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Two New Variegated Snailfishes of the Genus *Careproctus* (Teleostei: Scorpaeniformes: Liparidae) from the Aleutian Islands, Alaska

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Two new species of snailfishes are described on the basis of 99 individuals collected from the Aleutian Islands during resource assessment surveys conducted by the National Marine Fisheries Service. Both are distinguished from all known species of *Careproctus* by a variegated red, white, and gray body coloration, an unlobed dorsal fin, protruding snout, the absence of distal pectoral radials at the base of 8–12 ventral rays, and counts of median-fin rays and vertebrae. *Careproctus comus*, new species, is distinguished from *Careproctus faunus*, new species, by having a greater number of caudal vertebrae and median-fin rays, as well as a narrower interorbital width, shorter maxilla, shorter snout, shorter connection of anal-fin membrane to caudal fin, and more slender caudal-fin base. *Careproctus comus* ranges from west of Attu Island, on Stalemate Bank, to the eastern Aleutian Islands, near Unalaska Island. *Careproctus faunus* ranges from Adak Island in the central Aleutians to just east of Unalaska Island. Both species are found at depths of approximately 150–400 m. Among other liparids of the North Pacific, the new species are superficially similar to *Temnocora candida*, from which both can be readily distinguished on the basis of their unlobed dorsal fin and higher counts of median-fin rays and vertebrae.

The snailfish family Liparidae encompasses over 300 species in 30 genera worldwide (Chernova et al., 2004; Orr, 2004). Its most species-rich genus, *Careproctus*, comprises over 100 species, about 50 of which are known from the North Pacific (Chernova et al., 2004), where they are found mainly in the deeper waters of the continental slope. Nearly two-thirds of these species were described in the late 1800s and early 1900s based on collections obtained from Albatross expeditions (Gilbert, 1896; Gilbert and Burke, 1912; Burke, 1930) and several are known from very few specimens (Mecklenburg et al., 2002). More recent descriptions of new species have been provided by Schmidt (1950) from the western Pacific, Stein (1978) from the eastern Pacific, and Kido (1983, 1985, 1988) primarily from the western Pacific and Aleutian Islands.

The new species are easily distinguished from all known *Careproctus* because of their striking variegated coloration, being confused only with a superficially similar species currently recognized as a member of another genus, *Temnocora candida*. *Careproctus* has been diagnosed by the following characters: pelvic disk present, nostril single, pectoral-fin rays typically less than anal-fin rays, pseudobranch absent, body color not variegated (Kido, 1988; Stein et al., 2001). However, the descriptions herein require the emendation of the diagnosis to include the variegated color pattern of these two new species.

Resource assessment surveys conducted by the National Marine Fisheries Service, Alaska Fisheries Science Center (AFSC), have provided additional material leading to the descriptions of several new liparids from Alaska (Orr and Busby, 2001, 2006; Orr, 2004). The two new species described herein were collected during these periodic surveys from 1997 to 2004 in the Aleutian Islands and appear to be relatively common throughout the length of the island chain. We provide diagnoses, descriptions, and distributions of the two new species, as well as an emended diagnosis of the genus *Careproctus*.

Materials and Methods

All material examined was obtained from benthic otter trawls. Where indicated, some material was collected in a small ''benthic bag'' attached near the footrope of the otter trawl as described by Orr (2004).

Counts, measurements, and descriptive terminology follow Andriashev and Stein (1998). Counts of median-fin rays and vertebrae were taken from radiographs. The right gill membrane and abdomen were slit to examine the branchial and visceral cavities. Counts of gill rakers were taken from the first gill arch on the right side. Lengths are presented as standard length (SL) and proportions as percent SL, unless otherwise indicated as percent head length (HL), pelvic disk length (DL), or caudal length (CL). Measurements and counts are presented in species accounts as the range for all material examined followed by the value for the holotype in parentheses when intraspecific

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variation is indicated. Institutional abbreviations are as listed at http://www.asih.org/codons.pdf.

Univariate analyses were conducted using Statgraphics Plus 4.1 (Manugistics, Rockville, MD). To assess differences between the two new species, arcsine-transformed morphometric ratios (with SL as denominator) and raw meristic characters were tested to meet the assumptions of normality and homogeneity of variance required for ANOVA and ANCOVA. With the exception of orbit length, mandible to anus length, and length of attachment of anal fin to caudal fin, all morphometric characters met these assumptions and were subjected to ANCOVA, using SL as covariate following Orr and Busby (2006). Counts of the following meristic characters also met assumptions and were subjected to ANOVA: dorsal-, anal-, and pectoral-fin rays, abdominal and caudal vertebrae, and gill rakers.

Careproctus Kröyer 1862

Diagnosis.—*Careproctus* is distinguished from all other liparids by the following characters: one pair of nostrils; pseudobranch absent; pelvic disk present, small to large; pectoral fins typically with fewer rays than anal fin, with or without developed lower lobe, notch variable; body color uniformly dark or light, often gradually darkening posteriorly when light, rarely variegated (Stein et al., 2001, emended).

Comments.—The genus *Careproctus* has been diagnosed in part by the lack of a variegated color pattern (Kido, 1988; Andriashev and Stein, 1998; Stein et al., 2001). However, both new species described herein possess this general coloration. While the two new species are apparently sister species forming a clade diagnosed by color and a unique character of the pectoral fin described below, liparid phylogenetics are poorly understood and additional new species are awaiting description and probable discovery (Andriashev and Stein, 1998; Stein et al., 2001; Chernova et al., 2004). Therefore, rather than erect a new genus to accommodate these differences, we have emended the diagnosis of *Careproctus* by broadening it to include the body coloration of these new species.

Careproctus comus, new species
Comic Snailfish
Figures 1A, 2A, 3, 4; Tables 1, 2

Holotype.—UW 111841, 78.9 mm, male, north of Unalaska I., 53.67°N, 167.53°W, 303 m depth, F/V Dominator, cruise 200001, haul 28, benthic bag, 24 May 2000, J. W. Orr.

