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Bothrocara nyx: a new species of eelpout (Perciformes: Zoarcidae) from the Bering Sea

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Abstract

A new species of eelpout, *Bothrocara nyx*, is described from the eastern Bering Sea slope on the basis of 142 specimens collected during bottom trawl surveys conducted from 2000 through 2004. This species has a small maximum size, a short snout, a relatively low number of small vomerine and palatine teeth, a high number of gill rakers, and a heavily pigmented mouth and gill chamber. It is similar to *B. pusillum*, but differs in the number of gill rakers, and in the morphology of gill rakers and pectoral fins. It can be distinguished from all other congeners on the basis of morphometric and meristic characters.

Key words: North Pacific, Bering Sea, taxonomy, Zoarcoidei, Zoarcidae, new species

Introduction

The zoarcid genus *Bothrocara* Bean, 1890, includes several species of deepwater eelpouts distributed primarily along the North Pacific rim. Anderson (1994) recognized at least seven species, with the status of three nominal forms uncertain. He considered the genus to be the most primitive member of a "*Bothrocara*-group clade" including *Bothrocara*, *Bothrocarina*, *Lycogrammoides*, and *Lycodapus* (Anderson, 1994: fig. 16). *Bothrocara* is distinguished within the Zoarcidae by the absence of pelvic fins, absence of an oral valve, the number of suborbital bones (7–9), a weak palatopterygoid series, and a wide gill opening with a very narrow isthmus.

At least two species of *Bothrocara*, *B. brunneum* (Bean) and *B. pusillum* (Bean), are found in the eastern Bering Sea. A third species, *B. molle* Bean, has been reported from the Bering Sea, although records are scarce (Mecklenburg et al., 2002). During the course

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of bottom trawl surveys conducted along the eastern Bering Sea upper continental slope from 2000 through 2004 by the Resource Assessment and Conservation Engineering (RACE) Division of the U. S. National Marine Fisheries Service (NMFS), Alaska Fisheries Science Center, a new species of *Bothrocara* was discovered. Like *B. pusillum*, this new species is small and has a relatively short snout. However, it is distinguished from *B. pusillum* and all other species of the genus on the basis of meristic and morphometric characters.

Although Anderson (1994) simplified the taxonomy of this group by synonymizing *Allolepis* Jordan and Hubbs and *Zestichthys* Jordan and Hubbs with *Bothrocara*, the genus is still in need of revision. A full analysis is currently underway, and the new species is described here in the interest of timely reporting of new taxa.

Materials and Methods

All type material was collected during groundfish surveys using a 25-m wide Poly Nor'Eastern bottom trawl towed behind the F/V *Morning Star* or F/V *Northwest Explorer* (Hoff and Britt, 2003). Specimens were fixed at sea in a 10% formalin-seawater solution and later transferred to 70% ethanol. Standard length (SL) is used throughout. Measurements were made with dial calipers to the nearest 0.1 mm. Methods of counting and measuring follow Anderson (1982, 1995). Pectoral-fin ratio is the ratio of pectoral-fin base to pectoral-fin length. Vertebral characters were determined using digital and standard radiographs. The resolution of digital radiographs was usually insufficient to permit an accurate count of the median fin rays of these small fishes, so dorsal-, anal-, and caudal-fin rays were counted only in the holotype (using standard radiography) and in material cleared and stained using the method of Potthoff (1984). Cephalic lateralis system terminology follows Gosztonyi (1977) as modified by Anderson (1982). Institutional abbreviations follow Leviton et al. (1985). Counts and measurements in the text are presented as the holotype followed by the range for paratypes in parentheses; a summary is presented in Table 1.

***Bothrocara nyx* n. sp.**
Figs. 1–4, Table 1

Holotype: UW 111798, male, 158 mm, 58.512°N, 175.063°W, 1085 m, 28 June 2004, F/V *Northwest Explorer*, D. Stevenson.

