWCF 7244 (9, 31.5–39.0), Manila Bay, Luzon, A. W. Herre, 25 May 1949. Additional material: USNM 168176 (3).

Taiwan: USNM 76650 (1).

Celebes: RMNH 5901 (5), see Nomenclatural Remarks.

DESCRIPTION (See also generic diagnosis; Fig. 6; Tables 1–2).—Dorsal fin with 10–11 (usually 11) spines and 8–10 (usually 9–10) soft rays; total dorsal spines and rays 19–21 (usually 20–21); dorsal spines moderately strong, thin, and flexible in specimens under about 40 mm SL; first dorsal spine short, usually less than half (0.3–0.5) length of second and close at base to second. Anal fin with 2 spines and 7–9 (usually 8) soft rays; spines difficult to distinguish from soft rays; total anal fin elements 9–11 (usually 10). Vertebrae 24 (1 specimen) or 25 (6). Gill rakers total 10–13 on outside of first arch, 2–4 on upper arch, 7–10 on lower arch. Lateral line pores 15–16. Gas bladder absent. Pectoral fin reaching to middle of anal fin as a maximum. Head spines poorly developed. Lachrymal bone with 2 short spines over maxillary, first points down and forward, second down and back; second spine longer than first.

General body shape and preserved coloration as in Figure 6. Dorsal half of body grayish brown. Underside white, without markings. Body and fins with scattered dark spots. Soft dorsal fin pale anteriorly, becoming darker distally and posteriorly. Pectoral fin base pale; pectoral fin mostly black. Inside of pectoral fin mostly gray; axil pale, with many large white spots forming a hexagonal pattern; fin gray distally, the rays occasionally with minute dark black spots. Pelvic fins gray, sometimes with black spots on rays. Caudal fin rays with alternating gray and pale color; fin membranes mostly clear, with many minute dark flecks.

Measurements for 14 specimens (35.0–65.7 mm SL) in percent standard length: head 43–48; orbit 12–16; snout 14–18; interorbital width 7–9; postorbital 14–18; pectoral fin 40–46; first dorsal spine 3–5; second dorsal spine 11–14.

DISTRIBUTION.—*Minous trachycephalus* is known from areas bordering the South China Sea and from northern Indonesia and Ceylon. A wider distribution is expected. This species appears to be one of the more shallower-living species. Few depths of capture are available, but are between 11–46 m.

Minous coccineus Alcock

(Figures 1, 2d, 7; Tables 1–2)

Minous coccineus ALCOCK 1890:428–429 (original description;

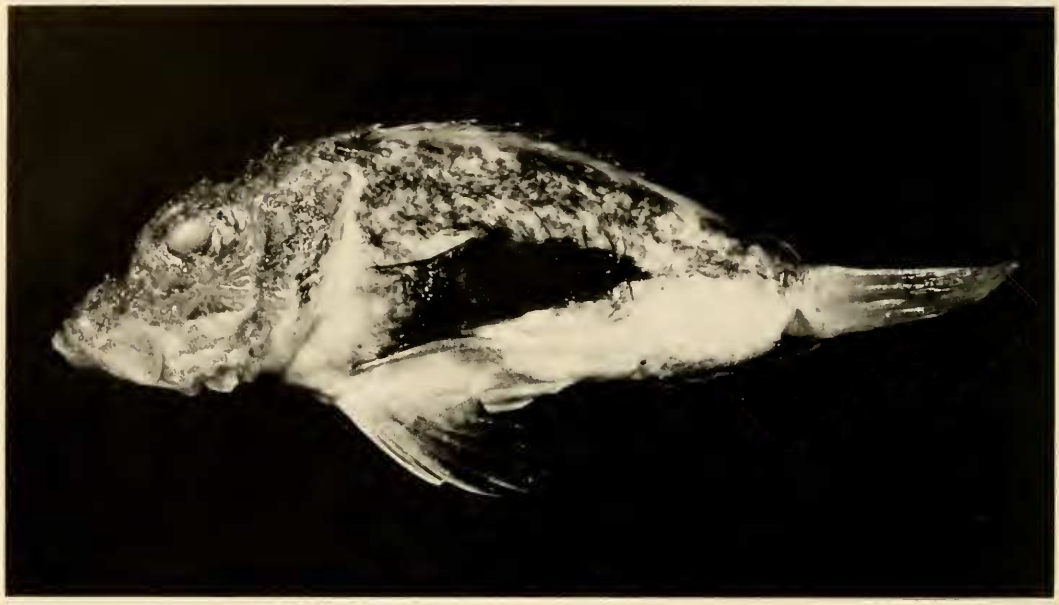


FIGURE 6. *Minous trachycephalus*, CAS 13876, 64.8 mm SL, Gulf of Thailand.

type locality India, Ganjam Coast, 28–30 fms [51–54 m], sand and shell bottom).