Paratypes.—56 specimens, 32.0–98.6 mm. UW 111834, 4, 58.1–77.8 mm, 52.28°N, 172.94°W, 291 m depth, F/V Vesteraalen, cruise 200001, haul 65, benthic bag, 3 June 2000, W. C. Flerx; UW 111836, 83.3 mm, 52.63°N, 172.81°E, 229 m depth, F/V Dominator, cruise 200001, haul 217, benthic bag, 17 July 2000, K. E. Pearson; UW 111838, 2, 75.3–80.4 mm, 51.82°N, 174.98°W, 250 m depth, F/V Dominator, cruise 200001, haul 93, benthic bag, 13 June 2000, K. E. Pearson; UW 111855, 70.7 mm, 52.04°N, 178.52°E, 366 m depth, F/V Vesteraalen, cruise 200001, haul 137, 23 June 2000, W. C. Flerx; UW 111856, 76.3 mm, 51.80°N, 175.20°W, 266 m depth, F/V Dominator, cruise 200001, haul 95, benthic bag, 14 June 2000, K. E. Pearson; UW 111858, 3, 78.1–88.6 mm, 52.44°N, 173.774°W, 246 m depth, F/V Sea Storm, cruise 200201, haul 159, benthic bag, 24 July 2002, J. W. Orr; USNM 387974, 2, 61.2–74.3 mm, 51.87°N, 178.55°E, 395 m depth, F/V Dominator, cruise 200001, haul 157, benthic bag, 30 June 2000, K. E. Pearson; UW 111865, 4, 57.8–71.7 mm, 52.06°N, 179.80°W, 242 m depth, F/V Sea Storm, cruise 200201, haul 128, benthic bag, 14 July 2002, J. W. Orr; UW 111866, 3, 66.9–79.8 mm, 52.06°N, 178.30°E, 343 m depth, F/V Sea Storm, cruise 200201, haul 96, 6 July 2002, J. W. Orr; CAS 224212, 2, 74.6–80.8 mm, 52.28°N, 173.25°W, 351 m depth, F/V Sea Storm, cruise 200201, haul 176, benthic bag, 30 July 2002, R. C. Harrison; UW 113634, 2, 77.6–78.0 mm, 52.05°N, 179.81°W, 246 m depth, F/V Sea Storm, cruise 200401, haul 124, 6 July 2004, R. N. Clark; SIO 06-109, 2, 68.0–71.0 mm, 51.61°N, 176.29°W, 345 m depth, F/V Sea Storm, cruise 200201, haul 86, benthic bag, 3 July 2002, J. W. Orr; UW 113636, 32.0 mm, 51.91°N, 178.25°E, 249 m depth, F/V Vesteraalen, cruise 200201, haul 152, 6 July 2002; UW 113642, 7, 45.0–75.3 mm, 53.31°N, 170.72°E, 353 m depth, F/V Gladiator, cruise 200401, haul 224, 31 July 2004, R. N. Clark; UW 113643, 68.0 mm, 52.84°N, 172.36°E, 308 m depth, F/V Vesteraalen, cruise 200201, haul 100, benthic bag, 20 June 2002, R. N. Clark; UW 113648, 80.0 mm, 53.67°N, 167.53°W, 305 m depth, F/V Morning Star, cruise 200201, haul 11, 27 May 2002, J. W. Orr; UW 113649, 78.0 mm, 51.87°N, 178.55°E, 400 m depth, F/V Vesteraalen, cruise 200201, haul 154, 6 July 2002; UW 113650, 85.0 mm, 51.92°N, 178.25°E, 244 m depth, F/V Gladiator, cruise 200401, haul 177, 21 July 2004, R. N. Clark; UW 113652, 61.0 mm, 54.40°N, 165.76°W, 235 m depth, F/V Vesteraalen, cruise 200201, haul 20, 22 May 2002, W. C. Flerx; UW 113654, 80.0 mm, 51.46°N, 178.45°W, 274 m

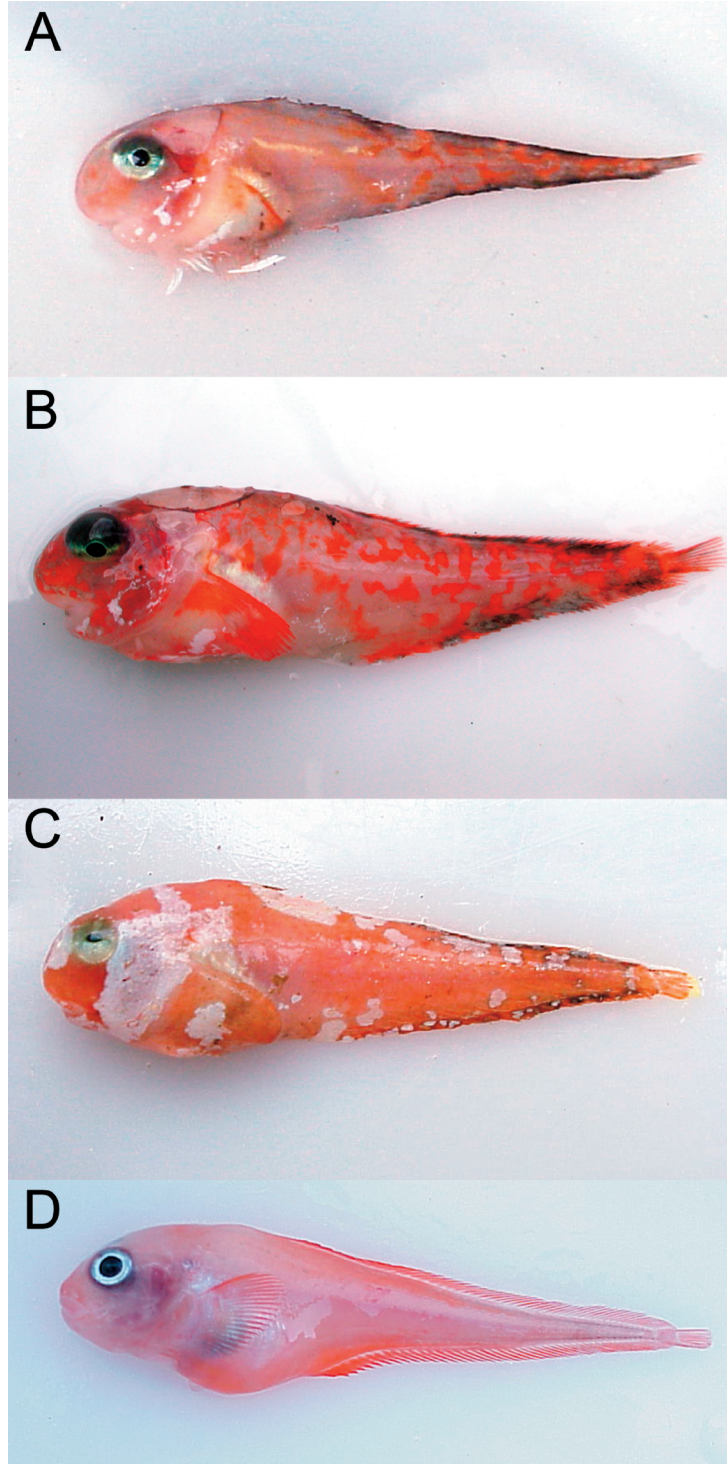

Fig. 1. Two new species of *Careproctus*, *Temnocora candida*, and *C. bowersianus* from the Aleutian Islands: (A) *Careproctus comus*, new species, holotype, UW 111841, 78.9 mm SL, male; (B) *Careproctus faunus*, new species, holotype, UW 111867, 101.9 mm SL, male; (C) *Temnocora candida*, UW 111862, 67.8 mm SL, female; (D) *Careproctus bowersianus*, UW 111871, 90.0 mm SL, female.

