*Zoological Studies* **40**(3): 206-225 (2001)

Zoological Studies

# Five New Indo-Pacific Gobiid Fishes of the Genus *Coryphopterus*

John E. Randall

*Bishop Museum, 1525 Bernice St., Honolulu, HI 96817-2704, USA*

*(Accepted March 13, 2001)*

**John E. Randall (2001)** Five new Indo-Pacific gobiid fishes of the genus *Coryphopterus*. *Zoological Studies* **40**(3): 206-225. The Indo-Pacific species of the gobiid genus *Coryphopterus* consist of *C. aureus*, *C. duospilus*, *C. inframaculatus*, *C. longispinus*, *C. neophytus*, *C. signipinnis*, and the following new species: *C. gracilis* from the western Pacific, east to Fiji, has the pelvic fins separated, lacks a pelvic frenum, and has a slender body (depth 5.45-5.75 in SL); *C. humeralis* from the Red Sea to the Society Islands, the smallest species (to 33.7 mm SL), has the posterior nostril next to the orbit, usually 18 pectoral rays, a short snout (3.4-3.7 in SL), and 2 prominent black spots (above pectoral-fin base and at midbase of caudal fin); *C. maximus*, from the Red Sea to the western Pacific, the largest species (to 75 mm SL), has prominent dusky orange-yellow spots on head, body, dorsal, and caudal fins, some on head nearly as large as pupil, a black spot at front of 1st dorsal fin, 1 at midbase of caudal fin, and usually 18 pectoral rays; *C. melacron* from the Andaman Sea and western Pacific east to Fiji has the pelvics separated and without a frenum, 10 dorsal and 9 anal soft rays, the 1st dorsal fin elevated and black-tipped, and usually 20 pectoral rays; and *C. pallidus*, similar to *C. maximus* but has 19 or 20 pectoral rays and its orange-yellow spots show little dark pigment (hence largely lost on preserved specimens).
http://www.sinica.edu.tw/zool/zoolstud/40.3/206.pdf

**Key words:** Gobiidae, *Coryphopterus*, Indo-Pacific, New species.

The gobiid genus *Coryphopterus* Gill, 1863 is represented by 9 species in the western Atlantic and 1 in the eastern Pacific. Species of this genus in the Indo-Pacific were usually classified in *Fusigobius* Whitley, 1930 until Randall (1995) placed *Fusigobius* in the synonymy of *Coryphopterus*. Böhlke and Robins (1969) listed 21 characters to define the genus in their revision of Atlantic species.

The species of *Coryphopterus* are generally found on sand within or near coral reefs. The general common name, sandgoby, is gaining acceptance for these fishes. Five Indo-Pacific species have been described: *C. neophytus* (Günther, 1877), *C. longispinus* (Goren, 1978), *C. duospilus* (Hoese and Reader, 1985), *C. signipinnis* (Hoese and Obika, 1988), *C. inframaculatus* Randall, 1994, and *C. aureus* (Chen and Shao, 1997). *C. inframaculatus* was described from the western Indian Ocean, but it is now realized that the western Pacific form that ranges from southern Japan to the Great Barrier Reef and east to Tonga should also bear this name. Five other common species have long been recognized as undescribed and have been illustrated and discussed in publications such as Masuda et al. (1984), Winterbottom and Emery (1986), Allen and Steene (1987), Randall and Goren (1993), Masuda and Kobayashi (1994), Okamura and Amaoka (1997), and Myers (1999). The author is currently writing a guidebook on reef fishes of the South Pacific; the time has come to provide the long-overdue descriptions of these species so that they can be named in the book. At least 1 additional undescribed species is known for the genus, but material is not available for its description.

A preliminary key to the known Indo-Pacific species of *Coryphopterus* is given, and color photographs have been reproduced for all (Figs. 1-18).

## MATERIALS AND METHODS

Type specimens of the new species have been deposited in the following institutions: Institute of Zoology, Academia Sinica, Taipei (ASIZP); Bernice P. Bishop Museum, Honolulu (BPBM); California Academy of Sciences, San Francisco (CAS); Muséum National d'Histoire Naturelle, Paris (MNHN); National Science Museum, Tokyo (NSMT);

Royal Ontario Museum, Toronto (ROM); J.L.B. Smith Institute of Ichthyology, Grahamstown, South Africa (RUSI); and the U.S. National Museum of Natural History, Washington, D.C. (USNM).

Lengths given for specimens are standard length (SL), the straight-line distance from the front of the upper lip (when not protruded) to the base of the caudal fin (distal end of the hypural plate). Head length is measured from the same median anterior point to the end of the opercular membrane, and snout length from the same point to the fleshy edge of the orbit. Body depth is the maximum depth from the base of the dorsal spines (adjusting for any obvious malformation from preservation), and body width is the greatest width just posterior to the gill opening. Orbit diameter is the greatest fleshy diameter, and interorbital width the least fleshy width (difficult to measure precisely in species such as those of *Coryphopterus* with a very narrow interorbital). Caudal-peduncle depth is the least depth, and caudal-peduncle length is measured horizontally from the rear base of the anal fin to the caudal-fin base. Base of the dorsal fins is the distance from the front of the base of the 1st dorsal spine to the rear base of the last dorsal soft ray. Lengths of fin spines and soft rays are measured from their tips to their extreme bases.

Pectoral-ray counts include the slender uppermost ray. The number of pectoral rays is the most useful meristic character for species of *Coryphopterus*. Table 1 was prepared for pectoral-ray counts of specimens from the Bishop Museum and Royal Ontario Museum collections except for including counts of the 2 type specinens of *C. aureus* (Chen and Shao) from the original description. Bishop Museum specimens of this species collected by the author in the Solomon Islands and Bougainville Reef in the Coral Sea are on loan to Douglass F. Hoese of the Australian Museum in Sydney.

Counts were made of the pectoral rays on both sides of all specimens. The longitudinal scale series is the number of oblique scale rows from the upper end of the gill opening to the midbase of the caudal fin. The count of the transverse scale series is made from the origin of the 2nd dorsal fin obliquely downward to the base of the anal fin. Gill-raker counts are made on the 1st gill arch and include rudiments; the upper-limb count is given first, and the raker at the angle is contained in the lower-limb count.

No differences were noted in the pattern of sensory papillae of the species of *Coryphopterus*. The sensory papillae of species of the genus have been illustrated by Masuda et al. (1984: fig. 83), Winterbottom and Emery (1986: figs. 48, 50), Hoese and Obika (1988, figs. 5, 6), and Randall (1994: fig. 3).

Proportional measurements of the new species are presented in tables 2-6 as percentages of standard length. Proportions in the text are step-in measurements rounded to the nearest 0.05. Data in parentheses in the descriptions refer to paratypes.

**Key to the Indo-Pacific species of *Coryphopterus***

1a. Dorsal soft rays 10; anal soft rays 9; pectoral rays 19-21, usually 20; 1st dorsal fin notably higher than 2nd and broadly tipped with black or dark brown; pelvic fins joined only basally by membrane; pelvic frenum absent (Andaman Sea and western Pacific, east to Fiji) ..... *melacron*, n. sp.

1b. Dorsal soft rays 9; anal soft rays 8; pectoral rays usually 17-19; 1st dorsal fin not notably higher than 2nd (except in *longispinus* and *inframaculatus*, then only the 1st 2 spines are elongate, especially in males); pelvic fins united or separate; pelvic frenum present or absent ..... 2

2a. Pelvic fins separate (joined by membrane only at extreme base); 5th (innermost) pelvic ray unbranched; pectoral rays modally 17; outer part of 1st dorsal fin irregularly reddish brown, the tips of 1st 2 membranes black (Ryukyu Is. to Great Barrier Reef, east to Guam, Caroline Is. and Fiji) .... 3

2b. Pelvic fins joined medially by membrane (often torn); 5th (innermost) pelvic ray branched; pectoral rays modally 18 or 19; 1st dorsal fin not colored as in 2a (black, if present, on leading edge of fin) ..... 4

3a. Pectoral rays 16-18 (modally 17); body with small brown to reddish brown spots; caudal fin without markings; 5th ray of pelvic fins less than two-thirds length of 4th ray (Ryukyu Is. to Great Barrier Reef, east to Guam, Caroline Is. and Fiji) ..... *signipinnis*

3b. Pectoral rays 18 or 19; body with prominent yellow spots; caudal fin with yellow spots; 5th ray of pelvic fins about three-fourths length of 4th ray (Indonesia, Solomon Is., and Coral Sea) ..... *aureus*

4a. Pelvic frenum absent; body slender, depth 5.45-5.75 in SL; translucent with dusky yellow dots on head and body, a basicaudal black spot smaller than pupil, a smaller blackish spot above pectoral-fin base, and a thin blackish line from near tip of 1st interspinous membrane of dorsal fin to base of 2nd spine (Ryukyu Is. to Great Barrier Reef and New Caledonia, east to Fiji) ..... *gracilis*, n. sp.

4b. Pelvic frenum present (weakly developed in *duospilus*); body not as slender (except for small *duospilus*), depth 4.15-5.45 in SL; color not entirely as in 3a ..... 5

5a. First and 2nd dorsal spines elongate and filamentous, the 1st 1.7-4.5 in SL (much longer in males than females) ... 6

5b. First and 2nd dorsal spines not elongate or filamentous, the 1st 4.8-6.85 in SL ..... 7

6a. A subtriangular to oval black spot at midbase of caudal fin, its greatest diameter usually as large or larger than orbit diameter; pectoral rays modally 19; 2nd dorsal spine of males 67%-80% length of 1st spine (western Indian Ocean to western Pacific, east to Tonga) ..... *inframaculatus*

6b. Black spot at base of caudal fin present or absent (if present, smaller than eye); pectoral rays modally 18; 2nd dorsal spine of males less than 60% length of 1st spine (Red Sea) ..... *longispinus*

7a. Posterior nostril adjacent to orbit; snout short, 3.4-3.7 in head; a prominent round black spot above base of pectoral fin about as large as basicaudal spot and usually more strongly pigmented; largest specimen, 33.7 mm SL (Indo-Pacific) ... ..... *humeralis*, n. sp.

7b. Posterior nostril closer to mid-snout than front of orbit; snout not short, 2.8-3.5 in head; a dark spot above base of pectoral fin present or absent (if present, not round and black); largest specimens, 46-75 mm SL ..... 8
8a. Sensory canal behind eye with 3 pores (including 1 at posterior end); scales on side of nape ctenoid; a small cycloid scale on upper anterior part of opercle (often lost); a narrow dusky bar usually present on lower side in middle of caudal peduncle (more evident in preserved than in live fish) (Indo-Pacific) ..... *neophytus*
8b. Sensory canal behind eye with 2 pores; scales on side of nape cycloid; no scale on opercle; no dusky bar on caudal peduncle ..... 9
9a. A blackish line on 1st dorsal fin from base of 3rd dorsal spine to outer part of 1st membrane where it usually ends in a black spot in adults; a 2nd black spot or cluster of dots or lines usually present on membrane between 5th and 6th spines of adults; most markings on body as yellowish brown dots; caudal fin 3.35-4.15 in SL; maximum size, 46 mm SL (Indo-Pacific) ..... *duospilus*
9b. A single black spot on outer part of 1st membrane of dorsal fin, not linked by a dark line to base of fin; spots on head and body of moderate size, some on head nearly as large as pupil; caudal fin 2.95-3.4 in SL; maximum size 64.5-75 mm SL ..... 10
10a. Spots on head, body, dorsal, and caudal fins dusky orange-yellow in life, persisting in preservative; caudal fin 3.25-3.4 in SL; pelvic fins 4.25-4.85 in SL; pectoral rays 17-19, usually 18; size to 75 mm SL (Red Sea and Seychelles to western Pacific) ..... *maximus*, n. sp.
10b. Spots on head, body, dorsal, and caudal fins orange-yellow in life, largely lost on preserved specimens; caudal fin 2.95-3.2 in SL; pelvic fins 3.65-4.05 in SL; pectoral rays 19-20, usually 19; size to 64.5 mm SL (western Indian Ocean to western Pacific) ..... *pallidus*, n. sp.

### ***Coryphopterus gracilis*, n. sp.**
(Tables 1, 2; Fig. 4)

*Fusigobius* sp. 2 Masuda et al. 1984: 251, pl. 240, fig. M (Ryukyu Is.).

*Holotype*: BPBM 22296, 40.8 mm, ♂, Japan, Ryukyu Is., Okinawa, Sesoko I., W side, sand and rubble at base of reef front, 15-18 m, rotenone, J.E. Randall and T. Yoshino, 12 Sept. 1977.