Minous superciliosus GILCHRIST AND THOMPSON 1908:177–178 (original description; type locality NW 7.5 miles [12 km] from Amatikulu Conical Hill, PIETER FAURE, shrimp trawl, 26 fms [47 m]); 1917:410 (compiled). BARNARD 1927:921 (description; Zululand coast, 26 fms [47 m]; close to *M. trachycephalus*); 1947:199, fig. 1 on pl. 24 (brief description; figure poor). FOWLER 1934:486 (description; distinct from *M. monodactylus* and *M. trachycephalus*). VON BONDE 1924:3, 29–30 (specimens from PICKLE stations 169, 171, 179, and 193, in 27–29 fms [49–53 m]). SMITH 1958:175–176, fig. H on pl. 8 (description; synonymy; specimen from off Durban in 40 fms [73 m]).

Minous trachycephalus: ALCOCK 1896:313 (misidentified; listed from Malabar Coast, India; R.I.M.S. INVESTIGATOR collection). SMITH 1949:375, fig. 1054 (misidentified; brief description; thought *M. superciliosus* was a synonym of *trachycephalus*). DE BEAUFORT *in* WEBER AND DE BEAUFORT 1962:109–110 (in part; wrongly included references to *M. superciliosus* in synonymy of *M. trachycephalus*).

MATERIAL EXAMINED.—South Africa: ANSP 77866 (1, 76.0), Natal, PICKLE Survey, H. W. Bell Marley, 17 Aug. 1930.

Red Sea: CAS 14489 (31, 53.0–80.0) and USNM 218451 (1, 63.0), Bay of Massawa, about 15°40′N, 39°36′E, 79 m, L. Knapp, 20 Sep. 1971. USNM 218452 (1, 62.0), off Ajuz, about 16 miles (26 km) S of Massawa, 15°18′N, 40°17′E, 29–31 m, mud bottom, L. Knapp, 19 Sep. 1971. USNM 218453 (1, 64), Massawa Bay, 15°40′N, 39°36′E, 79 m, L. Knapp, 20 Sep. 1971. USNM 218454 (3, 66–69), Massawa Bay, 15°40′N, 40°23′E, 79 m, L. Knapp, 21 Sep. 1971.

Arabian Sea: ZSI 13760 (1, 85.0), Malabar Coast, 81 m, western India, R.I.M.S. INVESTIGATOR collection.

Bay of Bengal: ZSI 12924 (1, 77.0, syntype of *M. coccineus*), off Ganjam Coast, 51 m, R.I.M.S. INVESTIGATOR, 17–21 Feb. 1890. BMNH 1978.4.19.3 (1, 48.0) and ZSI F7403/2 (1, 41.2), Bangladesh, 21°00′N, 91°59′E, 23–25 m, ANTON BRUUN cruise 1, sta. 46, 5 Apr. 1963. SU 67169 (3, 47.4–86.3) and SU 67170 (2, 60.3–74.9, cleared and stained), India, mouth of Hughli River, Sandheads, A. W. Herre, 6 Jan. 1928. ZSI 2485/1 (2, 74–76), Ganjam Coast. Additional material: ZSI Madras collections from Kakinda and Madras, India.

Burma: USNM 218455 (2, 58.6–75.3), Mergui Archipelago, 9°54′N, 97°42′E, 70 m, ANTON BRUUN cruise 1, hydro sta. 21, 24 Mar. 1963.

Java: SU 49320 (1, 69.8), no other data.

Thailand: CAS 13893 (1, 78.9), 12°26′–27′30″N, 101°20′–26′E, 26 Feb.–2 Mar. 1961.

Taiwan: SU 49442 (1, 80), no other data.

