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Snailfishes of the *Careproctus rastrinus* complex (Liparidae): redescriptions of seven species in the North Pacific Ocean region, with the description of a new species from the Beaufort Sea

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Abstract

Herein we review and recognize as valid all previously described species of the *Careproctus rastrinus* complex based on morphological evidence, provide diagnoses and descriptions of all species, describe a new species from the Beaufort Sea, and address the misapplication of several names throughout the area. In particular, the name *C. rastrinus* is restricted to populations of the western Pacific and is known conclusively only from the Sea of Okhotsk. *Careproctus acanthodes*, from the Sea of Japan and Sea of Okhotsk, and *C. pellucidus*, from the Pacific Ocean side of northern Japan, are resurrected from synonymy with *C. rastrinus*. Populations of the eastern Pacific previously routinely identified as *C. rastrinus* are recognized under two names: *C. scottae*, a name that is applied to deeper water Bering Sea, Aleutian Islands, and eastern Pacific populations having a postorbital pore, and *Careproctus phasma*, applied to shallow water populations of the Bering Sea and Gulf of Alaska lacking a postorbital pore. Although we consider *Careproctus spectrum* valid, the species has been routinely misidentified and is presently known only from the type series. *Careproctus lerikimae* is a new species described from the Beaufort Sea, diagnosed from other species of the *C. rastrinus* complex by the absence of the postorbital pore and higher median fin and vertebral counts.

Key words: Teleostei, Alaska, Japan, Russia, deep-water, molecular, morphology, *Careproctus rastrinus, Careproctus scottae*, *Careproctus phasma, Careproctus acanthodes, Careproctus pellucidus, Careproctus trachysoma, Careproctus spectrum, Careproctus lerikimae* **n. sp.**

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Introduction

Among the over 400 species in the family Liparidae, *Careproctus* Krøyer is one of the most speciose genera. Found in both the northern and southern hemispheres and in all the world's oceans, the genus contains at least 140 species (Chernova *et al.* 2004) and new species are regularly being recognized and described (e.g., Chernova *et al.* 2004; Orr 2012, Chernova 2014ab). Nominal species have uncommonly been synonymized, and when synonymized (e.g., Kido 1988) are often resurrected when additional data become available. The genus is diverse and as additional species are described and relationships better understood, it becomes clearer that the genus should be divided and lineages recognized as distinct taxa. However, phylogenetic analyses are thus far limited by inadequate taxonomic sampling (Kido 1988; Balushkin 1996; Knudsen *et al.* 2007; Smith & Busby 2014) and elevating lineages to the generic level without a clear understanding of the phylogenetic relationships among the species will likely render *Careproctus* paraphyletic.

More than 50 species are known from the North Pacific (Chernova *et al.* 2004; Imamura & Noetsu 2002; Orr & Maslenikov 2007; Kai *et al.* 2011a; Machi *et al.* 2012; Orr 2012), and among these, one group of similar species that may represent a distinct lineage is the *C. rastrinus* complex (Pitruk 1991; Chernova 1999) comprising *C. rastrinus* Gilbert & Burke, *C. trachysoma* Gilbert & Burke, *C. scottae* Chapman & DeLacy, *C. acanthodes* Gilbert & Burke, and *C. pellucidus* Gilbert & Burke, as recognized by Kai *et al.* (2011a,b) and Nakabo & Kai (2013), as well as *C. phasma* Gilbert, *C. spectrum* Bean, and a new species herein described (Figs. 1–4). These species share a characteristic anteriorly deep body that strongly tapers posteriorly ("tadpole morph" of Chernova [2005b]), a moderately sized pelvic disc about the size of the orbit, a small gill slit entirely above the pectoral fin or extending to the base of a few of its dorsal-most rays, a strongly notched pectoral fin with a moderately to strongly elongate lower lobe ("long-feather" of Chernova [2005b]), simple conical teeth, and, with the exception of some *C. trachysoma*, a predominately pale body with pale peritoneum. Although several of the species have been synonymized in the past because of their similarity, we consider all to be valid.

The first species of the *C. rastrinus* complex to be described were taken in Alaska: *C. spectrum* (Bean 1890) and *C. phasma* (Gilbert 1896). Both have been problematic, primarily because two unrelated species were included among the syntypes of *C. spectrum*, leading to faulty comparisons with *C. phasma* and other misidentifications. The poor condition of most of the types further complicated identifications.

In their review of the liparids of Japan, Gilbert & Burke (1912b) described as new most of the remaining species in the *C. rastrinus* species complex, including *C. rastrinus*, *C. acanthodes*, *C. pellucidus*, and *C. trachysoma*. Burke (1930) continued to recognize all described species in the complex as valid in his worldwide review of the Liparidae. Concurrently, treating primarily the species of Russian waters, Soldatov & Lindberg (1930) listed *C. rastrinus*, *C. acanthodes*, *C. trachysoma*, *C. pellucidus*, and *C. spectrum* as valid, and included descriptions of *C. acanthodes*, *C. trachysoma*, and *C. spectrum* based solely on the original descriptions.

Shortly after Burke's review, Chapman & DeLacy (1934) described *C. scottae* from southeast Alaska. They compared the new species to the western Pacific *C. rastrinus* in particular, acknowledging its obvious similarities, as well as noting differences from other members of the complex.

Other authors (Taranetz 1937; Schmidt 1950; Wilimovsky 1954, 1958; Quast & Hall 1972; Fedorov 1973; Lindberg & Krasyukova 1987) variously listed as valid all the species known in the regions they considered. Among these authors, Schmidt (1950) offered additional descriptions of new specimens from the Sea of Okhotsk, indicating significant intraspecific variation from the types in some characters within *C. rastrinus* and *C. acanthodes*. While he also provided a description of *C. phasma*, this was likely a misidentification based on evidence from his morphological characters and the depth of collection.

In the most recent revision of the liparids of Japan, Kido (1988) recognized as valid in the western Pacific only *C. rastrinus* and *C. trachysoma* within this group, synonymizing *C. acanthodes* and *C. pellucidus* under *C. rastrinus*. In both cases, he noted either slight differences in morphometric characters in the case of *C. acanthodes* (shorter lower pectoral lobe, smaller gill opening, shorter pelvic disk) or complete overlap in morphometric and meristic characters in *C. pellucidus*. He did not address the eastern North Pacific species *C. scottae*, *C. phasma*, and *C. spectrum*.

Nearly all later authors followed Kido (1988). Sheiko & Fedorov (2000) treated the Japanese species *C. acanthodes* and *C. pellucidus*, as well as the eastern Pacific *C. scottae*, as synonyms of *C. rastrinus*; and Mecklenburg *et al.* (2002), in their inventory of species of this group in Alaskan waters, listed *C. acanthodes* and *C. pellucidus* as synonyms of *C. rastrinus*. Their review included *C. rastrinus*, *C. scottae*, *C. phasma*, and *C. spectrum*, noting that *C. scottae* was likely also a synonym of *C. rastrinus*.

However, in their checklist of the Liparidae, Chernova *et al.* (2004) listed as valid all species within the *C. rastrinus* complex, without explanation. Chernova (2005b, 2014a) reiterated this conclusion in her review and descriptions of new species of *Careproctus* of the North Atlantic and adjacent Arctic, redescribing and correcting many errors related to *C. reinhardti* Krøyer while providing additional descriptions for several species, including comparative observations on species of the *C. rastrinus* complex.

In the first genetic survey of the group, Kai *et al.* (2011a) found molecular evidence to identify genetically distinct groups within the *C. rastrinus* complex. They were able to correlate most of these groups with morphological characters and zoogeographic areas. Despite several of these species being among the most common liparids encountered in the Bering Sea and waters off Japan, none have been adequately described since their original publication as new species. Herein we recognize as valid all previously described species of the *C. rastrinus* complex based on additional morphological evidence, provide diagnoses and descriptions of all species, describe a new species from the Beaufort Sea, and address the misapplication of several names throughout the area.

TABLE 1. Identification, catalog number of voucher specimen, and Genbank accession numbers for 16S and Cyt*b* sequence data for species of the *Careproctus rastrinus* species complex. See material examined for associated locality data for vouchers.

Species	Voucher	16S	Cyt*b*
Careproctus acanthodes	FAKU 130974	AB565678.1	AB565566.1
	FAKU 130975	AB565684.1	AB565572.1
	FAKU 130977	AB565682.1	AB565570.1
	NMCI-P 1910	AB565680.1	AB565568.1
	NMCI-P 1912	AB565681.1	AB565569.1
	NMCI-P 2090	AB565683.1	AB565571.1
	NMCI-P 2091	AB565679.1	AB565567.1
C. lerikimae	UW 117918(1)	AB565642.1	AB565530.1
	UW 117918(2)	AB565644.1	AB565532.1
C. pellucidus	FAKU 130715	AB565685.1	AB565573.1
	FAKU 131325	AB565694.1	AB565582.1
	FAKU 131326	AB565695.1	AB565583.1
	FAKU 131327	AB565697.1	AB565585.1
	FAKU 131328	AB565700.1	AB565588.1
	FAKU 131329	AB565698.1	AB565586.1
	FAKU 131330	AB565699.1	AB565587.1
	FAKU 131331	AB565686.1	AB565574.1
	FAKU 131332	AB565687.1	AB565575.1
	FAKU 131334	AB565688.1	AB565576.1
	FAKU 131336	AB565689.1	AB565577.1
	FAKU 131339	AB565690.1	AB565578.1
	FAKU 131340	AB565691.1	AB565579.1
	FAKU 131341	AB565692.1	AB565580.1
	FAKU 131343	AB565693.1	AB565581.1
	FAKU 131348	AB565696.1	AB565584.1
C. phasma	UW 117915	AB565629.1	AB565517.1
	UW 117916	AB565631.1	AB565519.1
	UW 151271		LCO36266
	UW 151272		LCO36267

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TABLE 1. (Continued)

Species	Voucher	16S	Cyt*b*
	UW 151291(1)		LCO36270
	UW 151291(2)		LCO36271
	UW 151291(3)		LCO36272
	UW 151292(1)		LCO36273
	UW 151292(2)		LCO36274
	UW 151292(3)		LCO36275
	UW 151293(1)		LCO36276
	UW 151293(2)		LCO36277
	UW 151293(3)		LCO36278
	UW 151293(4)		LCO36279
	UW 151293(5)		LCO36280
	UW 151293(6)		LCO36281
	UW 151294(1)		LCO36268
	UW 151294(2)		LCO36269
	UW 151295(3)		LCO36282
	UW 151295(4)		LCO36283
	UW 151295(5)		LCO36284
	UW 151295(6)		LCO36285
	UW 151296(1)		LCO36286
	UW 151296(2)		LCO36287
	UW 117929	AB565636.1	AB565524.1
	UW 117931	AB565637.1	AB565525.1
	UW 117932(1)	AB565638.1	AB565526.1
	UW 117932(2)	AB565632.1	AB565520.1
	UW 117934(1)	AB565639.1	AB565527.1
	UW 117934(2)	AB565640.1	AB565528.1
	UW 117936(1)	AB565633.1	AB565521.1
	UW 117936(2)	AB565634.1	AB565522.1
	UW 117936(3)	AB565630.1	AB565518.1
	UW 117936(4)	AB565635.1	AB565523.1
	UW 117936(5)	AB565641.1	AB565529.1
	UW 154442	AB565643.1	AB565531.1
C. rastrinus	FAKU 131687	AB565671.1	AB565559.1
	FAKU 131688	AB565675.1	AB565563.1
	FAKU 131689	AB565676.1	AB565564.1
	FAKU 131690	AB565672.1	AB565560.1
	FAKU 131691	AB565677.1	AB565565.1
	FAKU 132128	AB565673.1	AB565561.1
	FAKU 132129	AB565674.1	AB565562.1
C. scottae	FAKU 131179	AB565704.1	AB565592.1
	KU 27997	AB565652.1	AB565540.1
	UW 113526(1)	AB565656.1	AB565544.1

.....continued on the next page

TABLE 1. (Continued)

Species	Voucher	16S	Cyt*b*
	UW 113526(2)	AB565657.1	AB565545.1
	UW 113726(1)	AB565645.1	AB565533.1
	UW 113726(2)	AB565658.1	AB565546.1
	UW 113726(3)	AB565647.1	AB565535.1
	UW 113906(1)	AB565650.1	AB565538.1
	UW 113906(2)	AB565659.1	AB565547.1
	UW 113906(3)	AB565660.1	AB565548.1
	UW 113906(4)	AB565665.1	AB565553.1
	UW 113906(5)	AB565661.1	AB565549.1
	UW 113906(6)	AB565668.1	AB565556.1
	UW 113906(7)	AB565662.1	AB565550.1
	UW 113906(8)	AB565664.1	AB565552.1
	UW 116265(1)	AB565655.1	AB565543.1
	UW 116841	AB565654.1	AB565542.1
	UW 117910(1)	AB565646.1	AB565534.1
	UW 117910(2)	AB565649.1	AB565537.1
	UW 117912(1)	AB565669.1	AB565557.1
	UW 117912(2)	AB565648.1	AB565536.1
	UW 117913	AB565663.1	AB565551.1
	UW 117914	AB565651.1	AB565539.1
	UW 117921	AB565670.1	AB565558.1
	UW 117930	AB565667.1	AB565555.1
	UW 117933	AB565666.1	AB565554.1
	UW 48118	AB565653.1	AB565541.1
C. trachysoma	FAKU 130800	AB565717.1	AB565605.1
	FAKU 130846	AB565718.1	AB565606.1
	FAKU 131127	AB565701.1	AB565589.1
	FAKU 131131	AB565723.1	AB565611.1
	FAKU 131132	AB565715.1	AB565603.1
	FAKU 131180	AB565732.1	AB565620.1
	FAKU 131181	AB565716.1	AB565604.1
	FAKU 131402	AB565714.1	AB565602.1
	FAKU 131403	AB565713.1	AB565601.1
	FAKU 131404	AB565712.1	AB565600.1
	FAKU 131542	AB565728.1	AB565616.1
	FAKU 131543	AB565729.1	AB565617.1
	FAKU 131544	AB565719.1	AB565607.1
	FAKU 131545	AB565730.1	AB565618.1
	FAKU 131546	AB565727.1	AB565615.1
	FAKU 131547	AB565709.1	AB565597.1
	FAKU 131548	AB565708.1	AB565596.1
	FAKU 131549	AB565702.1	AB565590.1

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TABLE 1. (Continued)

Species	Voucher	16S	Cyt*b*
	FAKU 131550	AB565703.1	AB565591.1
	FAKU 131551	AB565720.1	AB565608.1
	FAKU 131552	AB565710.1	AB565598.1
	FAKU 131553	AB565737.1	AB565625.1
	FAKU 131556	AB565721.1	AB565609.1
	FAKU 131557	AB565725.1	AB565613.1
	FAKU 131558	AB565707.1	AB565595.1
	FAKU 131560	AB565726.1	AB565614.1
	NMCI-P 1823	AB565722.1	AB565610.1
	NMCI-P 1860	AB565734.1	AB565622.1
	NMCI-P 1867	AB565735.1	AB565623.1
	NMCI-P 1905	AB565705.1	AB565593.1
	NMCI-P 1906	AB565711.1	AB565599.1
	NMCI-P 1907	AB565724.1	AB565612.1
	NMCI-P 1909	AB565733.1	AB565621.1
	NMCI-P 1913	AB565736.1	AB565624.1
	NMCI-P 1966	AB565731.1	AB565619.1
	NMCI-P 1978	AB565706.1	AB565594.1

Material and methods

Counts, measurements, and descriptive terminology follow Andriashev & Stein (1998), with the exception of the cephalic sensory pore series, which follows Stein *et al.* (2001), and pectoral girdle morphology, which follows Orr & Maslenikov (2007). Counts of median-fin rays and vertebrae were taken from radiographs. Counts of teeth were made according to methods of Able & McAllister (1980). Counts of gill rakers were taken from the first gill arch on the right side. The right gill membrane and abdomen were cut to examine the branchial and visceral cavities; right pectoral girdles were dissected and cleared and counter stained following Potthoff (1984). Lengths are presented as standard length (SL) and proportions as percent SL, unless otherwise indicated as percent head length (HL), orbit length (OL), or caudal length (CL). Fleshy interorbital width is taken at the greatest width including tissue extending to the orbital rim; bony interorbital width is the narrowest bony width. Suborbital depth to lower jaw is measured from the ventral rim of the orbit to the mandibular articulation. Prickle density is the number of prickles counted in a line the length of the orbit diameter in a region having the highest density of prickles. Measurements and counts are presented in species accounts as the range for all material examined followed by the value for the holotype or lectotype in parentheses when intraspecific variation is indicated. Institutional abbreviations are as listed at http://www.asih.org/codons.pdf. Sequences used by Kai et al. (2011a) to recognize clades within the *C. rastrinus* species complex are summarized by new identifications with Genbank numbers in Table 1, including additional specimens of *C. phasma* sequenced for this revision.

Two principal components analyses (PCA) were conducted to visualize differences among the species: one conducted on the new species and its most similar congeners (*C. phasma* and *C. spectrum*) and a second on the western Pacific species (*C. rastrinus*, *C. trachysoma*, *C. acanthodes*, and *C. pellucidus*). The analyses were conducted on the covariance matrix of log-transformed morphometric characters and on the correlation matrix of meristic characters, following Kai *et al.* (2011a). Differences between species were illustrated by plotting scores of morphometric principal component (PC) 2 against PC3, meristic PC1 against PC2, and meristic PC1 against morphometric PC3, the axes that most clearly distinguished the species.

Systematic accounts

Careproctus rastrinus Gilbert & Burke 1912

English common name: Salmon Snailfish
Japanese common name: Sake-bikunin
Figures 1A, 5A, 6; Tables 1–3

Careproctus rastrinus Gilbert & Burke 1912:362, pl. 43, fig. 2. Type locality: Sea of Okhotsk, 48°36'10"N, 145°17'30"E.—Burke 1930:136, figs. 57–58 (description, key).—Soldatov & Lindberg 1930:24 (key).—Chapman & DeLacy 1934:3 (comparisons).—Taranetz 1937:137 (Sea of Okhotsk, key).—Okada & Matsubara 1938:346, pl. 85-2 [Sea of Okhotsk, Sakhalin; plate modified from Gilbert & Burke (1912)].—Schmidt 1950:203 (brief description, Russia).—Böhlke 1953:136 (type catalog).—Matsubara 1955:1193 (southern Sea of Okhotsk).—Kato 1956: 329 (Sea of Japan, list, = *C. trachysoma*?).—Ueno 1971:97 (off Sakhalin).—Quast & Hall 1972:29 (Alaska).—Fedorov 1973:66 (Bering Sea).—Kido 1984:339, pl. 305-D (brief description, Sea of Okhotsk).—Lindberg & Krasyukova 1987:446 (Sea of Okhotsk and Sea of Japan, in part?).—Allen & Smith 1988:67 (Alaska, "pink snailfish", in part).—Kido 1988:217, fig. 48 (description, phylogenetics, in part).—Pitruk 1990:38 (Sea of Okhotsk).—Tsuda 1990:513 (Sea of Japan, Sea of Okhotsk, in part).—Robins *et al.* 1991:44 (list, based on Allen & Smith 1988).—Nakabo 1993:586 (Sea of Japan, Sea of Okhotsk, and Pacific coast of northern Japan, in key, in part).—Amaoka *et al.* 1995:211 (Sea of Japan, Sea of Okhotsk, and Pacific coast of northern Japan, in part).—Shinohara *et al.* 1996:178 (Pacific Japan, = *C. pellucidus*?).—Kido 1997:245 (Sea of Japan, Sea of Okhotsk, and Pacific coast of northern Japan, in part).—Nakabo 2000:672 (Sea of Japan, Sea of Okhotsk, and Pacific coast of northern Japan, in key, in part).—Sheiko & Fedorov 2000:32 (northern Kuril Is. and Kamchatka, in part).—Mecklenburg *et al.* 2002:611 (Alaska, illustration, in key, = *C. scottae*, in part).—Nakabo 2002:672 (Sea of Japan, Sea of Okhotsk, and Pacific coast of northern Japan, in key, in part).—Youn 2002:278 (list, = *C. trachysoma*?).—Fedorov *et al.* 2003:99 (Sea of Okhotsk).—Maeda & Tsutsui 2003:495 (off Hokkaido, list, in part).—Chernova *et al.* 2004:14 (checklist).—Nelson *et al.* 2004:124 (list, = *C. scottae*).—Chernova 2005b:S7 (comparisons).—Love *et al.* 2005:103 (checklist, = *C. scottae* in part).—Orlov 2005:141 (Kamchatka, Kuril Islands, in part).—Kitagawa *et al.* 2008:77 (Sea of Japan, Sea of Okhotsk, and Pacific coast of northern Japan, in part, photo = *C. pellucidus*?).—Shinohara *et al.* 2009:720 (Pacific Japan, = *C. pellucidus*?).—Kai *et al.* 2011a:143 (genetics, morphology, phylogenetics, as "OKH1").—Kai *et al.* 2011b:368 (fig. 1a, phylogenetics, as "OKH1").—Honma 2013 (Sea of Japan).—Nakabo & Kai 2013:1213 (northern Japan to Gulf of Alaska, in key, in part).—Page *et al.* 2013:127 (list, = *C. scottae*).—Shinohara *et al.* 2014:256 (Sea of Japan, = *C. trachysoma*?).