*Paratypes*: ROM 45592, 3: 20.0-25.5 mm, Fiji, Viti Levu, Yanu-Yanu-Sau I. (1.8 km SW of Dravuni I.), off W tip, 18°46'30"S, 178°30'28"E, rotenone, A.R. Emery, R. Winterbottom, J. Payne, and R. McKinnon, 25 Mar. 1983; ROM 49507, 2: 20.3-33.6 mm, Philippines, Mactan, 5 km N of Tambuli Beach Resort, 10°18'N, 124°2'E, reeftop, rotenone, R. Winterbottom and E.O. Murdy, 9 Aug. 1985; ROM 53186, 7: 14.1-35.6 mm, Philippines, Negros, mouth of Bais Bay, 9°37'N, 123°10'E, rotenone, R. Winterbottom, D. Johnson, R. Mooi, E. Benjamin, M. Burridge-Smith, and V. Deran, 17 May 1987; ROM 53187, 2: 22.2-27.2 mm, Philippines, Bohol, W side of island, 9°26'11"N, 123°23'6"E, rotenone, D. Johnson, E. Downar, D. Catada, and V. Deran, 21 May 1987; ROM 63950, 41.9 mm, New Caledonia, NW of Récif Mbere, 22°16'50"S, 166°10'30"E, rotenone, R. Winterbottom, G. Klassen, and P. Tirard, 10 Sept. 1991; ROM 64174, 32.8 mm, New Caledonia, Récif Mbere (just inside barrier reef NW of Passe de Dumbea), 22°20'30"S, 166°14'45"E, rotenone, R. Winterbottom, G. Klassen, and P. Tirard, 11 Sept. 1991; ROM 64309, 4: 31.2-38.2 mm, I. Redika, SW side, 22°31'20"S, 166°36'30"E, rotenone, R. Winterbottom, G. Klassen, and P. Tirard, 12 Sept. 1991; ROM 64429, 2: 26.3-33.3 mm, New Caledonia, I. Ua, E side just S of fringing reef, 22°42'40"S, 166°48'50"E, rotenone, R. Winterbottom and P. Tirard, 13 Sept. 1991; BPBM 33544, 37.2 mm, Coral Sea, Chesterfield Bank, lagoon, SE corner, 19°53.5'S, 158°28.2'E, small patch reef and sand, 5-7 m, rotenone, J.E. Randall, M.L. Kulbicki, P.J. Doherty et al., 20 Aug. 1988; USNM 361372, 39.9 mm, same data as preceding.

*Nontype Materials*: ROM 40453, 25.5 mm, Escape Reef, Great Barrier Reef; ROM 45593, 25.4 mm, Fiji; ROM 53185, 27.4 mm, Siquijor, Philippines.

*Diagnosis*: Dorsal rays VI-I,9; anal rays I,8; pectoral rays 17-19 (usually 18); longitudinal scale series 25; head naked except for scales on side of nape reaching nearly to above upper end of preopercular margin; posterior nostril not close to orbit; body slender, depth 5.45-5.75 in SL; snout length 3.0-3.4 in head; 1st dorsal fin not higher than 2nd; 2nd dorsal spine usually longest, 5.35-5.8 in SL; pelvic fins fully joined medially by membrane (when intact); pelvic frenum absent. Translucent with numerous very small orange-yellow spots with blackish centers on head and body, those on head arranged in oblique rows; a black spot the size of pupil or smaller at midbase of caudal fin; a 2nd smaller blackish spot just above base of pectoral fin; dorsal and caudal fins with orange-yellow spots; a dusky orange line from upper part of 1st membrane of 1st dorsal fin to base of 2nd spine. Largest specimen examined, 41.9 mm SL.

*Description*: Dorsal rays VI-I,9; anal rays I,8 (1 paratype aberrant with 5 soft rays); all dorsal and anal soft rays branched, the last to base; pectoral rays 18 (17-19, usually 18), the upper 2 and lowermost unbranched; pelvic rays I,5; branched caudal rays 12; upper unbranched caudal rays 9 (9-10, usually 9), the posterior 3 segmented; lower unbranched caudal rays 8 (7-8, usually 8), the posterior 2 segmented; longitudinal scale series 25 (scales partially missing on most specimens); transverse scale series 7; circumpeducular scales 12; gill rakers 2+6 (1-2+5-6); pseudobranchial filaments 7 (6-8); bran-

**Fig. 1.** *Coryphopterus aureus*, 55 mm SL, Bougainville Reef, Coral Sea.

**Fig. 2.** Underwater photograph of *Coryphopterus aureus*, Babi I., Flores, Indonesia.

**Fig. 3.** *Coryphopterus duospilus*, about 50 mm TL, Alor, Indonesia.

**Fig. 4.** Holotype of *Coryphopterus gracilis*, BPBM 22296, 40.8 mm SL, Okinawa, Ryukyu Is.

**Fig. 5.** Holotype of *Coryphopterus humeralis*, BPBM 32955, 27.9 mm SL, South Malé Atoll, Maldive Is.

**Fig. 6.** *Coryphopterus humeralis*, 38 mm TL, Bali, Indonesia.

**Fig. 7.** *Coryphopterus inframaculatus*, female, about 40 mm TL, Sipadan I., Sabah.

**Fig. 8.** *Coryphopterus inframaculatus*, male, about 50 mm TL, Lizard I., Great Barrier Reef.

**Fig. 9.** *Coryphopterus longispinus*, 50.7 mm SL, Gulf of Aqaba, Red Sea.

**Fig. 10.** Holotype of *Coryphopterus maximus*, BPBM 28539, 54.7 mm SL, Negros, Philippines.

**Fig. 11.** *Coryphopterus maximus*, about 65 mm TL, North Malé Atoll, Maldive Is.

**Fig. 12.** Holotype of *Coryphopterus melacron*, BPBM 31581, 35.2 mm SL, Bali, Indonesia.

**Fig. 13.** Underwater photograph of holotype of *Coryphopterus melacron*.

**Fig. 14.** *Coryphopterus melacron*, about 35 mm TL, Sangiang, Indonesia.

**Fig. 15.** *Coryphopterus neophytus*, about 55 mm TL, Chesterfield Bank, Coral Sea.

**Fig. 16.** Holotype of *Coryphopterus pallidus*, BPBM 33580, 64.5 mm SL, Chesterfield Bank, Coral Sea.

**Fig. 17.** *Coryphopterus pallidus*, about 60 mm TL, South Malé Atoll, Maldive Is.

**Fig. 18.** *Coryphopterus signipinnis*, about 40 mm TL, Sulawesi, Indonesia.

chiostegal rays 5; vertebrae 10+16.

Body elongate, depth 5.45 (5.5-5.75) in SL, and compressed, width 1.35 (1.3-1.5) in depth; ventral part of head and chest broad and nearly flat; head triangular when viewed from above, its length 3.2 (3.1-3.3) in SL; snout pointed, its length 3.15 (3.0-3.4) in head; orbit diameter 3.2 (3.0-3.35) in head, the eye extending slightly above dorsal profile of head; interorbital space extremely narrow, 34.5 (30.5-37.7) in head; caudal-peduncle depth 2.7 (2.85-3.2) in head; caudal-peduncle long, its length 1.1 (1.05-1.15) in head.

Mouth moderately large, the maxilla ending below anterior 1/3 of eye, the upper-jaw length 2.8 (2.6-2.9) in head; lower jaw slightly projecting; mouth slightly oblique, the gape forming an angle of less than 10° to horizontal axis of head and body; upper jaw with an outer row of slender, well-spaced, in-

curved conical teeth (16 on each side of holotype), the longest about 1/3 pupil diameter; front of upper jaw with an inner row of slender, depressible, incurved and inwardly projecting, conical teeth that extend about halfway back in jaw; inner and outer rows of teeth at front of upper jaw separated by 2 irregular rows of smaller conical teeth, narrowing to 1 row posteriorly in jaw; front of lower jaw with 5 pairs of well-spaced, slender, slightly incurved, conical teeth that are a little longer than teeth at front of upper jaw; a middle band of small conical teeth in 3 rows at front of lower jaw, narrowing on side of jaw where they become the outer rows, and an inner row of long, slender, depressible teeth that continue to become progressively shorter to end of jaw; no teeth on palate. Tongue truncate with rounded corners that curl upward, making it seem bilobed. Gill opening extending forward to below middle of opercle. Gill rakers short, the longest at angle about 1/2 length of longest gill filaments.

Head naked except for scales on side of nape extending forward nearly to eye; no scales on fins except a few on base of caudal fin that are smaller than largest scales on body. Scales ctenoid except those on side of nape, thorax, prepectoral area, and a few just above base of pelvic fins that are cycloid.

Anterior nostril a short membranous tube at level of lower edge of eye, about 1/3 distance from base of upper lip to edge of orbit; posterior nostril usually with a slight rim, dorsoposterior to anterior nostril and slightly ventroposterior to nasal pore (hence about 2/5 distance from orbit to base of upper

**Table 1.** Counts of the pectoral-fin rays of species of *Coryphopterus*

| | 16 | 17 | 18 | 19 | 20 | 21 |
|---|---|---|---|---|---|---|
| *C. aureus* | | | 1 | 1 | | |
| *C. duospilus* | | | 6 | 37 | 7 | |
| *C. gracilis* | | 5 | 27 | 4 | | |
| *C. humeralis* | | 7 | 45 | 5 | | |
| *C. inframaculatus* | | 2 | 17 | 37 | 6 | |
| *C. longispinus* | | 4 | 6 | | | |
| *C. maximus* | | 2 | 28 | 14 | | |
| *C. melacron* | | | | 2 | 22 | 8 |
| *C. neophytus* | 1 | 45 | 55 | 1 | | |
| *C. pallidus* | | | | 16 | 4 | |
| *C. signipinnis* | 1 | 34 | 7 | | | |

**Table 2.** Proportional measurements of type specimens of *Coryphopterus gracilis* expressed as percentages of the standard length

| | Holotype | Paratypes | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | BPBM 22296 | ROM 53187 | ROM 45592 | ROM 64309 | BPBM 33544 | ROM 64309 | USNM 361372 | ROM 63950 |
| Sex | male | female | female | female | male | male | male | male |
| Standard length (mm) | 40.8 | 22.0 | 25.7 | 30.3 | 37.2 | 38.1 | 39.9 | 41.9 |
| Body depth | 18.3 | 18.0 | 18.2 | 17.9 | 18.0 | 17.8 | 17.7 | 17.4 |
| Body width | 13.5 | 12.5 | 12.0 | 12.8 | 11.9 | 13.0 | 12.6 | 13.2 |
| Head length | 31.0 | 31.9 | 31.3 | 32.1 | 31.4 | 31.5 | 30.5 | 30.5 |
| Snout length | 9.9 | 9.8 | 9.2 | 9.8 | 9.3 | 10.2 | 9.7 | 9.6 |
| Orbit diameter | 9.7 | 10.7 | 9.7 | 9.9 | 9.4 | 9.4 | 9.6 | 9.6 |
| Interorbital width | 0.9 | 0.9 | 0.9 | 0.8 | 0.9 | 1.0 | 1.0 | 1.0 |
| Caudal-peduncle depth | 11.4 | 10.1 | 10.7 | 10.2 | 9.7 | 11.0 | 10.0 | 9.6 |
| Caudal-peduncle length | 28.8 | 29.5 | 29.6 | 29.0 | 27.7 | aberrant | 28.5 | 28.7 |
| Upper-jaw length | 11.1 | 11.5 | 11.4 | 11.5 | 10.9 | 11.8 | 11.9 | 11.5 |
| Predorsal length | 33.8 | 34.9 | 34.8 | 34.0 | 34.4 | 33.9 | 33.5 | 33.3 |
| Preanal length | 54.0 | 52.7 | 54.2 | 52.8 | 54.4 | 54.1 | 53.4 | 53.5 |
| Prepelvic length | 30.4 | 32.3 | 31.2 | 30.0 | 32.4 | 31.4 | 30.9 | 32.2 |
| Base of dorsal fins | 39.9 | 38.6 | 39.1 | 39.6 | 39.5 | 39.4 | 39.7 | 40.5 |
| First dorsal spine | 17.8 | 17.9 | 17.5 | 18.2 | 17.8 | 18.3 | 18.0 | 17.3 |
| Longest dorsal spine | 19.1 | 18.4 | 18.5 | 19.1 | 18.3 | 18.9 | 18.8 | 18.4 |
| Spine of second dorsal fin | 15.9 | 16.0 | 16.2 | 16.4 | 16.2 | 16.1 | 16.3 | 16.7 |
| Longest dorsal ray | 19.2 | 21.0 | broken | 19.8 | 20.1 | 18.9 | 20.3 | 20.6 |
| Anal-spine length | 10.2 | 9.5 | 9.7 | 9.9 | 11.3 | 10.4 | 10.1 | 9.7 |
| Longest anal ray | 17.9 | 15.8 | broken | 15.1 | 19.6 | aberrant | 17.8 | 17.0 |
| Caudal-fin length | 27.1 | 26.9 | 27.2 | 29.2 | 28.8 | 27.7 | 28.9 | 28.3 |
| Pectoral-fin length | 27.3 | 27.1 | 26.5 | 27.4 | 26.1 | 27.3 | 27.1 | 27.0 |
| Pelvic-spine length | 9.4 | 10.0 | 9.7 | 9.9 | 9.0 | 9.3 | 9.9 | 9.6 |
| Fourth pelvic-fin ray | 22.3 | 22.0 | 21.8 | 23.2 | 22.0 | 22.1 | 22.5 | 22.1 |
| Fifth pelvic-fin ray | 19.8 | 17.9 | 18.3 | 19.7 | 18.7 | 19.7 | 19.8 | 19.2 |

lip). Head pores prominent, as follows: a nasal pore, an anterior and a posterior interorbital pore, a postorbital pore, an infraorbital pore below the postorbital, a pore at end of lateral sensory canal with a small pore in canal above upper end of preopercular margin; a short posterior lateral canal with a pore at each end, and 3 preopercular pores.