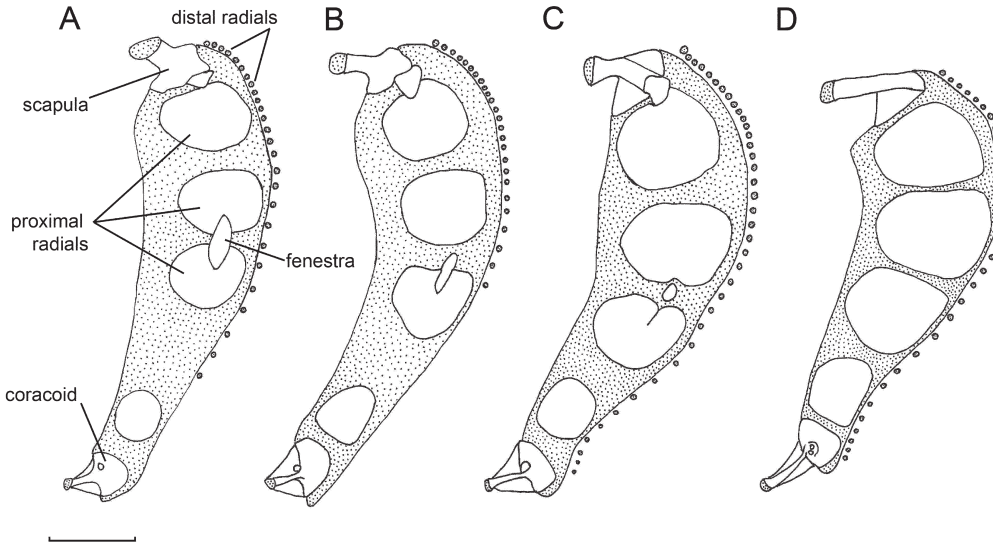

Fig. 2. Pectoral girdles of two new species of *Careproctus* and similar species: (A) *Careproctus comus,* new species, UW 111834, 72.8 mm SL; (B) *Careproctus faunus,* new species, UW 113646, 96 mm SL; (C) *Temnocora candida*, UW 111870, 77.9 mm SL; (D) *Careproctus bowersianus*, UW 111871, 100 mm SL. Scale bar = 5 mm.

depth, F/V Sea Storm, cruise 200201, haul 72, benthic bag, 26 June 2002; UW 113655, 68.0 mm, 51.61°N, 178.86°W, 314 m depth, F/V Sea Storm, cruise 200401, haul 118, 5 July 2004, R. N. Clark; UW 113656, 74.4 mm, 54.20°N, 166.26°W, 274 m depth, F/V Sea Storm, cruise 200401, haul 8, benthic bag, 8 June 2004, J. W. Orr; UW 113657, 10, 75.0–98.6 mm, 52.16°N, 179.49°E, 242 m depth, F/V Vesteraalen, cruise 200201, haul 176, benthic bag, 13 July 2002; UW 113659, 79.6 mm, 52.16°N, 179.49°E, 242 m depth, F/V Vesteraalen, cruise 200201, haul 176, 13 July 2002; UW 113660, 85.3 mm, 52.15°N, 179.48°E, 242 m depth, F/V Vesteraalen, cruise 200201, haul 175, benthic bag, 13 July 2002, R. N. Clark; LACM 56482-1, 2, 80.3–82.9 mm, 51.90°N, 178.29°E, 189 m depth, F/V Vesteraalen, cruise 200201, haul 156, benthic bag, 6 July 2002, R. N. Clark.

Diagnosis.—*Careproctus comus* is diagnosed from all other described species of *Careproctus* by its

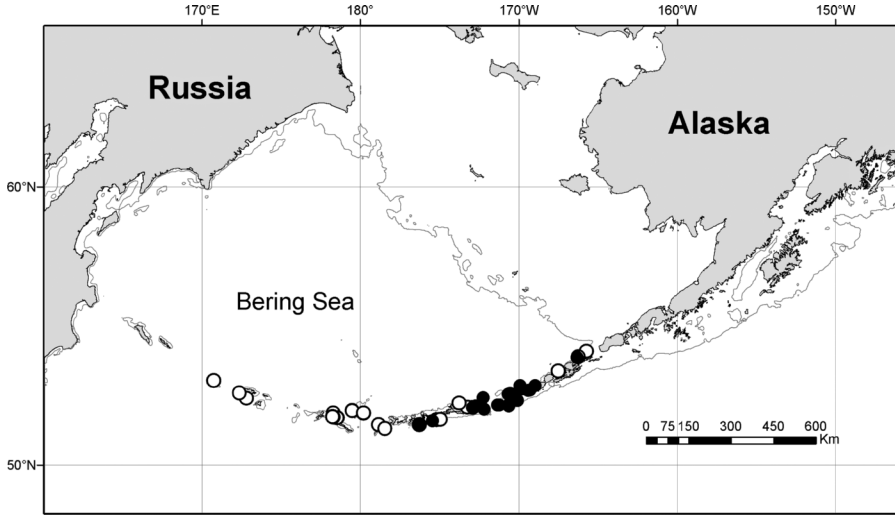

Fig. 3. Distribution of two new species of *Careproctus* from the Aleutian Islands based on all known material: *Careproctus comus,* new species (open circle), *Careproctus faunus,* new species (solid circle).

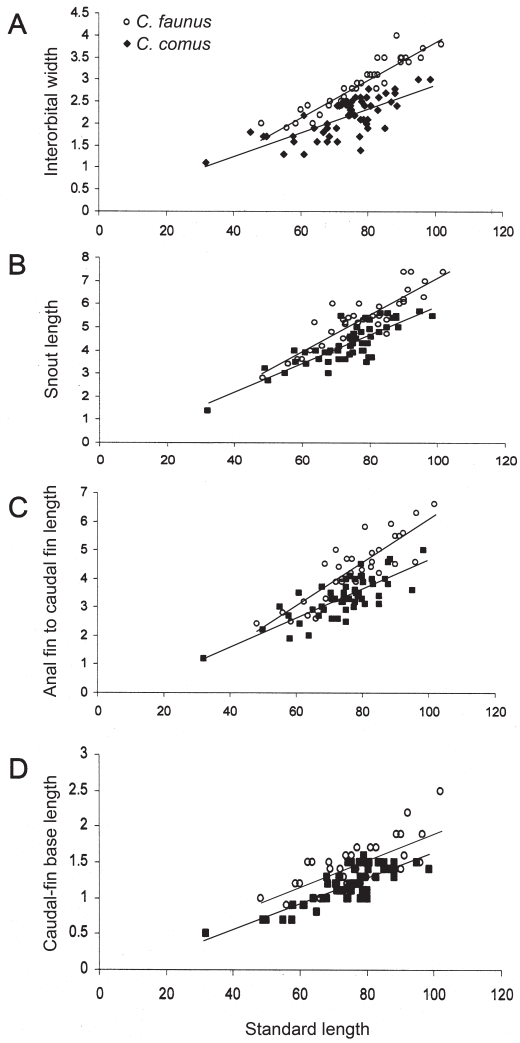

Fig. 4. Scatter plots of significant morphometric characters distinguishing *Careproctus comus,* new species, and *Careproctus faunus,* new species: (A) Interorbital width; (B) Snout length; (C) Anal-fin connection to caudal-fin length; (D) Caudal-fin base depth.

body coloration of red and gray mottling. It is further distinguished from *Careproctus faunus,* new species, in having the following character states: dorsal-fin rays 50–56 (vs. 47–51 in *C. faunus*); anal-fin rays 44–50 (vs. 41–45); caudal vertebrae 45–51 (vs. 42–45); interorbit narrower, 7.0–13.6% HL (vs. 11.9–16.7% HL); maxilla shorter, 32.0–46.0% HL (vs. 37.4–49.0% HL); snout shorter, 16.9–28.2% HL (vs. 20.1–34.9% HL); connection of anal-fin membrane to caudal fin shorter, 26.7–45.6% CL (vs. 34.8–56.3% CL); caudal-fin base more slender, 10.0–17.2% CL (vs. 11.7–19.7% CL).

In addition, the following combination of character states distinguish *C. comus* from all other species of *Careproctus*: snout protruding beyond lower jaw; pelvic disk moderate in size, 5.9–8.4%; pectoral fin with shallow notch and short lower lobe; distal pectoral radials absent from base of 10–14 ventral rays; teeth trilobed.