Holotype. USNM 73331, 243.3 mm, Russia, southern Sea of Okhotsk, off Cape Patience, Sakhalin Island, 48.6028°N, 145.2917°E, *Albatross* station 5026, 217 m depth, 28 September 1906.

Paratypes. SU 22371, 147.8 mm, Russia, southern Sea of Okhotsk, off Cape Patience, Sakhalin Island, 48.5417°N, 145.1458°E, *Albatross* station 5021, 114 m depth, 27 September 1906.

Additional material examined. A total of 35 specimens, not including the types above, 72.0–385.6 mm SL. See "Non-type material examined below."

Diagnosis. *Careproctus rastrinus* is distinguished from all other species of *Careproctus* by the combination of cyt*b* and 16S rRNA sequences ("OKH1" of Kai *et al.* 2011a,b; Table 1), an anteriorly robust body covered by cactus-like prickles, the presence of a postorbital pore, a moderate-sized pelvic disc, a lower pectoral-fin lobe longer than upper lobe, a pale peritoneum, and a speckled gray stomach. It is most similar to light colored *C. trachysoma* of the western Pacific, from which it can be distinguished by the color of its peritoneum and stomach (pale peritoneum and speckled gray stomach vs. speckled pale and dark in *C. trachysoma*), and its deeper and longer head and anterior body. It is also similar to the eastern Pacific *C. scottae*, from which it can be distinguished by its higher counts of caudal vertebrae (51–56 in *C. rastrinus* vs. 48–52 in *C. scottae*) and anal-fin rays (51–56 vs. 47–53), speckled gray stomach (pale in *C. scottae*), smaller pelvic disc (9.9–26.8 vs. 13.9–26.5 % HL), and shorter nasal tube (0.9–4.7 vs. 3.2–6.4 % HL), and to *C. phasma* from which it can be distinguished by the postorbital pore (present in *C. rastrinus* vs. absent in *C. phasma*), smaller pelvic disc (9.9–26.8 vs. 20.1–35.9 % HL), longer upper jaw (36.6–55.1 vs. 31.4–48.1 % HL), shorter nasal tube (0.9–4.7 vs. 2.9–5.7% HL), speckled gray stomach (pale in *C. phasma*), higher counts of dorsal-fin rays (57–63 vs. 50–56), higher counts of anal-fin rays (51–56 vs. 43–49), and higher counts of vertebrae (62–66 vs. 55–60). It is further distinguished from *C. spectrum* by its higher counts of dorsal-fin rays (57–63 vs. 52–54), smaller pelvic disc (9.9–26.8 vs. 22.5–23.1 % HL), and smaller orbit (16.7–33.3 vs. 33.9–34.4 % HL).

Description. Body heavy and deep anteriorly, tapering strongly posteriorly, strongly compressed; depth at pectoral-fin base 90.6–145.7 (126.3) % HL. Head large, 20.2–32.7 (26.2) % SL, and robust, dorsal profile rounded

from nape to snout. Snout blunt, slightly projecting anterior to lower jaw. Mouth terminal, small, horizontal; upper jaw 36.6–55.1 (43.8) % HL, maxilla extending to anterior part of orbit or mid-orbit, oral cleft extending to anterior rim of orbit; mandible 45.1–60.9 % HL. Premaxillary tooth plates matching mandibular tooth plates. Premaxillary and mandibular teeth simple with weak shoulders in 22–46 oblique rows of 7–14 teeth forming narrow bands. Diastema absent at symphysis of upper and lower jaws. Orbit 16.7–33.2 (21.8) % HL, dorsal margin well below dorsal contour of head, suborbital depth to upper jaw 11.1–19.8 (13.5) % HL, to lower jaw 26.1–36.6 (34.2) % HL; pupil round. Interorbital space broad, fleshy distance 31.8–54.4 (43.1) % HL, bony distance 17.8–32.1 (32.1) % HL, strongly convex. Snout typically much longer than orbit, 93.1–257.3 (176.0) % OL, 30.6–46.1 (38.3) % HL. Nostril single, with well-developed tube at level with lower rim of orbit; nostril tube length 3.7–18.3 % OL.

Pores of cephalic lateralis system of moderate size, pore pattern 2-6-7-2, chin pores paired. Interorbital pore absent.

Gill opening small, 19.7–49.4 (29.6) % HL, upper margin at or just above level of dorsal rim of orbit, extending ventrally to just above the upper pectoral-fin ray to pectoral-fin ray 1–5 (ray 4). Opercular flap rounded to slightly angular (rounded). Gill rakers 9–12 (Tables 2–3), short, blunt.

Dorsal-fin rays 57–63 (60; Tables 2–3), anterior dorsal lobe absent, anterior rays buried in tissue, tips of more posterior rays not exserted. Anteriormost dorsal-fin pterygiophore inserted between neural spines 3 and 4, rayless or bearing a single small or rudimentary ray (between 3 and 4, rayless). Predorsal length 23.3–33.1 (30.4) % SL. Anal-fin rays 51–56 (52; Tables 2–3), one or two anal-fin pterygiophores anterior to first haemal spine (one), each bearing a single ray, tips of all rays slightly exserted. Anal-fin origin below vertebrae 13–14 (caudal vertebrae 2–3), preanal length 33.4–48.7 (36.8) % SL.

Pectoral fin deeply notched, with 32–39 (37) rays (Tables 2–3). Upper lobe 54.5–75.7 (56.5) % HL, with 24–31 (29) rays extending well beyond anus to or near anal-fin origin, shorter than lower lobe, dorsalmost rays lengthening to rays 8–10, more ventral rays gradually shortening to shortest ray of notch. Lower lobe elongate, 52.6–141.9 (101.0) % HL, with 7–11 rays (8), extending beyond anus to or near anal-fin origin; dorsal rays gradually lengthening to elongate rays 7–8, ventral rays gradually shortening to ventralmost ray near pectoral symphysis. Tips of rays in dorsal lobe 0–25% free of membrane, rays of lower lobe more strongly exserted up to 70% free. Notch strong, rays in notch slightly more widely spaced than rays of lobes, more widely spaced ventrally. Uppermost pectoral-fin ray level with region between ventral rim of orbit and cleft. Insertion of lowermost pectoral-fin ray below mid-orbit. Proximal pectoral radials four (3+1), robust: radials 1–2 notched and hour-glass shaped; radial 3 a rounded square, slightly notched; radial 4 small, round (Fig. 5A). Interradial fenestrae three, extending between scapula and proximal radials 1–3: fenestrae between the scapula and radials 1 and 2 elliptical, generally elongate in the sagittal plane, fenestra between radials 2 and 3 oval. Scapula broadly T-shaped with robust distally broadened helve; coracoid with broad triangular head and broad helve, angled slightly anteriorly. Distal radials present at base of rays 2–29, ventralmost at level of proximal radial 4, dorsalmost ray and more ventral rays articulating directly with pectoral cartilage.

Pelvic disc small, length 9.9–26.8 (10.6) % HL, round, about as long as wide, width 11.0–25.8 (12.2) % HL, anterior lobe weakly developed, slightly cupped, distance from snout to pelvic disc 9.6–14.6 (12.3) % SL. Anus at level about even with posterior rim of orbit, close behind pelvic disc; distance from snout to anus 13.7–26.1 (16.3) % SL, 54.0–82.6 % HL.

Principal caudal-fin rays 9–10, dorsal procurrent rays 1–2, ventral procurrent rays 0–2 (1–2 + 4–5/5 + 0–2) (? + 4/5 + ?). Caudal fin 30.8–54.0 (37.4) % HL. Membrane of posterior dorsal-fin rays attached to caudal fin at shorter distance than anal-fin rays: dorsal-fin rays attached to caudal fin 35.1–66.5 (49.4) % CL; anal-fin rays, 38.6–71.1 (57.1) % CL. Depth at base of caudal fin 12.0–21.3 (18.5) % CL.

Skin relatively thick, thick gelatinous layer beneath skin, cactus-like prickles uniformly covering body, in most dense region about 13 prickles in orbit length. Pyloric caeca 21–34, length about 27–53 (36.2) % HL, center-left side of visceral cavity.

Vertebrae 62–66 (64), precaudal 10–12 (10), caudal 51–56 (54; Tables 2–3). Pleural ribs 2 or 3, anteriormost small when 3, others long and slender, present on vertebrae 8–9 or 9–10 or 10–11 (9–10).

Coloration. Body and fins orangish pink and white in life (Fig. 1A); head, dorsum from nape to caudal fin, and ventrum at anal-fin origin to caudal fin orangish pink; isthmus, base of pectoral fin, and body posterior of gill slit to anal-fin origin lighter; area above belly silvery white (crystalline guanine) with orangish-pink highlights becoming obsolete at about a quarter to half the anal-fin length; base and lower lobe of pectoral fin white; dorsal margin and distal portion of fin orangish pink; dorsal half of eye dark, silvery gray ventrally. Body and fins pale in

preservation; base of fins beneath skin with pigment, showing faint line between fins and body. Peritoneum pale, speckled gray; orobranchial cavity pale; stomach gray, intestines pale to darkly mottled, pyloric caeca pale to darkly mottled, and urogenital papilla pale.

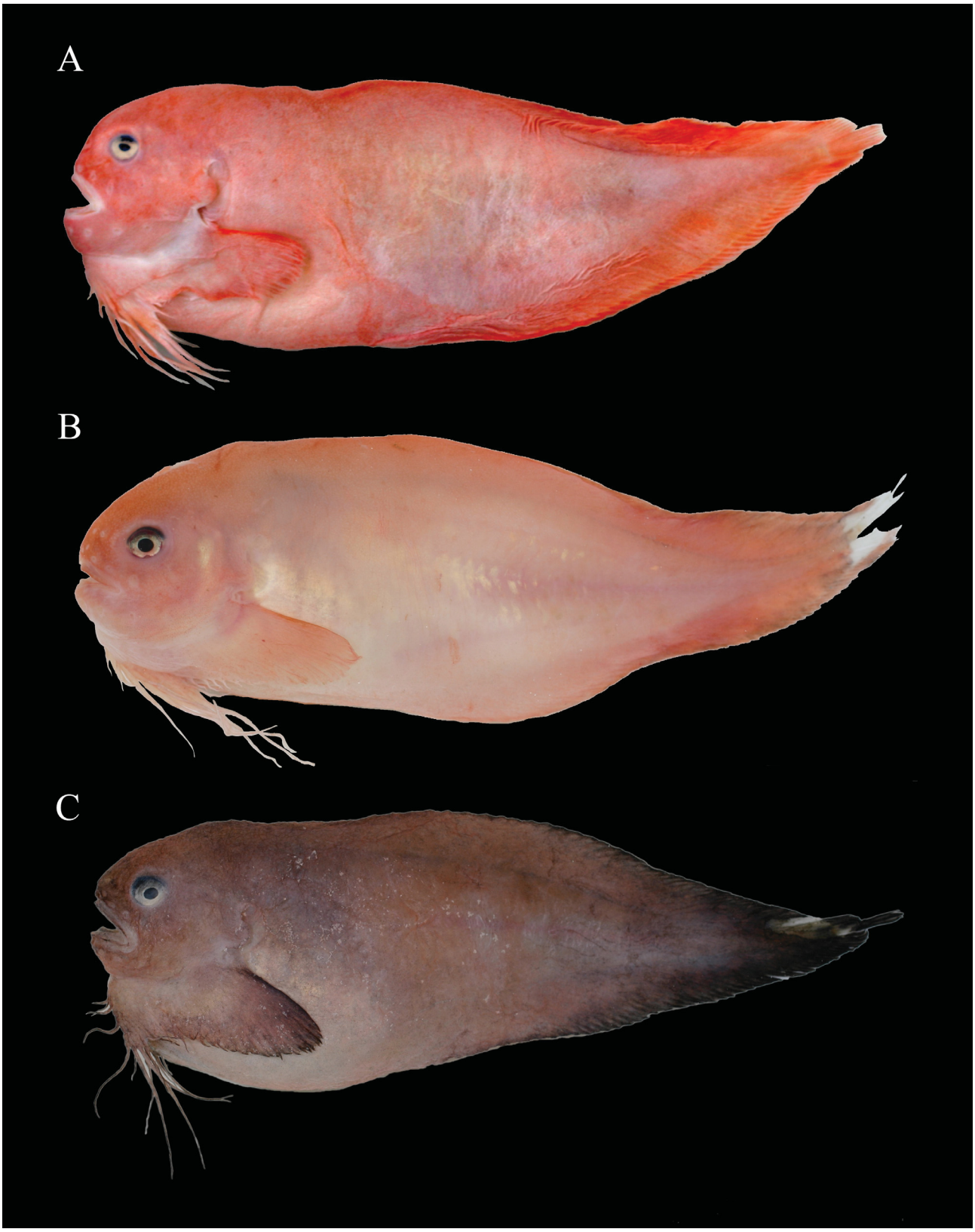

FIGURE 1. Selected western Pacific species of the *Careproctus rastrinus* species complex: A) *C. rastrinus*, FAKU 131687, 320.7 mm; B) *C. trachysoma*, FAKU 130800, 214.4 mm, light morphotype; C) *C. trachysoma*, FAKU 131402, 264.8 mm, dark morphotype.

TABLE 2. Proportional morphometric and meristic characters of species of the *Careproctus rastrinus* species complex. Morphometric data are given in percent SL (standard length) and presented as the range, followed by the mean +/- standard deviation (SD).

	C. rastrinus		*C. trachysoma*		*C. scottae*		*C. acanthodes*	
	n	Range (Mean ± SD)	*N*	Range (Mean ± SD)	*n*	Range (Mean ± SD)	*n*	Range (Mean ± SD)
Standard length	37	62.3–385.6	35	101.6–264.8	118	44.6–253.2	22	66.9–104.7
Morphometrics								
Head length	37	20.2–32.7 (25.2 ± 2.3)	35	19.3–26.3 (22.4 ± 1.7)	114	21.7–32 (26.3 ± 1.8)	22	24.2–27 (25.6 ± 0.7)
Head width	31	7.7–17.1 (12.3 ± 2.3)	32	8.8–14.8 (11.7 ± 1.6)	53	7.9–16.8 (12.4 ± 2.1)	13	11.9–16.7 (14.4 ± 1.6)
Greatest body depth	35	22.7–35.9 (29.3 ± 3.2)	34	20.8–31.1 (25.9 ± 2.6)	106	20.6–41 (30.9 ± 4)	22	21.1–28.2 (25.1 ± 1.8)
Body depth at anal-fin origin	8	23.3–31 (27.2 ± 2.7)	5	22.7–24.3 (23.5 ± 0.8)	15	18.9–35.5 (28.7 ± 4.1)	7	20.5–26.5 (23.1 ± 1.9)
Dorsal-fin origin to anal-fin origin	7	27–33.7 (30.4 ± 2.9)	5	25.8–30 (27.9 ± 1.8)	13	26.8–37 (31.7 ± 2.9)	7	22.6–31.6 (26.9 ± 3.4)
Body depth at pectoral-fin base	36	22.7–35.4 (28.7 ± 3.3)	33	18.7–30.7 (25 ± 2.9)	105	18.4–41 (30.8 ± 4.1)	22	21.1–28.2 (25 ± 1.8)
Body depth at pelvic fin	7	15.3–23.8 (19.6 ± 2.9)	5	12.2–18 (15.2 ± 2.1)	12	16.3–22.6 (19.6 ± 2)	7	16.4–20.5 (19.2 ± 1.4)
Snout length	36	7.2–11.6 (9.3 ± 1)	35	6.2–9.5 (8 ± 0.7)	105	7.2–13.4 (9.9 ± 1.3)	22	6.9–10 (8.9 ± 0.9)
Orbit length	36	3.7–9.2 (5.8 ± 1.2)	35	4–6.4 (5.4 ± 0.6)	112	4–9.4 (6.2 ± 1)	22	6.1–8.5 (6.9 ± 0.7)
Interorbital width (bony)	19	4.8–9 (6.5 ± 1.1)	5	4.9–6.4 (5.8 ± 0.6)	18	5–8.6 (6.7 ± 1)	10	3.7–7.5 (6.3 ± 1.5)
Interorbital width (fleshy)	36	8.4–14 (11.5 ± 1.4)	35	7.8–13.1 (11.1 ± 1)	101	5.5–15.1 (10.7 ± 1.9)	22	11–19.3 (13.9 ± 2.1)
Suborbital depth to upper jaw	19	2.7–5 (4 ± 0.6)	9	2.5–3.5 (3 ± 0.4)	15	2.3–4.6 (3.6 ± 0.7)	10	1.6–4.8 (3.7 ± 1)
Suborbital depth to lower jaw	19	6.4–10.3 (8.4 ± 0.9)	9	5.8–7.4 (6.4 ± 0.6)	15	6.9–9.1 (8.1 ± 0.7)	10	5.1–9 (7.4 ± 1.3)
Mouth width	19	8.9–15.4 (12.2 ± 1.8)	5	8.7–11.5 (10.2 ± 1.1)	15	9.4–14 (12.1 ± 1.3)	7	10.8–15.6 (13.5 ± 1.8)
Maxilla length	31	9.2–13.6 (11.6 ± 1.1)	32	7.7–11.7 (9.8 ± 0.9)	105	9–14.1 (11.1 ± 1)	13	10.4–12.1 (11.2 ± 0.5)
Mandible length	19	10.6–16.2 (13.6 ± 1.3)	9	9.4–11.4 (10.2 ± 0.6)	15	11.8–14.9 (12.9 ± 0.9)	10	10.9–13.2 (12.1 ± 0.7)
Gill slit length	30	4.6–12 (8.3 ± 1.8)	33	4.7–9.6 (7.4 ± 1.1)	103	4.7–11.2 (8.3 ± 1.3)	21	4.6–11 (7.4 ± 1.3)
Pectoral fin length	29	12.3–18.5 (15.8 ± 1.6)	34	13.3–18.8 (16.1 ± 1.3)	103	12.9–21.2 (16.3 ± 1.7)	19	12.7–19.2 (16.5 ± 1.6)
Pectoral-fin lower lobe length	29	14.8–34.6 (23.8 ± 4)	35	18.5–28.4 (24.5 ± 2.4)	101	15.7–34.7 (23 ± 4.3)	17	8.9–15.8 (12.3 ± 2)
Notch ray length	18	3.3–8.5 (5.3 ± 1.3)	10	5.8–9.2 (7.7 ± 1.3)	16	3.8–8.1 (6 ± 1.2)	7	4–7.5 (5.8 ± 1.4)

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TABLE 2. (Continued)