Length of genital papilla of male holotype equal to pupil diameter.

Origin of dorsal fin above upper base of pectoral fin, predorsal distance 2.95 (2.85-3.0) in SL; spines of fins slender and flexible; 1st dorsal fin not higher than 2nd; 1st dorsal spine 1.75 (1.7-1.8) in head; 2nd and 3rd dorsal spines subequal, the 2nd usually longest, 1.6 (1.65-1.75) in head; last membrane of 1st dorsal fin (when intact) reaching base of spine of 2nd dorsal fin; spine of 2nd dorsal fin 1.95 (1.85-2.0) in head; 1st dorsal soft ray usually longest, 1.6 (1.5-1.65) in head; origin of anal fin below base of 1st soft ray of 2nd dorsal fin, preanal distance 1.85 (1.85-1.9) in SL; anal spine 3.05 (2.8-3.35) in head; last or penultimate anal soft ray longest, 1.75 (1.6-2.1) in head, longer in males than females, caudal fin slightly to moderately rounded, 3.7 (3.4-3.7) in SL; pectoral fins pointed, the middle rays longest, 3.7 (3.65-3.8) in SL; origin of pelvic fins slightly posterior to base of pectoral fins, prepelvic distance 3.3 (3.1-3.35) in SL; pelvic fins fully joined by membrane (when intact); pelvic frenum absent; pelvic spine 3.3 (3.1-3.5) in head; 4th pelvic soft ray longest, nearly or just reaching origin of anal fin, its length 4.5 (4.3-4.6) in SL (1.35-1.45 in head); 5th pelvic soft ray 82%-89% length of 4th ray; 5th pelvic ray branched; 4th pelvic ray of holotype with 5 branches; tips of pelvic rays free of membrane, resulting in a lateral fringe to each fin.

Color of holotype in alcohol: pale yellowish with a dusky spot as large as pupil at midbase of caudal fin, a smaller fainter spot above base of pectoral fin, a series of 6 faint dusky midlateral blotches on body, numerous very small dark spots on head and body, and a faint dusky blotch below eye; fins translucent without markings; however, paratypes collected later and not so faded still show a vertical dark line from the outer part of the 1st interspinous membrane of the dorsal fin to the base of the 2nd dorsal spine.

Color of holotype in life: translucent, but soon changing to opaque white; basicaudal and humeral spots black; a series of 6 midlateral dusky blotches with orange-yellow centers; head and body with numerous very small orange-yellow spots, most of which with blackish centers, those on head in oblique rows, 1 from eye across lips; a diffuse dusky blotch below eye; dorsal and caudal fins translucent, finely flecked with white, with scattered small orange-yellow spots; an orange line with dusky center from outer part of 1st membrane of 1st dorsal fin to base of 2nd spine; anal and pelvic fins white; pectoral fins with whitish rays and transparent membranes.

*Etymology*: This species is named *gracilis* from the Latin in reference to its being the most slender species of the genus.

*Remarks*: *Coryphopterus gracilis* occurs in the western Pacific from the Ryukyu Is. to the Great Barrier Reef and New Caledonia, and east to Fiji. It has been collected from depths of 6-18 m.

*Cryphopterus humeralis*, described below, is very similar in color to *C. gracilis*, having the same prominent 2 dark spots on the body, numerous dusky orange-yellow spots, and a vertical dark line anteriorly on the 1st dorsal fin. The 2 also have the same meristic data. *C. gracilis* differs in lacking a pelvic frenum, in its more elongate body (depth 5.45-5.75 in SL, compared to 4.4-4.8 for *C. humeralis*), longer snout (3.0-3.4 in head, compared to 3.4-3.7 for *C. humeralis*), and in having the posterior nostril well separated from the orbit.

### ***Coryphopterus humeralis*, n. sp.**

(Tables 1, 3; Figs. 5, 6)

*Fusigobius* sp. B Winterbottorn and Emery 1986: 32, figs. 49-50 (Chagos Archipelago).

*Fusignobius* sp. 2 Randall and Goren 1993: 13, pl. 3, fig. B (South Malé Atoll, Maldive Is.).

*Holotype*: BPBM 32955, ♂, 27.9 mm, Republic of Maldivers, South Malé Atoll, Embudu I., S side, lagoon reef, 8-10 m, rotenone, J.E. Randall, R.C. Anderson, M.S. Adam, H. Shareef, and H. Zahir, 18 Mar. 1988.

*Paratypes*: NSMT-P 59444, 31.8 mm, Ryukyu Is., Ishigaki, S side of pass, 1.5 km E of isthmus, 6-21 m, rotenone, J.E. Randall, A.H. Banner, P. Helfrich, and W.J. Newhouse, 28 May 1968; ASIZP 60501, 3: 25.2-28.0 mm, Taiwan, S end at Maopitou, rock and rubble bottom with caves, 15 m, rotenone, J.E. Randall, G. Tribble, and R. Rutherford, 18 July 1978; BPBM 23393, 26.0 mm, Taiwan, S end, Nanwan, middle of bay directly E of harbor at Houpihu, rocky pinnacle, base of drop-off at cave entrance, 30 m, rotenone, J.E. Randall et al., 18 July 1978; ROM 37243, 2: 20.5-21.7 mm, Chagos Archipelago, I. Anglaise, 5°25'S, 71°45'E, rotenone, R. Winterbottom, 30 Sept. 1979; ROM 53304, 2: 19.2-25.9 mm, Philippines, Siquijor I., Tonga Point, W side about 1 km from tip of point, 9°12'16"N, 123°27'16"E, rotenone, D. Johnson, R. Mooi, E. Downar, and P. Benjamin, 9 May 1987; ROM 53306,

3: 25.7-26.0 mm, Philippines, Cebu, S end, about 0.75 km NE of sand spit, 9°26'10"N, 123°23'6"E, rotenone, D. Johnson, E. Downar, and D. Catada, 20 May 1987; BPBM 32276, 24.1 mm, Indonesia, Molucca Is., Ambon, Ambon Bay, NW side off Hative-Besar, base of fringing reef, coral and adjacent sand and rubble, 15 m, rotenone, J.E. Randall and D. Pelasula, 1 Oct. 1987; CAS 212408, 29.0 mm, Indonesia, Komodo, just E of Toro Liu Point, sloping silty sand bottom with isolated coral clumps, 25-28 m, rotenone, J.E. Randall and E. Clark, 16 Oct. 1987; MNHN 2000-757, 20.0 mm, Papua New Guinea, Barrier Reef, Horseshoe Reef (S of Motupore I. off Bootless Inlet), 9°135'47"S, 147°16'32"E, sand in caves, 13-15 mm, rotenone, J.E. Randall and P.L. Colin, 28 Oct. 1987; ROM 60879, 4: 19.6-26.9 mm, Society Is., Moorea, NE end of pass to Cook Bay, 17°28'42"S, 149°49'22"W, rotenone, R. Winterbottom and R. Mooi, 15 Dec. 1989; BPBM 34286, 28.3 mm, New Caledonia, lagoon, S of Ile Puen, 21°159'15"S, 165°57'15"E, reef and sand, 2-5 m, rotenone, M. Kulbicki, J.E. Randall, et al., 23 Mar. 1990; RUSI 61851, 24.4 mm, Indonesia, Banda Sea, Penyu Is., Maisel I. Mar Islet, reef front, rubble and sand on ledge in drop-off, 15 mm, hand net, J.L. Earle, 24 Oct. 1990; BPBM 36627, 4: 23.3-33.7 mm, Indonesia, Banda Sea, Manuk, dark volcanic sand in cave near shore, 3.7 m, hand net and quinaldine, J.L. Earle, 30 Oct. 1990; USNM 360975, 27.2 mm, Indonesia, Banda Sea, Karang Dusburgh, sand and rubble, 9-12 m, hand net, J.L. Earle, 31 Oct. 1990; ROM 60865, 3: 25.4-26.5 mm, Andaman Sea, Thailand, off Phuket, Ko Hi, bay on S coast, 7°44'30"N, 98°22'33"E, base of fringing reef and adjacent silty sand, 6-10 m, rotenone, R. Winterbottom, R. Mooi, W. Holleman, and U. Satapoomin, 11 Nov. 1993; ROM 68658, 2: 22.7-25.2 mm, Andaman Sea, Thailand, off Phuket, Ko Hi, S coast, 7°35'10"N, 98°22'5"E, coral and sand, 15-20 m, rotenone, R. Winterbottom, W. Holleman, R. Mooi, and U. Satapoomin, 26 Nov. 1993; BPBM 38716, 23.8 mm, Fiji, Viti Levu, barrier reef S of Suva, N of wreck on reef, "Fish Patch", 18°19.52'S, 178°23.9'E, backside of wall in moat, 7.5-10.5 m, rotenone, D.W. Greenfield, J.E. Randall, K. Longenecker, and K.S. Cole, 27 May 1999; CAS 212409, 23.9 mm, Fiji, Viti Levu, barrier reef S of Suva, off sand islet, 18°10.8'S, 178°28.14'E, silty sand and dead coral, 10.5-13.5 m,

**Table 3.** Proportional measurements of type specimens of *Coryphopterus humeralis* expressed as percentages of the standard length

| | Holotype | Paratypes | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | BPBM 32955 | BPBM 36627 | BPBM 32276 | BPBM 36627 | BPBM 34286 | BPBM 36627 | NSMT 59444 | BPBM 36627 |
| Sex | male | female | female | female | male | female | male | male |
| Standard length (mm) | 27.9 | 23.3 | 24.1 | 26.1 | 28.3 | 30.7 | 31.8 | 33.7 |
| Body depth | 21.4 | 21.5 | 21.1 | 22.5 | 21.7 | 22.8 | 20.8 | 21.0 |
| Body width | 15.0 | 16.4 | 13.1 | 15.1 | 13.3 | 17.9 | 13.7 | 15.2 |
| Head length | 32.1 | 31.0 | 32.5 | 30.7 | 32.3 | 31.0 | 31.1 | 30.5 |
| Snout length | 9.2 | 8.6 | 8.7 | 8.6 | 8.8 | 9.1 | 8.8 | 8.7 |
| Orbit diameter | 9.7 | 9.9 | 10.1 | 9.6 | 10.1 | 9.5 | 9.4 | 9.0 |
| Interorbital width | 1.3 | 1.2 | 1.2 | 1.1 | 1.2 | 1.3 | 1.2 | 1.2 |
| Caudal-peduncle depth | 12.4 | 12.1 | 12.5 | 11.7 | 11.2 | 10.8 | 11.3 | 12.9 |
| Caudal-peduncle length | 26.1 | 26.5 | 26.9 | 26.9 | 26.2 | 27.0 | 26.8 | 26.7 |
| Upper-jaw length | 11.5 | 12.0 | 12.0 | 11.4 | 11.2 | 11.4 | 11.0 | 11.6 |
| Predorsal length | 34.8 | 34.3 | 33.4 | 33.5 | 34.6 | 33.3 | 34.4 | 32.7 |
| Preanal length | 54.5 | 55.3 | 55.5 | 54.2 | 54.7 | 54.3 | 53.4 | 53.5 |
| Prepelvic length | 29.5 | 30.9 | 30.1 | 29.9 | 31.7 | 30.1 | 29.3 | 29.2 |
| Base of dorsal fins | 41.2 | 42.9 | 41.0 | 42.2 | 41.8 | 42.7 | 41.7 | 42.8 |
| First dorsal spine | 16.4 | 16.3 | 14.6 | 16.1 | 14.7 | 14.7 | 15.5 | 14.9 |
| Longest dorsal spine | 18.6 | 18.0 | 17.3 | 18.1 | 17.7 | 17.8 | 17.8 | 17.7 |
| Spine of second dorsal fin | 16.2 | 16.9 | 16.4 | 16.6 | 14.1 | 16.4 | 15.8 | 15.6 |
| Longest dorsal ray | 23.4 | 19.3 | 19.8 | 18.4 | 18.3 | 18.9 | 22.0 | 23.2 |
| Anal-spine length | 11.7 | 10.3 | 10.4 | 11.4 | 11.3 | 10.4 | 11.5 | 10.3 |
| Longest anal ray | 22.3 | 20.6 | 20.3 | 18.7 | 19.6 | 18.9 | 22.0 | 21.4 |
| Caudal-fin length | 29.5 | 28.1 | 29.0 | 28.2 | 30.7 | 27.8 | 28.8 | 29.1 |
| Pectoral-fin length | 28.7 | 29.8 | 29.5 | 27.6 | 29.4 | 27.9 | 29.0 | 28.5 |
| Pelvic-spine length | 9.1 | 9.4 | 8.7 | 9.0 | 8.7 | 9.7 | 9.3 | 9.2 |
| Fourth pelvic-fin ray | 26.1 | 26.2 | 25.2 | 25.7 | 25.4 | 25.6 | 24.6 | 25.7 |
| Fifth pelvic-fin ray | 23.8 | 25.4 | 23.4 | 24.3 | 24.5 | 23.2 | 24.1 | 24.7 |

rotenone, D.W. Greenfield, K. Longenecker, and K.S. Cole, 1 June 1999; BPBM 38783, 2: 27.5-29 mm, Indonesia, Bali, NE coast at Tulamben, top of drop-off, small cave in 6 m, quinaldine, J.E. Randall, 12 Oct. 2000.