Description.—Body slender, tapering strongly posteriorly, moderately compressed; depth at dorsal-fin origin 49.2–83.9 (75.1)% HL. Head moderately large, dorsal profile gradually sloping from nape to snout. Snout rounded, strongly projecting beyond upper jaw. Mouth small, maxilla 32.0–49.6 (42.3)% HL, extending to mid-orbit, oral cleft extending to anterior rim of orbit. Lower jaw inferior, premaxillary tooth plates matching mandibular tooth plates. Premaxillary teeth trilobed in 9–10 oblique rows, increasing from three teeth in anteromedial rows to eight teeth in posterolateral rows. Mandibular teeth trilobed in 9–10 oblique rows, increasing from 4–6 teeth in anteromedial rows to nine teeth in posterolateral rows. Diastema absent at symphysis of upper and lower jaws. Orbit large, 33.7–44.2 (40.3)% HL, dorsal margin below dorsal contour of head, suborbital depth to oral cleft 26.3–54.6 (39.0)% orbit length; pupil elliptical to round. Interorbital space narrow, 7.0–15.1 (10.5)% HL, slightly convex. Snout shorter than orbit, 16.9–28.2 (26.9)% HL. Nostril single, with well-developed tube at level with middle or upper part of orbit; nostril tube length 2.0–4.0 (3.5)% HL.

Pores of cephalic lateralis of moderate size: nasal pores two, maxillary pores six, preoperculomandibular pores seven, suprabranchial pores two (pore pattern 2-6-7-2); chin pores paired in separate pits. Interorbital pore absent. Free neuromasts (Andriashev and Stein, 1998) about 5–6, small and difficult to discern, originating from above gill slit and extending to a level at mid-body to about level with the anus.

Gill opening small, 16.2–26.6 (19.9)% HL, upper margin at level of mid-orbit or dorsal part of orbit, extending to just above pectoral fin or to pectoral-fin ray 1–5 (ray three). Opercular flap rounded or angular. Branchiostegal rays six.

Dorsal-fin rays 50–56 (53; Table 1), anterior 4–5 rays uniserial and unsegmented, more posterior rays biserial and segmented; all rays simple. Anteriormost dorsal-fin pterygiophore inserted between neural spines two and three, bearing a single ray.

Anal-fin rays 44–50 (46; Table 1), all rays biserial and segmented; all rays simple. One or two anal-fin pterygiophores each bearing a single ray anterior to first haemal spine. Anal-fin origin below vertebrae 11–12 (caudal vertebrae 1–2).

TABLE 1. PROPORTIONAL MORPHOMETRIC CHARACTERS IN PERCENT SL AND MERISTIC CHARACTERS FOR INDIVIDUALS OF *Careproctus comus,* NEW SPECIES, AND *C. faunus,* NEW SPECIES, USED FOR STATISTICAL ANALYSES. Range followed by mean ± standard deviation in parentheses.

	n	*Careproctus comus*	*n*	*Careproctus faunus*	Significance
Standard length (mm)		32.0–98.6		48.3–101.9	
Head length	54	22.8–29.3 (25.8±1.2)	36	24.0–29.1 (26.7±1.4)	
Head width	30	7.4–15.6 (11.9±1.7)	20	10.2–15.5 (12.8±1.3)	
Depth at anal-fin origin	30	12.3–19.7 (16.1±1.9)	20	13.9–20.4 (17.7±1.9)	
Depth from dorsal-fin to anal-fin origin	30	19.1–25.2 (22.3±1.6)	20	20.3–27.0 (23.3±1.9)	
Depth at pectoral-fin base	30	12.6–21.4 (16.7±2.6)	20	13.3–20.7 (17.2±2.2)	
Depth at pelvic disk	30	15.2–23.3 (19.8±2.4)	20	16.6–25.3 (21.2±2.1)	
Snout length	52	4.4–7.7 (5.8±0.7)	35	4.6–8.7 (6.8±0.8)	<0.001
Orbit length	30	8.3–11.5 (10.1±0.7)	20	8.3–12.5 (10.0±1.1)	
Interorbital width	54	1.8–4.0 (2.9±0.4)	36	3.1–4.5 (3.7±0.3)	<0.001
Suborbital depth to oral cleft	30	2.5–5.3 (3.9±0.8)	20	2.5–5.5 (4.3±0.8)	
Suborbital depth to mandible	30	5.9–10.2 (7.7±1.4)	20	6.2–9.5 (8.1±1.2)	
Mouth width	30	6.0–12.6 (9.0±1.7)	20	6.9–13.0 (9.5±1.7)	
Maxilla length	53	8.1–12.6 (10.6±.8)	35	9.5–13.0 (11.3±0.8)	<0.001
Mandible length	30	8.0–11.8 (9.8±0.8)	20	9.0–11.1 (10.2±0.7)	
Gill-slit length	50	4.1–7.6 (5.4±1.0)	35	4.6–7.5 (6.2±0.8)	<0.001
Upper pectoral-fin length	30	15.8–22.4 (18.5±1.4)	20	17.0–22.8 (19.6±1.4)	
Lower pectoral-fin length	30	11.4–16.9 (14±1.5)	20	13.0–17.2 (15.0±1.2)	
Pectoral-fin notch-ray length	30	3.3–8.0 (6.4±1.2)	20	5.2–9.0 (6.5±1.0)	
Predorsal length	30	24.2–28.2 (26.7±1.0)	20	25.8–31.1 (28.1±1.4)	<0.001
Preanal length	30	34.2–42.0 (37.2±1.8)	20	33.3–42.0 (38.0±2.6)	
Snout to pelvic-disk length	30	8.9–16.1 (12.9±1.7)	20	9.0–17.3 (13.3±2.0)	
Snout to anus length	30	20.5–27.0 (23.1±1.6)	20	19.7–28.2 (24.4±2.1)	
Mandible to pelvic-disk length	30	7.0–12.2 (9.3±1.1)	20	8.0–13.5 (10.0±1.4)	
Mandible to anus length	30	17.5–22.6 (20.1±1.2)	20	19.1–27.6 (21.7±2.0)	
Pelvic disk length	30	5.9–8.4 (7.4±0.6)	20	6.9–9.3 (7.9±0.7)	
Pelvic disk width	30	5.2–7.6 (6.6±0.7)	20	6.3–8.4 (7.1±0.6)	
Pelvic disk to anus length	30	1.4–5.5 (3.6±1.0)	20	1.8–5.8 (3.6±1.2)	
Anus to anal-fin length	30	10.0–18.8 (14.2±2.2)	20	10.6–18.5 (14.3±2.2)	
Caudal-fin length	30	9.6–14.3 (12.2±0.9)	20	11.8–15.0 (13.0±0.8)	
Length of dorsal-fin connection to caudal fin	30	1.7–4.5 (3.2±0.7)	20	1.9–5.6 (3.7±1.0)	
Length of anal-fin connection to caudal fin	51	3.1–5.7 (4.5±0.6)	33	3.9–7.2 (5.6±0.8)	<0.001
Caudal-fin base depth	53	1.2–2.0 (1.6±0.2)	35	1.5–2.5 (1.9±0.3)	<0.001
Meristics					
Dorsal-fin rays	52	50–56 (53±1.2)	34	47–51 (48.8±1.0)	<0.001
Anal-fin rays	52	44–50 (46.7±1.3)	34	41–45 (42.9±0.9)	<0.001
Pectoral-fin rays	49	33–39 (35.8±1.4)	34	32–38 (36.0±1.3)	
Lower pectoral-fin rays	48	7–10 (7.8±1.0)	34	7–10 (8.1±0.8)	
Caudal-fin rays	33	10–13 (11.1±0.5)	28	11–12 (11.1±0.3)	
Precaudal vertebrae	54	9–11 (10.1±0.5)	34	9–11 (10.0±0.4)	
Caudal vertebrae	54	45–51 (47.2±1.3)	34	42–45 (43.6±1.0)	<0.001
Gill rakers	48	6–10 (7.2±0.9)	34	5–10 (7.2±1.0)	