DESCRIPTION (See also generic diagnosis; Figs. 2d, 7; Tables 1–2).—Dorsal fin with 10–11 (usually 11) spines and 11–12 (usually 12) soft rays; total dorsal spines plus rays 21–23 (usually 23); dorsal spines sharp and moderately strong; first dorsal spine short, sometimes hidden under skin, less than half (0.2–0.4) length of second spine and close to second spine at base. Anal fin with 2 spines and 9–10 (usually 10) soft rays; spines difficult to distinguish from soft rays; total anal fin elements 11–12 (usually 12). Vertebrae 26 (7 specimens). Gill rakers total 11–14 on outside of first arch, 3–4 on upper arch, 7–10 on lower arch. Lateral line pores 18–19. Gas bladder present. Pectoral fin reaching to middle of

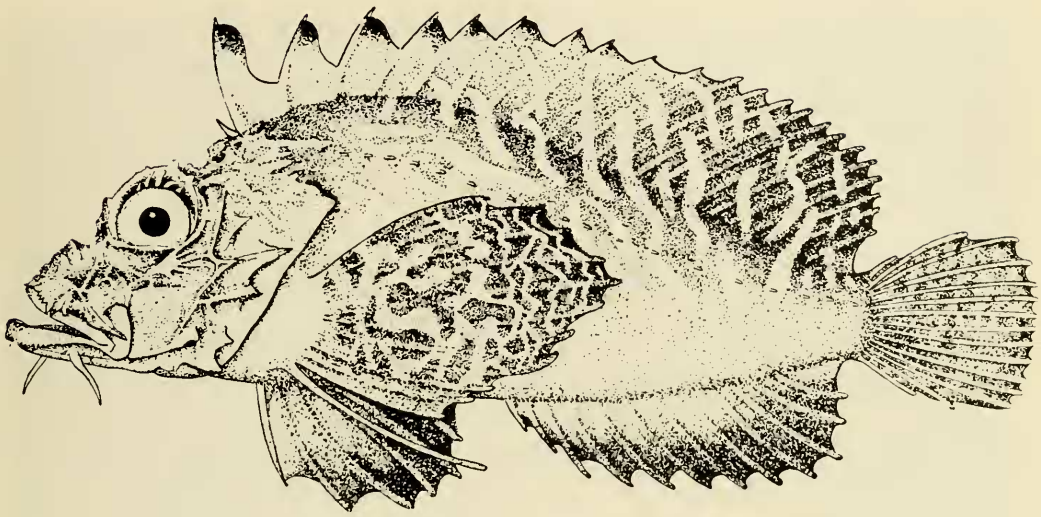


FIGURE 7. *Minous coccineus*, about 63 mm SL, South Africa. (From Smith 1949; fig. 1054, p. 375.)

anal fin as a maximum. Head spines well developed. Lachrymal bone with 2 sharp spines over maxillary, first points down and forward, second down and to rear; first spine about half length of second.

General body shape and preserved coloration as in Figure 7. Body coloration variable. Posterior part of spinous dorsal fin and soft dorsal fin usually with alternating white and brown bands extending down and back, often onto the upper surface of the body. Lower portion of body pale, without markings. Pectoral fin base light brown, with color from inside fin showing through; axil pale; inside of pectoral fin with distinct black spots on a pale background (Fig. 2d). Pelvic and anal fins dark. Caudal fin pale, without markings.

Measurements for 9 specimens (48.2–86.3 mm SL) in percent of standard length: head 39–43; orbit 12–14, snout 13–14; interorbital width 9–10; postorbital 16–19; pectoral fin 33–41; first dorsal spine 4–5; second dorsal spine 14–17.

DISTRIBUTION.—*Minous coccineus* is known from coastal waters of South Africa, the Red Sea, Arabian Sea, Bay of Bengal, Burma, Gulf of Thailand, Java, and Taiwan in depths ranging from 23 to 81 m.

Minous pictus Günther

(Figures 1, 8a; Tables 1–2)

Minous pictus GÜNTHER 1880:41, pl. 18, fig. D (original description; type locality Arafura Sea, S of New Guinea, 9°59′S, 139°42′E, CHALLENGER sta. 188). JORDAN AND SEALE 1906:378 (listed; New Guinea). FOWLER 1928:299 (compiled). DE BEAUFORT *in* WEBER AND DE BEAUFORT 1962:111 (redescribed type).