*Nontype Materials*: BPBM 18272, 27.8 mm, Red Sea, Gulf of Aqaba, Sinai coast, 1 km N of Fiord, patch reef of dead coral, 21 m, rotenone, J.E. Randall and O. Gon, 26 Sept. 1974; BPBM 17930, 4: 19.0-25.7 mm, Red Sea, Sudan, Suakin Harbor, off marine lab jetty, 3-6 mm, rotenone, J.E. Randall and P.J. Vine, 12 Oct. 1974; BPBM 35714, 26.3 mm, southern Red Sea, Hanish Group, Southwest Rock, 13°38.1'S, 42°35.9'E, reef and sand, 25 m, quinaldine, J.E. Randall, 18 May 1993; BPBM 35726, 29.0 mm, Gulf of Aden, Seven Brothers Is., Rhounda Komaxtou, reef, 14 m, quinaldine, J.E. Randall, 19 May 1993.

*Diagnosis*: Dorsal rays VI-I,9; anal rays I,8; pectoral rays 17-19 (usually 18); longitudinal scale series 25; head naked except for scales on side of nape reaching nearly to orbit; posterior nostril near edge of orbit; body depth 4.4-4.8 in SL; snout short, 3.4-3.7 in head; 1st dorsal fin not higher than 2nd (longest dorsal soft ray longer than longest dorsal spine); 2nd or 3rd dorsal spines longest, 5.35-5.8 in SL; pelvic fins fully joined medially by membrane (when intact); pelvic frenum present. Body translucent with numerous small dusky orange-yellow spots on head and body, those on head in oblique rows; a round black spot as large or larger than pupil in humeral region just above base of pectoral fin, and a 2nd black spot of about the same size at midbase of caudal fin. A small species, the largest examined, 33.7 mm SL.

*Description*: Dorsal rays VI-I,9; anal rays I,8; all dorsal and anal soft rays branched, the last to base; pectoral rays 18 (17-19, usually 18), the upper 2 and sometimes the lowermost unbranched; pelvic rays I, 5; branched caudal rays 12; upper unbranched caudal rays 9 (8-9, usually 9), posterior 3 segmented; lower unbranched caudal rays 7 (7-8, usually 7), the posterior 2 segmented; longitudinal scale series 25 (scales partially missing on most specimens); transverse scale series 7; circumpeduncular scales 12; gill rakers 2+6 (1-2+5-6); pseudobranchial filaments 6 (5-6); branchiostegal rays 5; vertebrae 10+16.

Body moderately elongate, depth 4.7 (4.4-4.8) in SL, and compressed, width 1.45 (1.25-1.6) in depth; ventral part of head and chest broad and nearly flat; head triangular when viewed from above, its length 3.1 (3.0-3.25) in SL; snout short and moderately pointed, its length 3.5 (3.4-3.7) in head; orbit diameter 3.3 (3.15-3.4) in head, the eye extending slightly above dorsal profile of head; interorbital space very narrow, 26.7 (23.0-27.9) in head; caudal-peduncle depth 2.6 (2.35-2.9) in head; caudal-peduncle length 1.25 (1.15-1.25) in head.

Mouth moderately large, the maxilla just reaching or extending slightly posterior to a vertical at anterior edge of pupil, the upper-jaw length 2.8 (2.6-2.9) in head; mouth terminal or with lower jaw slightly projecting, and oblique, the gape forming an angle of about 30° to horizontal axis of head and body; upper jaw with an outer row of slender, well-spaced, incurved conical teeth (14 on each side of holotype), the longest about 1/5 orbit diameter; teeth in outer row on posterior 1/2 of upper jaw angling forward as well as curving inwardly, only the last few progressively shorter; front of upper jaw with an inner row of slender, depressible, strongly incurved, conical teeth, separated from teeth in outer row by a band of small conical teeth in 3 rows, this band narrowing on side of jaw to 1 row and disappearing on posterior 1/3 of jaw; lower jaw with 3 pairs of well-spaced, slender, slightly incurved, conical teeth that are a little longer than teeth at front of upper jaw; a middle band of small conical teeth in 3 rows at front of lower jaw, narrowing on side of jaw where they become the outer rows, and an inner row of long, slender, depressible teeth that become progressively shorter to end of jaw; no teeth on palate. Tongue broadly rounded, free anteriorly from floor of mouth. Gill opening extending forward to within 1/4 of opercle width from posterior edge of preopercle. Gill rakers short, the longest at angle about 1/2 length of longest gill filaments.

Head naked, except for scales on side of nape extending forward nearly to eye; a broad median triangular naked area behind eyes, the apex at origin of 1st dorsal fin; scales ctenoid except those on thorax, prepectoral area, and a few just above base of pelvic fins that are cycloid; no scales on fins except a few on base of caudal fin, most of which are smaller than scales on body.

Anterior nostril a short membranous tube at level of lower edge of pupil, a little closer to front of snout at base of upper lip than to edge of orbit; posterior nostril with a slight rim, dorsoposterior to anterior nostril and very near edge of orbit. Head pores prominent, as follows: nasal pore just dorsoanterior to posterior nostril, an anterior and a posterior interorbital pore, a postorbital pore, an infraorbital pore below postorbital, a pore at end of lateral sensory canal with a small pore in canal above upper end of preopercular margin; a short posterior lateral canal with a pore at each end, and 3 preopercular pores.

Genital papilla of males about 3/4 orbit dia-

meter.

Origin of dorsal fin above upper base of pectoral fin, predorsal distance 2.85 (2.85-3.05) in SL; spines of fins slender and flexible; 1st dorsal fin not higher than 2nd; 1st dorsal spine 1.95 (1.9-2.2) in head; 2nd and 3rd dorsal spines longest and subequal, 1.75 (1.7-1.9) in head; last membrane of 1st dorsal fin separated from origin of 2nd dorsal fin by a space about equal to or slightly greater than space of 1st membrane of 2nd dorsal fin; spine of 2nd dorsal fin 2.0 (1.85-2.3) in head; longest dorsal soft ray (varying from 2nd to last) 1.45 (1.3-1.75) in head, longer in males than in females; origin of anal fin slightly posterior to a vertical at base of 1st soft ray of 2nd dorsal fin, preanal distance 1.85 (1.8-1.85) in SL; anal spine 2.75 (2.7-3.1) in head; longest anal soft ray 1.45 (1.5-1.8) in head, longer in males than females; caudal fin rounded, 3.4 (3.25-3.5) in SL; pectoral fins pointed, middle rays longest, 3.5 (3.35-3.5) in SL; origin of pelvic fins below base of pectoral fins, prepelvic distance 3.4 (3.15-3.4) in SL; pelvic fins fully joined by membrane (when intact); pelvic frenum present; pelvic spine 3.5 (3.2-3.75) in head; 4th pelvic soft ray longest, reaching to or slightly beyond origin of anal fin, its length 3.85 (3.8-4.05) in SL (1.15-1.3 in head); 5th pelvic soft ray more than 90% length of 4th ray; 5th pelvic ray branched; 4th pelvic ray of holotype with 5 branches.

Color of holotype in alcohol: pale yellowish with a round black spot nearly as large as pupil just above proximal part of pectoral fin, and a slightly larger, more irregular, blackish spot at midbase of caudal fin; numerous small brown spots, 1 on most scales of body, many vertically elongate; a brown spot on base of 3rd, 4th, and 6th dorsal spines and 2nd, 3rd, 6th and 7th soft rays, each extending a short distance as a line onto back; head with small brown spots, mainly in oblique rows, the darkest crossing lips and extending to lower part of eye; a U-shaped dusky mark middorsal on snout, with each end at nasal pore; prepectoral area with 2 brown spots, 1 above the other, the uppermost continuing as a short band into fin; anal fin slightly dusky; remaining fins pale except for dusky spots on spines and rays of dorsal fins and basally on caudal rays.

The 4 paratypes from Manuk in the Banda Sea are much more strongly pigmented; they were collected from dark volcanic sand.

Color of holotype when fresh: translucent, the spots as described above dusky bright orange; dorsal and caudal fins translucent, finely flecked with white, with rows of dark-edge orange spots; anal and pelvic fins whitish.

*Etymology*: This species is named *humeralis* from the Latin in reference to the black spot in the humeral region, the most conspicuous marking.

*Remarks*: *Coryphopterus humeralis* is the smallest species of the genus; the largest specimen examined, from Indonesia, measures 33.7 mm SL. It is widely distributed, occurring from the Red Sea, Maldive Is., and Chagos Archipelago in the western Indian Ocean, east to French Polynesia. In the western Pacific it ranges from the Ryukyu Is. to the Great Barrier Reef and New Caledonia. Specimens were collected from depths of 3-30 m.

Three BPBM lots from the Red Sea and 1 from the Gulf of Aden are not listed as paratypes because the specimens have 17 pectoral rays, whereas the type specimens have mainly 18 pectoral rays (see Table 1). In other respects, including life color, the Red Sea and Gulf of Aden fish are like the type specimens.

This species is very similar to *Coryphopterus gracilis* (see Remarks for *C. gracilis*). In addition, it can also be confused with *C. duospilus*, also a small species (to 46 mm SL), especially when the latter lacks the 2 black spots typically found on the 1st dorsal fin. *C. duospilus* differs further in having modally 19 instead of 18 pectoral rays, and a more pointed and slightly longer snout (usually a little longer than the eye diameter, whereas the snout is shorter than the eye in *C. humeralis*).

### ***Coryphopterus maximus*, n. sp.**

(Tables 1, 4; Figs. 10, 11)

*Fusigobius* sp. 1 Masuda et al. 1984: 251, pl. 240, fig. J (Kerama Is., Ryukyu Is.).

*Holotype*: BPBM 28539, ♀, 54.7 mm, Philippines, Negros, Dumaguete City, off South Sea Resort Hotel, artifical reef and sand, 21 m, spear, J.E. Randall, 3 June 1981.

*Paratypes*: CAS 212410, 39.0 mm, Indonesia, Molucca Is., Ambon, Ambon Bay, Poka, adjacent to wreckage of ship near dock, silty sand, rubble, and shell, 15 m, rotenone, J.E. Randall, G.R. Allen, and O.K. Sumadiharga, 16 Jan. 1975; BPBM 19353, Ambon, Morilla, N coast, cave, silty sand bottom, 10-12 m, rotenone, J.E. Randall and G.R. Allen, 28 Jan. 1975; RUSI 61852, 68.8 mm, Sri Lanka, Trincomalee, N side of Fort Frederick Peninsula, sand and rubble, 3 m, spear, J.E. Randall, 4 Apr. 1975; USNM 360976, 46.0 mm, Philippines, Negros, Dumaguete City, off South Sea Resort Hotel, dark sand and isolated small coral heads, with some seagrass, 15-21 m, rotenone, J.E. Randall and M.J. Gawel, 4 June 1981; ROM 68152, 2: 56.3-62.2 mm, Oman, Kalhat, 1 mile NW of end of wadi, 200 m be-

fore start of cliffs, 22°43'N, 59°22'E, B.N.G. Simm, 23 Nov. 1981; ROM 49451, 3: 35.5-47.7 mm, Philippines, Bohol Strait, Sumilon I., NW coast, 9°25'N, 123°20'E, rotenone, R. Winterbottom, E.O. Murdy, D. Catada, and A. Cabanban, 11 Aug. 1985; BPBM 33581, 2: 42.8-75.0 mm, Coral Sea, Chesterfield Bank, lagoon, SE corner, 19°53.5'S, 158°28.1'E, small patch reef and sand, rotenone, J.E. Randall, M.L. Kulbicki, and P.J. Doherty, 21 Aug. 1988; ASIZP 60502, 52.3 mm, MNHN 2000-758, 42.1 mm, and NSMT-P 59445, 58.5 mm, all with same data as preceding; ROM 58869, 3: 28.5-36.0 mm, Comoro Is., Kakazou, N side, adjacent to shore, 12°46'6"S, 45°15'24"E, rotenone, R. Winterbottom and C. Buxton, 11 Nov. 1988; ROM 64426, 3: 40.7-56.3 mm, New Caledonia, 0.5 km inside barrier reef, 22°23'S, 166°18'40"E, rotenone, G. Klassen and P. Tirard, 16 Sept. 1991; ROM 64173, 52.9 mm, New Caledonia, Passe de Dumbea, a little W of Récif Laregnere, 22°19'50"S, 166°16'50"E, rotenone, R. Winterbottom, G. Klassen, and J. Menou, 5 Sept. 1991; BPBM 35709, 3: 21-57.3 mm, southern Red Sea, Hanish Is., reef at 13°51.2'N, 42°50.4'E, cave with sand and rubble bottom, 19 m, quinaldine, J.E. Randall, 17 May 1993; ROM 68657, 48.8 mm, Andaman Sea, Thailand, off Phuket, Ko Racha Yai, off 1st bay at SE tip, 7°35'10"N, 98°22'5"E, patch reef surrounded by sand, 15-23 m, rotenone, R. Winterbottom, W. Holleman, R. Mooi, and U. Satapoomin, 25 Nov. 1993.