Pectoral fin shallowly notched, with 33–39 (36) rays (Table 1). Upper lobe of 25–32 (26) rays extending to anal-fin origin or beyond to anal-fin ray five, dorsalmost rays lengthening to rays 3–5, more ventral rays gradually shortening to shortest ray of notch. Lower lobe short, with 7–10 rays, extending to about anus; dorsal rays gradually lengthening to thick and fleshy rays 2–5, ventral rays more slender and gradually shortening to ventralmost ray near pectoral symphysis. Tips of rays 5–50% free of membrane, lower rays more strongly exserted. Rays in notch slightly more widely spaced than rays of lobes. Uppermost pectoral-fin ray level with ventral rim of orbit. Lowermost pectoral-fin ray below anterior part of orbit. Proximal pectoral radials four (3+1), robust; proximal radials 2–3 notched (Fig. 2A). Interradial fenestra one, elliptical, elongate, extending between proximal radials two and three. Scapula with strong helve; coracoid tri-

TABLE 2. FREQUENCY DISTRIBUTIONS OF COUNTS OF DORSAL-, ANAL-, AND PECTORAL-FIN RAYS, AND GILL RAKERS AND VERTEBRAE IN *Careproctus comus,* NEW SPECIES, AND *C. faunus,* NEW SPECIES.

	Dorsal-fin rays										
Species	47	48	49	50	51	52	53	54	55	56	*n*
C. comus				1	5	7	21	15	2	1	52
C. faunus	3	11	11	8	1						34

	Anal-fin rays										
Species	41	42	43	44	45	46	47	48	49	50	*n*
C. comus				2	9	10	17	13		1	52
C. faunus	2	9	15	7	1						34

	Pectoral-fin rays								
Species	32	33	34	35	36	37	38	39	*n*
C. comus		1	6	15	16	2	7	2	49
C. faunus	1		1	10	13	2	7		34

	Pectoral-fin lower lobe rays				
Species	7	8	9	10	*n*
C. comus	23	17	6	2	48
C. faunus	7	20	4	3	34

	Gill rakers						
Species	5	6	7	8	9	10	*n*
C. comus		8	25	12	2	1	48
C. faunus	1	8	11	13		1	34

	Vertebrae										
Species	52	53	54	55	56	57	58	59	60	61	*n*
C. comus				1	10	22	13	6	1	1	54
C. faunus	4	13	10	6	1						34

angular with broad lamina. Distal radials present at base of pectoral-fin rays one to 24–25, more ventral distal radials reduced, absent from base of ventralmost rays, which articulate directly with pectoral cartilage.

Pelvic disk moderate in size, 24.5–31.8 (26.4)% HL, round, slightly longer than wide, anterior lobe moderately developed or obsolete, flat with margins often slightly upturned. Anus closer to pelvic disk than to anal-fin origin.

Principal caudal-fin rays 10–13 (11; Table 1), dorsal procurrent rays 2–3 (2), ventral procurrent rays 1–2 (1). Membrane of posterior dorsal-fin rays attached to caudal fin 15.4–36.7 (27.8)% CL; posterior anal-fin rays, 26.7–45.6 (37.8)% CL.

Skin thin, fragile, prickles absent. Pyloric caeca 16–18, thick, length about 20.7–37.0 (24.9)% HL.

Vertebrae 56–61 (57), 9–11 (10) precaudal, 45–51 (47) caudal (Table 1). Pleural ribs present on vertebrae 8–10, anteriormost short and slender, those more posterior long and slender. Hypural plate composed of dorsal and ventral plates divided by deep split about 50–75% length of plate. Single epural present.

Largest specimen examined a 98.6 mm female (UW 113657). Smallest female with yolked eggs 72.8 mm (UW 111834); smallest male with enlarged, swollen testes 61.2 mm (USNM 387974).

Coloration in life.—Body pale to dusky, mottled red and white anteriorly, mottled red and gray posteriorly, posterior fins often edged with black (Fig. 1A). Head with red band extending from tip of snout to anterior rim of orbit, red mottling on cheek and operculum, with bright white blotches along lower jaw and edge of operculum from near tip of jaw to gill slit; lips unpigmented. Upper pectoral-fin rays bright red; middle rays unpigmented proximally, lighter red distally, with bright patch of white anteriorly at middle part of rays; rays of lower lobe white. Caudal-fin rays dusky to light red, often edged with black. Peritoneum and orobranchial cavity pale; stomach, intestines, pyloric caeca, and urogenital papilla pale.

Distribution.—*Careproctus comus* has been collected only in the Aleutian Islands, primarily the

western and central Aleutians from Stalemate Bank (170.7°E), west of Attu Island, to just east of Unalaska Island (165.8°W) at depths of 189–400 m (Fig. 3).

Etymology.—Named for *Comus*, the Roman god of mirth and son of Bacchus and Circe, a reference to the comical appearance of the species.

***Careproctus faunus*, new species**

Mischievous Snailfish

Figures 1B, 2B, 3, 4; Tables 1, 2

Holotype.—UW 111867, 101.9 mm, male, Amukta Pass, 52.21°N, 172.21°W, 348 m depth, F/V Sea Storm, cruise 200201, haul 157, 23 July 2002, J. W. Orr.