	C. rastrinus		*C. trachysoma*		*C. scottae*		*C. acanthodes*	
	n	Range (Mean ± SD)	*N*	Range (Mean ± SD)	*n*	Range (Mean ± SD)	*n*	Range (Mean ± SD)
Predorsal length	36	23.3–33.1 (27.8 ± 2.4)	35	21.9–30.4 (25.7 ± 1.8)	100	22.8–34.8 (28.9 ± 2.3)	21	26.3–32.6 (29.3 ± 1.6)
Preanal length	36	33.4–48.7 (41.1 ± 3.6)	35	31.5–44.4 (37.6 ± 3.5)	99	30.5–49.5 (39.6 ± 3.8)	21	33.4–45.2 (39.2 ± 3.1)
Snout to pelvic disc length	19	9.6–14.6 (12.4 ± 1.3)	5	10–12.4 (10.9 ± 1.1)	15	9.9–15.8 (11.8 ± 1.4)	10	11.7–14.9 (13.2 ± 1)
Snout to anus length	29	13.7–26.1 (17.2 ± 2.7)	34	13.7–19.9 (16.5 ± 1.6)	104	13.1–26.2 (18.8 ± 2.8)	22	16.8–22.5 (19.9 ± 1.5)
Pelvic disc length	37	2.3–7.3 (4 ± 1.1)	34	2.5–4.2 (3.3 ± 0.4)	115	3.5–6.8 (4.8 ± 0.7)	22	4.6–7.3 (5.7 ± 0.6)
Pelvic disc width	31	2.6–7.2 (3.8 ± 1)	18	2.3–3.9 (3.2 ± 0.4)	96	2.8–6.4 (4.6 ± 0.6)	22	4.2–7.6 (5.9 ± 0.9)
Pevic disc to anus length	19	0.1–3.6 (1.9 ± 0.7)	9	1.2–3.8 (2.3 ± 0.8)	15	0.6–2.8 (1.6 ± 0.7)	10	0.1–1.9 (1 ± 0.6)
Anus to anal fin length	19	17.2–30.8 (24.4 ± 2.7)	5	20.3–30.6 (27.2 ± 4.1)	15	16.3–27.8 (23.3 ± 3.4)	10	19.1–27.8 (22.3 ± 2.7)
Caudal fin length	30	8.4–14.1 (10.7 ± 1.3)	14	8.8–11.3 (10.3 ± 0.7)	72	9–13.4 (10.7 ± 1.1)	15	9.2–12.1 (10.7 ± 0.9)
Dorsal-fin attachment to caudal fin length	30	3.4–7.4 (5.4 ± 1)	13	4–6.2 (5.2 ± 0.6)	71	3–7.6 (5.7 ± 0.9)	14	2.1–5.1 (3.6 ± 0.8)
Anal-fin attachment to caudal fin length	29	3.8–7.6 (5.9 ± 0.9)	12	3–6.7 (5.4 ± 1.1)	71	4.3–8.4 (6.2 ± 0.8)	14	3.3–6.3 (4.4 ± 0.9)
Caudal base depth	19	1.2–2.2 (1.7 ± 0.3)	5	1.1–1.7 (1.4 ± 0.2)	15	1.4–2.7 (1.8 ± 0.3)	10	0.7–1.9 (1.5 ± 0.4)
Nasal tube length	15	0.2–1.2 (0.6 ± 0.3)	15	0.3–1 (0.7 ± 0.2)	10	0.8–1.5 (1 ± 0.2)	7	0.5–1.6 (0.9 ± 0.4)
Meristics								
Dorsal-fin rays	31	57–63 (59.6 ± 1.3)	35	57–62 (59.5 ± 1.3)	124	54–61 (56.9 ± 1.2)	21	52–55 (53.6 ± 1.1)
Anal-fin rays	31	51–56 (52.5 ± 1.3)	34	51–57 (53.6 ± 1.4)	124	47–53 (50.0 ± 1.2)	22	44–49 (47.2 ± 1.1)
Pectoral-fin rays	31	32–39 (35.3 ± 2.0)	35	31–37 (33.7 ± 1.6)	124	31–39 (33.8 ± 1.9)	21	29–36 (32.2 ± 1.9)
Pectoral-fin lower lobe rays	31	7–11 (8.2 ± 1.1)	34	7–10 (8.7 ± 1)	124	7–12 (8.5 ± 0.8)	19	6–9 (7.1 ± 0.9)
Gill rakers	24	9–12 (10.8 ± 1.0)	21	8–11 (9.2 ± 1)	120	8–13 (10.1 ± 0.9)	6	7–10 (9.2 ± 1.2)
Principal caudal-fin rays	30	9–10 (9.1 ± 0.4)	22	8–11 (9.2 ± 0.8)	105	8–10 (9 ± 0.3)	9	9–11 (10.1 ± 1.1)
Precaudal vertebrae	36	10–12 (10.7 ± 0.6)	29	10–12 (10.9 ± 0.5)	116	10–13 (10.7 ± 0.5)	22	9–11 (9.8 ± 0.7)
Caudal vertebrae	36	51–56 (53.1 ± 1.3)	29	51–56 (54.2 ± 1.2)	113	48–52 (50.4 ± 0.9)	22	47–51 (48.5 ± 1.2)
Total vertebrae	31	62–66 (63.9 ± 1.2)	29	62–67 (65.1 ± 1.2)	123	59–64 (61.1 ± 1.0)	22	56–61 (58.4 ± 1.3)

TABLE 2. (Continued)

	C. pellucidus		*C. phasma*		*C. spectrum*		*C. lerikimae*	
	n	Range (Mean ± SD)	*n*	Range (Mean ± SD)	*n*	Range (Mean ± SD)	*n*	Range (Mean ± SD)
Standard length	34	92.6–285.5	58	54.3–272	3	68.2–91	27	50.5–159
Morphometrics								
Head length	34	21.2–28.3 (23.8 ± 1.7)	58	22.5–29.7 (26.1 ± 1.7)	2	26.6–31.8 (29.2 ± 31.8)	27	22.9–29.8 (27.1 ± 1.7)
Head width	26	8.5–15.1 (12.3 ± 2)	32	7.3–19.3 (12.8 ± 2.6)	2	14.3–17.1 (15.7 ± 17.1)	25	9–17.5 (13 ± 2.4)
Greatest body depth	34	22.7–35.3 (28.4 ± 2.8)	46	20.4–34.1 (28.6 ± 3.5)	3	24.7–28.5 (26.7 ± 28.5)	24	21.4–31.6 (26.1 ± 2.2)
Body depth at anal-fin origin	9	23.5–29.6 (26.5 ± 2.6)	5	21.2–28.3 (23.8 ± 2.8)	3	23–28.5 (26.1 ± 28.5)	25	15.1–26.2 (20.6 ± 3)
Dorsal- to anal-fin origin	9	26.5–35 (29.1 ± 2.7)	5	25.2–36.4 (30.9 ± 4.1)	1	28.0	25	20.4–31.8 (26.7 ± 3.2)
Body depth at pectoral-fin base	34	22.7–35.3 (28.4 ± 2.9)	46	20.4–34.1 (28.6 ± 3.5)	1	24.7	25	20.8–29 (25.3 ± 2)
Body depth at pelvic fin	9	16.5–20.1 (18 ± 1.3)	5	17.7–26.4 (21.9 ± 3.9)	1	20.3	25	15.3–21.6 (18 ± 1.5)
Snout length	34	6.7–11.3 (9 ± 1)	47	7.1–11.3 (9.5 ± 1)	2	7.5–10.2 (8.8 ± 10.2)	25	7.4–10.6 (9 ± 1)
Orbit length	34	5–9.6 (7.7 ± 1.1)	55	4.4–9 (6.1 ± 1)	3	9–10.9 (10.1 ± 10.9)	26	5.4–8.5 (6.9 ± 0.8)
Interorbital width (bony)	17	4.8–7.9 (6.2 ± 0.9)	12	3.7–8.6 (6.1 ± 1.3)	1	5.5	26	4.5–8.2 (6.2 ± 1.1)
Interorbital width (fleshy)	34	9.5–14.5 (12 ± 1.3)	44	5.4–13.4 (9.7 ± 2.2)	2	8.2–12.2 (10.2 ± 12.2)	26	7.6–15.9 (12 ± 2.2)
Suborbital depth to upper jaw	17	2.6–4.2 (3.2 ± 0.5)	11	3.2–4.8 (3.9 ± 0.5)	1	2.5	25	3–5.1 (4.1 ± 0.5)
Suborbital depth to lower jaw	17	6.6–9.4 (7.6 ± 0.8)	11	6.6–9.9 (8.1 ± 0.8)	1	9.0	25	6.8–10.4 (8.6 ± 0.9)
Mouth width	17	8.9–14 (11.1 ± 1.3)	11	9.6–16.3 (12.8 ± 2.2)	1	15.4	25	8–18.2 (12 ± 2.3)
Maxilla length	26	9.7–12.8 (11.3 ± 0.7)	45	8.1–12.2 (10.3 ± 1)	2	11.9–14.2 (13 ± 14.2)	25	10.4–14.1 (12.4 ± 1)
Mandible length	17	10.3–15.4 (12.7 ± 1.4)	12	7.1–15.3 (12.2 ± 2.1)	1	14.4	25	11.9–17.8 (14.5 ± 1.4)
Gill slit length	31	5.2–10.7 (8 ± 1.5)	46	3.4–10.2 (6.9 ± 1.4)	1	4.7	25	4.6–10 (7.5 ± 1.3)
Pectoral fin length	33	11.1–17.5 (15.3 ± 1.4)	47	13.7–22.9 (18.1 ± 2)	1	17.4	26	13–21.5 (17.5 ± 2.1)
Pectoral-fin lower lobe length	33	14.2–29 (22.5 ± 3.6)	47	17.6–34.2 (26.2 ± 3.9)	1	9.1	26	15.8–25 (19.8 ± 2.6)
Notch ray length	13	4.7–9.8 (6.5 ± 1.6)	11	4.8–10.3 (7.9 ± 1.6)	1	4.0	24	3.6–9.9 (6.4 ± 1.5)

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TABLE 2. (Continued)

	C. pellucidus		*C. phasma*		*C. spectrum*		*C. lerikimae*	
	n	Range (Mean ± SD)	*n*	Range (Mean ± SD)	*n*	Range (Mean ± SD)	*n*	Range (Mean ± SD)
Predorsal length	34	25–35.1 (28.9 ± 2.1)	48	24–32.8 (28.6 ± 2.2)	1	24.7	25	25.2–32.2 (28.8 ± 1.8)
Preanal length	34	32.9–46.5 (41.3 ± 3.1)	47	31.6–51.8 (41.5 ± 3.7)	1	39.1	25	36.3–48.2 (42 ± 3.2)
Snout to pelvic disc length	18	8.7–14.4 (12 ± 1.5)	11	9.3–15.7 (11.3 ± 1.8)	1	13.7	25	11–16 (13.1 ± 1.4)
Snout to anus length	33	14.1–21.2 (16.8 ± 1.6)	45	13.7–27.8 (18.5 ± 3.3)	1	20.3	25	14.7–25.2 (19.7 ± 2.4)
Pelvic disc length	34	2.2–4.1 (3.3 ± 0.5)	58	4.9–9.6 (6.8 ± 1)	2	6.2–7.1 (6.6 ± 7.1)	27	5–7.4 (6.2 ± 0.6)
Pelvic disc width	34	2.2–3.9 (3.1 ± 0.4)	42	4.8–7.8 (6.3 ± 0.8)	2	6–6.5 (6.3 ± 6.5)	25	4.2–6.8 (5.5 ± 0.7)
Pevic disc to anus length	18	0.7–3.2 (1.6 ± 0.7)	11	0.4–1.9 (1 ± 0.4)	1	1.1	26	0.1–2.6 (1.3 ± 0.7)
Anus to anal fin length	18	17.8–33.1 (26.9 ± 4.4)	12	20.8–30.6 (26.8 ± 3.5)	1	22.9	25	20.9–32.1 (25.4 ± 3)
Caudal fin length	32	10–13.1 (11.4 ± 0.8)	37	8.5–14.7 (11.7 ± 1.4)			25	8.7–13.5 (11.4 ± 1.3)
Dorsal fin attachment to caudal fin length	32	4–7.9 (5.8 ± 0.9)	34	3.2–8.4 (5.9 ± 0.9)			22	2.3–6.5 (4.4 ± 1.2)
Anal-fin attachment to caudal fin length	32	4.1–8.1 (6.2 ± 1)	34	3.9–8.2 (6.2 ± 1)			21	3–6.9 (5.3 ± 1)
Caudal base depth	18	1.3–2 (1.5 ± 0.2)	11	1.3–2.4 (1.7 ± 0.3)	1	2	26	1.1–2 (1.5 ± 0.2)
Nasal tube length	10	0.2–0.7 (0.4 ± 0.2)	11	0.7–1.5 (1.1 ± 0.3)			17	0.1–1.1 (0.7 ± 0.2)
Meristics								
Dorsal-fin rays	34	51–60 (55 ± 1.8)	56	50–56 (53.1 ± 1.2)	2	52–54 (53 ± 1.4)	27	56–59 (57.6 ± 1)
Anal-fin rays	34	46–53 (49.1 ± 1.5)	56	43–49 (45.8 ± 1.3)	2	47	27	48–51 (50.2 ± 0.9)
Pectoral-fin rays	34	30–38 (33.6 ± 1.9)	57	27–35 (30.7 ± 1.7)	2	32–32 (32 ± 0)	26	28–36 (31 ± 2.2)
Pectoral-fin lower lobe rays	32	6–10 (8.5 ± 1)	54	6–12 (7.8 ± 0.9)	1	8	26	7–10 (8.1 ± 0.7)
Gill rakers	26	9–13 (10.6 ± 0.9)	51	6–10 (8.8 ± 1.1)	2	8–9 (8.5 ± 0.7)	24	6–10 (8.1 ± 1)
Caudal-fin rays	29	9–11 (9.2 ± 0.5)	51	8–11 (9 ± 0.4)	1	9	21	9–9 (9 ± 0)
Precaudal vertebrae	33	9–11 (9.9 ± 0.3)	56	10–12 (11.1 ± 0.5)	1	10	27	10–12 (10.9 ± 0.5)
Caudal vertebrae	33	47–53 (49.5 ± 1.2)	56	44–50 (46.6 ± 1.3)	1	49	27	49–52 (51.1 ± 0.8)
Total vertebrae	33	57–63 (59.5 ± 1.3)	56	55–60 (57.7 ± 1.2)	1	59	27	59–63 (62 ± 1)

TABLE 3. Counts of dorsal-fin rays, anal-fin rays, pectoral-fin rays, vertebrae, and gill rakers in members of the *Careproctus rastrinus* species complex.

	Dorsal-fin rays															
	50	51	52	53	54	55	56	57	58	59	60	61	62	63	*n*	
C. rastrinus								1	4	11	8	6		1	31	
C. trachysoma								4	3	8	16	6	1		38	
C. scottae					1	12	36	42	19	10	2	1			123	
C. acanthodes			4	8	5	6									23	
C. pellucidus		1	1	3	10	6	7	4		1	1				34	
C. phasma	2	2	10	23	12	7	1								57	
C. spectrum			1		1										2	
C. lerikimae							4	9	9	5	1				28	
	Anal-fin rays															
	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	*n*
C. rastrinus									7	12	5	6		1		31
C. trachysoma									2	4	12	10	4	2	1	36
C. scottae					3	13	24	38	37	6	2					123
C. acanthodes		1		2	12	6	3									24
C. pellucidus				1	3	5	16	5	2		2					34
C. phasma	3	7	8	22	12	4	1									57
C. spectrum					2											2
C. lerikimae						2	2	12	12							28
	Pectoral-fin rays															
	27	28	29	30	31	32	33	34	35	36	37	38	39	*n*		
C. rastrinus						1	5	4	9	1	5	4	2	31		
C. trachysoma				1	5	2	11	8	4	6	1			38		
C. scottae					18	19	13	30	19	19	2	1	2	123		
C. acanthodes			2	3	2	4	8	3	1	1				24		
C. pellucidus				2	1	8	5	8	5	2	2	1		34		
C. phasma	1	5	10	9	16	8	7	1	1					58		
C. spectrum						2								2		
C. lerikimae		3	8	2	3	4	4	1	1	1				27		

……*continued on the next page*

TABLE 3. (Continued)

	Vertebrae													
	55	56	57	58	59	60	61	62	63	64	65	66	67	*n*
C. rastrinus								3	9	11	5	3		31
C. trachysoma								2		6	9	10	2	29
C. scottae					6	21	56	30	8	1				122
C. acanthodes		1	3	13	3	2	2							24
C. pellucidus			2	4	11	13	1		2					33
C. phasma	4	4	14	18	15	2								57
C. spectrum					1									1
C. lerikimae					1	1	4	13	9	1				29
	Gill rakers													
	6	7	8	9	10	11	12	13	*n*					
C. rastrinus				4	4	10	6		24					
C. trachysoma			6	8	4	3			21					
C. scottae			2	25	56	26	9	1	119					
C. acanthodes		1		2	3				6					
C. pellucidus				2	12	8	3	1	26					
C. phasma	1	5	15	16	15				52					
C. spectrum			1	1					2					
C. lerikimae	1	6	8	9	1				25					

Life history. Largest specimen examined was a 385.6 mm (FAKU 131691). The only ripe female with yolked eggs was 210 mm; males 146.5–285 mm were ripe with large testes. At least two sizes of eggs were present in the ripe female: yolked eggs were about 3.1 mm in diameter and white eggs had diameters of 0.5–1.5 mm.

Distribution. *Careproctus rastrinus* has been collected from the Sea of Okhotsk, from west of Kamchatka south to eastern Sakhalin Island and northeastern Hokkaido Island (Fig. 6). Collection depths range from 114 to 217 m.

Etymology. The specific epithet is derived from the Latin *rastrum*, meaning "rake", likely a reference to the dense covering of cactus-like prickles on the types.

Remarks. Prior to our examination of type material and the availability of tissues suitable for genetic analysis, *C. rastrinus* had been recognized as one of the most common liparids in the Bering Sea and Aleutian Islands. Herein, we recognize *C. rastrinus* to be limited in geographic range to the Sea of Okhotsk, replaced in the eastern Bering Sea and Aleutian Islands by the similar species *C. scottae*. Records of *C. rastrinus* from the Pacific Ocean east of the Kuril Islands into the western Bering Sea (e.g., Orlov 2005) require verification.

We reidentified one paratype of *C. rastrinus* as *C. acanthodes*. It was among the smallest collected but was readily identified as *C. acanthodes* by counts of vertebrae, the large size of the pelvic disc, and short lower pectoral-fin lobe.

Careproctus trachysoma Gilbert & Burke 1912

English common name: Rough Snailfish
Japanese common name: Zara-bikunin
Figures 1B–C, 5B, 6; Tables 1–3

Careproctus trachysoma Gilbert & Burke 1912:364, pl. 44, fig. 1. Type locality: Sea of Japan, 43°N, 140.1722°E.—Burke 1930:137, fig. 60 (description, key).—Soldatov & Lindberg 1930:27 (Sea of Okhotsk, key, = *C. rastrinus*?).—Chapman & DeLacy 1934:3 (comparisons).—Taranetz 1937:137 (Sea of Japan, in key).—Okada & Matsubara 1938:346 (Niigata and west coast of Hokkaido, Japan, Gulf of Tartary).—Schmidt 1950:204 (brief description, Russia).—Honma 1952:224 (Sea of Japan).—Böhlke 1953:136 (type catalog).—Matsubara 1955:1193 (Sea of Japan, in key).—Kato, 1956:329 (Sea of Japan, list).—Honma 1963:224 (Niigata, Japan, list).—Ueno 1971:97 (Sea of Japan, Sakhalin).—Quast & Hall 1972:29 (Alaska).—Honma & Kitami 1978:62 (Niigata, Japan, list).—Kido 1984:339, pl. 305-C (brief description, Sea of Japan, Tartary Strait, Sea of Okhotsk, in part).—Lindberg & Krasyukova 1987:450 (Sea of Japan, west coast of Hokkaido, Japan, Gulf of Tartary, = *C. rastrinus*?).—Kido 1988:220, fig. 50 (description, phylogenetics, in part?).—Nambu & Kido 1990:111 (Sea of Japan).—Pitruk 1990:38 (list, Seas of Japan and Okhotsk, in part?).—Tsuda 1990:513 (Sea of Japan, Hokkaido, Sakhalin, Sea of Okhotsk, in part).— Nambu *et al.* 1992:74 (Yamato Bank, Sea of Japan).—Nakabo 1993:586 (Sea of Japan, Tartary Strait, Sea of Okhotsk, in key, in part).—Amaoka *et al.* 1995:211 (Sea of Japan, Sea of Okhotsk, in part).—Kido 1997:244 (Sea of Japan and Sea of Okhotsk, in part).—Nakabo 2000:672 (Sea of Japan, Hokkaido, Sakhalin, Sea of Okhotsk, in part), Nakabo 2002:672 (Sea of Japan, Hokkaido, Sakhalin, Sea of Okhotsk, in part).—Maeda & Tsutsui 2003:495 (Sea of Japan and Sea of Okhotsk coasts of Hokkaido, in part, = *C. rastrinus*?).—Chernova *et al.* 2004:17 (checklist, in part?).—Okiyama 2004:413 (Sea of Japan).—Chernova 2005b:S7 (comparisons).—Kai *et al.* 2011a:144 (genetics, morphology, phylogenetics, as "SOJ1" and "SOJ2").—Kai *et al.* 2011b:366 (genetics, as "SOJ1" and "SOJ2").—Shinohara *et al.* 2011:47 (Sea of Japan).—Shinohara *et al.* 2014:257 (Sea of Japan).

Holotype. USNM 73333, 227 mm, Japan, Sea of Japan, off Iwanai, off Otaru, Hokkaido, Benkei Mizaki Light, S 3°E, 17 km, 43°N, 140.1722°E, *Albatross* station 4982, depth 783 m, 19 September 1906.

Paratypes. SU 22376, 2 (120.8–201.8 mm), Japan, between Hakodate and Otaru, Hokkaido, via Tsugaru Strait, Benkei Mizaki Light, S 2°, 43.0264°N, 140.1778°E, *Albatross* station 4983, 782.7 m, 19 September 1906.

Additional material examined. A total of 39 specimens, not including the types above, 101.6–264.8 mm SL. See "Non-type material examined below."