*Diagnosis*: Dorsal rays VI-I,9; anal rays I,8; pectoral rays 17-19 (rarely 17); longitudinal scale series 26-27; head naked except for scales on side of nape extending to above upper end of preopercular margin; posterior nostril about halfway between edge of orbit and front of snout; body depth 4.7-5.45 in SL; 1st dorsal fin shorter than 2nd; first 4 spines of dorsal fin subequal, the 2nd usually longest, 5.2-5.9 in SL; pelvic fins fully joined medially by membrane (though often torn); pelvic frenum present; pelvic fins usually not reaching origin of anal fin, 4.25-4.6 in SL. Body translucent with numerous dusky orange-yellow spots on head, body, dorsal, and caudal fins, some on head as large as pupil; a prominent black spot on 1st membrane of dorsal fin, and a blackish spot at midbase of caudal fin. Largest species of the genus;

**Table 4.** Proportional measurements of type specimens of *Coryphopterus maximus* expressed as percentages of the standard length

| | Holotype | Paratypes | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | BPBM 28539 | MNHN 758* | BPBM 33581 | ASIZP 60502 | BPBM 35709 | NSMT 59445 | RUSI 61852 | BPBM 33581 |
| Sex | female | female | female | female | female | female | female | male |
| Standard length (mm) | 54.7 | 42.1 | 42.8 | 52.3 | 57.3 | 58.5 | 68.8 | 75.0 |
| Body depth | 19.8 | 18.3 | 18.8 | 19.1 | 20.2 | 18.8 | 20.2 | 21.4 |
| Body width | 13.3 | 13.1 | 11.8 | 13.6 | 13.9 | 14.4 | 14.5 | 14.9 |
| Head length | 31.3 | 30.9 | 30.5 | 31.8 | 31.5 | 30.8 | 30.8 | 30.9 |
| Snout length | 9.8 | 9.5 | 9.4 | 9.2 | 9.1 | 9.3 | 9.7 | 9.2 |
| Orbit diameter | 9.1 | 10.3 | 10.2 | 9.6 | 9.2 | 9.2 | 8.6 | 8.3 |
| Interorbital width | 1.8 | 1.6 | 1.6 | 1.7 | 1.7 | 1.7 | 1.7 | 2.3 |
| Caudal-peduncle depth | 13.7 | 10.8 | 11.7 | 12.8 | 12.9 | 12.0 | 13.9 | 13.6 |
| Caudal-peduncle length | 25.9 | 25.4 | 25.2 | 25.0 | 26.2 | 25.1 | 26.3 | 24.2 |
| Upper-jaw length | 11.8 | 11.7 | 11.6 | 11.6 | 12.1 | 12.3 | 11.7 | 12.4 |
| Predorsal length | 33.0 | 33.2 | 33.9 | 33.1 | 34.0 | 33.5 | 33.0 | 32.7 |
| Preanal length | 57.0 | 58.5 | 58.5 | 57.9 | 56.8 | 58.1 | 56.1 | 58.7 |
| Prepelvic length | 31.3 | 30.5 | 30.7 | 30.6 | 31.3 | 29.9 | 30.1 | 30.3 |
| Base of dorsal fins | 42.5 | 42.6 | 42.8 | 42.6 | 43.7 | 42.5 | 44.9 | 44.4 |
| First dorsal spine | 17.6 | 16.7 | 16.6 | 15.9 | 16.2 | 15.8 | 14.6 | 16.3 |
| Second dorsal spine | 18.2 | 17.1 | 18.1 | 17.0 | 17.3 | 17.0 | broken | 14.6 |
| Spine of second dorsal fin | 18.8 | 17.9 | 21.0 | 21.6 | 19.4 | 19.2 | 17.7 | 20.4 |
| Longest dorsal ray | 21.5 | 20.8 | 21.1 | 22.0 | 23.5 | 22.0 | 21.8 | 21.7 |
| Anal-spine length | 9.5 | 9.4 | 9.4 | 9.9 | 10.1 | 9.5 | 8.9 | 9.6 |
| Longest anal ray | 22.1 | 20.8 | 20.7 | 22.5 | 21.0 | 20.6 | 21.1 | 21.3 |
| Caudal-fin length | 30.7 | 30.7 | 30.6 | 30.5 | 30.9 | 30.4 | 29.4 | 30.8 |
| Pectoral-fin length | 29.2 | 30.2 | 30.3 | 29.9 | 30.0 | 28.5 | 27.3 | 26.8 |
| Pelvic-spine length | 9.5 | 9.5 | 9.8 | 9.6 | 10.1 | 9.9 | 8.7 | 9.3 |
| Fourth pelvic-fin ray | 23.6 | 22.7 | broken | 23.0 | 23.1 | 21.9 | 21.8 | 22.9 |
| Fifth pelvic-fin ray | 22.0 | 21.6 | broken | 21.2 | 21.6 | 20.5 | 20.6 | 21.8 |

*MNHN 2000-758

attains 75 mm SL.

*Description*: Dorsal rays VI-I,9; anal rays I,8; all dorsal and anal soft rays branched, the last to base; pectoral rays 19 (17-19, rarely 17), all rays except uppermost branched (2nd and lower 1 or 2 rays unbranched in smaller paratypes); pelvic rays I,5; branched caudal rays 12 (12-13); upper unbranched caudal rays 10 (8-10), the posterior 3 segmented; lower unbranched caudal rays 8 (6-8), the posterior 2 segmented; longitudinal scale series 26 (26-27, scales partially missing on most specimens); transverse scale series 7; circumpeducular scales 12; gill rakers 2+8 (2-3+8); pseudobranchial filaments 9 (8-9); branchiostegal rays 5; vertebrae 10+16.

Body moderately elongate, depth 5.05 (4.7-5.45) in SL, and compressed, width 1.5 (1.3-1.6) in depth; ventral part of head and chest broad and nearly flat; head triangular when viewed from above, its length 3.2 (3.15-3.3) in SL; snout length 3.2 (3.2-3.45) in head; orbit diameter 3.45 (3.0-3.7) in head, the eye extending slightly above dorsal profile of head; interorbital space very narrow, 17.4 (15.2-19.3) in head; caudal-peduncle depth 2.3 (2.2-2-85) in head; caudal-peduncle length 1.2 (1.15-1.3) in head.

Mouth moderately large, the maxilla reaching a vertical at anterior edge of pupil (varying in paratypes from below front edge of eye to below center of eye), upper-jaw length 2.65 (2.5-2.75) in head; lower jaw slightly projecting; mouth moderately oblique, the gape forming an angle of about 20° to horizontal axis of head and body; upper jaw with an outer row of slender, well-spaced, incurved conical teeth (20 on side of jaw of holotype) that progressively shorten posteriorly, the longest about 1/7 orbit diameter in holotype; posterior teeth in outer row slightly antrorse; front of upper jaw with a middle band of villiform teeth in 3-4 rows, followed by a row of long, slender, conical teeth that are inward-projecting and depressible, this row also progressively smaller posteriorly, ending about halfway back in jaw; middle band of villiform teeth narrowing posteriorly to a single row; front of lower jaw with an outer row of 6 slender, well-spaced, incurved, conical teeth on each side as large as teeth at front of upper jaw; band of villiform teeth in 3-4 rows anteriorly in lower jaw behind outer larger teeth, and an inner row of longer, inwardly depressible teeth that are progressivley shorter posteriorly, ending about 2/3 distance to end of jaw; middle band of teeth narrowing to a single row posteriorly; no teeth on palate. Tongue broadly rounded, free anteriorly from floor of mouth. Gill opening extending forward to within 1/5 opercle width from posterior edge of preopercle. Gill rakers short, the longest about 1/2 length of longest gill filaments.

Head naked except for scales on side of nape that extend forward to above upper end of preopercular margin; no scales on fins except a few rows of small scales smaller than those of body on base of caudal fin; scales ctenoid except those on chest, anteroventrally on abdomen, and prepectoral area that are cycloid.

Anterior nostril a short membranous tube with a pointed posterior flap at level of lower edge of eye a 1/2 orbit diameter in front of orbit; posterior nostril a prominent opening with a slight rim dorsoposterior to anterior nostril about 1/2 distance from base of upper lip to edge of orbit. Head pores prominent, as follows: a nasal pore just dorsoanterior to posterior nostril, an anterior and a posterior interorbital pore, a postorbital pore, an infraorbital pore below the postorbital, a pore at end of lateral sensory canal with a small pore in canal above upper end of preopercular margin; a short posterior lateral canal with a pore at each end, and 3 preopercular pores.

Genital papilla of 75-mm male paratype nearly as long as orbit diameter.

Origin of dorsal fin above upper base of pectoral fin, predorsal distance 3.0 (2.95-3.05) in SL; spines of fins slender and flexible; 1st dorsal fin lower than 2nd dorsal fin; 1st 4 dorsal spines subequal, the 1st 1.75 (1.85-2.0) in head, the 2nd usually longest, 1.7 (1.7-1.85) in head; last membrane of 1st dorsal fin nearly reaching base of spine of 2nd dorsal fin; spine of 2nd dorsal fin 1.65 (1.45-1.75) in head; last dorsal soft ray usually longest (but penultimate ray longest on some paratypes), 1.45 (1.35-1-5) in head; origin of anal fin below base of 2nd soft ray of 2nd dorsal fin, preanal distance 1.75 (1.7-1.8) in SL; anal spine 3.3 (3.1-3.45) in head; last anal soft ray usually longest (but 1st or penultimate longest on some paratypes), 1.4 (1.4-1.5) in head; caudal fin strongly rounded, 3.25 (3.25-3.4) in SL; pectoral fins pointed, the middle rays (11th on holotype) longest, 3.4 (3.3-3.75) in SL; origin of pelvic fins below base of pectoral fins, prepelvic distance 3.2 (3.2-3.35) in SL; pelvic fins fully joined medially by membrane (though membrane often torn); pelvic frenum well developed, but thin and often damaged; pelvic spine 3.3 (3.1-3.5) in head; pelvic fins usually not reaching origin of anal fin, the 4th pelvic soft ray longest, 4.25 (4.35-4.6) in SL; 5th pelvic soft ray branched, more than 90% length of 4th ray; 4th pelvic ray of holotype with 6 branches.

Color of holotype in alcohol: pale yellowish brown with a blackish spot larger than pupil at midbase of caudal fin and numerous small dark

brown spots on body except ventrally, the most conspicuous in midlateral row (some as double spots) and 2 at base of each dorsal fin; prepectoral area with 2 dark brown spots, 1 above the other, that extend onto base of fin; head with dark brown spots, some as large as pupil, those ventrally on head arranged in oblique rows, those on snout across lips; 4 dark brown spots dorsally on snout, 1 at front of interorbital, 1 enclosing each nasal pore, and 1 medially at front of snout and extending onto upper lip (the 3 anterior spots joined on some paratypes); sensory papillae on head dark brown; 1st dorsal fin with a large black spot just above middle of 1st membrane and large elliptical dark brown spots in oblique rows; 1st dorsal spine crossed by 6 dark brown spots that extend onto adjacent membrane; 2nd dorsal and caudal fins with rows of small brown spots; remaining fins pale.

Color of holotype in life: translucent light gray with large obscure blackish dashes and smaller white dashes visible along vertebral column; spots on head and body dusky orange-yellow, except 1 at midbase of caudal fin that is black; sensory papillae of head black; pupil dark green, narrowly rimmed in yellow, iris yellowish on upper 3/4 with 5 yellowish-brown blotches, and light gray on lower 1/4; fins translucent, spots on dorsal and caudal fins dusky orange except for the conspicuous jet black spot on 1st membrane of 1st dorsal fin; outer margin of dorsal fins narrowly white.

The following color note was made of 2 juveniles, 21-23 mm, from the southern Red Sea: translucent gray with a large internal blackish blotch the full length of caudal peduncle; 2 rows of irregular small dusky yellow spots, 1 slightly below the midlateral position, ending in a black spot at base of caudal fin (some of these spots as double spots); 2nd row of spots beginning behind eye and extending to upper side of caudal peduncle; a large yellowish-brown band from lower part of eye across corner of mouth; a dusky yellow spot low on head below eye with a small spot in front; a dusky yellow V-shaped mark dorsally on snout; a middorsal row of dark yellowish-brown spots along base of dorsal fins; 2 narrow middorsal yellowish spots on nape; a black spot in outer part of first 2 membranes of 1st dorsal fin; 2nd dorsal and caudal fins faintly yellowish with small dusky orange spots; anal rays dusky yellow; pectoral fins with a dark brown spot on upper base and 2 dusky yellow spots on prepectoral area; pupil green; iris yellow with 2 dorsal dusky orange spots.