Paratypes: (97 specimens) CAS 221001, male, 100 mm, 54.382°N, 166.617°W, 798 m, 13 June 2004; CAS 221002, 8 (4 males, 3 females, 1 unknown, 107–147 mm), 54.812°N, 167.678°W, 1064 m, 14 June 2004; LACM 56263-1,3 (118–167 mm), 54.284°N, 167.119°W, 1400 m, 19 July 2000; LACM 56264-1, (NMFS 134,2004-01,36

LACM) 2 (males, 127n140 mm), 54.737°N, 167.601°W, 940 m, 15 June 2004; LACM 56265-1, (NMFS 134,2004-01,90 LACM) 2 (1 male, 1 female, 150–163 mm), 58.237°N, 175.634°W, 858 m, 30 June 2004; SAIAB 75278, male, 162 mm, 56.515°N, 172.259°W, 937 m, 24 June 2004; SAIAB 75279, 5 (4 males, 1 female, 150–217 mm), 54.263°N, 166.7°W, 1105 m, 11 June 2004; USNM 380736, 12 (9 males, 2 females, 1 unknown, 115–183 mm), 54.271°N, 166.635°W, 1091 m, 11 June 2004; USNM 380737, male, 157 mm, 58.509°N, 174.84°W, 1024 m, 28 June 2004; UW 46028, female, 135 mm, 58.155°N, 175.607°W, 1016 m, 9 July 2000; UW 47449, male, 92 mm, 59.588°N, 178.512°W, 924 m, 13 July 2000; UW 47557, female, 129 mm, 59.59°N, 178.51°W, 916 m, 15 July 2000; UW 47834, female, 168 mm, 54.209°N, 167.927°W, 1508 m, 12 June 2002; UW 111799, 20 (9 males, 10 females, 1 unknown, 67–157 mm), 55.589°N, 168.871°W, 1016 m, 5 June 2002; UW 111800, 3 (sex unknown, 122–125 mm) (C&S), 55.589°N, 168.871°W, 1016 m, 5 June 2002; UW 111801, male, 208 mm, 54.209°N, 167.927°W, 1508 m, 12 June 2002; UW 111802, female, 105 mm, 56.127°N, 169.118°W, 1161 m, 18 June 2004; UW 111803, 21 (11 males, 10 females, 105–205 mm), 56.017°N, 168.880°W, 1177 m, 20 June 2004; UW 111804, 7 (3 males, 3 females, 1 unknown, 158–195 mm), 56.017°N, 168.880°W, 1177 m, 20 June 2004; UW 111805, 5 (2 males, 3 females, 125–152 mm), collected with holotype.

Diagnosis: A species of *Bothrocara* as defined by Anderson (1994), with vertebrae 17–19 + 90–98 = 108–116; pectoral-fin rays 12–15; vomerine teeth 0–3; gill rakers moderately long, 23–27; snout short, less than eye diameter; median occipital pore present; lateral line not visible on body; interior of mouth darkly pigmented.

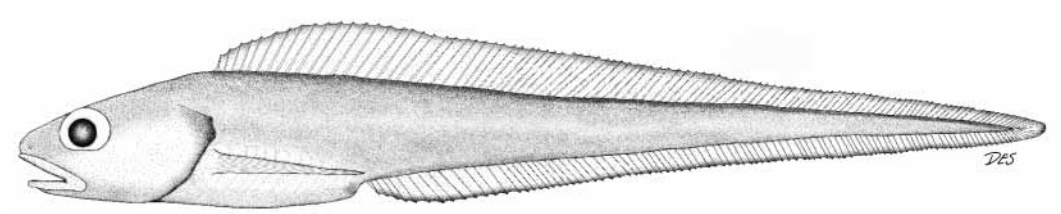

FIGURE 1. Holotype of *Bothrocara nyx* n. sp. (UW 111798, male, 158 mm SL).