Paratypes.—41 specimens, 24.0–101.9 mm. UW 113667, 2, 58.6–68.7 mm, 52.28°N, 172.94°W, 291 m depth, F/V Vesteraalen, cruise 200001, haul 65, benthic bag, 3 June 2000; UW 113671, 91.3 mm, female, collected with holotype; UW 111835, 3, 73.8–85.8 mm, 52.85°N, 170.57°W, 329 m depth, F/V Dominator, cruise 200001, haul 37, benthic bag, 26 May 2000, J. W. Orr; UW 111837, 63.7 mm, 52.38°N, 170.66°W, 278 m depth, F/V Vesteraalen, cruise 200001, haul 51, benthic bag, 31 May 2000; UW 111839, 69.0 mm, 52.65°N, 172.26°W, 376 m depth, F/V Dominator, cruise 200001, haul 84, benthic bag, 11 June 2000, K. E. Pearson; USNM 387975, 2, 62.4–77.0 mm, 52.99°N, 169.89°W, 120 m depth, F/V Vesteraalen, cruise 200001, haul 36, benthic bag, 27 May 2000, W. C. Flerx; UW 111857, 90.2 mm, 52.33°N, 172.75°W, 444 m depth, F/V Vesteraalen, cruise 200001, haul 67, 4 June 2000; UW 111868, 5, 80.5–96.5 mm, 52.37°N, 171.24°W, 323 m depth, F/V Dominator, cruise 200001, haul 51, benthic bag, 31 May 2000, J. W. Orr; CAS 224213, 2, 73.0–79.9 mm, 51.62°N, 176.25°W, 321 m depth, F/V Vesteraalen, cruise 200201, haul 191, 17 July 2002; SIO 06-108, 2, 74.0–90.0 mm, 52.94°N, 169.44°W, 422 m depth, F/V Morning Star, cruise 200201, haul 43, benthic bag, 2 June 2002, J. W. Orr; UW 113639, 56.0 mm, 53.15°N, 168.99°W, 259 m depth, F/V Morning Star, cruise 200201, haul 24, 30 May 2002, J. W. Orr; UW 113640, 2, 85.0–88.8 mm, 52.34°N, 170.65°W, 226 m depth, F/V Sea Storm, cruise 200201, haul 188, 1 Aug. 2002, R. C. Harrison; UW 113641, 85.0 mm, 52.37°N, 171.36°W, 324 m depth, F/V Sea Storm, cruise 200201, haul 225, 10 Aug. 2002, R. C. Harrison; UW 113644, 76.7 mm, 52.41°N, 170.62°W, 313 m depth, F/V Sea Storm, cruise 200201, haul 198, 3 Aug. 2002; UW 113645, 78.2 mm, 53.12°N, 169.94°W, 219 m depth, F/V Morning Star, cruise 200201, haul 29, benthic bag, 30 May 2002, J. W. Orr; UW 113646, 2, 90.0–96.0 mm, 52.21°N, 172.21°W, 341 m depth, F/V Sea Storm, cruise 200401, haul 73, 23 June 2004, J. W. Orr; UW 113647, 72.1 mm, 51.76°N, 175.46°W, 272 m depth, F/V Vesteraalen, cruise 200201, haul 60, benthic bag, 11 June 2002, R. N. Clark; UW 113651, 66.0 mm, 54.18°N, 166.34°W, 266 m depth, F/V Vesteraalen, cruise 200201, haul 31, benthic bag, 28 May 2002; UW 113653, 82.6 mm, 52.95°N, 169.31°W, 397 m depth, F/V Gladiator, cruise 200401, haul 30, benthic bag, 14 June 2004, K. E. Pearson; UW 113658, 3, 48.3–75.5 mm, 52.83°N, 170.56°W, 332 m depth, F/V Morning Star, cruise 200201, haul 50, benthic bag, 3 June 2002, J. W. Orr; UW 113662, 60.0 mm, 52.78°N, 170.69°W, 324 m depth, F/V Dominator, cruise 200001, haul 38, benthic bag, 26 May 2000, J. W. Orr; UW 113663, 2, 24.0–72.2 mm, 52.55°N, 170.11°W, 230 m depth, F/V Sea Storm, cruise 200401, haul 32, 14 June 2004, J. W. Orr; LACM 56483–1, 2, 82.2–82.9 mm, 52.39°N, 170.67°W, 281 m depth, F/V Sea Storm, cruise 200201, haul 187, benthic bag, 1 Aug. 2002, R. C. Harrison.

Diagnosis.—*Careproctus faunus* is diagnosed from all other described species of *Careproctus* by its body coloration of red and gray mottling. It is further distinguished from *Careproctus comus,* new species, by the following character states: dorsal-fin rays 47–51 (vs. 50–56 in *C. comus*); anal-fin rays 41–45 (vs. 44–50); caudal vertebrae 42–45 (vs. 45–51); interorbital space wider, 11.9–16.7% HL (vs. 7.0–13.6% HL); maxilla longer, 37.4–49.0% HL (vs. 32.0–46.0% HL); snout longer, 20.1–34.9% HL (vs. 16.9–28.2% HL); connection of anal-fin membrane to caudal fin longer, 34.8–56.3% CL (vs. 26.7–45.6% CL); caudal-fin base deeper, 11.7–19.7% CL (vs. 10.0–17.2% CL).

In addition, the following combination of character states distinguish *C. faunus* from all other species of *Careproctus*: snout protruding beyond lower jaw; pelvic disk moderate in size, 6.9–9.3%; pectoral fin with shallow notch and short lower lobe; distal pectoral radials absent from base of 8–12 ventral rays; teeth trilobed.

Description.—Body slender, tapering strongly posteriorly, moderately compressed; depth at dorsal-fin origin 60–100 (75.7)% HL. Head moderately large, dorsal profile gradually sloping from nape to snout. Snout rounded, strongly projecting beyond upper jaw. Mouth small, maxilla 37.4–49.0 (40.8)% HL, extending to mid-orbit, oral cleft extending to anterior rim of orbit. Lower jaw inferior, premaxillary tooth plates matching

mandibular tooth plates. Premaxillary teeth trilobed in 9–10 oblique rows, increasing from 3–5 teeth in anteromedial rows to 12 teeth in posterolateral row. Mandibular teeth trilobed in 9–10 oblique rows, increasing from 3–5 teeth in anteromedial rows to 14 teeth in posterolateral rows. Diastema absent at symphysis of upper and lower jaws. Orbit large, diameter 31.7–46.0 (33.0)% HL, dorsal margin below dorsal contour of head, suborbital depth to oral cleft 21.8–57.1 (43.3)% orbit length; pupil elliptical to round. Interorbital space narrow, 11.9–16.7 (14.2)% HL, slightly convex. Snout shorter than orbit, 16.1–34.9 (27.7)% HL. Nostril single, in well-developed tube at level with middle or upper part of orbit; nostril tube length 2.0–4.0 (3.4)% HL.

Pores of cephalic lateralis of moderate size: nasal pores two, maxillary pores six, preoperculomandibular pores seven, suprabranchial pores two (pore pattern 2-6-7-2); chin pores paired in separate pits. Interorbital pore absent. Free neuromasts (Andriashev and Stein, 1998) about 5–6, small and difficult to discern, originating from above gill slit and extending to a level at mid-body to about level with anus.

Gill opening small, 16.7–27.0 (25.8)% HL, upper margin at level of mid-orbit or dorsal part of orbit, extending to just above pectoral fin. Opercular flap rounded or angular. Branchiostegal rays six.

Dorsal-fin rays 47–51 (48; Table 1), anterior 4–5 rays uniserial and unsegmented, more posterior rays biserial and segmented; all rays simple. Anteriormost dorsal-fin pterygiophore inserted between neural spines two and three, bearing a single ray.

Anal-fin rays 41–45 (43; Table 1), anterior ray uniserial and unsegmented, more posterior rays biserial and segmented; all rays simple. One or two anal-fin pterygiophores each bearing a single ray anterior to first haemal spine. Anal-fin origin below vertebrae 11–12 (caudal vertebrae 1–2).

Pectoral fin shallowly notched, with 32–38 (35) rays (Table 1). Upper lobe of 25–31 (25) rays extending to anal-fin origin or beyond to anal-fin ray five, dorsalmost rays lengthening to rays 3–4, more ventral rays gradually shortening to shortest ray of notch. Lower lobe short, with 7–10 (10) rays, extending to or slightly beyond anus; dorsal rays gradually lengthening to thick and fleshy rays 2–4, more ventral rays more slender and gradually shortening to ventralmost ray near pectoral symphysis. Tips of rays 5–20% free of membrane, lower rays more strongly exserted. Rays in notch slightly more widely spaced than rays of lobes. Uppermost pectoral-fin ray level with ventral rim of orbit. Lowermost pectoral-fin ray below anterior part of orbit. Proximal pectoral radials four (3+1), robust; proximal radials 2–3 notched (Fig. 2B). Interradial fenestra one, shape variable: slender to elliptical, formed as a notch in proximal radial two only or extending partially or completely from radial two to three. Scapula with strong helve; coracoid triangular with broad lamina. Distal radials present at base of pectoral-fin rays one to 22–30; more ventral distal radials reduced, absent from base of ventralmost rays, which articulate directly with pectoral cartilage.