Minous trachycephalus: MATSUBARA 1943:405–406 (misidentified; 1 specimen from Japan; description). KAMOHARA 1958a:76 (listed; Japan); 1960:27 (compiled); 1964:75 (compiled).

MATERIAL EXAMINED.—New Guinea: BMNH 1879.5.14.371 (1, 46.1, holotype of *M. pictus*), Arafura Sea, S of New Guinea, 9°59′S, 139° 42′E, CHALLENGER sta. 188, 56 m.

Philippines: SU 39136 (1, 41.1), Manila Bay, Luzon, A. W. Herre, 7 June 1940. USNM 218444 (2, 66.0–76.3), Manila Bay, purchased at fish market, F. Schwartz, 13 May 1939. Additional material: CAS 32650 (2), 32770 (1), 32943 (1), 33090 (1), and USNM 99787 (6).

Taiwan: CAS 13864 (1, 45.5, cleared and stained) and CAS 13901 (2, 72.8–79.7), 25°N, 120°E, 90 m, trawl, muddy bottom, F. B. Steiner, Apr. 1971. Additional material: CAS 14491 (6), CAS 14497 (6), CAS 28180 (24), CAS 29975 (5), CAS 30309 (1), CAS 34214 (2), SU 49443 (1), USNM 200233 (2).

Hong Kong area: CAS 13869 (1, 78.1), off Lema Is., 21°57′N, 114° 20′E, 38–40 m, shrimp trawl, ALISTER HARDY, R. L. Bolin, 25 July 1958. CAS 13894 (2, 73.2–85.1) and CAS 13895 (1, 76, cleared and stained), 21°35′N, 114°00′E, 42 m, mud bottom, R. L. Bolin, 24 July 1958. CAS 13896 (2, 65.5–78.5), 22°06′30″N, 114°16′30″E, 33 m, sticky gray mud, ALISTER HARDY, R. L. Bolin, 29 Dec. 1957. CAS 13900 (1, 120), about 150 miles (ca. 240 km) west of Hong Kong, F. B. Steiner, 14 June 1971. CAS 14487 (1, 63.5), South China Sea, 20°32′N, 112°51′E, R. L. Bolin, 23 July 1958. SU 60895 (3, 58.4–68.8), 21°56′N, 114°23′E, R. L. Bolin, 28 Dec. 1957. SU 61010 (4, 67.7–68.2), Mira Bay, 22°28′N, 114°23′E, R. L. Bolin and party, 7 Jan. 1958. Additional material: CAS 14488 (2), CAS 27741 (10).

Viet Nam: CAS 13897 (1, 54.1), 15°41′30″N, 108°42′E, fine green mud, M/V STRANGER, R. L. Bolin, 27 Feb. 1960. Additional material: CAS 13898 (2).