Description: Vertebrae 18 (17–19) + 94 (90–98) = 112 (108–116); dorsal-fin rays 109 (103–112); anal-fin rays 93 (89–99); caudal-fin rays 10; pectoral-fin rays 13 (12–15); vomerine teeth 2 (0–3); palatine teeth 10 (0–10); gill rakers 6 (5–7) + 21 (17–21) = 27 (23–27); pseudobranchial filaments 9 (7–10). Following measurements in percent SL: head length 19.4 (17.6–20.3); head width 7.8 (5.6–8.3); head depth 8.1 (8.8–11.4); pectoral-fin length 12.5 (9.9–14.4); predorsal length 17.9 (17.0–21.4); preanal length 33.9 (32.5–38.0); body height 8.5 (8.8–10.8); gill-slit length 9.1 (9.1–12.6). Following measurements in percent head length (HL): head width 40.1 (27.7–43.2); head depth 41.7 (43.4–59.6); upper jaw length 40.1 (36.4–43.5); pectoral-fin length 64.5 (49.8–72.4); pectoral base 9.1

(8.0–14.7); snout length 23.1 (17.8–26.0); eye diameter 27.0 (24.2–34.7); gill-slit length 46.9 (49.7–64.6); interorbital width 9.8 (8.4–16.4); interpupillary width 26.7 (22.0–34.6); caudal-fin length 22.1 (13.7–25.4). Pectoral-fin base/length ratio: 0.14 (0.14–0.22).

FIGURE 2. Photograph of fresh specimens of *Bothrocara nyx* n. sp. (UW 111805, paratypes, 125–152 mm SL).

Body relatively long and compressed. Skin thin and delicate, particularly on head. Head ovoid in lateral view, with slightly convex dorsal profile and rounded snout; narrow in dorsal view, with widest point immediately posterior to orbit. Eye nearly circular, entering dorsal profile of head. Nostril tube short, not reaching upper jaw. Mouth subterminal, upper jaw extending approximately to mid-orbit. Lips thin. Jaw teeth conical, sharp, slightly recurved; premaxilla with two rows of teeth anteriorly diminishing to single row posteriorly, outer row largest; dentary with four rows of teeth anteriorly diminishing to single row posteriorly. Vomer with 0–3 small conical teeth arranged in transverse row. Palatine with 0–10 small conical teeth in single row, often protruding only slightly through skin. Suborbital bones seven. Gill slit extending anteroventrally to vertical through posterior margin of preopercle. Gill rakers relatively long, slender, pointed, slightly curved medially, with scattered dark chromatophores (Fig. 3A). Pseudobranchial filaments unpigmented, approximately as long as gill rakers.