Diagnosis. *Careproctus trachysoma* is distinguished from all other species of *Careproctus* by the combination of cyt*b* and 16S rRNA sequences ("SOJ1" and "SOJ2" of Kai *et al.* 2011; Table 1), an anteriorly robust body more or less covered by cactus-like prickles, presence of the postorbital pore, moderate-sized pelvic disc, lower pectoral-fin lobe longer than upper lobe, speckled peritoneum, dark stomach, and, unlike other members of the *C. rastrinus* species complex, a dark color morphotype. It is most similar to *C. rastrinus* of the western Pacific, from which it can also be distinguished by its peritoneum and stomach color (pale and speckled gray in *C. rastrinus*), and a less deep and shorter head and anterior body. It is also similar to *C. scottae*, from which it can be distinguished by its

higher counts of caudal vertebrae (51–56 in *C. trachysoma* vs. 48–52 in *C. scottae*) and anal-fin rays (51–57 vs. 47–53), and peritoneum and stomach color (both pale in *C. scottae*), smaller pelvic disc (11.1–18.1 vs. 13.9–26.5 % HL), and shorter nasal tube (1.3–4.3 vs. 2.1–6.4 % HL), and to *C. phasma* from which it can be distinguished by the postorbital pore (present in *C. trachysoma* vs. absent in *C. phasma*), smaller pelvic disc (11.2–18.1 vs. 20.1–35.9 % HL), shorter nasal tube (1.3–4.3 vs. 2.9–5.7 % HL), peritoneum and stomach color (pale in *C. phasma*), higher counts of dorsal-fin rays (57–62 vs. 50–56), higher counts of anal-fin rays (51–57 vs. 43–49), and higher counts of caudal vertebrae (51–56 vs. 44–50). It is further distinguished from *C. spectrum* by its higher counts of dorsal-fin rays (57–62 vs. 52–54 in *C. spectrum*), smaller orbit (16.7–28.3 vs. 33.9–34.4 % HL), and smaller pelvic disc (11.2–18.1 vs. 22.5–23.1 % HL).

Description. Body heavy and deep anteriorly, tapering strongly posteriorly, moderately compressed; depth at pectoral-fin base 87.3–133.2 % (125.5) % HL. Head short, 19.3–26.3 (23.1) % SL, robust, dorsal profile rounded from nape to snout. Snout blunt, slightly projecting anterior to lower jaw. Mouth terminal, small, horizontal; upper jaw 35.5–51.5 (42.3) % HL, maxilla extending to anterior rim of orbit or mid-orbit, oral cleft extending to anterior rim of orbit; mandible 42.1–55.6 % HL. Premaxillary tooth plates matching mandibular tooth plates. Premaxillary and mandibular teeth simple with weak shoulders in 21–47 oblique rows of 7–14 teeth forming narrow bands. Diastema absent at symphysis of upper and lower jaws. Orbit 16.7–28.3 (23.5) % HL, dorsal margin well below dorsal contour of head, suborbital depth to upper jaw 11.3–15.3 % HL, to lower jaw 26.6–38.0 % HL; pupil round. Interorbital space broad, fleshy distance 38.5–61.6 (49.2) % HL, bony distance 22.9–33.0 % HL, strongly convex. Snout much longer than orbit, 109.2–223.7 (143.3) % OL, 30.9–43.8 (33.6) % HL. Nostril single, with well-developed tube at level with lower rim of orbit; nostril tube length 12.3–24.2 % OL.

Pores of cephalic lateralis system of moderate size, pore pattern 2-6-7-2, chin pores paired. Interorbital pore absent.

Gill opening small, 21.1–43.9 (28.8) % HL, upper margin at level of mid-orbit or dorsal rim of orbit, extending ventrally to just above the upper pectoral-fin ray to pectoral-fin ray 1–3 (ray 3). Opercular flap rounded to slightly angular (rounded). Gill rakers 8–11 (Tables 2–3), short, blunt.

Dorsal-fin rays 57–62 (61; Tables 2–3), anterior dorsal lobe absent, anterior rays buried in tissue, tips of more posterior rays not exserted. Anteriormost dorsal-fin pterygiophore often rayless, inserted between neural spines 2 and 3 or 3 and 4 (between 3 and 4). Predorsal length 21.9–30.4 (25.0) % SL. Anal-fin rays 51–57 (53; Table 2–3), one to four anal-fin pterygiophores anterior to first haemal spine (two), each bearing a single ray, tips of rays not exserted. Anal-fin origin below vertebrae 13–14 (caudal vertebrae 2–3), preanal length 31.4–44.4 (32.1) % SL.

Pectoral fin deeply notched, with 31–37 (31) rays (Table 2–3). Upper lobe 55.8–89.9 (73.4) % HL, with 21–31 (24) rays extending beyond anus to or near anal-fin origin, shorter than lower lobe, dorsalmost rays lengthening to rays 4–5, more ventral rays gradually shortening to shortest ray of notch. Lower lobe elongate, 77.7–132.5 (101.3) % HL, with 7–10 rays (8), extending beyond anus to or near anal-fin origin; dorsal rays gradually lengthening to elongate rays 4–5, ventral rays gradually shortening to ventralmost ray near pectoral symphysis. Tips of rays of dorsal lobe enclosed by membrane dorsally, up to 40% free of membrane in notch; rays of lower lobe more strongly exserted, 50–60% free. Notch strong, rays in notch slightly more widely spaced than rays of lobes, more widely spaced ventrally. Uppermost pectoral-fin ray level with region between ventral rim of orbit and oral cleft. Insertion of lowermost pectoral-fin ray below mid-orbit. Proximal pectoral radials four (3+1), robust: radials 1–2 notched and hour-glass shaped, radial 3 round, with deep dorsal notch, radial 4 a rounded square (Fig. 5B). Interradial fenestrae three, extending between scapula and proximal radials 1–3: fenestrae between the scapula and radials 1 and 2 elliptical, fenestra between radials 2 and 3 narrow and dorsoventrally elongate. Scapula broadly T-shaped with robust distally broadened helve; coracoid with broad triangular head and broad helve, angled slightly anteriorly. Distal radials present at base of rays 2–18, ventralmost at level of proximal radial 3, more ventral rays articulating directly with pectoral cartilage.

Pelvic disc small, length 11.2–18.1 (11.2) % HL, round, about as long as wide, width 10.9–17.4 (13.4) % HL, anterior lobe weakly developed, slightly cupped, distance from snout to pelvic disc 10.0–12.4 % SL. Anus posterior to gill slit, close behind pelvic disc; distance from snout to anus 58.4–89.0 (60.4) % HL.

Principal caudal-fin rays 8–11, dorsal procurrent rays 0–1, ventral procurrent rays 0–1 (0–1 + 4–5/4–6 + 0–1) (1 + 4/4 + 1). Caudal fin length 40.3–57.7 (46.8) % HL. Membrane of posterior dorsal-fin rays attached to caudal fin at shorter distance than anal-fin rays: dorsal-fin rays attached to caudal fin 29.8–59.6 (47.0) % CL; anal-fin rays, 39.1–63.4 (54.8) % CL. Depth at base of caudal fin 11.2–16.3 % CL.

Skin relatively thick, cactus-like prickles more or less covering body, in most dense region about 13 prickles in orbit length. Pyloric caeca 31–34 (31; Burke, 1930), length about 33–53 % HL, center-left side of visceral cavity.

Vertebrae 62–67 (66), precaudal 10–12 (11), caudal 51–56 (55; Tables 2–3). Pleural ribs 2 or 3 (2), anteriormost small when 3, others long and slender, present on vertebrae 8–9 or 9–10 or 10–11 (9–10).

Coloration. Body dusky purple-orange to orangish pink (Fig. 1B,C). In darker color morphotype (Fig. 1C), fins dusky, margins dark, lighter anteriorly becoming darker posteriorly; head, dorsum from nape to caudal fin, and ventrum at anal-fin origin to caudal fin dusky purple-orange; isthmus, base of pectoral fin, and body posterior of gill slit to anal-fin origin lighter; area above belly pale to silvery white (guanine) becoming obsolete at about a quarter to half the anal-fin length; base and lower lobe of pectoral fin light with dusky areas; dorsal margin and distal portion of fin dusky; dorsal margin of eye dark, most of eye silvery white. In lighter color morphotype (Fig. 1B), body and fins orangish pink and white in life; head, dorsum from nape to caudal fin, and ventrum at anal-fin origin to caudal fin orangish pink; isthmus, base of pectoral fin, and body posterior of gill slit to anal-fin origin lighter; area above belly silvery white (guanine) with orangish-pink highlights becoming obsolete at about a quarter to half the anal-fin length; base and lower lobe of pectoral fin white; dorsal margin and distal portion of fin orangish pink; dorsal margin of eye dark, most of eye silvery white. Body and fins dusky to pale in preservation; base of fins beneath skin with pigment, showing faint line between fins and body. Peritoneum pale with scattered speckles; orobranchial cavity pale with scattered speckles; stomach dark, speckled dusky to black; intestines dark, dusky speckled to black; pyloric caeca pale to mottled, and urogenital papilla pale.

Life history. Reaching a maximum size of 350 mm (Okiyama 2004), the largest specimen examined was 264.8 mm (FAKU 131402), a ripe female with yolked eggs. The smallest ripe female with yolked eggs was 194.4 mm. Eggs were 3.6–5.0 mm in diameter. The only ripe male was 229.2 mm.

Distribution. *Careproctus trachysoma* has been collected from the Sea of Japan, from Hokkaido to off Oki Island, at 150–1345 m (Fig. 6; Okiyama 2004).

Etymology. The specific epithet is derived from the Greek *trakhys* (τραχύς), meaning "rough", and soma (σῶμα), meaning "body", likely a reference to the covering of cactus-like prickles on the types.

Remarks. We recognize two color morphotypes within *C. trachysoma* (see Kai *et al.* 2011a,b). Lighter individuals had either been previously misidentified as *C. rastrinus* or recognized as a new species, and darker individuals, especially those with dark fins, identified as *C. trachysoma* (Kido 1988). However, no differences in morphological characters or in mitochondrial or nuclear DNA sequence data have been found between light and dark morphs (Kai *et al.* 2011a,b).

Careproctus scottae Chapman & DeLacy 1934

English Common Name: Peachskin Snailfish

Figures 3A, 5C, 6; Tables 1–3

Careproctus scottae Chapman & DeLacy 1934:2. Type locality: southeast Alaska, off Petersburg.—Taranetz 1937:137 (list, Alaska).—Quast & Hall 1972:29 (Alaska).—Allen & Smith 1988:67 (Alaska, "pink snailfish", in part).—Robins *et al.* 1991:44 (list).—Sheiko & Fedorov 2000:32 (listed as questionable synonym of *C. rastrinus*).—Mecklenburg *et al.* 2002:612 (Alaska, in key, listed as probable synonym of *C. rastrinus*).—Chernova *et al.* 2004:16 (checklist).— Nelson *et al.* 2004:124 (list), Love *et al.* 2005:103 (checklist).—Kai *et al.* 2011a:144 (genetics, morphology, phylogenetics, as "BER1" and "BER2").—Kai *et al*. 2011b:368 (fig. 1a, phylogenetics, as "BER1" and "BER2").—Page *et al.* 2013:127 (list).

Holotype. USNM 104497 [ex UW 2742], 187.7 mm, southeast Alaska, off Petersburg, Dorothy R. Scott.

Paratypes. UW 2741, 5 (123.0–180.0 mm), Alaska, Frederick Sound, Thomas Bay, 57ºN, 132.783ºW, 183 m depth, 1920; UMMZ 102220, 1 (143 mm), off Petersburg, 31 December 1932; USNM 93787, n = 1, radiograph only, off Petersburg, January 1933; UW 2743, n = 2, and USNM 104681 [ex UW 2743], n = 3, off Petersburg, 20 June 1932 [not seen]. All collected by Dorothy R. Scott.

Additional material examined. A total of 344 specimens, not including the types above, 44.6–253.2 mm SL. See "Non-type material examined below."

Diagnosis. *Careproctus scottae* is distinguished from all other species of *Careproctus* by the combination of cyt*b* and 16S rRNA sequence data ("BER1" and "BER2" of Kai *et al.* 2011a; Table 1), an anteriorly robust body covered by cactus-like prickles, the presence of the postorbital pore, a moderate-sized pelvic disc, a lower pectoral-

fin lobe longer than upper lobe, a pale peritoneum and stomach, and counts of vertebrae and median fin rays. It is most similar to *C. rastrinus*, from which it can be distinguished by its lower counts of caudal vertebrae (48–52 in *C. scottae* vs. 51–56 in *C. rastrinus*) and anal-fin rays (47–53 vs. 51–56), pale peritoneum and stomach (gray in *C. rastrinus*), a larger pelvic disc in individuals larger than 100 mm (13.9–28.8 vs. 9.9–18.8 % HL), and a longer nasal tube (3.2–6.4 vs. 0.9–4.7 % HL), and to *C. phasma*, from which it can be distinguished by the postorbital pore (present in *C. scottae* vs. absent in *C. phasma*), smaller pelvic disc (13.9–28.8 vs. 20.1–35.9 % HL), higher counts of dorsal-fin rays (54–61 vs. 50–56), higher counts of anal-fin rays (47–53 vs. 43–49), and higher counts of vertebrae (59–64 vs. 55–60). It is further distinguished from *C. spectrum* by its higher counts of dorsal-fin rays (54–61 vs. 52–54 in *C. spectrum*) and smaller orbit (16.4–32.1 vs. 33.9–34.4 % HL).

Description. Body heavy and deep anteriorly, tapering strongly posteriorly, strongly compressed; depth at pectoral-fin base 81.0–154.8 (104.7) % HL. Head large, 21.7–32.0 (26.0) % SL, robust, dorsal profile rounded from nape to snout. Snout blunt, slightly projecting anterior to lower jaw. Mouth terminal, small, horizontal; upper jaw 35.9–57.3 (39.1) % HL, maxilla extending to anterior part of orbit or mid-orbit, oral cleft extending to anterior rim of orbit; mandible 45.1–63.0 % HL. Premaxillary tooth plates matching mandibular tooth plates. Premaxillary and mandibular teeth simple with weak shoulders in 20–38 oblique rows of 6–11 teeth forming narrow bands. Diastema absent at symphysis of upper and lower jaws. Orbit 16.4–32.1 (20.3) % HL, dorsal margin well below dorsal contour of head, suborbital depth to upper jaw 8.4–18.9 (18.5) % HL, to lower jaw 27.5–36.0 (31.8) % HL; pupil round. Interorbital space broad, fleshy distance 20.3–62.9 % HL, bony distance 18.2–34.5 (29.2) % HL, strongly convex. Snout much longer than orbit, 102.8–244.1 (188.7) % OL, 28.1–47.5 (38.2) % HL. Nostril single, with well-developed tube at level with lower rim of orbit; nostril tube length 5.8–19.7 % OL.

Pores of cephalic lateralis system of moderate size, pore pattern 2-6-7-2, chin pores paired. Interorbital pore absent.

Gill opening small, 18.3–44.2 (30.1) % HL, upper margin at or just above level of dorsal rim of orbit, extending ventrally to above pectoral-fin or to pectoral-fin rays 1–8 (ray 3). Opercular flap rounded to slightly angular (rounded). Gill rakers 8–12 (Tables 2–3), short, blunt.

Dorsal-fin rays 54–61 (56; Tables 2–3), anterior dorsal lobe absent, anterior rays buried in tissues, tips of more posterior rays not exserted. Anteriormost dorsal-fin pterygiophore inserted between neural spines 2 and 3 or 3 and 4, rayless or bearing a single small ray (3 and 4, rayless). Predorsal length 22.8–34.8 (28.7) % SL. Anal-fin rays 47–53 (50; Tables 2–3), zero to three (two) anal-fin pterygiophores anterior to first haemal spine, each bearing a single ray, tips of all rays not exserted. Anal-fin origin below vertebrae 13–14 (caudal vertebrae 2–3), preanal length 30.5–49.5 (38.5) % SL.

Pectoral fin deeply notched, with 31–39 (32) rays (Tables 2–3). Upper lobe 46.9–75.6 (61.2) % HL, with 21–32 (24) rays extending well beyond anus to or near anal-fin origin, shorter than lower lobe, dorsalmost rays lengthening to rays 8–10, more ventral rays gradually shortening to shortest ray of notch. Lower lobe elongate, 54.2–1.33 (98.3) % HL, with 7–12 (8) rays, extending well beyond anus to or near anal-fin origin; dorsal rays gradually shortening to ventralmost ray near pectoral symphysis. Tips of rays 5–20% free of membrane, elongate rays of lower lobe mostly free of membrane. Notch strong, rays in notch slightly more widely spaced than rays of lobes, more widely spaced ventrally. Uppermost pectoral-fin ray level with region between ventral rim of orbit and oral cleft. Insertion of lowermost pectoral-fin ray below mid-orbit. Proximal pectoral radials four (3+1), robust: radials 1–2 notched and hour-glass shaped, radial 3 round, with slight dorsal notch, radial 4 round (Fig. 5C). Interradial fenestrae three, extending between scapula and proximal radials 1–3: fenestrae between the scapula and radials 1 and 2 elliptical, fenestra between radials 2 and 3 narrow and elongate. Scapula broadly T-shaped with robust distally broadened helve; coracoid with broad triangular head and broad helve, angled slightly anteriorly. Distal radials present at base of rays 2–19, ventralmost at level of proximal radial 3, dorsalmost ray and more ventral rays articulating directly with pectoral cartilage.

Pelvic disc small, length 13.9–26.6 (16.4) % HL, round, about as long as wide, width 11.2–26.1 (16.7) % HL, anterior lobe weakly developed, slightly to strongly cupped, distance from tip of snout to pelvic disc 9.9–15.8 % SL. Anus below posterior rim of orbit, close behind pelvic disc; distance from snout to anus 13.1–26.1 (18.4) % SL, 50.2–96.5 (70.8) % HL.

Principal caudal-fin rays 9–10, dorsal procurrent rays 1–3, ventral procurrent rays 0–2 (1–3 + 4–5/5 + 0–2) (? + 4/5 + ?). Caudal fin 32.3–48.7 (41.1) % HL. Membrane of posterior dorsal-fin rays attached to caudal fin at shorter distance than anal-fin rays: dorsal-fin rays attached to caudal fin 26.9–64.0 (53.7) % CL; anal-fin rays, 43.4–79.3 (48.0) % CL. Depth at base of caudal fin 13.4–29.2 (22.6) % CL.

Skin relatively thick, thick gelatinous layer beneath skin, cactus-like prickles uniformly covering body, in most dense region about 13 prickles in orbit length. Pyloric caeca 15–22, length about 32–64 (53.2) % HL, center-left side of visceral cavity.

Vertebrae 59–64 (62), precaudal 10–13 (11), caudal 48–52 (51; Tables 2–3). Pleural ribs 2 or 3 (2), anteriormost small when 3, others long and slender, present on vertebrae 9–10 or 8–10 (9–10).

Coloration. Body and fins orangish pink and white in life (Fig. 3A); head, dorsum from nape to caudal fin, and ventrum at anal-fin origin to caudal fin orangish pink; isthmus, base of pectoral fin, and body posterior of gill slit to anal-fin origin white; area above belly silvery white (crystalline guanine) with orangish-pink highlights becoming obsolete posteriorly at about a quarter to half the anal-fin length; base and lower lobe of pectoral fin white; dorsal margin and distal portion of fin orangish pink; eye dark dorsally, silvery greenish gray ventrally. Body and fins pale in preservation; base of fins beneath skin with pigment, showing faint line between fins and body. Peritoneum pale to lightly speckled; orobranchial cavity pale; stomach pale to gray, intestines pale to mottled, pyloric caeca pale to mottled, and urogenital papilla pale.

Life history. The largest specimen examined was 253.8 mm (UW 117348), a ripe female with yolked eggs, and the largest specimen observed was about 390 mm from off Amchitka Island in the Aleutian Islands (AFSC 2000 survey photograph, JWO, unpublished data). The smallest ripe female with yolked eggs was 186.8 mm. Ripe yolked eggs were about 2.6 mm in diameter. The smallest ripe male was 123.9 mm; the largest, 237 mm.

Distribution. *Careproctus scottae* has been collected throughout the deeper waters of the eastern Bering Sea and the Aleutian Islands (Fig. 6). Collection depths range from 71 to 390 m. Previously recognized as *C. rastrinus* outside of Southeast Alaska, it is one of the most commonly identified species of *Careproctus* on the Bering Sea slope (e.g., Hoff 2013) and in the Aleutian Islands (e.g., Von Szalay *et al.* 2011). Records of *C. rastrinus* from the western Bering Sea (e.g., Orlov 2005) may be either *C. scottae* or *C. rastrinus* and require verification.

Etymology. The specific epithet is a patronym honoring the collector of all the type material, Dorothy R. Scott.