Pelvic disk moderate in size, 24.6–33.0 (30.0)% HL, round, slightly longer than wide, anterior lobe moderately developed or obsolete, flat with margins often slightly upturned. Anus closer to pelvic disk than to anal-fin origin.

Principal caudal-fin rays 11–12 (11; Table 1), dorsal procurrent rays 2–3 (2), ventral procurrent rays 1–2 (1). Membrane of posterior dorsal-fin rays overlapping caudal fin 15.9–43.7 (28.1)% CL; posterior anal-fin rays, 20.3–56.3 (47.5)% CL.

Skin thin, fragile, prickles absent. Pyloric caeca 16–18, thick, length about 25.3–41.5 (26.2)% HL.

Vertebrae 52–56 (53), 9–11 (10) precaudal, 42–45 (43) caudal (Table 1). Pleural ribs present on vertebrae 8–10, anteriormost short and slender, those more posterior long and slender. Hypural plate composed of dorsal and ventral plates divided by deep split about 75% length of plate. Single epural present.

Largest specimen examined a 101.9 mm male (UW 111867, holotype). Smallest female with yolked eggs 91.3 mm (UW 113671, collected with holotype); smallest male with enlarged, swollen testes 58.6 mm (UW 113667).

Coloration in life.—Body pale to dusky, mottled red and white anteriorly, mottled red and gray posteriorly, posterior fins often edged with black (Fig. 1B). Head with red band extending from tip of snout to anterior rim of orbit, red mottling on cheek and operculum, with bright white blotches along lower jaw and edge of operculum from near tip of jaw to gill slit; lips unpigmented. Upper pectoral-fin rays bright red; middle rays unpigmented proximally, lighter red distally, with bright patch of white anteriorly at middle part of rays; rays of lower lobe white. Caudal-fin rays dusky to light red, often edged with black. Peritoneum and orobranchial cavity pale; stomach, intestines, pyloric caeca, and urogenital papilla pale.

Distribution.—*Careproctus faunus* has been collected only in the central and eastern Aleutian Islands, from Adak Island (176.3°W) to just east

of Unalaska Island (166.3°W) at depths of 120–422 m (Fig. 3).

Etymology.—Named for the Roman god *Faunus*, the mischievous half-brother of *Comus*, because of the close similarity of this species to *C. comus*.

Comparisons.—The two new species, *Careproctus comus* and *C. faunus*, are most similar to one another and are apparently closely related. Several statistically significant differences were found between the new species (Table 1). Dorsal- and anal-fin rays, and caudal vertebrae counts were each significantly different, with *C. comus* possessing higher counts of each. Snout length, interorbital width, maxilla length, gill-slit length, predorsal length, length of anal-fin connection to caudal fin, and caudal-fin base depth also differed significantly. Among morphometric characters, the following are the most useful to distinguish the species: interorbital width narrower in *C. comus* (7.0–13.6% HL vs. 11.9–16.7% HL in *C. faunus*), maxilla length shorter in *C. comus* (32.0–46.0% HL vs. 37.8–49.0% HL), and snout length shorter in *C. comus* (16.9–28.2% HL vs. 20.1–34.9% HL). Differences were also visualized by plotting those morphometric characters most useful for identification against standard length (Fig. 4).

The geographic ranges of *C. comus* and *C. faunus* overlap in the central and eastern Aleutian Islands. Despite our collection of all liparids encountered in over 1000 tows in the Aleutian Islands during AFSC surveys, only *C. comus* has been collected west of Adak Island. The two species were obtained syntopically in one haul in Seguam Pass at 291 m depth. This area has become known for its high diversity of liparids, where, for example, three species of *Allocareproctus* were also collected in the same haul (Orr and Busby, 2006).

Among other snailfishes of the North Pacific, *Temnocora candida* (Fig. 1C) is easily misidentified as either of the new species both when alive and preserved. In life, it is also mottled with red and white but lacks the gray mottling posteriorly of *C. comus* and *C. faunus* (Fig. 1A, 1B). *Temnocora candida* can also be distinguished from the new species by several other characters, including its having a lobed dorsal fin, lower counts of median-fin rays (D 43–48, A 36–41) and caudal vertebrae (37–42), fewer pyloric caeca (12–13), a wider interorbital width (14.2–26.5% HL), and a deeper body (22.8–27.3% at pelvic disk, 19.5–24.7% at anal-fin origin). Although *T. candida* is commonly called the Bigeye Snailfish (Robins et al., 1991; Nelson et al., 2004), both new species have larger orbits (31.6–46.0% HL in *C. comus* and *C. faunus* vs. 21.6–35.2% HL in *T. candida*). The pectoral girdle also differs in having larger proximal radials, with a small fenestra present between proximal radials two and three (Fig. 2C).

Careproctus bowersianus (Fig. 1D) was known from two specimens collected on Bower's Bank in the Bering Sea north of the central Aleutian Islands until Kido (1985) provided a redescription based on additional material from the Aleutian Islands and Bering Sea slope. It is similar in body shape to both new species (Fig. 1D), and numbers of median-fin rays and vertebrae are within the range of *C. comus*. However, its overall body coloration, dark stomach, and nonprotruding snout, as well as its smaller mouth, pelvic disk, and orbit immediately distinguish it from each of the new species. The pectoral girdle is also strikingly different, with *C. bowersianus* having large squarish to rectangular proximal radials that nearly abut one another and lacking fenestrae between proximal radials two and three and between the scapula and proximal radial one (Fig. 2D).

Among these species, the total number of distal pectoral radials also differs, a character that has not been described for other liparids (Andriashev et al., 1977; Kido, 1988; Andriashev and Stein, 1998). The distal radials in snailfishes are cartilaginous nodules formed in the fibrocartilage pad along the distal margin of the scapulocoracoid cartilage. Typically, the dorsalmost radials are larger, the more ventral radials becoming smaller until they are lost in the one or two ventralmost rays, as in both *T. candida* and *C. bowersianus*. In *C. comus* and *C. faunus*, the radials become smaller until at rays 22–30 they coalesce with the scapulacoracoid cartilage, upon which the ray bases then articulate. The ventralmost rays articulate freely with the fibrocartilage pad. An analysis of the distribution of this character is beyond the scope of this paper, although it appears worthy of further investigation within the context of liparid phylogenetics.

Three species known only from their holotypes are also similar to *C. comus* and *C. faunus*. *Careproctus mollis* is only known from off Attu Island in the western Aleutian Islands. Fin-ray counts are within the range of *C. comus*. However, *C. mollis* is more robust than either new species and has a distinct hump at the nape. It also differs in several morphometric characters, having a greater head width, interorbital width, and caudal-base depth, as well as a smaller orbit.

Careproctus attenuatus was taken in deep waters (882 m) from the western Aleutian Islands off Agattu Island. Its dorsal-, anal-, and pectoral-fin ray counts are at or near the lower end of the

range of *C. faunus*, and it is similar in general body shape to both new species. Unlike the new species, however, its gill cavity is black, its snout does not project beyond the lower jaw, its head is broad and depressed, with the width about equal to the depth (Gilbert and Burke, 1912), and its dorsal fin is notched slightly (Burke, 1930; Mecklenburg et al., 2002; not presently evident because of the poor condition of the holotype).