*Etymology*: This species is named *maximus* from the Latin in reference to its being the largest of the genus.

*Remarks*: *Coryphopterus maximus* is represented by type specimens from the following localities: southern Red Sea, Sri Lanka, Indonesia, Philippines, and Coral Sea. It is also known from the Ryukyu Is. (Masuda et al. 1984, as *Fusigobius* sp. 1), and from the Maldive Is. and Seychelles by underwater photographs taken by the author. It occurs on sand or sand and rubble substrata within or near reefs from depths of 3 to at least 21 m.

This species is most closely related to *Coryphopterus pallidus*, described below. The 2 were initially believed to be color forms of 1 species, assuming that the pale fish were taken from white sand areas. When the 2 forms were taken in the same rotenone station on white sand by a patch reef on the Chesterfield Bank in the Coral Sea, it was suspected that they might be different species. A loan of specimens from the Royal Ontario Museum collected by Richard Winterbottom and colleagues in the Andaman Sea off Phuket, Thailand also contained specimens of both species from the same rotenone station. See Remarks for *C. pallidus* for differences.

### ***Coryphopterus melacron*, n. sp.**

(Tables 1, 5; Figs. 12, 13, 14)

*Fusigobius* sp. 4 Masuda et al. 1984: 251, pl. 240, fig. O (Ryukyu Is.).

*Fusigobius neophytus* (non Günther) Kuiter 1992: 235, fig. D (Flores, Indonesia).

*Fusigobius* sp. 1 Masuda and Kobayashi 1994: 373, fig. 3 (Okinawa, Japan).

*Fusigobius* sp. 1 Okamura and Amaoka 1997: 599, fig. 4 (Iriomote I., Japan).

*Coryphopterus* sp. A Myers 1999: 250, pl. 159, fig. E (Ryukyu Is. and Palau).

*Holotype*: BPBM 31581, ♂, 35.2 mm, Indonesia, Bali, NE coast at Tulamben, off wreck of U.S.S. “Liberty”, on sand near small rock, 30.5 m, quinaldine, J.E. Randall, 20 Oct. 1986.

*Paratypes*: NSMT-P 59446, 36.0 mm, Ryukyu Is., Okinawa, Sesoko I., W side, sand and rubble at base of reef front, 15-18 m, rotenone, J.E. Randall and T. Yoshino, 12 Sept. 1977; BPBM 28466, 30.7 mm, Philippines, Luzon, Batangas, Caban I., W side, rubble and sand, 28-30 m, rotenone, J.E. Randall and M.J. Gawel, 25 May 1981; ROM 45599, 7: 15.2-43.2 mm, Fiji, Suva Harbor at Rattail Pass, W side, 18°8’29”S, 178°23’13”E, rotenone, A.R. Emery, R. McKinnon, and J. Payne, 13 Apr. 1983; ROM 42764, 2: 11.8-19.0 mm, Solomon Is., Guadalcanal, Honiara, 2 km W of Point Cruz Yacht Club, reef off V.S.O. Lodge, 9°28’S, 159°49’E, rotenone, P. Nichols and D. Evans, 4 May 1983; ASIZP 60503,

32.3 mm, BPBM 32136, 28.4 mm, and MNHN 2000-759, 27.7 mm, Indonesia, Flores, Wailiti Reef, N of Maumere, 8°34'40"S, 122°11'55"E, 18 m, sand near reef, rotenone, J.E. Randall, R.H. Kuiter, and L.C. Reynolds, 18 Sept. 1987; Rom 72240, 28.8 mm and USNM 360977, 30.0 mm, Indonesia, Komodo, just S of Toro Liu Point, 8°36'S, 119°31'6"E, sloping silty sand bottom with isolated clumps of coral, 25-28 m, rotenone, J.E. Randall and E. Clark, 16 Oct. 1987; ROM 68655, 30.7 mm, Andaman Sea, Thailand, off Phuket, Ko Racha Noi, SE end, 7°28'15"N, 98°19'34"E, large beach rock bommie surrounded by sand and patch reef, 1.5-9 m, rotenone, R. Winterbottom, R. Mooi, W. Holleman, and U. Satapoomin, 18 Nov. 1993; ROM 68656, 8: 12.9-28.0 mm, Andaman Sea, Thailand, off Phuket, Ko Racha Yai, S tip, 7°35'0"N, 98°21'45"E, 45° slope of large boulders, 15-21 m, rotenone, R. Winterbottom, W. Holleman, R. Mooi, and U. Satapoomin, 25 Nov. 1993; CAS 212411, 27.8 mm, Fiji, Viti Levu, lagoon side of barrier reef off Suva, 18°10.8'S, 178°28.14'E, silty sand and dead coral, 10.5-13.5 m, rotenone, D.W. Greenfield, K. Longenecker, and K.S. Cole, 1 June 1999.

*Diagnosis*: Dorsal rays VI-I,10; anal rays I,9; pectoral rays 19-21 (usually 20); longitudinal scale series 27; head, including most of nape, naked; posterior nostril near edge of orbit; body depth 4.75-5.2 in SL; 1st dorsal fin clearly higher than 2nd, 2nd and 3rd spines longest, 3.2-3.55 in SL; pelvic fins joined by membrane only at their extreme bases; no pelvic frenum. Body translucent gray, with numerous small yellowish brown or dusky orange-red spots, those ventrally on body forming longitudinal rows, and scattered small greenish-white spots; a series of larger dark blotches along back and often 1 on lower side; about outer 1/2 of 1st dorsal fin dark brown or black. Largest specimen, 43.2 mm SL.

*Description*: Dorsal rays VI-I,10; anal rays I,9; all dorsal and anal soft rays branched, the last to base; pectoral rays 20 (fin of holotype aberrant on 1 side) (19-20, usually 20), all rays except uppermost branched (2nd and lowermost rays unbranched in smaller paratypes); pelvic rays I,5; branched caudal rays 12; upper unbranched caudal rays 12 (11-12), the posterior 3 segmented; lower unbranched caudal

**Table 5.** Proportional measurements of type specimens of *Coryphopterus melacron* expressed as percentages of the standard length

| | Holotype | Paratypes | | | | | |
|---|---|---|---|---|---|---|---|
| | BPBM 31581 | MNHN 759* | BPBM 32136 | ROM 77240 | USNM 360977 | BPBM 28466 | ASIZP 60503 | NSMT 59446 |
| Sex | male | male | female | female | female | female | female | female |
| Standard length (mm) | 35.2 | 27.5 | 28.4 | 28.8 | 30.0 | 30.7 | 32.3 | 36.0 |
| Body depth | 20.2 | 20.3 | 21.0 | 20.9 | 20.5 | 18.8 | 19.4 | 20.5 |
| Body width | 15.4 | 14.4 | 15.6 | 16.2 | 16.0 | 14.7 | 15.7 | 15.3 |
| Head length | 32.3 | 32.9 | 32.8 | 32.7 | 32.9 | 33.0 | 33.5 | 33.2 |
| Snout length | 9.7 | 9.7 | 9.9 | 9.9 | 10.0 | 10.1 | 10.0 | 10.3 |
| Orbit diameter | 10.2 | 10.9 | 10.9 | 10.5 | 10.2 | 10.4 | 10.6 | 10.1 |
| Interorbital width | 1.1 | 1.2 | 1.2 | 1.2 | 1.3 | 1.3 | 1.2 | 1.1 |
| Caudal-peduncle depth | 13.1 | 11.7 | 12.2 | 12.7 | 13.1 | 12.1 | 12.3 | 12.2 |
| Caudal-peduncle length | 25.0 | 26.1 | 25.0 | 25.1 | 25.7 | 26.4 | 25.1 | 24.7 |
| Upper-jaw length | 14.2 | 13.3 | 14.0 | 13.6 | 13.4 | 13.3 | 13.3 | 13.7 |
| Predorsal length | 34.1 | 34.2 | 34.9 | 34.7 | 33.9 | 35.3 | 34.8 | 35.4 |
| Preanal length | 57.1 | 57.5 | 56.7 | 57.7 | 57.9 | 57.2 | 57.3 | 57.8 |
| Prepelvic length | 33.7 | 31.8 | 31.0 | 33.2 | 33.9 | 32.5 | 34.0 | 32.2 |
| Base of dorsal fins | 42.7 | 41.5 | 41.4 | 41.2 | 43.2 | 43.1 | 43.1 | 42.5 |
| First dorsal spine | 27.0 | 28.1 | 27.8 | 27.5 | 29.3 | 26.7 | 28.4 | 28.6 |
| Longest dorsal spine | 29.0 | 28.9 | 29.0 | 29.5 | 30.5 | 28.3 | 30.8 | 30.6 |
| Spine of second dorsal fin | 15.5 | 15.7 | 14.7 | 16.3 | 16.6 | 15.7 | 15.8 | 16.7 |
| Longest dorsal ray | 22.2 | 19.8 | 19.3 | 19.8 | 19.6 | 20.4 | 20.8 | 20.5 |
| Anal-spine length | 11.0 | 11.2 | 10.9 | 10.8 | 10.4 | 11.8 | 11.5 | 10.8 |
| Longest anal ray | 23.3 | 18.3 | 19.8 | 19.7 | 21.5 | broken | 20.5 | broken |
| Caudal-fin length | 29.3 | 30.6 | 29.0 | 30.7 | 29.2 | 28.0 | 29.3 | 29.1 |
| Pectoral-fin length | 31.0 | 32.8 | 31.7 | 31.5 | 31.1 | 30.9 | 31.6 | 30.5 |
| Pelvic-spine length | 11.3 | 11.7 | 11.9 | 11.1 | 10.4 | 10.7 | 11.7 | 11.4 |
| Fourth pelvic-fin ray | 25.9 | 27.9 | 24.7 | 29.8 | 26.3 | 26.0 | 26.8 | 27.1 |
| Fifth pelvic-fin ray | 22.4 | 21.8 | 21.5 | 23.4 | 22.0 | 22.8 | 21.7 | 21.0 |

*MNHN 2000-759

rays 11 (10-11), the posterior 2 segmented; longitudinal scale series 27 (scales partially missing on most paratypes); transverse scale series 7; circumpeducular scales 12; gill rakers 2+8 (2-3+8); pseudobranchial filaments 6 (5-6); branchiostegal rays 5; vertebrae 10+16.

Body moderately elongate, depth 4.95 (4.75-5.2) in SL, and compressed, width 1.3 (1.25-1.35) in depth; ventral part of head and chest broad and nearly flat; head triangular when viewed from above, its length 3.1 (3.0-3-05) in SL; snout length 3.35 (3.2-3.4) in head; orbit diameter 3.15 (3.0-3.3) in head, the eye extending slightly above dorsal profile of head; interorbital space very narrow, 29.3 (25.2-30.0) in head; caudal-peduncle depth 2.45 (2.5-2.8) in head; caudal-peduncle length 1.3 (1.25-1.35) in head.

Mouth moderately large, maxilla reaching to or nearly to a vertical at anterior edge of pupil, the upper-jaw length 2.3 (2.35-2.5) in head; mouth terminal or with lower jaw slightly inferior; mouth oblique, the gape forming an angle of about 30° to horizontal axis of head and body; upper jaw with an outer row of slender, well-spaced, incurved, conical teeth (14 on each side of holotype) that progressively shorten posteriorly, the longest about 1/5 orbit diameter; front of upper jaw with a middle band of villiform teeth in 2-3 rows, followed by a row of longer conical teeth that are nearly recumbent; middle band of villiform teeth soon disappearing on side of jaw, posterior 1/3 of jaw consisting only of the outer and inner rows of teeth (the inner row no longer recumbent); lower jaw with an outer row of slender, incurved, conical teeth (22 on side of jaw of holotype) that progressivley shorten posteriorly, the longest about 3/4 length of longest upper teeth; front of lower jaw with a middle zone of small conical teeth in 1-2 rows, and an inner row of larger incurved conical teeth which progressively lengthen posteriorly, this row ending in a recurved conical tooth as large as largest teeth at front of upper jaw; no teeth on palate. Tongue broadly rounded, free anteriorly from floor of mouth. Gill opening extending forward nearly to a vertical at the most posterior edge of preopercle. Gill rakers short, the longest about 1/2 length of longest gill filaments.

Scales ctenoid except those on chest, prepectoral area, and a few just above base of pelvic fins that are cycloid; head naked, including nape except for its most posterior part above and slightly anterior to upper end of gill opening; no scales on fins except a few rows of scales smaller than those of body on base of caudal fin.

Anterior nostril a short membranous tube at level of lower edge of eye about 1/2 distance from orbit to base of upper lip; posterior nostril a prominent opening with a slight rim dorsoposterior to anterior nostril and very near edge of orbit. Head pores prominent, as follows: nasal pore just dorsoanterior to posterior nostril, an anterior and a posterior interorbital pore, a postorbital pore, an infraorbital pore below the postorbital, a pore at end of lateral sensory canal with a small pore in canal above upper end of preopercular margin; a short posterior lateral canal with a pore at each end, and 3 preopercular pores.