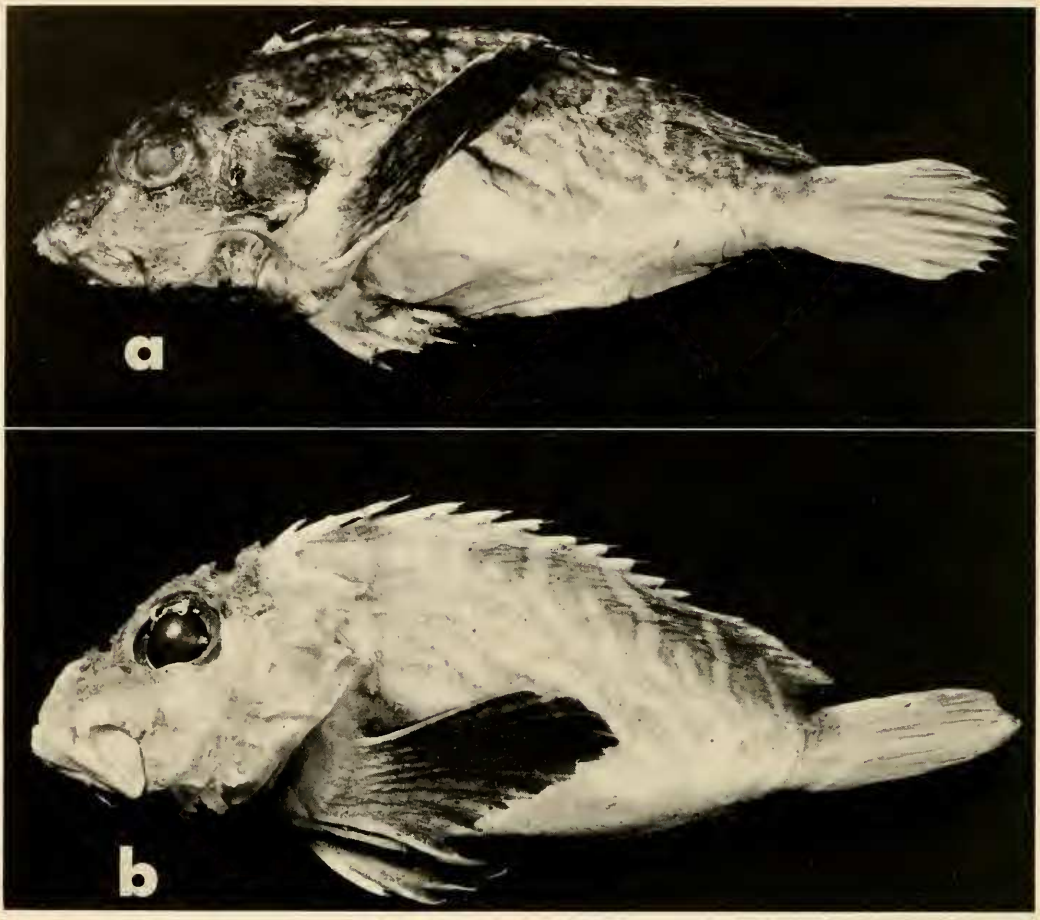


FIGURE 8. (*a*) *Minous pictus*, CAS 28180, 125 mm SL, Taiwan. (*b*) *M. dempsterae*, holotype, USNM 218417, 84 mm SL, off western India.

Indonesia: CAS 41051 (1, 32.0), Java Sea, 5°58'S, 106°48'E, 24 m, muddy, F. B. Steiner, 5 Dec. 1975.

DESCRIPTION (See also generic diagnosis; Fig. 8a; Tables 1–2).—Dorsal fin with 10–12 (usually 11) spines and 11–13 (usually 12) soft rays; total dorsal spines plus soft rays 22–24 (usually 23); dorsal spines sharp and moderately strong; first dorsal spine short, usually less than one fourth (0.2–0.4) of second and close to base of second. Anal fin with 2 spines and 9–11 (usually 10) soft rays; spines difficult to distinguish from soft rays; total anal fin elements 11–13 (usually 12). Vertebrae 24 (1 specimen), 25 (2), 26 (8), 27 (1). Gill rakers total 13–17 on first gill arch, 3–5 on upper arch, 9–12 on lower arch. Lateral line pores 18–20. Gas bladder present. Pectoral fin reaching to middle of anal fin as a maximum. Head spines well developed. Lachrymal bone with two sharp spines over maxillary, first points down and forward, second down and to rear; second spine about twice length of first.

General body shape and preserved coloration as in Figure 8a. Body coloration variable; alternating pale and dark oblique bands present to some degree in all specimens, these bands extend obliquely back from under the posterior portion of the spinous dorsal fin and the soft dorsal fin. Undersurface of body pale, without markings. Anal fin pale, sometimes with outer margin tinged with black. Pectoral fin base light brown or pale; pectoral fin blackish. Inside of pectoral fin variable, axil light brown or pale, with gray stripes or rows of spots radiating outward along pectoral rays (similar to Fig. 2c).

Pelvic fins brown, darker distally. Caudal fin pale, with a dark edge.

Measurements for 16 specimens (46.1–85.1 mm SL) in percent standard length: head 40–46; orbit 12–16; snout 13–16; interorbital width 9–11; postorbital 16–19; pectoral fin 38–45; first dorsal spine 3–4; second dorsal spine 10–14.

DISTRIBUTION.—*Minous pictus* is known from the Arafura Sea, Philippines, Taiwan, Hong Kong, and Viet Nam, in depths from 27–90 m.

Minous dempsterae Eschmeyer, Hallacher, and Rama-Rao, new species

(Figures 1, 2e, 8b, 9; Tables 1–3)

No literature applies to this species.

MATERIAL EXAMINED.—All type-specimens were collected by the International Indian Ocean Expedition, ANTON BRUUN cruise 4B, Nov. 1963.