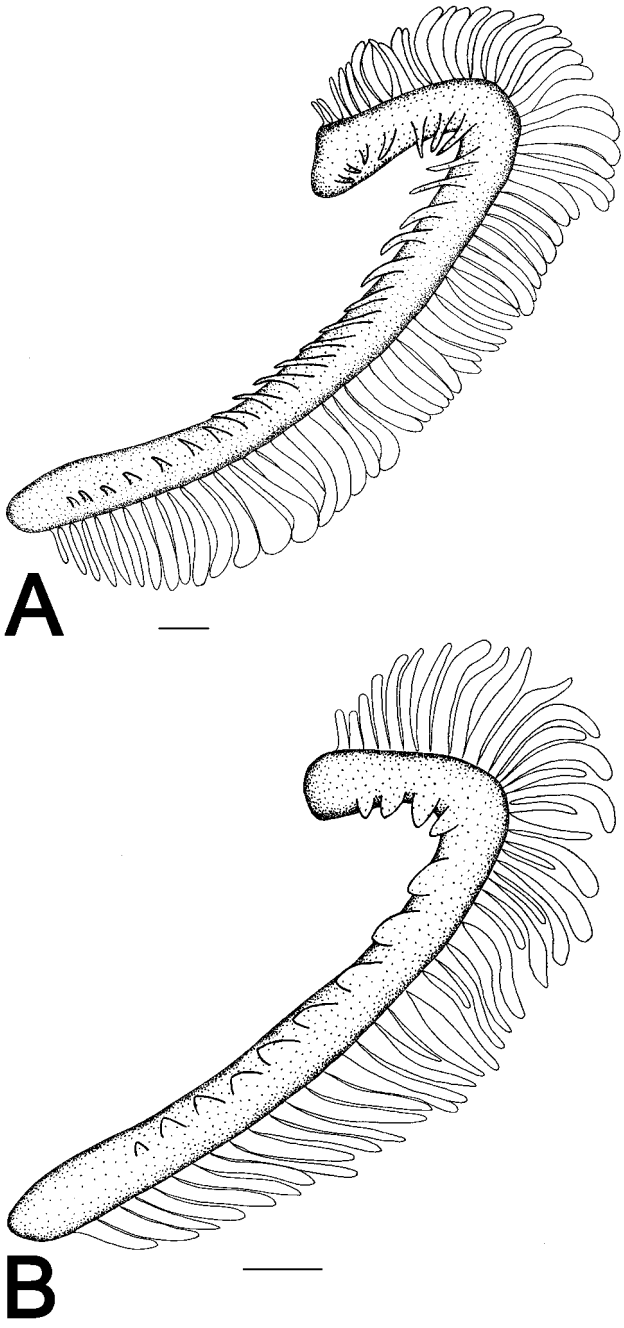

FIGURE 3. First gill arch of (A) *Bothrocara nyx* n. sp. (UW 111799, paratype, 148 mm SL) and (B) *Bothrocara pusillum* (UW 111827, 148 mm SL). Scale bar = 1 mm.

Cephalic lateralis system with two pairs of nasal pores, one pair anteromedial to nostril tubes, the other pair posteromedial. Interorbital pore single, near vertical through anterior margin of pupil. Postorbital pores four. Single occipital pore present on midline. Suborbital pores eight or nine, six along ventral ramus of canal and two or three along

ascending ramus of canal. Preoperculomandibular pores eight, four along dentary, one on anguloarticular and three on preopercle. Lateral line not visible on body.

TABLE 1. MORPHOMETRIC MEASUREMENTS AND MERISTIC COUNTS FOR *Bothrocara nyx* n. sp.

		Paratypes			
	Holotype	*n*	Range	Mean	SD
Precaudal vertebrae	18	50	17–19	17.9	0.6
Caudal vertebrae	94	49	90–98	94.1	1.8
Total vertebrae	112	49	108–116	112	1.8
Dorsal-fin rays	109	12	103–112	108.4	2.5
Anal-fin rays	93	12	89–99	93.4	2.6
Pectoral-fin rays	13	59	12–15	13.6	0.6
Gill rakers	27	51	23–27	25.3	1.1
Pseudobranchs	9	47	7–10	8.6	0.9
Standard length (mm)	158	30	92–217	145.9	29.9
Total length (mm)	164	30	96–226	152	30.3
Head length (mm)	30.7	30	18.3–40	27.7	5.3
Percentage of standard length:					
Head length	19.4	30	17.6–20.3	19	0.6
Head width	7.8	30	5.6–8.3	7.5	0.6
Head depth	8.1	30	8.8–11.4	9.9	0.6
Pectoral-fin length	12.5	30	9.9–14.4	12.1	1
Predorsal length	17.9	30	17.0–21.4	19.5	1
Preanal length	33.9	30	32.5–38.0	35.4	1.4
Body height	8.5	30	8.8–10.8	9.7	0.5
Gill slit length	9.1	30	9.1–12.6	11.1	0.9
Percentage of head length:					
Head width	40.1	30	27.7–43.2	39.3	3.2
Head depth	41.7	30	43.4–59.6	52	3.4
Upper jaw length	40.1	30	36.4–43.5	40.2	1.8
Pectoral-fin length	64.5	30	49.8–72.4	63.8	5.1
Pectoral-fin base	9.1	30	8.0–14.7	12.1	1.4
Snout length	23.1	30	17.8–26.0	22.8	1.6
Eye diameter	27	30	24.2–34.7	28	2.3
Gill slit length	46.9	30	49.7–64.6	58.4	3.6
Interorbital width	9.8	30	8.4–16.4	10.9	1.6
Interpupillary width	26.7	30	22.0–34.6	28	3
Caudal-fin length	22.1	30	13.7–25.4	20.8	2.6
Pectoral base/length	0.14	30	0.14–0.22	0.19	0.02

Fins delicate, easily damaged. Dorsal-fin origin dorsal to pectoral-fin base, the first pterygiophore usually inserted in the second interneural space (rarely third or fourth), last dorsal-fin ray associated with third preural centrum. Anal-fin origin anterior to midbody, 0–2 anal-fin pterygiophores preceding first haemal spine, last anal-fin ray associated with third preural centrum. Caudal-fin rays ten, two borne on single epural, four on upper hypural plate, four on lower hypural plate. Pectoral fin long, with narrow base, extending to or nearly to anus.