Genital papilla of male more than 1/2 orbit diameter.

Origin of dorsal fin above upper base of pectoral fin, predorsal distance 2.95 (2.85-2.95) in SL; spines of fins slender and flexible; 1st dorsal fin distinctly higher than 2nd; 1st dorsal spine 3.7 (3.4-3.75) in SL; 2nd and 3rd dorsal spines longest and subequal, 3.45 (3.25-3.45) in SL; last membrane of 1st dorsal fin nearly reaching base of spine of 2nd dorsal fin; spine of 2nd dorsal fin 2.1 (2.0-2.25) in head; penultimate dorsal soft way usually longest, 1.45 (1.6-1.7) in head; origin of anal fin below base of 1st soft ray of 2nd dorsal fin, preanal distance 1.75 in SL; anal spine 2.95 (2.8-3.15) in head; penultimate anal soft ray longest, 1.4 (1.5-1.8) in head; caudal fin rounded, 3.4 (3.25-3.7) in SL; pectoral fins pointed, middle rays longest, 3.2 (3.05-3.3) in SL; origin of pelvic fins below base of pectoral fins, prepelvic distance 2.95 (2.95-3.2) in SL; pelvic fins nearly fully separated (joined only at extreme base by membrane); no pelvic frenum; pelvic spine 2.85 (2.75-3.15) in head; 4th pelvic soft ray longest, reaching beyond anus in holotype (slightly beyond origin of anal fin in largest paratype), its length 3.85 (3.35-4. 05) in SL; 5th pelvic soft ray branched, about 80% length of 4th ray; 4th pelvic soft ray of holotype with 6 branches.

Color of holotype in alcohol: pale yellowish with scattered small brown spots, those on lower side of body forming horizontal lines, those on nape darkest; 4 irregular quadrangular brown blotches dorsally on body, the 1st extending below 1st dorsal fin posterior to 3rd spine, the 2nd below 2nd dorsal fin, and the last 2 on caudal peduncle; a midlateral series of roundish dusky blotches nearly as large as eye, the 1st beneath pectoral fin and the last on caudal peduncle, each containing a horizontal row of 3 close-set, small, darker spots; a round dark brown spot about 1/2 size of eye midlateral on base of caudal fin; a middorsal U-shaped dark brown mark on snout, with each end at a nasal pore; a small brown spot middorsal on upper lip; an oblique dark brown band across upper lip to lower edge of orbit, ending proximally on nape; a parallel dark brown band from

corner of mouth across cheek; a 3rd band beginning as a dark blotch above base of branchiostegal rays and ending in an irregular dark brown blotch dorsoposterior to upper end of gill opening; isthmus dusky; 1st dorsal fin translucent, the upper 1/2 of 1st 4 spines and membranes dark brown, the lower and posterior part of fin with 3 horizontal rows of small dark brown blotches, the 1st of each row on 1st dorsal spine; 2nd dorsal fin translucent with 4 horizontal rows of small brown spots, the upper row only on about anterior 1/2 of fin; anal fin similar but with 3 rows of small brown spots; caudal fin translucent with traces of a few small brown spots basally on fin; pectoral fins translucent with a bilobed brown spot on base, 1/2 on base of fin and the other on prepectoral area; lower base of fin with a cluster of small brown blotches; pelvic fins dusky.

Color of holotype in life: light greenish gray, large dark bars and blotches as described above blackish, small spots and diagonal markings on head dark yellowish brown; scattered small greenish white flecks on head and body, 1 close-set series adjacent to row of small brown spots along lower side of body; apical part of 1st dorsal fin black, the basal part dusky and blotchy white with dark brown and orangish spots forming horizontal rows; spots in remaining median fins brownish orange.

Underwater photographs of other individuals are less strongly pigmented, the large quadrangular bars dorsally on the body more diffuse, the midlateral row of large dusky blotches faint or absent, and the small spots dusky orange to red instead of dark yellowish brown; on some individuals the first 2 of the midlateral series of triple spots are joined to form a dash.

*Etymology*: This species is named *melacron* from the Greek *melas* for black and *akron* for top or tip, in reference to the dark upper part of the dorsal fin, its most characteristic color marking.

*Remarks*: The holotype was collected on dark brown volcanic sand on the northeast coast of Bali which may explain why it is more darkly pigmented than most of the other specimens.

This species has been collected in the Ryukyu Is., Philippines, Indonesia, Andaman Sea off Thailand, Solomon Is., Fiji, and is also reported from Palau (Myers 1999). It is known from the depth range of 7 to 30.5 m. Two of the 3 paratypes from Flores have large parasitic copepods attached to the back.

*Coryphopterus melacron* appears to be a small species. It is unusual in having females as the 2 largest specimens, 43.2 mm from Fiji and 36.0 mm from Okinawa. Cole and Robertson (1988), Cole (1990), Cole and Shapiro (1990), Hoese and Reader (1985), Hoese and Obika (1988), and Randall (1994) presented evidence for protogyny in species of *Coryphopterus*. The 36-mm female is the sole specimen from Okinawa. The 43.2-mm female from Fiji is 1 of 7 specimens; the others are all females or immature. It is expected that larger males exist at localities where these females were collected. Data relating sex to length of specimens should be taken from a series collected from the same locality.

This species seems to be most similar to *C. signipinnis* Hoese and Obika with which it shares the rapid raising and lowering of the 1st dorsal fin, the near-separation of the pelvic fins, lack of a pelvic frenum, and a similar color pattern. It differs in having 10 instead of 9 dorsal soft rays, 9 instead of 8 anal soft rays, a higher 1st dorsal fin (28.3%-30.8% SL, compared to 18.8%-23.6% SL for *C. signipinnis*), and some features of color. The body of *C. signipinnis* is more translucent, the dark spots are smaller, more as dots than small spots, and the dark apical part of the dorsal fin is generally more reddish and contains 2 or 3 pale spots.

### ***Coryphopterus pallidus*, n. sp.**

(Tables 1, 6; Figs. 16, 17)

*Fusigobius* sp. Allen and Steene 1987: pl. 113, fig. 3 (North Malé Atoll, Maldive Is.).

*Fusigobius* sp. 1 Randall and Goren 1993: 13, pl. 3, fig. A (North Malé Atoll, and South Malé Atoll, Maldive Is.).

*Coryphopterus* sp. C Myers 1999: 250, pl. 159, fig. G (Palau).

*Holotype*: BPBM 33580, ♂, 64.5 mm, Coral Sea, Chesterfield Bank, lagoon, SE side, 19°53.5'S, 158°28.1'E, patch reef and adjacent sand, 14-15 m, rotenone, J.E. Randall, M.L. Kulbicki, and P.J. Doherty, 21 Aug. 1988.

*Paratypes*: RUSI 61853, 57.0 mm, Tanzania, Mafia I., spear, J.E. Randall, 10-12 Dec. 1973; MNHN 2000-760, 60.4 mm, Philippines, Sumilon I. (off S end of Cebu, W side, 15 m, rotenone, J.E. Randall, M.J. Gawel, and K.E. Carpenter, 3 June 1981; BPBM 32906, 54.2 mm, Maldive Is., North Malé Atoll, reef W of Villingili I., ocean side, cave, 20 m, quinaldine, J.E. Randall, 16 Mar. 1988; BPBM 33060, 34.2 mm, Maldive Is., North Malé Atoll, W side of Huraa I., base of reef, 20-22 m, rotenone, J.E. Randall, R.C. Anderson, M.S. Adam, and H. Shareef, 24 Mar. 1988; USNM 360978, 63.7 mm, same data as holotype; ASIZP 60504, 51.1 mm and NSMT-P 59447, 49.3 mm, Indonesia, Maisel Is., Mai I., N side, 5°30'S, 127°50'E, 15 m, spear, J.E. Randall, 30 Sept. 1988; CAS 212412, 47.2 mm, Maldive Is., North Malé Atoll, Furana I., E side, steep rocky bottom, 28 m, rotenone, J.E. Randall, R.C.

Anderson, and M.S. Adam, 20 Oct. 1988; ROM 68659, 42.7 mm, Andaman Sea, Thailand, off Phuket, Ko Racha Yai, off 1st bay at SE tip, 7°35'10"N, 98°22'5"E, patch reef surrounded by sand, 15-23 m, rotenone, R. Winterbottom, W. Holleman, R. Mooi, and U. Satapoomin, 25 Nov. 1993.

*Diagnosis*: Dorsal rays VI-I,9; anal rays I,8; pectoral rays 19-20 (usually 19); longitudinal scale series 26-27; head naked except for scales on side of nape extending to above upper end of preopercular margin; posterior nostril about halfway between edge of orbit and front of snout; body depth 4.65-5.4 in SL; 1st dorsal fin shorter than 2nd; 1st 4 spines of dorsal fin subequal, the 2nd usually longest, 5.0-5.9 in SL; pelvic fins fully joined medially by membrane (though often torn); pelvic frenum present; pelvic fins usually reaching origin of anal fin, 3.65-4.05 in SL. Body translucent with numerous, small, dusky-edged yellow spots on head, body, caudal, and dorsal fins; a black spot on 1st membrane of dorsal fin. Largest specimen, 64.5 mm SL.

*Description*: Dorsal rays VI-I,9; anal rays I,8; all dorsal and anal soft rays branched, the last to base; pectoral rays 19 (19-20, usually 19), all rays except uppermost branched (lowermost unbranched in smallest paratypes); pelvic rays I,5; branched caudal rays 13 (12-13); upper unbranched caudal rays 10 (9-10), the posterior 3 segmented; lower unbranched caudal rays 8 (7-8), the posterior 2 segmented; longitudinal scale series 26; transverse scale series 7, circumpeducular scales 12; gill rakers 2+8 (2-3+8); pseudobranchial filaments 9 (8-9); branchiostegal rays 5; vertebrae 10+16.

Body moderately elongate, depth 4.65 (4.65-5.4) in SL, and compressed, width 1.45 (1.35-1.45) in depth; ventral part of head and chest broad and nearly flat; head triangular when viewed from above, its length 3.2 (3.15-3.25) in SL; snout length 3.1 (3.1-3.5) in head; orbit diameter 3.4 (3.15-3.4) in head, the eye extending slightly above dorsal profile of head; interorbital space very narrow, 21.0 (19.8-24.7) in head; caudal-peduncle depth 2.5 (2.4-2.65) in head; caudal-peduncle length 1.2 (1.15-1.2) in head.

Mouth terminal or with lower jaw slightly projecting, and moderately large, the maxilla reaching to below anterior 1/2 of eye, upper-jaw length

**Table 6.** Proportional measurements of type specimens of *Coryphopterus pallidus* expressed as percentages of the standard length

| | Holotype | Paratypes | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | BPBM 33580 | BPBM 33060 | CAS 212412 | NSMT 59447 | ASIZP 60504 | BPBM 32906 | MNHN 760* | USNM 360978 |
| Sex | male | female | male | female | female | female | male | male |
| Standard length (mm) | 64.5 | 34.2 | 47.2 | 49.3 | 51.1 | 54.2 | 60.4 | 63.7 |
| Body depth | 21.5 | 18.9 | 18.6 | 19.4 | 20.5 | 19.8 | 21.6 | 20.1 |
| Body width | 14.8 | 12.3 | 12.0 | 13.2 | 13.9 | 14.4 | 14.9 | 14.2 |
| Head length | 31.5 | 32.2 | 30.8 | 32.3 | 31.6 | 31.2 | 32.0 | 31.7 |
| Snout length | 10.2 | 9.2 | 9.5 | 9.8 | 10.0 | 10.1 | 10.1 | 10.3 |
| Orbit diameter | 9.3 | 10.2 | 9.8 | 9.7 | 9.7 | 9.6 | 9.4 | 9.4 |
| Interorbital width | 1.5 | 1.3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.5 | 1.6 |
| Caudal-peduncle depth | 12.7 | 13.2 | 12.1 | 12.0 | 11.9 | 12.8 | 13.3 | 12.7 |
| Caudal-peduncle length | 26.1 | 27.2 | 25.8 | 26.4 | 26.1 | 27.4 | 27.4 | 26.2 |
| Upper-jaw length | 11.9 | 11.7 | 11.3 | 12.1 | 12.2 | 11.4 | 11.5 | 12.3 |
| Predorsal length | 33.6 | 34.3 | 32.3 | 34.3 | 34.8 | 33.7 | 33.2 | 34.4 |
| Preanal length | 57.6 | 55.0 | 55.3 | 54.2 | 57.2 | 57.0 | 56.4 | 55.0 |
| Prepelvic length | 32.6 | 32.1 | 31.4 | 31.7 | 32.7 | 32.6 | 31.3 | 31.0 |
| Base of dorsal fins | 43.4 | 41.4 | 42.4 | 43.3 | 41.4 | 42.3 | 42.8 | 43.9 |
| First dorsal spine | 16.6 | 19.5 | 18.9 | 18.3 | 18.4 | 18.2 | 17.4 | 19.2 |
| Second dorsal spine | 17.0 | 20.0 | 19.2 | 18.5 | 18.7 | 18.2 | 18.0 | 19.0 |
| Spine of second dorsal fin | 17.3 | 19.8 | 21.4 | 19.9 | 19.0 | 21.2 | 18.4 | 18.4 |
| Longest dorsal ray | 19.1 | 20.2 | 29.8 | 21.5 | 19.6 | 23.5 | 28.2 | 24.2 |
| Anal-spine length | 9.7 | 10.4 | 10.5 | 10.1 | 9.8 | 10.5 | 9.9 | 10.8 |
| Longest anal ray | 21.6 | 21.0 | 27.4 | 22.3 | 21.8 | 24.2 | 24.3 | 22.0 |
| Caudal-fin length | 31.4 | broken | 31.8 | 31.6 | 31.0 | 33.2 | 33.1 | 34.1 |
| Pectoral-fin length | 29.4 | 29.8 | 30.2 | 30.3 | 30.1 | 29.6 | 30.2 | 29.8 |
| Pelvic-spine length | 9.5 | 9.7 | 8.9 | 10.2 | 10.0 | 11.2 | 10.9 | 9.6 |
| Fourth pelvic-fin ray | 24.7 | 26.4 | 27.5 | 26.2 | 25.6 | 25.7 | 24.9 | 25.1 |
| Fifth pelvic-fin ray | 23.0 | 23.2 | 25.4 | 24.5 | 23.5 | 23.7 | 23.5 | 24.5 |