Remarks. Kai *et al.* (2011a) identified two closely related clades (BER1 and BER2) within *C. scottae* found sympatrically in the Bering Sea. These clades may be deserving of species-level recognition based on the similar level of sequence divergence found among other species of this complex. However, no difference in morphology was detected between specimens genetically assigned to these clades. Additional material from clade BER2 or nuclear DNA sequence data (e.g., Kai *et al.* 2011b) may be required to clarify its status.

Careproctus acanthodes Gilbert & Burke 1912

English common name: Toge Snailfish

Japanese common name: Toge-bikunin

Figures 2A, 5D, 6; Tables 1–3

Careproctus acanthodes Gilbert & Burke 1912:363, pl. 43, fig. 3. Type locality: Tatar Strait, 47°38'40"N, 141°24'30"E.—Burke 1930:135, fig. 56 (description, key).—Soldatov & Lindberg 1930:25 (Tatar Strait, key).—Chapman & DeLacy 1934:3 (comparisons).—Taranetz 1937:137 (Tatar Strait, key).—Okada & Matsubara 1938:346 (Gulf of Tartary).—Schmidt 1950:210 (description, Tatar Strait, west off Kamchatka Peninsula).—Böhlke 1953:135 (type catalog).—Matsubara 1955:1193 (Tartar Strait).—Ueno 1971:97 (Sakhalin, Russia).—Quast & Hall 1972:28 (near Alaska).—Kido 1984:339, pl. 365-H (Tatar Strait).—Lindberg & Krasyukova 1987:441 (Tatar Strait, Sea of Okhotsk).—Kido 1988:217 (considered *C. acanthodes* a synonym of *C. rastrinus*).—Pitruk 1990:36 (list, Sea of Japan).—Sokolovskaya *et al.* 1998:11 (Sea of Japan).—Sheiko & Fedorov 2000:32 (considered *C. acanthodes* a synonym of *C. rastrinus*).—Mecklenburg *et al.* 2002:611 (considered *C. acanthodes* a synonym of *C. rastrinus*).—Chernova *et al.* 2004:4 (checklist).—Chernova 2005b:S7 (comparisons).—Love *et al.* 2005 (*C. acanthodes* valid).—Kai *et al.* 2011a:144 (genetics, morphology, phylogenetics, as SOJ3).—Kai *et al.* 2011b:368 (fig. 1a, phylogenetics, as SOJ3).—Shinohara *et al.* 2011:47 (Sea of Japan).—Shinohara *et al.* 2014:256 (Sea of Japan).

Holotype. USNM 73332, 75.9 mm, Russia, Tatar Strait off southwestern coast of Sakhalin Island, *Albatross* station 4997, 47.6444°N, 141.4083°E, depth 581 m, 23 September 1906.

Paratypes. SU 22236, 4 (32.9–50.7 mm), same locality data as for holotype.

Additional material examined. A total of 24 specimens, not including the types above, 68.3–104.7 mm SL. See "Non-type material examined below."

FIGURE 2. Selected western Pacific species of the *Careproctus rastrinus* species complex: A) *C. acanthodes*, FAKU 130975, 93.1 mm; B) *C. pellucidus*, FAKU 134751, 138.2 mm.

Diagnosis. *Careproctus acanthodes* is distinguished from all other species of *Careproctus* by the combination of cyt*b* and 16S rRNA sequences ("SOJ3" of Kai *et al.* 2011a; Table 1), a slender body covered by cactus-like prickles, a broad interorbital, the presence of the postorbital pore, a moderate-sized pelvic disc, a lower pectoral-fin lobe shorter than upper lobe, and a light peritoneum. It is most similar to *C. pellucidus* of the western Pacific, from which it is further distinguished by its larger pelvic disc (18.2–28.8 % HL in *C. acanthodes* vs. 10.0–17.0 % HL in *C. pellucidus*), shorter lower pectoral-fin lobe (35.7–61.2 vs. 57.2–128.8 % HL), longer nasal tube (2.0–6.2 vs 0.1–2.6 % HL), and fewer gill rakers (7–10 vs. 10–13). It is also similar to *C. rastrinus* and light colored *C. trachysoma*, from both of which it can be distinguished by its shorter lower pectoral-fin lobe (35.7–61.2 vs. 52.6–141.9 % HL), longer nasal tube 2.0–6.2 vs 0.1–4.7 % HL), and lower counts of median fin rays (dorsal 52–55, anal 44–49 in *C. acanthodes* vs. 57–63 and 51–57 in *C. rastrinus* and *C. trachysoma*) and total vertebrae (56–61 vs. 62–67). From *C. phasma*, it can be distinguished by the postorbital pore (present vs absent in *C. phasma*), broader interorbital (fleshy distance 42.9–72.8 vs. 19.6–52.5 % HL), and shorter lower pectoral-fin lobe (35.7–61.2 vs 60.3–134.6 % HL). From *C. scottae*, it can be distinguished by its shorter lower pectoral-fin lobe (35.7–61.2 vs 54.2–132.6 % HL), lower counts of dorsal-fin rays (52–55 vs 54–61 in *C. scottae*), anal-fin rays (44–49 vs 47–53), and vertebrae (56–61 vs. 59–64). It is further distinguished from *C. spectrum* by its smaller orbit (24.0–33.9 vs. 33.9–34.4 % HL).

Description. Body small, maximum size examined 104.7 mm SL, relatively slender, tapering posteriorly, anteriorly rounded in cross section; depth at pectoral-fin base 80.2–107.1 (86.0) % HL. Head moderate, 24.5–27.0 (27.0) % SL, dorsal profile rounded from nape to snout. Snout blunt and short, slightly projecting anterior to lower jaw. Mouth terminal, small, horizontal; upper jaw 40.3–47.1 (40.8) % HL, maxilla extending to mid-orbit, oral cleft extending to anterior rim or anterior part of orbit; mandible 42.8–50.0 (48.9) % HL. Premaxillary tooth plates

matching mandibular tooth plates. Premaxillary and mandibular teeth simple with weak shoulders in 29–33 oblique rows of 7–9 teeth forming narrow bands. Diastema absent at symphysis of upper and lower jaws. Orbit 24.0–33.9 (32.7) % HL, dorsal margin well below dorsal contour of head, suborbital depth to upper jaw 25.6–75.8 (52.3) % OL, 6.5–19.0 (17.1) % HL; pupil round. Interorbital space broad, fleshy distance 42.9–72.8 (46.5) % HL, bony distance 14.5–29.9 (22.0) % HL, strongly convex. Snout longer than orbit, 87.8–154.6 (91.1) % OL, 27.3–39.5 (34.3) % HL. Nostril single, with well-developed tube at level with mid-orbit; nostril tube length 7.4–25.8 % OL.

Pores of cephalic lateralis system of moderate size, pore pattern 2-6-7-2, chin pores paired. Interorbital pore absent.

Gill opening large, 18.2–36.1 (24.4) % HL, upper margin at mid-orbit or level with dorsal rim of orbit, extending ventrally to pectoral-fin rays 1–5 (ray 2). Opercular flap rounded to slightly angular (rounded). Gill rakers 7–10 (Tables 2–3), short, blunt.

Dorsal-fin rays 52–55 (53; Tables 2–3), anterior dorsal lobe absent, anterior rays buried in tissues, tips of more posterior rays not exserted. Anteriormost dorsal-fin pterygiophore inserted between neural spines 2 and 3 or 3 and 4, rayless or bearing a small ray (between 3 and 4, rayless). Predorsal length 26.3–32.6 (32.6) % SL. Anal-fin rays 44–49 (49; Tables 2–3), one to two anal-fin pterygiophores anterior to first haemal spine (one), each bearing a single ray (anterior ray in holotype apparently split), tips of all rays exserted. Anal-fin origin below vertebrae 12–13 (caudal vertebrae 2–3), preanal length 33.4–45.2 (33.4) % SL.

Pectoral fin deeply notched, with 29–36 (33) rays (Tables 2–3). Upper lobe 48.3–75.1 (67.3) % HL, with 22–30 (27) rays extending to or beyond anal-fin origin, longer than lower lobe, dorsalmost rays lengthening to rays 4–6, more ventral rays gradually shortening to shortest ray of notch. Lower lobe moderately elongate, 35.7–61.2 (39.9) % HL, with 6–8 rays (8), extending between anus and anal-fin origin; dorsal rays gradually lengthening to elongate rays 2–5, ventral rays gradually shortening to ventralmost ray near pectoral symphysis. Tips of rays 5–30% free of membrane, rays of lower lobe more strongly exserted, up to 30% free of membrane in longest ray. Notch strong, rays in notch slightly more widely spaced than rays of lobes, more widely spaced ventrally. Uppermost pectoral-fin ray level with region between ventral rim of orbit and oral cleft. Insertion of lowermost pectoral-fin ray placed anteriorly, at level between snout and anterior rim of orbit. Proximal pectoral radials four (3+1), robust: radials 1–2 notched and hour-glass shaped, radial 3 crescent shaped, radial 4 round (Fig. 5D). Interradial fenestrae three, extending between scapula and proximal radials 1–3: fenestra 1 crescent shaped, 2 oval, 3 dorsoventrally elongate. Scapula broadly T-shaped, with long robust arms and shorter robust helve, broad notch between base of helve and anterior extension of basal cartilage; coracoid with broad triangular head and short, robust helve. Distal radials present at base of all rays except the dorsal- and ventralmost.

Pelvic disc of moderate size, length 18.2–28.8 (19.0) % HL, round, about as long as wide, width 16.9–30.2 (21.9) % HL, anterior lobe weakly to moderately developed, slightly cupped, distance from tip of snout to pelvic disc 11.7–14.9 (12.3) % SL. Anus at level just posterior to orbit, close behind pelvic disc; distance from snout to anus 16.8–22.5 (16.8) % SL, 62.2–91.8 (62.2) % HL.

Principal caudal-fin rays 9, dorsal procurrent rays 1–2, ventral procurrent rays 0 (1–2 + 4/5 + 0) (2 + 4/5 + 1). Caudal fin 36.1–47.1 (41.7) % HL. Membrane of posterior dorsal-fin rays attached for a shorter distance to caudal fin than anal-fin rays: dorsal-fin rays attached to caudal fin 21.5–47.3 (33.3) % CL; anal-fin rays, 32.0–52.1 (42.7) % CL. Depth at base of caudal fin 6.7–18.5 (17.3) % CL.

Skin relatively thick, thin gelatinous layer beneath skin, cactus-like prickles covering body, in most dense region about 10 prickles in orbit length. Pyloric caeca 19, length about 73 % HL, left side of visceral cavity.

Vertebrae 56–61 (58), precaudal 9–11 (9), caudal 47–51 (49; Tables 2–3). Pleural ribs 2 or 3 (2), when 3 anteriormost small, others long and slender, present on vertebrae 6–7, 7–8, 8–9, or 7–9 (7–8).

Coloration. Body and fins dusky orangish pink and white to dusky in life; head, dorsum from nape to caudal fin, and ventrum at anal-fin origin to caudal fin dusky orangish pink; isthmus, base of pectoral fin, and body posterior of gill slit to anal-fin origin lighter; area above belly silvery white (crystalline guanine) becoming obsolete at anal-fin origin; base and lower lobe of pectoral fin white, dorsal margin and distal portion of fin dusky; base of dorsal and anal fins pigmented along body margin; eye dark dorsally, silvery ventrally. Body and fins pale in preservation; base of fins beneath skin with pigment, showing faint line between fins and body. Peritoneum pale; orobranchial cavity pale; stomach pale to white, intestines pale, pyloric caeca pale, and urogenital papilla pale.

Life history. The largest specimen examined was 104.7 mm (FAKU 130974), a ripe female. The smallest ripe female with yolked eggs was 81 mm. Egg diameters of yolked eggs were 2.3–3.7 mm.

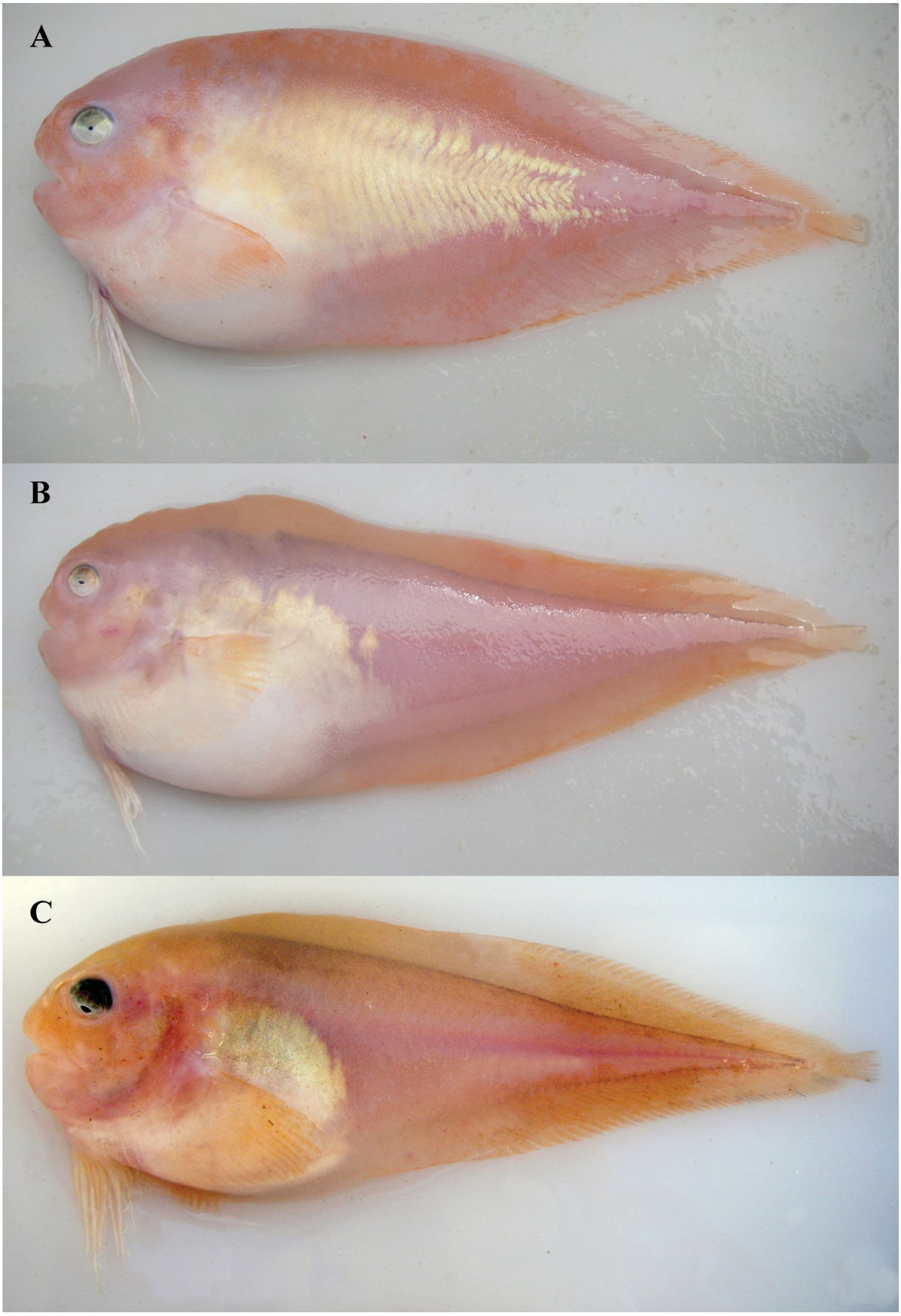

FIGURE 3. Eastern Pacific and Arctic species of the *Careproctus rastrinus* species complex: A) *C. scottae*, UW 151322, 195.0 mm; B) *C. phasma*, UW 154447, 72.3 mm; C) *Careproctus lerikimae* **n. sp.**, UW 118033, holotype, 132.3 mm.

Distribution. *Careproctus acanthodes* has been collected from the eastern Sea of Japan, in the Gulf of Tatary off the southwest coast of Sakhalin Island, and in the Sea of Okhotsk off Cape Patience (Fig. 6), and off the west coast of Kamchatka (Lindberg and Krasyukova 1987). Collection depths range from 114 m to 582 m at the type locality.

Etymology. The specific epithet is derived from the Greek word *akanthodes* (ἀκανθώδης), meaning "spiny form", a reference to the cactus-like prickles covering the bodies of the cotypes.

Remarks. Schmidt (1950) described three specimens of *C. acanthodes* taken in the northern Sea of Okhotsk off the western coast of Kamchatka. While noting their capture far north of the type locality in the Tatar Strait, he listed meristic data that differed from the description of type material. Although his counts of 30–31 (24–25/6) pectoral-fin rays are well within the range of our material, his counts of 55–57 dorsal- and 50–54 anal-fin rays are higher than nearly all of our material examined (six of our specimens had 55 dorsal-fin rays, all others had fewer), suggesting that he may have misidentified another species.

Careproctus pellucidus Gilbert & Burke 1912

English common name: Pellucid Snailfish
Japanese common name: Ao-bikunin
Figures 2B, 5E, 6; Tables 1–3

Careproctus pellucidus Gilbert & Burke 1912:366, pl. 44, fig. 3. Type locality: Off northeastern Honshu Island, 9°24'N, 141°52'30"E.—Burke 1930:134, fig. 54 (description, key).—Soldatov & Lindberg 1930:24 (key).—Chapman & DeLacy 1934:3 (comparisons).—Taranetz 1937:137 (Pacific Japan, key).—Hikita 1950:112 (list, northern Sea of Japan, = *C. trachysoma* or *C. acanthodes*?).—Katayama 1952:97 (Sea of Japan, = *C. trachysoma*?).—Böhlke 1953:136 (type catalog).—Matsubara 1955:1194 (Matsushima Bay, Japan).—Kato 1956:329 (Sea of Japan, list, = *C. trachysoma*?).—Oshima 1957:4 (Sea of Japan, = *C. trachysoma*?).—Takegawa & Morino 1970:387 (Sea of Japan, = *C. trachysoma*?).—Ueno 1971:97 (Sea of Japan, Sakhalin, Pacific Japan, in part).—Kido 1984:339, pl. 365-I (Pacific coast of Japan).—Lindberg & Krasyukova 1987:448 (Sea of Japan, Sea of Okhotsk, and Pacific coast of Japan, in part).—Kido 1988:217 (considered *C. pellucidus* a synonym of *C. rastrinus*).—Tsuda 1990:514 (Sea of Japan, Pacific coast of Japan, in part).—Sheiko & Fedorov 2000:32 (considered *C. pellucidus* a synonym of *C. rastrinus*).—Mecklenburg *et al.* 2002:611 (considered *C. pellucidus* a synonym of *C. rastrinus*).—Chernova *et al.* 2004:13 (checklist).—Chernova 2005b:S7 (comparisons).—Love *et al.* 2005:103 (*C. pellucidus* valid).—Shinohara *et al.* 2009:721 (considered *C. pellucidus* a synonym of *C. rastrinus*).—Kai *et al.* 2011a:144 (genetics, morphology, phylogenetics, as "PAC1").—Kai *et al.* 2011b:367 (genetics, as "PAC1").

Holotype. USNM 73335, 107.0 mm, Japan, off Oshika Peninsula, northeastern coast of Honshu Island, 38.1567ºN, 141.875ºE, *Albatross* station 5048, depth 236 m, 10 September 1906.

Paratypes. SU 22378, 2 (47.0–74.1 mm); USNM 74525, n = 1 [not seen]. Same data as for holotype.

Additional material examined. A total of 42 specimens, not including the types above, 92.6–213.9 mm SL. See "Non-type material examined below."

Diagnosis. *Careproctus pellucidus* is distinguished from all other species of *Careproctus* by the combination of cytb and 16S rRNA sequences ("PAC1" of Kai *et al.* 2011a,b; Table 1), an anteriorly robust body covered by scattered cactus-like prickles, the presence of the postorbital pore, a moderate-sized pelvic disc, elongate lower pectoral-fin rays, and a light peritoneum. It is most similar to *C. acanthodes* of the western Pacific, from which it can be distinguished by its higher number of gill rakers (9–13 in *C. pellucidus* vs. 7–9 in *C. acanthodes*), smaller pelvic disc (10.0–17.0 vs. 18.2–28.8 % HL), longer lower pectoral-fin lobe (57.2–128.8 vs. 35.7–61.2 % HL), and larger gill slit (24.4–44.9 % HL, extending to pectoral-fin rays 5–10 vs. 18.2–36.1 % HL, extending to pectoral-fin ray 2). It is also similar to *C. rastrinus* and *C. trachysoma*, from both of which it can be distinguished by its typically lower counts of median fin rays (dorsal-fin rays 51–60, anal-fin rays 46–53 in *C. pellucidus* vs. 57–63 and 51–57 in *C. rastrinus* and *C. trachysoma*) and total vertebrae (57–63 vs. 62–67). It is further distinguished from *C. spectrum* by its smaller pelvic disc (10.0–17.0 vs. 22.5–23.1 % HL).