Scales absent from head, cheeks, nape, pectoral fins, and abdomen; present on bases of dorsal and anal fins. Pyloric caeca two, short and stubby.

Color: In life, top of head and snout pale grayish-brown; cheek and opercle pearlescent white; lips, interior of mouth, and branchial chamber dark brown. Body pale grayish-brown, becoming dark brown to black at base of dorsal and anal fins, abdomen and prepectoral region pearlescent bluish white. Median fins dusky, with narrow dark margins. Pectoral fins nearly transparent. Peritoneum jet black; stomach heavily pigmented. In alcohol, head light brown with black lips and opercle; body light brown with distinct dark brown line along base of dorsal fin, black peritoneum visible through abdominal wall; dorsal and anal fins dusky with dark margin; pectoral fins nearly transparent, with some pigment along dorsal margin.

Distribution: This species is known only from the upper continental slope of the eastern Bering Sea, where it has been captured at depths ranging from 790 to 1508 m (Fig. 4).

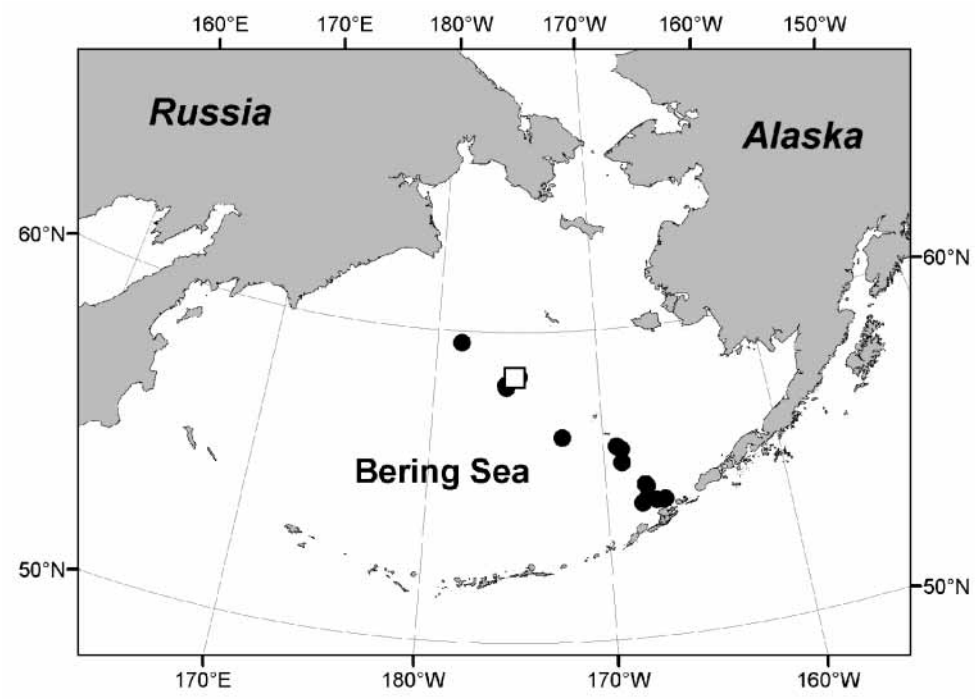

FIGURE 4. Distribution of *Bothrocara nyx* n. sp. Holotype locality indicated by open square.

Etymology: *Nyx* (Νυξ) is the Greek goddess of night and darkness. The specific epithet *nyx*, to be treated as a noun in apposition, alludes to the dark conditions prevalent in the deep waters and northern latitudes inhabited by this species, as well as the heavily pigmented lining of the mouth and visceral cavity.