*MNHN 2000-760

2.65 (2.6-2.8) in head; mouth slightly oblique, the gape forming an angle of about 10° to horizontal axis of head and body; upper jaw with an outer row of slender, well-spaced, incurved conical teeth (18 on side of jaw of holotype) that progressively shorten posteriorly, the longest about 1/8 orbit diameter in holotype; posterior teeth in outer row slightly antrorse; front of upper jaw with a middle band of villiform teeth in 2-3 irregular rows, followed by a row of longer, slender, conical teeth that are inward-projecting and depressible, this row also progressively smaller posteriorly, ending about halfway back in jaw; middle band of villiform teeth narrowing posteriorly to a single row; front of lower jaw with an outer row of 9 (6-9) slender, well-spaced, incurved, conical teeth on each side, nearly as large as teeth at front of upper jaw; band of villiform teeth in 3-4 rows anteriorly in lower jaw behind outer larger teeth, and an inner row of longer, inwardly depressible teeth that progressively shorten posteriorly, ending about 2/3 distance to end of jaw; middle band of teeth narrowing to a single row posteriorly; no teeth on palate. Tongue broadly rounded, free anteriorly from floor of mouth. Gill opening extending forward to within 1/5 opercle width from posterior edge of preopercle. Gill rakers short, the longest about 1/2 length of longest gill filaments.

Head naked except for scales on side of nape that extend forward to above upper end of preopercular margin; no scales on fins except a few rows of scales smaller than those of body on base of caudal fin. Scales ctenoid except those on chest, anteroventrally on abdomen, and prepectoral area that are cycloid.

Anterior nostril a short membranous tube with a pointed posterior flap at level of lower edge of eye 1/2 orbit diameter in front of orbit; posterior nostril a prominent opening with a slight rim dorsoposterior to anterior nostril about 1/2 the distance from base of upper lip to edge of orbit. Head pores prominent, as follows: a nasal pore just dorsoanterior to posterior nostril, an anterior and a posterior interorbital pore, a postorbital pore, an infraorbital pore below the postorbital, a pore at end of lateral sensory canal with a small pore in canal above upper end of preopercular margin; a short posterior lateral canal with pore at each end, and 3 preopercular pores.

Genital papilla of male holotype about 2/3 orbit diameter.

Origin of dorsal fin above upper base of pectoral fin, predorsal distance 3.0 (2.9-3.1) in SL; spines of fins slender and flexible; 1st dorsal fin lower than 2nd dorsal fin; 1st 4 dorsal spines subequal, the 1st 1.9 (1.65-1.75) in head, the 2nd usually longest, 1.8 (1.45-1.75) in head; last membrane of 1st dorsal fin nearly reaching base of spine of 2nd dorsal fin; spine of 2nd dorsal fin 1.85 (1.45-1.75) in head; last dorsal soft ray longest (1st ray longest in 34.2-mm paratype), 1.65 (1.0-1.6) in head; origin of anal fin below base of 2nd soft ray of 2nd dorsal fin, preanal distance 1.75 (1.75-1.8) in SL; anal spine 3.25 (2.9-3.25) in head; last anal soft ray longest, 1.45 (1.1-1.55) in head; caudal fin strongly rounded 3.2 (2.9-3.2) in SL; pectoral fins pointed, middle rays (10th on holotype) longest, 3.4 (3.3-3.4) in SL; origin of pelvic fins below base of pectoral fins, prepelvic distance 3.05 (3.05-3.2) in SL; pelvic fins fully joined medially by membrane (though membrane often torn); pelvic frenum well developed, but thin and often damaged; pelvic spine 3.3 (2.8-3.45) in head; pelvic fins usually reaching or extending slightly beyond origin of anal fin, 4th pelvic soft ray longest, 3.9 (3.65-4.05) in SL; 5th pelvic soft ray branched, about 90% length of 4th ray; 4th pelvic soft ray of holotype with 7 branches.

Color of holotype in alcohol: head and body pale yellowish overall with only traces of dark pigment (mostly not visible without magnification) corresponding to some of the small orange-yellow spots in life; fins translucent pale yellowish; a dark brown spot on posterior 1/2 of 1st interspinous membrane of dorsal fin about 2/3 distance to fin tip.

Color of holotype when fresh: translucent light gray with alternating dashes of blackish and white showing internally along vertebral column; head and body except chest and abdomen with scattered small orange-yellow spots, most with a trace of dusky pigment; fins translucent whitish, the caudal and dorsal fins with scattered small orange-yellow spots, the 1st dorsal with a black spot as described above; outer margin of dorsal fins narrowly white; iris yellowish with 5 brown spots.

*Etymology*: This species is named *pallidus* from the Latin for pale, in reference to the almost complete lack of color markings of preserved specimens.

*Remarks*: Specimens of *Coryphopterus pallidus* have been collected at the Chesterfield Bank in the Coral Sea, Indonesia, Philippines, Andaman Sea off Thailand, Maldive Is., and Mafia I., Tanzania at depths of 10-48 m. Myers (1999: 250, pl. 159 G) recorded it from Palau based on an underwater photograph.

This species was initially believed to be a color form of *Coryphopterus maximus*, as mentioned in the “Remarks” for the latter, its pale coloration perhaps correlated with occurrence on white sand. When both were collected in the same Coral Sea station, an effort was made to differentiate them morphologically. First a difference in pectoral-ray

counts was noted, *C. maximus* having 17-19 pectoral rays with a strong mode on 18, and *C. pallidus* 19-20 (mainly 19). Measurements of the fins revealed some differences, notably in the length of the caudal and pelvic fins. The caudal fin of *C. pallidus* varies from 31.0% to 34.1% SL, compared to 29.4%-30.9% for *C. maximus*. The pelvic fins of *C. pallidus* vary from 24.7% to 27.5% SL, compared to 20.6%-23.6% for *C. maximus*.

**Acknowledgments:** Richard Winterbottom is gratefully acknowledged for his large loan of specimens of *Coryphopterus* from the Royal Ontario Museum. Thanks are also due Douglas F. Hoese for early help in species identification, David W. Greenfield for providing X-rays of type specimens, and the collectors of type specimens as listed above.

## REFERENCES

Allen GR, RC Steene. 1987. Reef fishes of the Indian Ocean. Neptune City, NJ: T.F.H. Publications.

Böhlke JE, CR Robins. 1969. A revision of the gobioid fish genus *Coryphopterus*. Proc. Acad. Nat. Sci. Phila. **112:** 103-128.

Chen IS, KT Shao. 1997. *Fusigobius aureus*, a new species of gobiid fish (Perciformes, Gobiidae) from Flores Island, Indonesia. Acta Zool. Taiwanica **8:** 87-92.

Cole KS. 1990. Patterns of gonad structure in hermaphroditic gobies (Teleostei: Gobiidae). Environ. Biol. Fish. **28:** 124-142.

Cole KS, DR Robertson. 1988. Protogyny in a Caribbean reef goby, *Coryphopterus personatus*: gonad ontogeny and social influences on sex change. Bull. Mar. Sci. **42:** 317-333.

Cole KS, DY Shapiro. 1990. Gonad structure and hermaphroditism in the gobiid genus *Coryphopterus* (Teleostei: Gobiidae). Copeia **1990:** 996-1003.

Gill T. 1863. Descriptions of the gobioid genera of the western coast of temperate North America. Proc. Acad. Nat. Sci. Phila. **15:** 262-267.

Goren M. 1978. A new gobiid genus and seven new species from Sinai coasts (Pisces: Gobiidae). Senckenb. Biol. **59:** 191-203.

Günther ACLG. 1877. Andrew Garrett's Fische der Südsee. J. Mus. Godeffroy **13:** 169-216.

Hoese DH, Y Obika. 1988. A new gobiid fish, *Fusigobius signipinnis*, from the western tropical Pacific. Jpn. J. Ichth. **35:** 282-288.

Hoese DH, S Reader. 1985. A new gobiid fish, *Fusignobius duospilus*, from the tropical Indo-pacific. Spec. Publ. J.L.B. Smith Inst. Ichth. **36:** 1-9.

Kuiter RH. 1992. Tropical reef-fishes of the western Pacific Indonesia and adjacent waters. Jakarta: PT Gramedia Pustake Utama.

Masuda H, K Amaoka, C Araga, T Uyeno, T Yoshino, eds. 1984. The fishes of the Japanese Archipelago. Vol. 1 of text, vol. 2 of plates. Tokyo: Tokai Univ. Press.

Masuda H, Y Kobayashi. 1994. Grand atlas of fish life modes. Tokyo: Tokai Univ. Press. (in Japanese)

Myers RF. 1999. Micronesian reef fishes. 3rd ed. Guam: Coral Graphics.

Okamura O, K Amaoka. 1997. Sea fishes of Japan. Tokyo: Yama-kei Publ. (in Japanese)

Randall JE. 1994. A new genus and six new gobiid fishes (Perciformes: Gobiidae) from Arabian waters. Fauna Saudi Arabia **14:** 317-340.

Randall JE. 1995. *Fusigobius* Whitley, a junior synonym of the gobiid fish genus *Coryphopters* Gill. Bull. Mar. Sci. **56:** 795-798.

Randall JE, M Goren. 1993. A review of the gobiid fishes of the Maldives. Ichth. Bull. J.L.B. Smith Inst. Ichth. **58:** 1-37.

Whitley GP. 1930. Additions to the check list of the fishes of New South Wales. No. 3. Austral. Zool. **5:** 117-123.

Winterbottom R, AR Emery. 1986. Review of the gobioid fishes of the Chagos Archipelago, central Indian Ocean. Life Sci. Contr. Royal Ontario Mus. **142:** v+82.

# 記印度太平洋海域產五種新種鰏塘鱧屬(*Coryphopterus*)之鰕虎科魚類

John E. Randall

印度太平洋產之鰏塘鱧(*Coryphopterus*)共包括澳洲鰏塘鱧(*C. duospilus*)、黃斑鰏塘鱧(*C. inframaculatus*)、長棘鰏塘鱧(*C. longispinus*)、新鰏塘鱧(*C. neophytus*)、聖鰏塘鱧(*C. signipinnis*)以及下列新種：細身鰏塘鱧(*C. gracilis*)分布於西太平洋東至斐濟，特徵為腹鰭分離，無吸盤狀腹鰭，體較瘦長(體高為標準體長之 5.45~5.75)；臂斑鰏塘鱧(*C. humeralis*)，分布於紅海到社會群島，為本屬體型最小者(標準體長可到 33.7 mm)，在眼眶旁有後鼻孔，胸鰭鰭條數 18 ，吻短(標準體長之 3.4~3.77)，具二明顯黑斑(在胸鰭基部上方及尾鰭基底中央)；巨鰏塘鱧(*C. maximus*)分布於紅海到西太平洋，體型為本屬中最大者(可到 75mm 標準長)，頭部、軀幹、背鰭及尾鰭具明顯暗橙黃色斑點，有些在頭部的斑點可大如瞳孔，在第一背鰭之前緣有黑點，在尾鰭基底中央亦有一黑點，胸鰭鰭條數 18；黑尖鰏塘鱧(*C. melacron*)分布於安達曼海及西太平洋，東至斐濟島，腹鰭分離，無吸盤狀腹鰭，背鰭鰭條數 10 ，臂鰭軟條 9 ，第一背鰭高，尖端為黑色，胸鰭鰭條數通常 20；淡色鰏塘鱧(*C. pallidus*)與巨大鰏塘鱧相似，但胸鰭軟條數為 19 或 20 ，且其橙黃斑點具黑色素(但固定後大多會褪色)。

**關鍵詞**：鰕虎科，鰏塘鱧屬，印度太平洋，新種。

Bishop Museum, 1525 Bernice St., Honolulu, HI 96817-2704, USA