Description. Body heavy and deep anteriorly, tapering posteriorly, moderately compressed; depth at pectoral-fin base 89.1–145.4 (103.8) % HL. Head large 21.7–32.0 (26.8) % SL and robust, dorsal profile rounded from nape to snout. Snout rounded, slightly projecting anterior to lower jaw. Mouth, small, subterminal, lower jaw included, horizontal; upper jaw 41.6–58.0 (47.6) % HL, maxilla extending to mid or posterior part of the orbit, oral cleft extending to anterior rim of orbit; mandible 41.6–58.0 % HL. Premaxillary tooth plates matching mandibular tooth

plates. Premaxillary and mandibular teeth simple with weak shoulders in 26–48 oblique rows of 5–14 teeth forming narrow to broad bands. Diastema absent at symphysis of upper and lower jaws. Orbit large 25.0–40.0 (35.3) % HL, dorsal margin below dorsal contour of head, suborbital depth to upper jaw 31.6–67.5 (44.6) % OL; 10.8–18.2 (15.7) % HL; pupil round. Interorbital space broad, fleshy distance 37.3–60.1 (37.3) % HL, bony distance 21.4–31.6 (29.8) % HL, strongly convex. Snout typically longer than orbit, 86.0–159.1 (143.1) % OL, 25.0–40.0 (32.6) % HL. Nostril single, with well-developed tube at level with mid-orbit; nostril tube length 1.0–7.3 % OL.

Pores of cephalic lateralis system of moderate size, pore pattern 2-6-7-2, chin pores paired. Interorbital pore absent.

Gill opening large, 24.4–45.0 (36.9) % HL, upper margin at level of lower part of orbit, extending ventrally to pectoral-fin ray 5–10 (ray 7). Opercular flap rounded to angular (rounded). Gill rakers 9–13, short, blunt.

Dorsal-fin rays 51–60 (55; Tables 2–3), anterior dorsal lobe absent, anterior rays buried in tissues, tips of more posterior rays not exserted. Anteriormost dorsal-fin pterygiophore inserted between neural spines 2 and 3 or 3 and 4, always rayless, second pterygiophore either rayless or bearing a single ray (between 3 and 4, second pterygiophore with ray). Predorsal length 25.0–35.1 (29.0) % SL. Anal-fin rays 46–53 (50; Tables 2–3), one to three anal-fin pterygiophores anterior to first haemal spine (two), each bearing a single ray, tips of rays not exserted. Anal-fin origin below vertebrae 12–13 (caudal vertebrae 2–3), preanal length 32.9–46.5 (32.9) % SL.

Pectoral fin deeply notched, with 30–37 (35) rays (Tables 2–3). Upper lobe 52.6–77.6 (52.6) % HL, with 21–28 (27) rays extending beyond anus to or near anal-fin origin, shorter than lower lobe, dorsalmost rays lengthening to rays 5–7, more ventral rays gradually shortening to shortest ray of notch. Lower lobe elongate, 57.2–128.8 (73.4) % HL, with 6–10 rays (8), extending midway between anus and anal-fin origin to near anal-fin origin; dorsal rays gradually lengthening to elongate rays 4–5, ventral rays gradually shortening to ventralmost ray near pectoral symphysis. Tips of rays 5–50% free of membrane, rays of lower lobe more strongly exserted. Notch strong, rays in notch slightly more widely spaced than rays of lobes, more widely spaced ventrally. Uppermost pectoral-fin ray level with region between ventral rim of orbit and cleft. Insertion of lowermost pectoral-fin ray below anterior rim of orbit. Proximal pectoral radials four (3+1), moderately robust: radial 1 broadly hour-glass shaped with shallow notches; radial 2 hour-glass shaped, and radial 3 crescent shaped; radial 4 round (Fig. 5E). Interradial fenestrae three, extending between scapula and proximal radials 1–3: fenestra 1 round, 2 oval, 3 dorsoventrally elongate. Scapula broadly T-shaped, with short robust arms and helve; coracoid with broad triangular head and short, robust helve. Distal radials present at base of rays 2–22, ventralmost at level of proximal radial 3, dorsalmost ray and more ventral rays articulating directly with pectoral cartilage.

Pelvic disc small, length 10.0–17.0 (14.8) % HL, round, about as long as wide, width 10.0–16.0 (13.8) % HL, anterior lobe weakly developed, slightly cupped, distance from tip of snout to pelvic disc 8.7–14.4 (11.4) % SL. Anus at level of posterior rim of orbit, close behind pelvic disc; distance from snout to anus 14.1–21.2 (18.1) % SL, 57.7–86.3 (67.6) % HL.

Principal caudal-fin rays 9–10, dorsal procurrent rays 1–2, ventral procurrent rays 1–2 (1–2 + 4–5/5 + 1–2) (1 + 4/5 + 1). Caudal fin 38.3–54.8 (42.2) % HL. Membrane of posterior dorsal- and anal-fin rays attached about equidistant to caudal fin: dorsal-fin rays attached to caudal fin 35.4–56.0 (45.8) % CL; anal-fin rays, 39.4–67.7 (54.2) % CL. Depth at base of caudal fin 10.0–14.9 (12.5) % CL.

Skin relatively thin, loose gelatinous layer beneath skin, cactus-like prickles scattered over body, in most dense region about 9 prickles in orbit length. Pyloric caeca 15–18 (18, Gilbert and Burke, 1912), length about 30–37 % HL, left side of visceral cavity.

Vertebrae 57–63 (60), precaudal 9–11 (10), caudal 47–53 (50; Tables 2–3). Pleural ribs 2 or 3 (3), anteriormost small and slender when 3, others long and slender, present on vertebrae 8–9 or 8–10 (8–10).

Coloration. Body and fins pink and white in life (Fig. 2B); head, dorsum from nape to caudal fin, and ventrum at anal-fin origin to caudal fin dusky pink; isthmus, base of pectoral fin, and body posterior of gill slit to anal-fin origin lighter; area above belly silvery white (crystalline guanine) with orangish-pink highlights becoming obsolete at about anal-fin origin; base and lower lobe of pectoral fin white; dorsal margin and distal portion of fin pink; base of dorsal and anal fins pigmented along body margin; eye dark dorsally, silvery white ventrally. Body and fins pale in preservation; base of dorsal fin beneath skin with pigment, showing distinct line between fin and body. Peritoneum pale to lightly speckled; orobranchial cavity pale; stomach dark, intestines speckled, pyloric caeca pale, and urogenital papilla pale.

Life history. The largest specimen examined was a 213.9 mm male (HUMZ 67593). The smallest ripe female

with yolked eggs was 132.9 mm; the largest, 175 mm. Egg diameters were 2.5–3.3 mm. One female was spent, with small white eggs 0.1–0.8 mm in diameter. The smallest ripe male examined was 136.1 mm; the largest, 140 mm.

Distribution. *Careproctus pellucidus* has been collected from the Pacific coast of Japan, off Hokkaido and northern Honshu (Fig. 6) at depths of 145 to 300 m.

Etymology. The specific epithet is derived from the Latin *pellucidus*, meaning "shining through", referring to the species' thin transparent skin.

Careproctus phasma Gilbert 1896

English common name: Spectral Snailfish
Figures 3B, 4A, 5F, 6; Tables 1–3

Careproctus phasma Gilbert 1896:443. Type locality: Bristol Bay, Alaska, 56°50'00"N, 164°27'50"W.—Jordan & Evermann 1898:2132 (description).—Jordan & Gilbert 1899:478 (Bristol Bay).—Evermann & Goldsborough 1907:333 (Alaska).—Burke 1930:123, fig. 43 (description, key).—Taranetz 1937:137 (Bering Sea, in key).—Schmidt 1950:195 (brief description, Russia, possible misidentification, see below).—Böhlke 1953:136 (type catalog).—Wilimovsky 1954:286 (checklist).—Wilimovsky 1958:78 (keys).—Isakson *et al.* 1971:669 (listed, probable misidentification, = *C. scottae*).—Quast & Hall, 1972:28 (checklist).—Fedorov 1973:66 (Bering Sea).—Allen & Smith 1988:67 (Alaska, "pink snailfish", in part).—Pitruk 1990:38 (list, Bering Sea, Sea of Okhotsk from Schmidt, 1950).—Robins *et al.* 1991:44 (list).—Sheiko & Fedorov 2000:32 (Russia).—Mecklenburg *et al.* 2002:618 (Alaska, in key, in part).—Parin *et al.* 2002:S113 (list).—Chernova *et al.* 2004:13 (checklist).—Nelson *et al.* 2004:124 (list).—Chernova 2005b:S7 (comparisons).—Kai *et al.* 2011a:153 (genetics, morphology, phylogenetics, as "BER3").—Kai *et al.* 2011b:368 (fig. 1a, phylogenetics, as "BER3").—Page *et al.* 2013:127 (list).

Lectotype. USNM 48064, ca. 85 mm, Bristol Bay, Alaska, Albatross station 3254, 56.83°N, 164.46°W, depth 84 m, poor condition, disintegrated.

Paralectotype. SU 3028, 72.3 mm, N. of Unimak I., Albatross station 3256, 56.3°N, 164.57°W, depth 90 m, 14 June 1890 (Fig. 4A).

Additional material examined. A total of 119 specimens, not including the types above, 54.3–272.0 mm SL. See "Non-type material examined below."

Diagnosis. *Careproctus phasma* is distinguished from all other species of *Careproctus* by the combination of cyt*b* and 16S rRNA sequences ("ARC1", in part, and "BER3" of Kai *et al.* 2011a; Table 1), an anteriorly robust body that is either naked or covered with scattered cactus-like prickles, the absence of the postorbital pore, a moderate-sized pelvic disc, a lower pectoral-fin lobe longer than upper lobe, a light peritoneum and stomach, and lower counts of vertebrae and median fin rays. It is most similar to the new species *C. lerikimae* of the Beaufort Sea, from which it can be distinguished by its entirely pale coloration (vs. dusky body in *C. lerikimae*), fewer vertebrae (55–60 in *C. phasma* vs. 59–63 in *C. lerikimae*) and median fin rays (50–56 and 43–49 in *C. phasma* vs. dorsal 56–59 and anal 48–51 in *C. lerikimae*), as well as its shorter maxilla, longer lower pectoral-fin lobe, and longer nasal tube. It is also similar to *C. rastrinus* and *C. scottae* from which it can be distinguished by the presence of the postorbital pore (absent in *C. phasma*), larger pelvic disc (20.1–35.9 vs. 9.9–26.8 % HL), and lower counts of caudal vertebrae (44–50 vs. 48–56), dorsal-fin rays (50–56 vs. 54–63), and anal-fin rays (43–49 vs. 47–56). It is distinguished from *C. spectrum* by its smaller orbit (17.3–31.6 vs. 33.9–34.4 % HL).

Description. Body heavy and deep anteriorly, tapering posteriorly, moderately compressed; depth at pectoral-fin base 82.9–136.6 (83.6) % HL. Head large, 22.4–29.7 (25.3) % SL, robust, dorsal profile rounded from nape to snout. Snout blunt, short, slightly projecting anterior to lower jaw, longer than orbit, 100.0–223.6 (128.9) % OL, 26.2–42.9 (31.7) % HL. Mouth terminal, small, horizontal; upper jaw 31.1–48.1 (44.3) % HL, maxilla extending to anterior part of orbit or mid-orbit, oral cleft extending to anterior rim of orbit; mandible 27.1–56.2 % HL. Premaxillary tooth plates matching mandibular tooth plates. Premaxillary and mandibular teeth simple with weak shoulders in 17–33 oblique rows of 7–9 teeth forming narrow bands. Diastema absent at symphysis of upper and lower jaws. Orbit 17.3–31.6 (24.6) % HL, dorsal margin at or just below dorsal contour of head, suborbital depth to upper jaw 12.1–18.2 (12.5) % HL, to lower jaw 24.1–33.6 (31.7) % HL; pupil round. Interorbital space broad, fleshy distance 19.6–52.5 (52.5) % HL, bony distance 14.0–32.5 (33.3) % HL, strongly convex. Nostril single, with well-developed tube at level with lower rim of orbit; nostril tube length 13.0–30.4 (15.6) % OL.

Pores of cephalic lateralis system of moderate size, pore pattern 2-5-7-2, chin pores paired. Interorbital pore absent. Gill opening small, 14.5–36.9 (34.4) % HL, upper margin at or just above level of dorsal rim of orbit, extending ventrally to just above the upper pectoral-fin ray to pectoral-fin ray 1–5 (above upper ray). Opercular flap rounded to slightly angular (rounded). Gill rakers 6–10 (Tables 2–3), short, blunt.

Dorsal-fin rays 50–56 (54; Tables 2–3), anterior dorsal lobe absent, anterior rays buried in tissue, tips of more posterior rays not exserted. Anteriormost dorsal-fin pterygiophore inserted between neural spines 3 and 4, bearing a single small ray. Predorsal length 24.0–32.8 (28.4) % SL. Anal-fin rays 43–49 (47; Tables 2–3), one to three anal-fin pterygiophores anterior to first haemal spine, each bearing a single ray, tips of rays not exserted. Anal-fin origin below vertebrae 12–13 (caudal vertebrae 1–2), preanal length 31.6–51.8 (41.1) % SL.

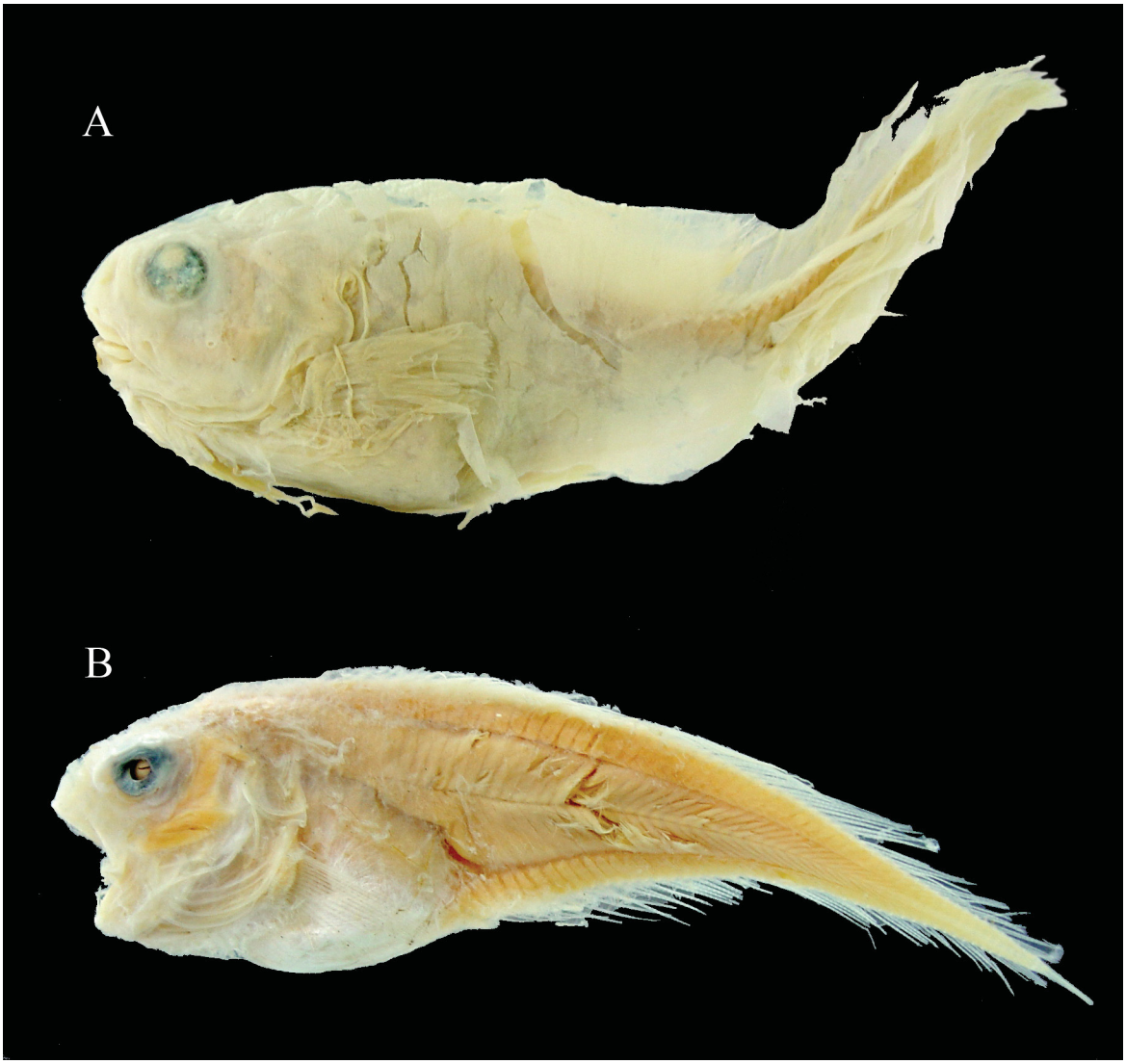

FIGURE 4. Types of selected species of the *Careproctus rastrinus* species complex: A) *C. phasma*, SU 3028, paralectotype, 72.3 mm; B) *C. spectrum*, SU 48, lectotype, 91 mm.

Pectoral fin deeply notched, with 27–35 rays (29; Tables 2–3). Upper lobe 51.5–86.6 (68.3) % HL, with 20–26 (21) rays, extending beyond anus short of anal-fin origin, shorter than lower lobe, dorsalmost rays lengthening to rays 5–7, more ventral rays gradually shortening to shortest ray of notch. Lower lobe moderately elongate, 60.3–134.6 (70.5) % HL, with 6–9 rays (8; Table 2), extending beyond anus short of anal-fin origin; dorsal rays gradually lengthening to elongate rays 3–4, ventral rays gradually shortening to ventralmost ray near pectoral symphysis. Tips of rays of dorsal lobe 5–15% free of membrane, rays of lower lobe more strongly exserted, up to 30% free. Notch strong, rays in notch slightly more widely spaced than rays of lobes, more widely spaced ventrally. Uppermost pectoral-fin ray level with region between ventral rim of orbit and cleft. Insertion of lowermost pectoral-fin ray anteriorly placed, below area between tip of snout and anterior rim of orbit. Proximal pectoral

radials four (3+1), small: radial 1 crescent shaped, radial 2 notched and distinctly hour-glass shaped, radial 3 crescent shaped, radial 4 round (Fig. 5D). Interradial fenestrae three, extending between scapula and proximal radials 1–3: oval between scapula and radial 1; small, elongate, forming a notch on dorsal margin of radial 2, distant from radial 1; elongate, elliptical between radials 2 and 3; dorsoventrally elongate between radials 2 and 3. Scapula broadly T-shaped with equally sized robust arms and helve; coracoid with broad triangular head, large foramen, and short robust helve. Distal radials present at base of rays 2–18, ventralmost at level of proximal radial 3, more ventral rays articulating directly with pectoral cartilage.