Remarks: Anderson (1994) recognized seven species of *Bothrocara*: *B. alalongum* (Garman), *B. brunneum* (Bean), *B. elongatum* (Garman), *B. hollandi* (Jordan and Hubbs), *B. molle* Bean, *B. pusillum* (Bean), and *B. tanakae* (Jordan and Hubbs). Among its congeners, *B. nyx* is most commonly collected with *B. brunneum* on the Bering Sea slope. Although *B. brunneum* attains a much larger maximum size than *B. nyx*, the two species can be difficult to differentiate at small sizes (<150 mm SL). However, *Bothrocara brunneum* has more pectoral-fin rays (15–18 vs. 12–15) and pseudobranchial filaments (9–16 vs. 7–10), as well as fewer gill rakers (18–22 vs. 23–27) than *B. nyx*. *Bothrocara brunneum* also has a higher pectoral-fin ratio (0.19–0.41 vs. 0.14–0.22) and longer snout (longer than orbit vs. shorter than orbit) than *B. nyx*, and lacks the dark pigment present inside the mouth of *B. nyx*.

Bothrocara pusillum is also common in the Bering Sea, although it is found in considerably shallower water than *B. nyx* (~200–500 m vs. ≥800 m). *Bothrocara pusillum* is similar to *B. nyx* in having a short snout and small maximum size (approximately 200 mm SL). However, *B. pusillum* has fewer and shorter gill rakers (12–15 vs. 23–27, Fig. 3), fewer pseudobranchial filaments (4–7 vs. 7–10), more pectoral-fin rays (15–17 vs. 12–15), and a higher pectoral-fin ratio (0.20–0.31 vs. 0.14–0.22) than *B. nyx*.

Bothrocara molle is also known throughout the North Pacific, but generally has a higher vertebral count (113–118 vs. 108–116), a more posteriorly placed dorsal fin (anterior pterygiophore usually in fourth interneural space vs. second interneural space), and a lower gill-raker count (18–24 vs. 23–27). *Bothrocara molle* also attains a much larger maximum size (>550 mm SL) and has a longer snout (longer than orbit vs. shorter than orbit) than *B. nyx*.

Although Anderson (1994) recognized two species known only from the eastern tropical Pacific, Anderson and Fedorov (2004) recently synonymized one of these (*Bothrocara alalongum*) with *B. molle* on the basis of Anderson's unpublished data. The other species, *B. elongatum*, is currently known only from the two type specimens and one other (Anderson, 1994). It is characterized by a long snout (nearly twice eye length), much higher vertebral count (118–125 vs. 108–116 for *B. nyx*), and exserted pectoral-fin rays protruding from the membrane "as a fringe" (Garman, 1899: 130), all of which clearly distinguish it from *B. nyx*. Furthermore, *B. elongatum* reaches a maximum size of more than twice that known for *B. nyx*.

Bothrocara hollandi and *B. tanakae* were both described by Jordan and Hubbs (1925) from Japan, and both are known only from the western side of the North Pacific, including the Yellow Sea, Sea of Japan, and Sea of Okhotsk (Anderson, 1994). Both species have higher vertebral counts (121 for *B. hollandi* and 131–133 for *B. tanakae* vs. 108–116) and

lower gill-raker counts (13 for *B. hollandi* and 16–17 for *B. tanakae* vs. 23–27) than *B. nyx*, and *B. hollandi* has more pectoral-fin rays (17 vs. 12–15). Again, both species attain a much larger maximum size than the largest known specimen of *B. nyx*.

Anderson (1994) listed three nominal species of uncertain status in this genus (*Bothrocara zesta* Jordan and Fowler, *Lycogramma soldatovi* Schmidt, and *Bothrocaropsis rictolata* Garman), suggesting that each is probably a synonym of one of the taxa listed above. Anderson and Fedorov (2004) recently synonymized *B. rictolata* with *B. brunneum*, and it is clear that neither of the other species is synonymous with *B. nyx*. According to Schultz (1967) the holotype of *Bothrocara zesta*, collected from Sagami Bay in Japan, has 119 vertebrae, which is outside the known range for *B. nyx*. The holotype of *Lycogramma soldatovi* has 15 pectoral-fin rays, which is at the upper end of the distribution for *B. nyx*, and 19 gill rakers, which is well below the lowest gill-raker count observed in *B. nyx*. Finally, both of these nominal species have the long snout and larger maximum size (>400 mm) typical of this genus, which clearly distinguishes them from *B. nyx*.