Holotype: USNM 218417 (84.0 mm SL), off western India, 21°11′–08′N, 69°16′–13′E, 70–72 m, sta. 213A.

Paratypes: Western India: BMNH 1978.4.19:1–2 (2, 66.6–83.1), CAS 13891 (3, 71.6–79.9), CAS 13892 (2, 74–77, cleared and stained), RUSI 953 (2, 62.8–73.2), USNM 218418 (2, 72.6–81.0), and ZSI F7401/2 (2, 69.4–70.0), all from 17°41′–45′N, 71°33′–32′E, 90 m, sta. 202B. CAS 13884 (3, 75.0–88.6), 21°52′–55′N, 68°06′E, 115–117 m, brown mud, sta. 219A. CAS 13887 (3, 71.8–83.2), 17°25′–21′N, 71°39′–41′E, 96–106 m, greenish sand and mud, sta. 202A. CAS 14508 (1, 75.1), 20°49′–52′N, 69°41′–39′E, 60–62 m, sta. 209A. CAS 14509 (5, 72.4–81.8) and USNM 218419 (4, 70.0–76.5), taken with the holotype. USNM 218420 (1, 59.6), 17°54′–57′N, 72°27′–23′E, 46–55 m, sta. 201A. ANSP 136720 (2, 62.0–67.7) and USNM 218421 (2, 69.7–70.1), 22°32′–31′N, 68°07′–05′E, 57 m, sta. 221A. Pakistan: CAS 13883 (3, 60.1–84.9), 23°45′–43′N, 67°23′–26′E, 23–24 m, greenish-brown clay bottom, sta. 228A. Gulf of Oman: CAS 13886 (1, 56.6), 26°10′–13′N, 57°02′E, 64–55 m, green mud, sta. 256A.

Non-type material: CAS 29591 (38 specimens), India, Bombay, 5–10 m, trawl mud-sand bottom, F. B. Steiner, 4–10 Nov. 1974.

DESCRIPTION (See also generic diagnosis; Figs. 2e, 8b, 9; Tables 1–3).—Dorsal fin with 10–11 (usually 11) spines and 11–13 (usually 12) soft rays; total dorsal spines and rays 22–24 (usually 23); dorsal spines sharp and moderately strong; first dorsal spine less than half (0.2–0.4) of second; close to base of second. Anal fin with 2 spines and 9–11 (usually 9–10) soft rays; anal spines difficult to distinguish from soft rays; total anal fin elements 11–13 (usually 11–12). Vertebrae 25 (1 specimen), 26 (18) and 27 (1). Gill rakers total 11–15 on outside of first arch, 3–5 on upper arch, 8–10 on lower arch. Lateral line pores 18–20. Gas bladder present. Pectoral fin reaching to middle of anal fin as a maximum.

TABLE 3. COUNTS AND MEASUREMENTS FOR SOME TYPE-SPECIMENS OF *Minous dempsterae* (measurements in mm, percent standard length in parentheses).

	Holotype USNM		CAS 13884			CAS 13887		CAS 13891	CAS 14508
Standard length	84.0	88.6	79.9	75.0	80.4	83.2	71.8	79.9	75.1
Dorsal rays	XI,12	XI,12	XI,12	X,12	XI,12	XI,11	XI,12	XI,12	XI,12
Anal rays	II,10	II,9	II,10	II,9	II,9	II,10	II,10	II,10	II,10
Pectoral rays	11 + 1	11 + 1	11 + 1	11 + 1	11 + 1	11 + 1	11 + 1	11 + 1	11 + 1
Gill rakers	3 + 8	4 + 9	4 + 8	4 + 8	4 + 9	4 + 9	4 + 9	4 + 9	5 + 10
Head length	35.0(42)	40.0(45)	35.0(44)	32.7(44)	37.6(47)	36.0(43)	32.5(45)	34.7(43)	33.5(45)
Orbit diameter	10.0(12)	11.0(12)	9.8(12)	9.7(13)	9.5(12)	9.7(12)	9.1(13)	9.2(12)	9.2(12)
Snout length	11.5(14)	13.9(16)	12.5(16)	11.3(15)	12.0(15)	11.5(14)	10.8(15)	12.5(16)	11.3(15)
Postorbital length	15.5(18)	17.7(20)	15.1(19)	14.5(19)	17.6(22)	16.3(20)	14.7(21)	14.6(18)	15.2(20)
Interorbital width	8.5(10)	8.1(09)	7.8(09)	7.8(10)	7.6(10)	7.9(10)	7.9(11)	7.7(10)	7.7(10)
Length pectoral fin	32.0(38)	37.9(43)	36.8(46)	32.6(43)	35.5(44)	34.7(41)	29.3(41)	33.1(41)	33.1(44)
Length 1st dorsal spine	5.2(06)	3.4(04)	3.9(05)	2.9(04)	2.4(03)	2.9(03)	2.5(04)	3.1(04)	3.7(05)
Length 2nd dorsal spine	12.4(15)	12.7(14)	12.1(15)	10.8(14)	11.2(14)	10.5(13)	10.0(14)	12.5(16)	11.7(16)
Length posterior preorbital spine	4.5(05)	4.3(05)	4.4(06)	5.2(07)	5.2(07)	3.8(05)	3.6(05)	4.6(06)	5.0(07)
Length longest preopercular spine	7.0(08)	7.3(08)	6.1(08)	7.2(10)	7.5(09)	5.8(07)	5.3(07)	6.6(08)	6.0(08)