Careproctus sinensis was collected in the Sea of Japan. While its meristics are well within the range of *C. comus*, its distinctive hump at the nape, similar to that of *C. mollis*, immediately distinguishes it from *C. comus*. In addition, the anterior mandibular pores open into a single pit (rather than opening as separate pores in *C. comus*) and a single suprabranchial pore is present (two are present in *C. comus*).

Material Examined

Careproctus attenuatus: USNM 74386, 37 mm, Gilbert and Burke, 1912, specimen now in poor condition, with posterior part of body broken, holotype, Albatross Sta. 4781.

Careproctus sinensis: USNM 73339, 59 mm, holotype, Sea of Japan, Albatross Sta. 4813.

Careproctus mollis: USNM 74383, 73.4 mm, holotype, off East Cape of Attu I., Albatross Sta. 4784.

Careproctus bowersianus: USNM 74382, 87.3 mm, holotype, Bowers Bank, Albatross Sta. 4772; UW 111871, 7, 87.5–100 mm, 53.10°N, 171.70°E, 453 m depth, F/V Sea Storm, cruise 200201, haul 36, benthic bag, 19 June 2002; UW 113836, 2, 130–142 mm, 58.53°N, 175.06°W, 1032 m depth, F/V Morning Star, cruise 200202, haul 106, 11 July 2002, D. E. Stevenson.

Temnocora candida: USNM 74384, 60.7 mm, holotype, off Attu I., Albatross Sta. 4784; UW 48241, 2, 65–75 mm, 52.40°N, 171.83°W, 271 m depth, F/V Dominator, cruise 200001, haul 53, benthic bag, 31 May 2000, J. W. Orr; UW 111860, 83.4 mm, 52.31°N, 175.82°E, 229 m depth, F/V Dominator, cruise 199701, haul 243, benthic bag, 9 Aug. 1997; UW 111861, 70.1 mm, 52.50°N, 173.56°W, 230 m depth, F/V Dominator, cruise 200001, haul 61, benthic bag, 2 June 2000, J. W. Orr; UW 111870, 77.9 mm, 52.34°N, 179.89°W, 159 m depth, F/V Dominator, cruise 199701, haul 164, 21 July 1997; UW 111862, 67.8 mm, 52.60°N, 169.36°W, 231 m depth, F/V Morning Star, cruise 200101, haul 1, benthic bag, 20 May 2001, J. W. Orr; UW 113665, 4, 55–75 mm, 52.16°N, 179.49°E, 242 m depth, F/V Vesteraalen, cruise 200201, haul 176, benthic bag, 13 July 2002, R. N. Clark; UW 113701, 72 mm, 51.91°N, 178.25°E, 249 m depth, F/V Vesteraalen, cruise 200201, haul 152, benthic bag, 6 July 2002; UW 113700, 60 mm, 52.21°N, 174.94°W, 206 m depth, F/V Sea Storm, cruise 200201, haul 5, 13 June 2002; UW 113708, 2, 72–83 mm, 52.16°N, 179.49°E, 242 m depth, F/V Vesteraalen, cruise 200201, haul 176, 13 July 2002, A. A. Abookire; UW 113702, 63 mm, 52.59°N, 172.93°E, 145 m depth, F/V Gladiator, cruise 200401, haul 212, 28 July 2004; UW 113705, 2, 60–64 mm, 51.43°N, 178.84°E, 197 m depth, F/V Gladiator, cruise 200401, haul 160, 15 July 2004.

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Literature Cited

Andriashev, A. P., A. V. Neyelov, and V. P. Prirodina. 1977. On the method of studying the morphology and systematics of snailfishes (Liparidae). Zoologicheskie Zhurnal 56:141–147. [In Russian, with English summary]

Andriashev, A. P., and D. L. Stein. 1998. Review of the snailfish genus *Careproctus* (Liparidae, Scorpaeniformes) in Antarctic and adjacent waters. Contributions in Science, Natural History Museum of Los Angeles County 470:1–63.

Burke, C. V. 1930. Revision of the fishes of the family Liparidae. Bulletin of the U.S. National Museum 150:1–204.

Chernova, N. V., D. L. Stein, and A. P. Andriashev. 2004. Family Liparidae Scopoli 1777—Snailfishes. California Academy of Sciences, Annotated Checklist of Fishes 31:1–72.

Gilbert, C. H. 1896. The ichthyological collections of the steamer Albatross during the years 1890 and 1891. Report of the U.S. Fish Commission 19:393–476.

Gilbert, C. H., and C. V. Burke. 1912. Fishes from Bering Sea and Kamchatka. Bulletin of the U.S. Bureau of Fisheries 30:31–96.

Kido, K. 1983. New and rare liparidid species from the Okhotsk and Bering seas and their adjacent waters. Japanese Journal of Ichthyology 29:374–384.

Kido, K. 1985. New and rare species of the genus *Careproctus* (Liparididae) from the Bering Sea. Japanese Journal of Ichthyology 32:6–17.

Kido, K. 1988. Phylogeny of the family Liparididae, with the taxonomy of the species found around

Japan. Memoirs of the Faculty of Fisheries, Hokkaido University 35:1–125.

MECKLENBURG, C. W., T. A. MECKLENBURG, AND L. K. THORSTEINSON. 2002. Fishes of Alaska. American Fisheries Society, Bethesda, Maryland.

NELSON, J. S., E. J. CROSSMAN, H. ESPINOSA-PEREZ, L. T. FINDLEY, C. R. GILBERT, R. N. LEA, AND J. D. WILLIAMS. 2004. Common and scientific names of fishes from the United States, Canada, and Mexico, 6th Edition. American Fisheries Society, Bethesda, Maryland.

ORR, J. W. 2004. *Lopholiparis flerxi*, a new genus and species of snailfish (Scorpaeniformes: Liparidae) from the Aleutian Islands, Alaska. Copeia 2004: 551–555.

ORR, J. W., AND M. S. BUSBY. 2001. *Prognatholiparis ptychomandibularis*, a new genus and species of the fish family Liparidae (Teleostei: Scorpaeniformes) from the Aleutian Islands, Alaska. Proceedings of the Biological Society of Washington 114:51–57.

ORR, J. W., AND M. S. BUSBY. 2006. Revision of the snailfish genus *Allocareproctus* Pitruk and Fedorov (Teleostei: Liparidae), with descriptions of four new species from the Aleutian Islands. Zootaxa 1173:1–37.

ROBINS, C. R., R. M. BAILEY, C. E. BOND, J. R. BROOKER, E. A. LACHNER, R. N. LEA, AND W. B. SCOTT. 1991. Common and scientific names of fishes from the United States, Canada, and Mexico, 5th Edition. American Fisheries Society, Bethesda, Maryland.

SCHMIDT, P. Y. 1950. Fishes of the Sea of Okhotsk. Academy of Sciences of the USSR, Transactions of the Pacific Committee, Volume 6, Moscow–Leningrad. [In Russian, translated by the Israel Program for Scientific Translations, 1965. Available from the National Technical Information Service, Springfield, Virginia]

STEIN, D. L. 1978. A review of the deepwater Liparidae (Pisces) from the coast of Oregon and adjacent waters. Occasional Papers of the California Academy of Sciences 127:1–55.

STEIN, D. L., N. V. CHERNOVA, AND A. P. ANDRIASHEV. 2001. Snailfishes (Pisces: Liparidae) of Australia, including descriptions of thirty new species. Records of the Australian Museum 53:341–406.

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