Additional material examined: ***Bothrocara nyx*** (specimens not fixed properly in the field, not suitable for designation as types): UW 111806, 178 mm, 59.354°N, 178.360°W, 966 m depth, collected 13 July 2004; UW 111807, 120 mm, 56.997°N, 173.544°W, 806 m depth, collected 25 July 2004; UW 111808, 5 (135–176 mm), 56.497°N, 172.189°W, 1020 m depth, collected 26 July 2004; UW 111809, 6 (82–115 mm), 56.091°N, 169.197°W, 1130 m depth, collected 27 July 2004; UW 111810, 2 (132–150 mm), 54.482°N, 167.870°W, 1016 m depth, collected 31 July 2004; UW 111811, 8 (117–172 mm), 54.353°N, 167.973°W, 1020 m depth, collected 31 July 2004; UW 111812, 4 (107–122 mm), 54.358°N, 167.848°W, 924 m depth, collected 31 July 2004; UW 111813, 2 (117–138 mm), 54.306°N, 166.907°W, 1017 m depth, collected 2 August 2004; UW 111814, 15 (103–155 mm), 54.283°N, 167.780°W, 1016 m depth, collected 3 August 2004. ***Allolepis hollandi***: FMNH 58842, holotype, 322 mm, Japan, Fukui. ***Bothrocara brunneum***: UW 17191, 275 mm, Oregon coast, 45.918°N, 124.802°W; UW 17740, 7 (318–535 mm), Washington coast, southwest Grays Harbor, 540 m depth; UW 19051, 4 (430–510 mm), Oregon coast, 45.95°N, 124.817°W; UW 19055, 297 mm, Oregon coast, 45.65°N, 124.917°W; UW 19302, 3 (297–430 mm), Oregon coast, 46°N, 125°W, 1080 m depth; UW 28071, 525 mm, Bering Sea, 60.25°N, 178.867°W; UW 44249, 570 mm, western Aleutian Islands, 52.443°N, 175.619°E, 437 m depth; UW 45541, 114 mm, Washington coast, 46.36°N, 124.93°W, 974 m depth; UW 46033, 109 mm, western Gulf of Alaska, 54.037°N, 161.576°W, 823 m depth; UW 46043, 32 (158–445 mm), California coast, 35.418°N, 121.501°W, 900 m depth; UW 46070, 332 mm, California coast, 38.695°N, 123.887°W, 1193 m depth; UW 46917, 3 (160–168 mm), Bering Sea, 59.379°N, 178.256°W, 794 m depth; UW 46933, 140 mm, western Gulf of Alaska, 54.04°N, 161.58°W, 823 m depth; UW 47287, 2 (162–168 mm), Aleutian Islands; UW 47811, eastern Bering Sea, 23 (110–185 mm), 54.306°N, 166.728°W, 852 m depth; UW 111815, 7