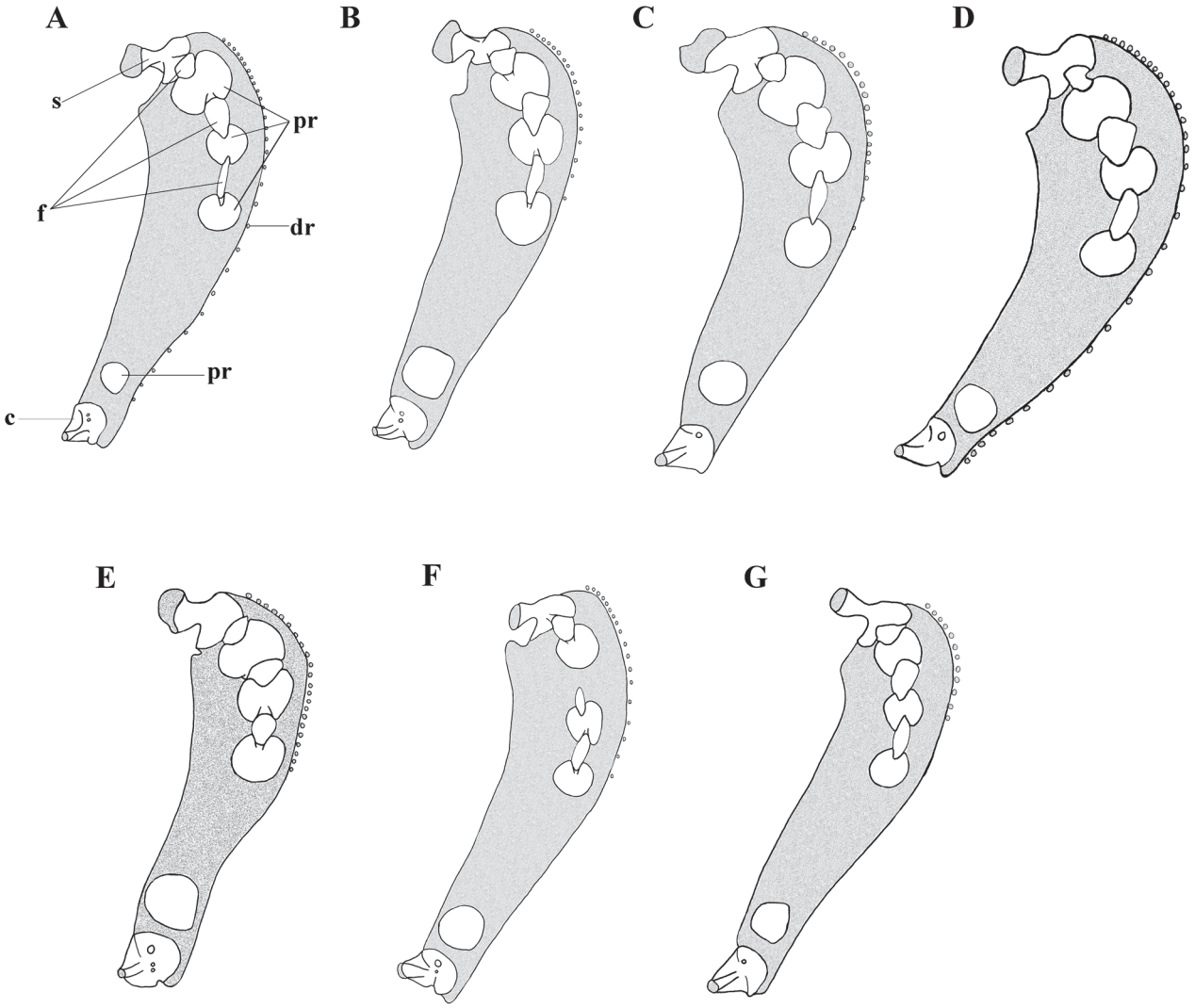

FIGURE 5. Pectoral girdles of species of the *Careproctus rastrinus* species complex: A) *C. rastrinus*, HUMZ 60772, 149.2 mm; B) *C. trachysoma*, FAKU 131179, 229.2 mm; C) *C. scottae*, UW 155110, 165 mm; D) *C. acanthodes*, FAKU 135569, 79.2 mm; E) *C. pellucidus*, FAKU 135317, 210.0 mm; F) *C. phasma*, UW 117934, 191 mm; G) *C. lerikimae* **n. sp.**, paratype, UW 154841. Scale bar = 5 mm. c = coracoid, f = interradial fenestra, pr = proximal radial, dr = distal radial, s = scapula. Shaded areas represent cartilage.

Pelvic disc large, length 20.1–35.6 (27.2) % HL, round, slightly longer than wide, width 18.3–32.3 (30.6) % HL, anterior lobe weakly developed, slightly to strongly cupped, distance from tip of snout to pelvic disc 9.3–15.7 (10.2) % SL. Anus at a level just posterior to orbit, close behind pelvic disc; distance from snout to anus 13.7–27.8 (19.4) % SL, 54.4–102.8 % HL.

Principal caudal-fin rays 8–11, dorsal procurrent rays 1–2, ventral procurrent rays 0–2 (1–2 + 4/4–5/5–5/6 + 0–2) (? + 5/5 + ?). Caudal fin 32.9–54.8 % HL. Membrane of posterior dorsal-fin rays attached to caudal fin at shorter distance than anal-fin rays: dorsal-fin rays attached to caudal fin 31.5–65.3 % CL; anal-fin rays, 38.0–77.7 % CL. Depth at base of caudal fin 14.4–27.8 % CL.

Skin relatively thin, loose gelatinous layer particularly evident in juveniles, prickles reduced, in most dense region about 9 prickles in orbit length, or absent. Pyloric caeca 17–24, length about 28–37 % HL, left side of visceral cavity.

Vertebrae 55–60 (59), precaudal 10–12 (11), caudal 44–50 (48; Tables 2–3). Pleural ribs 2 or 3, anteriormost small when 3, others long and slender, present on vertebrae 8–10 or 9–10.

Coloration. Body pink and white and fins orangish pink in life (Fig. 3B); head, dorsum from nape to caudal fin, and ventrum at anal-fin origin to caudal fin pink to marginally orange; isthmus, base of pectoral fin, and body posterior of gill slit to anal-fin origin white; area above belly silvery white (crystalline guanine) with orangish-pink highlights becoming obsolete posteriorly at about anal-fin origin; base and lower lobe of pectoral fin white; dorsal margin and distal portion of fin orangish pink; eye with dark dorsal margin, becoming brassy and whiter ventrally. Body and fins pale in preservation; base of fins beneath skin with pigment, showing faint line between fins and body. Peritoneum pale; orobranchial cavity pale; stomach, intestines, and pyloric caeca pale to dusky greenish; urogenital papilla pale.

Life history. The largest specimen examined was 272.0 mm (HUMZ 73075) of unknown sex. The smallest ripe female with yolked eggs was 102.9 mm; the largest, 176.7 mm. Three egg classes were found in ripe females: yolked eggs 3.5 mm, maturing white 1.8 mm, and immature < 1 mm. The smallest ripe male was 76.3 mm; the largest, 191 mm.

Distribution. *Careproctus phasma* has been collected from the continental shelf of the eastern Bering Sea and the northern Gulf of Alaska (Fig. 6). Collection depths range from 57 to 184 m.

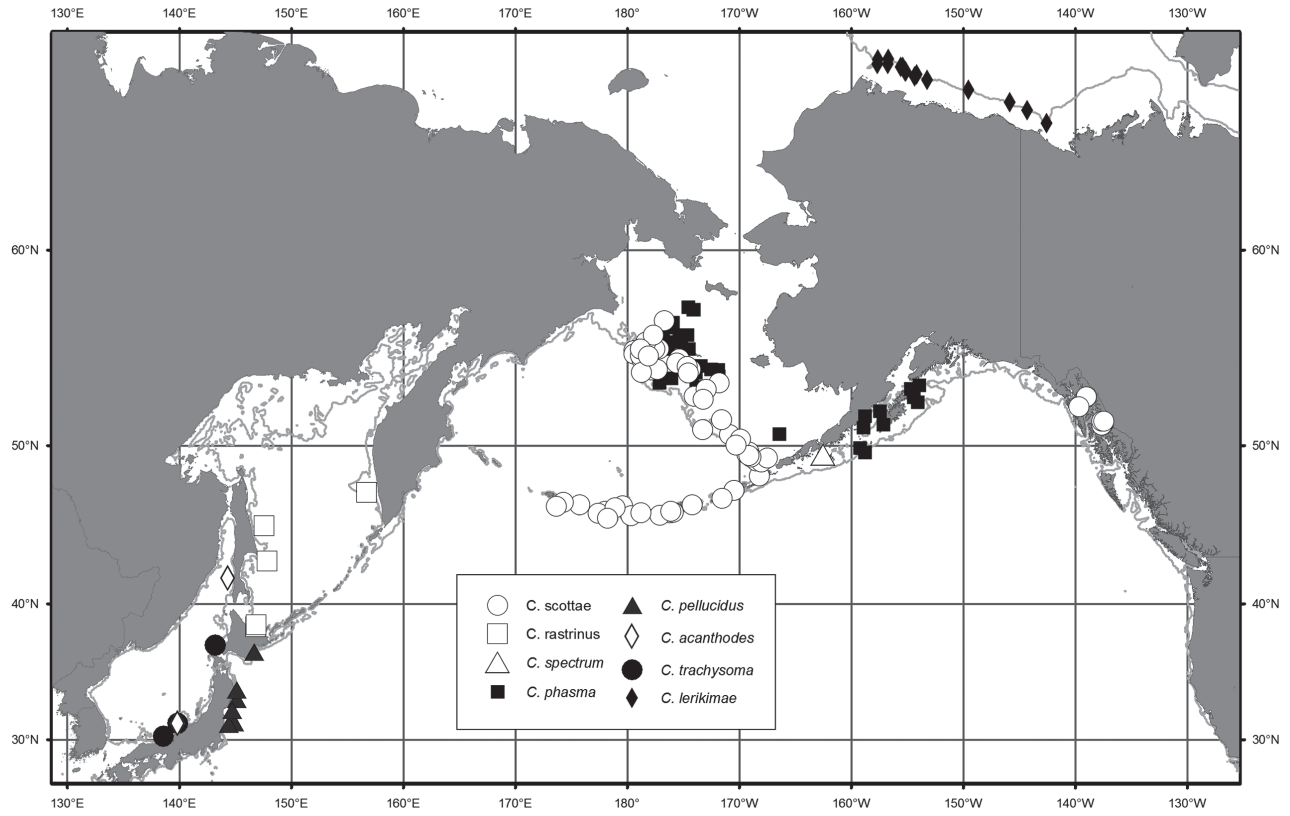

FIGURE 6. Distribution of species of the *Careproctus rastrinus* species complex: *C. rastrinus* (□), *C. trachysoma* (●), *C. scottae* (○), *C. acanthodes* (◊), *C. pellucidus* (▲), *C. phasma* (■), *C. spectrum* (Δ),and *C. lerikimae* **n. sp.** (♦), based on material examined. Each symbol may represent more than one capture.

Etymology. The specific epithet is taken from the Greek *phasma* (φάσμα), meaning "specter", "ghost", or "apparition."

Remarks. Gilbert (1896) described *C. phasma* from Bristol Bay in the Bering Sea and compared it to *C. spectrum,* known only from the type series. Based on his description of "the much larger sucking disk and the narrow gill-slit, the latter confined to area above base of pectorals", Gilbert was clearly comparing *C. phasma* to *C. gilberti* Burke, which has a disk much smaller than the orbit and a large gill slit extending to about pectoral-fin ray

11 (Burke 1912). *Careproctus gilberti* Burke was described from 21 of the 26 syntypes of *C. spectrum*, and not the presently recognized types of *C. spectrum*.

Schmidt (1950) reported *C. phasma* from the Sea of Okhotsk based on two specimens. However morphological differences in the illustration provided by Mecklenburg *et al.* (2002), based on ZIN 29087 and reflecting features described by Schmidt (1950), indicate this species is unlikely to be *C. phasma* and may be an undescribed species. The pelvic disc is much longer than wide rather than nearly round, the pectoral fin is much longer (ca. 100% HL) than in our material (51.5–86.6% HL), and the rays of the lower pectoral-fin lobe are nearly entirely free. In addition, the collection depth of Schmidt's specimens is 504 m, more than twice as deep as the relatively shallow-water *C. phasma* from the Bering Sea and Gulf of Alaska.

In the eastern Bering Sea, *C. phasma* is generally associated with the pool of cold water that extends from the north and in some years reaches the Alaska Peninsula (Stevenson & Lauth 2012). Temperatures recorded at depth during trawls in which *C. phasma* was caught ranged from -1.7 to 3.4°C (mean 0.3), in contrast with *C. scottae*, which was captured in temperatures of -1.2 to 4.7°C (mean 2.8). In the Gulf of Alaska, however, *C. phasma* was collected in temperatures ranging from 4.4 to 7°C; no temperature data was available for collections in the Gulf of Alaska of *C. scottae*.

In their phylogenetic analysis using cyt*b* and 16s data, Kai et al. (2011a) recovered a clade labeled as ARC1 as sister of the clade BER3 (*C. phasma*). "UW Uncataloged" was cataloged as UW 154442, a specimen of *C. phasma* from the northern Gulf of Alaska. Most similar to *C. phasma*, it differs from by two base pairs from nearly all others and by one base pair from *C. lerikimae*

***Careproctus spectrum* Bean 1890**

English common name: Stippled Snailfish

Figures 4B, 6; Tables 2–3

Careproctus spectrum Bean 1890:40. Type locality: Gulf of Alaska, 55.167°N, 160.3°W.—Gilbert 1896:443 (comparison, in part).—Jordan & Evermann 1898:2133 (description).—Jordan & Gilbert 1899:478 (Unga Island).—Evermann & Goldsborough 1907:333 (Alaska).—Burke 1912:570 (description of *C. gilberti*).—Gilbert & Burke 1912a:78 (misidentification, = *C. gilberti*?).—Burke 1930:123 (description, key).—Soldatov & Lindberg 1930:31 (Attu Island, keys).—Taranetz 1937:137 (Alaska, in key).—Schmidt 1950:195 (comparison).—Bhlke 1953:136 (type catalog).—Wilimovsky 1954:286 (Alaska).—Wilimovsky 1958:79 (Alaska, in key).—Quast & Hall 1972:29 (Alaska).—Fedorov 1973:66 (Bering Sea).—Allen & Smith 1988:67 (Alaska, "pink snailfish", in part).—Robins *et al.* 1991:44 (list).—Mecklenburg *et al.* 2002:617 (Alaska, in key, in part).—Chernova *et al.* 2004:16 (checklist).—Chernova 2005b:S7 (comparisons).—Nelson *et al.* 2004:124 (list), Love *et al.* 2005:103 (checklist).—Kai *et al.* 2011a:153 (listed).—Page *et al.* 2013:128 (list).

Lectotype. SU 48, 91 mm, Alaska, north of the Shumagin Islands, between Unga and Nagai islands; 55.167°N, 160.3°W, depth 201 m, *Albatross* station 2848, 31 July 1888, herein designated (Fig. 4B).

Paralectotypes. USNM 45363, 2 (68.2–73.1 mm), both in poor condition, same locality data as lectotype.

Diagnosis. *Careproctus spectrum* can be distinguished from other members of the *C. rastrinus* species complex by the combination of a large orbit, large pelvic disc, and counts of vertebrae, and dorsal- and anal-fin rays. Its larger orbit (33.9–34.4 % HL) distinguishes it from *C. scottae* (16.4–32.1 % HL), *C. phasma* (17.3–31.6 % HL), *C. acanthodes* (24.0–33.9 % HL), *C. trachysoma* (16.7–28.3 % HL), and the new species *C. lerikimae* (21.1–33.0 % HL). Its larger pelvic disc (22.5–23.1 % HL) distinguishes it from *C. trachysoma* (11.1–18.1 % HL), *C. pellucidus* (10.0–17.0 % HL), and most individuals of *C. rastrinus* and *C. scottae* (9.9–26.7 % HL). It is further distinguished from *C. rastrinus*, *C. scottae*, *C. trachysoma,* and *C. lerikimae* **n. sp.** by its lower counts of dorsal- (52–54 vs. ≥54 in *C. scottae*, *C. rastrinus*, *C. trachysoma,* and *C. lerikimae* **n. sp.**) and anal-fin rays (47 vs. ≥47 in *C. scottae*, *C. rastrinus, C. trachysoma,* and *C. lerikimae* **n. sp.**).

Description. Body moderately robust, gently tapering posteriorly, moderately compressed; depth at anal-fin origin 84.5–86.4 (86.4) % HL. Head large, robust, dorsal profile gently rounded from nape to snout. Snout rounded, slightly shorter than orbit 82.9–93.0 (82.9) % OL, 28.1–32.0 (28.1) % HL, slightly projecting anterior to lower jaw. Mouth subterminal, horizontal; upper jaw 44.7 % HL, maxilla extending to mid-orbit, oral cleft extending to anterior rim of orbit; mandible 54.1 % HL. Premaxillary tooth plates matching mandibular tooth plates. Premaxillary and mandibular teeth simple or with slightly developed lobes in 10 or 12 oblique rows.

Diastema absent at symphysis of upper and lower jaws. Orbit large, 33.9–34.4 (33.9) % HL, dorsal margin below dorsal contour of head, suborbital depth to upper jaw 28.1 % OL; pupil round. Interorbital space moderately broad, bony distance 20.7% HL, fleshy distance 25.7–45.9 (45.9) % HL, convex.

Suprabranchial pores 2 (Burke 1930).

Gill opening small, 17.8 % HL, upper margin at level of mid-orbit, extending ventrally to dorsalmost pectoral-fin ray.

Dorsal-fin rays 52–54 (Tables 2–3), anterior dorsal lobe absent; anteriormost pterygiophore bearing a single ray, inserted between neural spines 3 and 4. Predorsal length 24.7 % SL. Anal-fin rays 47 (Tables 2–3), one anal-fin pterygiophore anterior to first haemal spine. Preanal length 39.1 % SL.

Pectoral fin deeply notched, with 32 rays (Tables 2–3). Upper lobe 65.3 % HL, with 24 rays extending beyond anus to anal-fin origin. Lower lobe moderately elongate, >34.3 % SL, with 8 rays, extending to anus (Burke 1930). Uppermost pectoral-fin ray level with oral cleft. Insertion of lowermost pectoral-fin ray below mid-orbit.

Pelvic disc large, length 22.5–23.1 % HL, round, slightly longer than wide, width 20.6–22.7% HL, flat, distance from tip of snout to pelvic disc 13.7 % SL. Anus posterior to gill slit, close behind pelvic disc.

Principal caudal-fin rays 9, dorsal procurrent rays 1, ventral procurrent rays 0, (1+4+5+0).

Prickles absent. Pyloric caeca 21 (Burke 1930).

Vertebrae 59, precaudal 10, caudal 49 (Tables 2–3). Pleural ribs 2, present on vertebrae 8–9.

Coloration. The lectotype is now uniform light brown in preservation, with a pale orobranchial cavity, peritoneum, and viscera. The type material was described by Bean (1890) as having "Color along back of some examples light brown, elsewhere uniformly pale." This description is almost certainly of preserved material and likely includes type material of *C. gilberti*, subsequently described by Burke (1912). Burke (1930) later described a few aspects of coloration in the remaining types of *C. spectrum*: "Skin transparent, lax; muscles flesh colored; mouth, gill cavity, and internal organs pale; peritoneum silvery, without dots; abdomen silvery."

Life history. The largest specimen examined was the lectotype, a 91 mm male (SU 48).

Distribution. *Careproctus spectrum* is known only from the type series taken in the northwestern Gulf of Alaska (Fig. 6). The collection depth was 201 m at the type locality.

Etymology. The specific epithet is derived from the Latin *spectrum*, meaning "specter" or "ghostly apparition."

Remarks. *Careproctus spectrum* was described by Bean (1890) from the western Gulf of Alaska in the Shumagin Islands, based on at least 26 specimens, apparently split into at least two lots: USNM 45363 and SU 48 (Böhlke 1953; Chernova *et al.* 2004). Burke (1912) recognized that two species were among the syntypes and subsequently described *C. gilberti* based on the much smaller disc of many of the specimens. He described *C. gilberti* on the basis of 25 of the syntypes of *C. spectrum*, including three specimens of SU 48. A fourth specimen (Fig. 4B) is part of SU 48, labeled with the same tin tag, but was not noted by Burke (1912) and has not been mentioned in later publications. We identified it as likely to be one of the three remaining syntypes of *C. spectrum*. Unlike the two syntypes of USNM 45363, which are both disintegrating, the condition of this specimen, while poor, is adequate to collect additional morphological data. The apparent designation of USNM 45363 as the lectotype by Burke (1930) is invalid as the lot contains two specimens (Böhlke 1953). Because both of these specimens are in very poor condition, we herein designate SU 48 as the lectoype of *C. spectrum* and the two specimens of USNM 45363 as paralectotypes. The three specimens of C. gilberti remaining in SU 48 were recataloged as SU 69904.

An original illustration of one syntype is problematic (USNM 45363, view P02535, illustrated by S. F. Denton, provided by L. Palmer, USNM), as it shows an individual with an anus near the anal-fin origin and a dark line along the body. This illustration was published by Mecklenburg *et al.* (2002) and appropriately modified to place the anus near the pelvic disc following the description of Burke (1930) and to remove the dark line.

Careproctus lerikimae **new species**

Dusty Snailfish

Figure 3C, 5G, 6; Tables 2–3

Careproctus sp. cf. *rastrinus* (Orr *et al.*).—Rand & Logerwell 2011:480 (Beaufort Sea, checklist).—Mecklenburg et al. 2013:21 (Arctic–boreal Pacific?, checklist).

Holotype. UW 118033, 132.3 mm, ripe male, Alaska, Beaufort Sea, 71.5131ºN, 152.2033ºW, 178 m depth, E. Acuña, 15 August 2008, FV *Ocean Explorer*, cruise 200801, haul 22 (Fig. 3C).