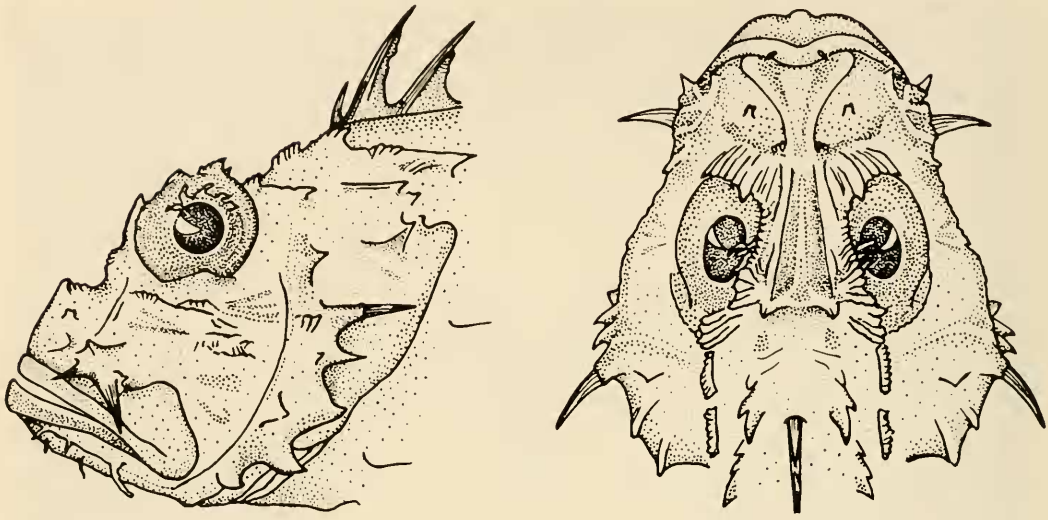


FIGURE 9. Diagram of head spines in *Minous dempsterae*, based on specimens in CAS 14509.

Head spines well developed (Fig. 9). Lachrymal bone with 2 sharp spines over maxillary, first points down and forward, second points out and to rear; first spine about half length of second.

General body shape and preserved coloration as in Figure 8b. Anterior spinous dorsal fin membranes blackish distally. Posterior spinous dorsal fin membranes and soft dorsal fin often with pale bands extending across fins and onto body; pale bands sometimes bordered with a thin dark line. Ventral part of body pale, without markings. Pectoral fin base pale, fin darker. Inside of pectoral fin as in Figure 2e, axil pale, inner surface with small irregular pale spots on a dark background. Pelvic and anal fins dusky. Caudal fins pale.

Measurements for 10 specimens (71.8–88.6 mm SL) in percent standard length: head 43–47; orbit 12–13; snout 14–16; interorbital width 9–11; postorbital 18–22; pectoral fin 38–46; first dorsal spine 3–5; second dorsal spine 11–14.

DISTRIBUTION.—*Minous dempsterae* is known from off western India, Pakistan, and the Gulf of Oman, in depths from 23 to 117 m, and from off Bombay, India, in 5–10 m.

NAME.—The species is named for Lillian J. Dempster, a friend and colleague, in recognition for her assistance in the preparation of this and other papers on scorpionfish.

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