(483–620 mm), eastern Bering Sea, 54.284°N, 167.119°W, 1400 m depth; UW 111816, 590 mm, eastern Bering Sea, 54.853°N, 167.598°W; 663 m depth; UW 111817, 238 mm, eastern Bering Sea, 60.063°N, 179.143°W, 551 m depth; UW 111818, 5 (330–515 mm), eastern Bering Sea, 54.313°N, 166.593°W, 806 m depth; UW 111819, 2 (158–162 mm), eastern Bering Sea, 54.263°N, 166.7°W, 1113 m depth; UW 111820, 135 mm, eastern Bering Sea, 54.382°N, 167.617°W, 798 m depth; UW 111821, 193 mm, eastern Bering Sea, 54.737°N, 167.601°W, 940 m depth; UW 111822, 710 mm, eastern Bering Sea, 55.542°N, 168.502°W, 534 m depth; UW 111823, 2 (123–147 mm), eastern Bering Sea, 56.127°N, 169.118°W, 1161 m depth; UW 111824, 3 (121–150 mm), eastern Bering Sea, 56.143°N, 169.457°W, 633 m depth. ***Bothrocara molle***: UW 17767, 550 mm, Washington coast, 46.967°N, 124.817°W, 540 m depth; UW 19083, 468 mm, Oregon coast, 45.65°N, 125.3°W, 1160 m depth; UW 19171, 14 (162–515 mm), Oregon coast, 45.833°N, 125.1°W, 1512 m depth; UW 43353, 156 mm, California coast, 41.17°N, 124.6°W, 1123 m depth; UW 45573, 104 mm, Oregon coast, 44.16°N, 125.05°W, 1193 m depth; UW 46811, 2 (162–347 mm), California coast, 38.695°N, 123.887°W, 1187 m depth; UW 46813, 3 (337–535 mm), California coast, 37.153°N, 123.142°W, 1413 m depth; UW 46815, 7 (182–294 mm), California coast, 34.981°N, 121.604°W, 1275 m depth; UW 46821, 3 (129–257 mm), California coast, 36.386°N, 122.232°W, 1161 m depth; UW 111832, 238 mm, Oregon coast, 44.965°N, 125.05°W, 1186 m depth; UW 111833, 2 (249–270 mm), California coast, 37.223°N, 123.176°W, 1267 m depth. ***Bothrocara pusillum***: UW 20683, 2 (130–146 mm), western Gulf of Alaska, 57.036°N, 153.954°W, 132 m depth; UW 28065, 159 mm, western Gulf of Alaska, 57.09°N, 153.9°W, 146 m depth; UW 28066, 4 (109–164 mm), western Gulf of Alaska, 57.086°N, 153.9°W, 146 m depth; UW 40776, 126 mm, western Gulf of Alaska, 60.059°N, 147.156°W, 216 m depth; UW 43798, 123 mm, western Gulf of Alaska, 56.775°N, 158.033°W, 255 m depth; UW 46034, 133 mm, western Gulf of Alaska, 57.118°N, 151.802°W, 80 m depth; UW 46035, 2 (124–140 mm), western Gulf of Alaska, 57.498°N, 155.358°W, 276 m depth; UW 46036, 131 mm, western Gulf of Alaska, 59.736°N, 149.33°W, 226 m depth; UW 46037, 131 mm, western Gulf of Alaska, 57.173°N, 155.594°W, 264 m depth; UW 46038, 127 mm, western Gulf of Alaska, 57.664°N, 154.888°W, 228 m depth; UW 47285, 96 mm, western Gulf of Alaska, 56.49°N, 155.32°W, 273 m depth; UW 47983, 2 (108–171 mm), western Gulf of Alaska, 57.081°N, 153.908°W, 179 m depth; UW 47991, 149 mm, western Gulf of Alaska, 58.06°N, 152.48°W, 186 m depth; UW 48458, 108 mm, eastern Bering Sea, 54.486°N, 167.212°W, 524 m depth; UW 111825, 3 (120–139 mm), western Gulf of Alaska, 56.603°N, 155.983°W, 284 m depth; UW 111826, 125 mm, eastern Bering Sea, 54.69°N, 166.376°W, 297 m depth; UW 111827, 148 mm, eastern Bering Sea, 59.946°N, 178.931°W, 294 m depth; UW 111828, 140 mm, western Gulf of Alaska, 59.339°N, 150.536°W, 289 m depth; UW 111829, 148 mm, eastern Bering Sea, 60.598°N, 178.82°W, 235 m depth; UW 111830, 2 (63–78 mm), Aleutian Islands, 52.314°N, 173.643°W, 408 m depth; UW 111831, 110 mm, western Gulf of Alaska, Shelikof Strait, 57.739°N,

154.045°W, 252 m depth. ***Zestichthys tanakae***: FMNH 58841, holotype, 490 mm, Japan, Kushiro; USNM 160718, 317 mm, Japan, Honshu, 38.19°N, 142.13°W, 479 m depth; USNM 161445, 299 mm, Japan, Honshu, 38.19°N, 142.13°W, 479 m depth. ***Lycogramma soldatovi***: ZIN 30963, holotype, 540 mm, Russia, Sakhalin Island, Cape Terpenie, 440 m depth.

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