Paratypes. UW 154841 (out of UW 118033), 3 (74.0–132.3 mm), same data as holotype; UW 117918, 2 (97.6–117.4 mm), 71.52ºN, 152.25ºW, 175 m depth, E. Acuña, 11 August 2008, FV *Ocean Explorer*, cruise 200801, haul 10; UW 119072, 63.0 mm, 71.6601ºN, 152.4944ºW, 302 m depth, E. Acuña, FV *Ocean Explorer*, cruise 200801, haul 9; UW 119073, 2 (149.0–153.5 mm), 71.7415ºN, 154.9833ºW, 198 m depth, E. Acuña, 7 August 2008, FV *Ocean Explorer*, cruise 200801, haul 3; UW 119200, 1 (116.3 mm), 71.7457ºN, 153.9435ºW, E. Acuña, 12 August 2008, FV *Ocean Explorer*, cruise 200801, haul 11; UW 119201, 87.8 mm, 71.9004ºN, 153.9072ºW, 347 m depth, E. Acuña, 7 August 2008, FV *Ocean Explorer*, cruise 200801, haul 4; UW 119202, 5 (70.7–159 mm), 71.8907ºN, 154.9465ºW, 470 m depth, E. Acuña, 6 August 2008, FV *Ocean Explorer*, cruise 200801, haul 2; UAM 47840, 2 (79.8–91.3 mm), 70.5397ºN, 141.9993ºW, sta. A2-350, 19 August 2013; UAM 47797, 2 (111.0 mm), 69.8306ºN, 138.4046ºW, 26 August 2013; UAM 47938, 1 (69.0 mm), 70.9297ºN, 146.0694ºW, L. Edenfield, 15 August 2013; UAM 47861, 2 (65.0–117.9 mm), 70.2685ºN, 140.2974ºW, L. Edenfield, sta. TBS-200, 25 August 2013; UAM 3707, 2 (65.0 mm, 1 disintegrated), 71.2526ºN, 150.1ºW, 500 m depth, L. Edenfield & K. Walker, 24 September 2012, Sta. B1-500, otter trawl, haul 8, PSR 2385; UAM 3710, 5 (50.5–123.0 mm), 71.4297ºN, 151.1ºW, 497 m depth, L. Edenfield & K. Walker, 27 September 2011, sta. B2-500, haul 10, otter trawl, PSR 2388; UAM 6317, 2 (81.9 mm), 71.6546ºN, 152.6617ºW, 184 m depth, L. Edenfield, 27 August 2011, *Norseman II*, Sta. WB08, haul 26, PSR 2000, DSFIB 092-11, 093-11; UAM 2973, 1 (136.2 mm), 71.3609ºN, 151.3092ºW, L. Edenfield, 25 August 2011, *Norseman II*, Beau 2011-71, PSR 1956, DSFIB 768-11.

Diagnosis. *Careproctus lerikimae* is distinguished from all other species of *Careproctus* by the combination of cytb and 16S rRNA sequences ("ARC1", in part, of Kai *et al.* 2011a; Table 1), an anteriorly robust body uniformly covered by widely spaced cactus-like prickles, the absence of the postorbital pore, a moderate-sized pelvic disc, elongate lower pectoral-fin rays, a light peritoneum, a round pupil, and 1–3 pterygiophores anterior to first haemal spine. It is most similar to *C. phasma* of the Bering Sea and Gulf of Alaska, from which it can be distinguished by its dusky coloration (vs. body entirely pale in *C. phasma*), higher number of vertebrae (59–64 in *C. lerikimae* vs. 55–60 in *C. phasma*) and median fin rays (dorsal 56–59 and anal 48–51 in *C. lerikimae* vs. 50–56 and 43–49 in *C. phasma*), as well as its longer maxilla, shorter lower pectoral-fin lobe, and shorter nasal tube. Among other species of *Careproctus* reported from the Arctic, *C. lerikimae* differs from *C. reinhardti* in having a much smaller gill slit extending only to the upper most pectoral-fin rays rather than to the lower pectoral-fin lobe, a larger orbit (3–4.5 times in head vs. 5–6 in *C. reinhardti*; Burke, 1930), a horizontally rather than an obliquely oriented mouth, a nearly round rather than a long pear-shaped pelvic disc, a normally positioned pectoral-fin rather than a low-inserted pectoral fin (Chernova, 2005b), and higher counts of median fin rays (D 56–60, A 48–51 vs. D 54–55, A 45–46 in *C. reinhardti*). It is also similar to members of the *C. dubius* group (Chernova 2014b), particularly *C. solidus* Chernova and *C. dubius* Chernova but differs from both in its higher number of vertebrae (59–64 in C. *lerikimae* vs. 60 in *C. solidus* and *C. dubius*), a higher number of dorsal-fin rays (56–60 vs. 54–55), and its horizontal mouth position (vs. oblique mouth in *C. solidus*). *Careproctus longipinnis* Burke is also similar but differs in its higher number of dorsal-fin rays (56–60 vs. 55 in *C. longipinnis*), presence of prickles (vs. absent in *C. longipinnis*), shorter pectoral-fin lower lobe (0.8–1.5 times the length of the upper lobe in C. *lerikimae* vs. 1.6 times in *C. longipinnis*), and lower position of the pectoral fin (even with oral cleft in C. *lerikimae* vs. middle of suborbital space in *C. longipinnis*). It is also similar to *C. karaensis* Chernova but differs in its round pupil (longitudinally oval in *C. karaensis*), the presence of 1–3 pterygiophores anterior to the first haemal spine (absent in *C. karaensis*), an arcuate vertebral column (gently curved in *C. karaensis*), the absence of dark pigment on upper pectoral-fin rays (blackish upper margin in *C. karaensis*), and a shorter urogenital papilla (1.3–2.4 vs. 5 % SL) in males.

Description. Body rounded and deep anteriorly, tapering moderately posteriorly, moderately compressed; depth at pectoral-fin base 82.8–126.9 (93.5) % HL. Head large, 22.9–29.8 (28.0) % SL, robust, dorsal profile rounded from nape to snout. Snout rounded, slightly projecting anterior to lower jaw, longer than orbit, 103.2–167.2 (159.1) % OL, 27.1–40.1 (36.6) % HL. Mouth terminal, small, horizontal; upper jaw 38.1–51.7 (44.8) % HL, maxilla extending to mid-orbit, oral cleft extending to anterior part of orbit; mandible 46.9–63.8 (47.0) % HL. Premaxillary tooth plates matching mandibular tooth plates. Premaxillary and mandibular teeth simple in 21–29 oblique rows of 8–10 teeth forming narrow bands. Diastema absent at symphysis of upper and lower jaws. Orbit 21.1–33.0 (23.0) % HL, dorsal margin at or just below dorsal contour of head, suborbital depth to upper jaw 11.4–

21.4 (14.6) % HL, to lower jaw 25.7–37.9 (30.0) % HL; pupil round. Interorbital space broad, fleshy distance 29.2–54.8 (42.3) % HL, bony distance 15.6–30.8 (22.7) % HL, strongly convex. Nostril single, with short tube at level with mid-orbit; nostril tube length 1.7–16.0 (11.8) % OL.

Pores of cephalic lateralis system of moderate size, pore pattern 2-5-7-2, chin pores paired. Interorbital pore absent.

Gill opening small, 16.9–35.8 (26.5) % HL, upper margin at or just above level of mid-orbit, extending ventrally to just above the upper pectoral-fin ray to pectoral-fin ray 1–4 (above upper ray). Opercular flap rounded. Gill rakers 6–10 (9) (Tables 2–3), short, blunt.

Dorsal-fin rays 56–60 (59; Tables 2–3), anterior dorsal lobe absent, anterior rays buried in tissue, tips of more posterior rays not exserted. Anteriormost dorsal-fin pterygiophore inserted between neural spines 2 and 3 or 3 and 4, rayless or bearing a single small ray (2 and 3, rayless). Predorsal length 25.2–32.2 (27.8) % SL. Anal-fin rays 48–51 (51; Tables 2–3), one to three anal-fin pterygiophores anterior to first haemal spine (two), each bearing a single ray, tips of rays not exserted. Anal-fin origin below vertebrae 12–13 (caudal vertebrae 1–2), preanal length 36.2–48.2 (38.3) % SL.

Pectoral fin deeply notched, with 28–36 rays (32; Tables 2–3). Upper lobe 47.8–82.4 (50.6) % HL, with 20–27 (22) rays, extending beyond anus to near anal-fin origin, shorter than lower lobe, dorsalmost rays lengthening to rays 5–7, more ventral rays gradually shortening to shortest ray of notch. Lower lobe moderately elongate, 59.0–105.6 (76.5) % HL, with 7–10 rays (10), extending beyond anus midway to anal-fin origin; dorsal rays gradually lengthening to elongate rays 3–4, ventral rays gradually shortening to ventralmost ray near pectoral symphysis. Tips of rays of dorsal lobe 5–15% free of membrane, rays of lower lobe more strongly exserted, up to 65% free. Notch strong, rays in notch slightly more widely spaced than rays of lobes, more widely spaced ventrally. Uppermost pectoral-fin ray level with oral cleft or slightly more dorsal (cleft). Insertion of lowermost pectoral-fin ray anteriorly placed, below area between snout and anterior rim of orbit. Proximal pectoral radials four (3+1), robust: radial 1 hour-glass shaped, radial 2 notched and distinctly hour-glass shaped, radial 3 crescent shaped, radial 4 round (Fig. 5G). Interradial fenestrae three, extending between scapula and proximal radials 1–3: oval between scapula and radial 1 and radials 1 and 2; dorsoventrally elongate between radials 2 and 3. Scapula broadly T-shaped with large robust dorsoposterior arm and helve and smaller ventroanterior arm; coracoid with broad triangular head, small foramen, and short robust helve. Distal radials present at base of rays 2–13, ventralmost at level of proximal radial 2, more ventral rays articulating directly with pectoral cartilage.

Pelvic disc large, length 18.8–29.1 (21.6) % HL, round, slightly longer than wide, width 14.8–24.1 (19.9) % HL, anterior lobe moderately developed, slightly to moderately cupped, distance from tip of snout to pelvic disc 11.0–16.0 (12.6) % SL. Anus at a level just posterior to orbit, close behind pelvic disc; distance from snout to anus 14.7–25.2 (17.5) % SL, 57.8–105.6 (62.6) % HL.

Principal caudal-fin rays 9, dorsal procurrent rays 1, ventral procurrent rays 1 (1 + 4/5 + 1). Caudal fin 30.9–49.6 % HL. Membrane of posterior dorsal-fin rays attached to caudal fin at shorter distance than anal-fin rays: dorsal-fin rays attached to caudal fin 27.5–56.4 % CL; anal-fin rays, 35.9–57.6 % CL. Depth at base of caudal fin 9.1–20.0 % CL.

Skin relatively thin, loose gelatinous layer beneath skin, short cactus-like prickles uniformly covering body, widely spaced, in most dense region about 10 prickles in orbit length. Pyloric caeca 17–23, length about 33–51 % HL, left side of visceral cavity.

Vertebrae 59–64 (63), precaudal 10–12 (11), caudal 50–52 (52; Tables 2–3). Pleural ribs 2 or 3 (2), present on vertebrae 9–10 or 9–11 (9–10), when 2 each long and slender, when 3 anteriormost small.

Coloration. Body orangish pink and white to grayish, fins orangish pink in life, with speckling scattered over body and fins (Fig. 3C); head, dorsum from nape to caudal fin, and ventrum at anal-fin origin to caudal fin pink to marginally orange; isthmus, base of pectoral fin, and body posterior of gill slit to anal-fin origin white; belly silvery white (crystalline guanine) to anal-fin origin, black speckling increasing dorsally; dark line internally at base of dorsal fin rays, extending from nape to caudal fin base, and at base of rays in the posterior half of the anal fin; base and lower lobe of pectoral fin white to faintly orange; dorsal margin and distal portion of fin dusky orange; eye with dark dorsal margin, becoming brassy and whiter ventrally. Body and fins pale with speckling in preservation; base of dorsal and anal fins beneath skin with pigment, showing faint line between fins and body; eye entirely black. Peritoneum pale, with occasional scattered speckles dorsally; orobranchial cavity pale; stomach, intestines, and pyloric caeca pale; urogenital papilla pale.

Life history. The largest specimen examined was a 136.2 mm maturing female (UAM 2973). The only ripe female with yolked eggs was 159.0 mm, with eggs about 4.1 mm in diameter. Ripe males ranged from 93 to 132.3 mm.

Distribution. *Careproctus lerikimae* has been collected only from the Beaufort Sea off northern Alaska (Fig. 6). Collection depths range from 175 to 500 m. One lot in poor condition collected from a haul at a depth of 66 m (Rand & Logerwell 2011) was likely left in the net and washed down from a previous haul conducted at 175 m or deeper (K. Rand, pers. comm., 2014).

Etymology. The new species is named in honor of Erika Acuña, Kim Rand, and Libby Logerwell of the Alaska Fisheries Science Center for collecting or coordinating in 2008 the collection of the first representatives of the new species at sea. The specific epithet is an amalgamation of the collectors' names to be treated as a noun in apposition.

Remarks. Kai *et al.* (2011a) recovered a clade they identified as "ARC1" that included both Arctic (*C. lerikimae*; UW 117918) and Gulf of Alaska specimens (*C. phasma*; UW 154442 as "UW uncataloged") as the sister clade of "BER3" (*C. phasma*) of the Bering Sea. Within ARC1, *C. lerikimae* formed the sister group of the single Gulf of Alaska representative of *C. phasma*, differing from it by 1 bp within cyt*b* data only. New16s and cyt*b* sequence data from *C. phasma* (UW 151271, 151272, 151291–151296; Table 1) placed the Gulf of Alaska *C. phasma* well within the *C. phasma* clade, to the exclusion of *C. lerikimae*, with 0.2% sequence divergence within *C. phasma* (Kai, unpublished data, 2014).

Careproctus lerikimae is similar to species of the *C. dubius* species group of Chernova (2014b) in lacking the postorbital pore and having a long lower pectoral-fin lobe and cactus-like prickles. In contrast, *C. lerikimae* has a round pupil, unlike the slit pupil of all species in the *C. dubius* group, and males have a short urogenital papillae (1-2 % SL), unlike the long urogenital papilla (2–6 % SL) in species of *C. dubius* (Chernova 2005a; Chernova 2014b). In addition, cactus-like prickles are widely spaced over the body in *C. lerikimae*; all members of the *C. dubius* species group densely covered by prickles (Chernova 2014ab; Chernova, pers. comm., 2015). Meristic characters are similar, although *C. lerikimae* has a higher range of vertebral and dorsal-fin ray counts than nearly all species (Chernova 2014b, table 1). However, all but four of the 11 species of the *C. dubius* group are described from single specimens and thus more complete ranges of morphometric and meristic data are unknown.

Principal component analysis

In the morphometric PCA of western Pacific species, the size component, PC1, accounted for 92.2 % of the variance. Shape components 2, heavily loaded on pelvic disc and lower pectoral-fin lobe lengths, and 3, heavily loaded on lower pectoral-fin lobe and gill slit length, each accounted for 2.4 % of the variance (Table 4). In the meristic PCA, PC1 was heavily loaded on median fin rays and vertebrae, accounting for 71.8 % of the variation, and PC2, heavily loaded on pectoral-fin rays, accounted for 14.4 % of the variation (Table 4). All species clusters in the plot of morphometric PC2 and PC3 overlapped to some degree (Fig. 7A). *Careproctus pellucidus* was most separated from other species, narrowly overlapping all but the *C. acanthodes* cluster, from which it was entirely separated. The other three species overlapped broadly. In the meristic PCA, a cluster composed of *C. acanthodes* and *C. pellucidus* narrowly overlapped with a cluster comprising *C. rastrinus* and *C. trachysoma* (Fig. 7B). In the plots of morphometric PC2 and meristic PC1, *C. acanthodes* and *C. pellucidus* were nearly completely separated from each other and from a cluster composed of broadly overlapping *C. rastrinus* and *C. trachysoma* (Fig.7C).

In the morphometric PCA of *C. lerikimae* and similar eastern Pacific species, the size component, PC1, accounted for 90.1 % of the variance. Shape components 2, heavily loaded on lower pectoral-fin lobe length and the fleshy interorbital width, and 3, heavily loaded on the fleshy interorbital width and snout to anal-fin origin length, accounted for 3.0 and 1.7 % of the variance, respectively (Table 4). In the meristic PCA, PC1, heavily loaded on median fin rays and vertebrae, accounted for 66.5 % and PC2, heavily loaded on vertebrae and pectoral-fin rays, accounted for 17.3 % of the variation (Table 4). In the plot of morphometric PC2 and PC3, clusters of *C. lerikimae* and *C. phasma* broadly overlapped, and *C. spectrum* was within the *C. phasma* cluster only (Fig. 8A). In the meristic PCA, clusters composed of *C. lerikimae* and *C. phasma* were nearly entirely separated, and *C. spectrum* again was within the *C. phasma* cluster near the overlap region (Fig. 8B). In the plots of morphometric PC2 and meristic PC1, *C. lerikimae* and *C. phasma* were nearly completely separated from each other and *C. spectrum* was separate from both (Fig. 8C).

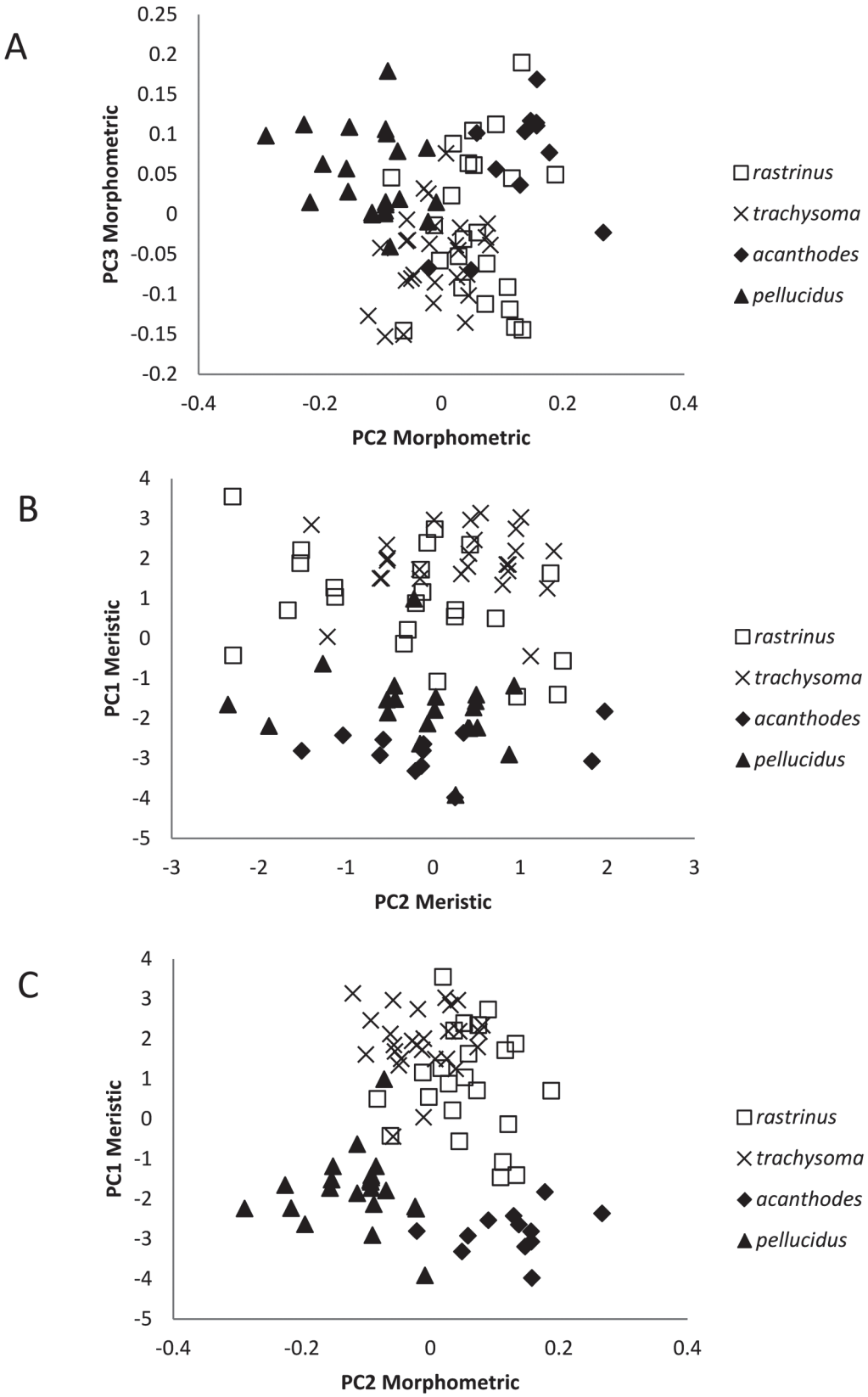

FIGURE 7. Plots of principal component scores for (A) morphometric, (B) meristic, and (C) combined morphometric and meristic characters of western Pacific species of the *Careproctus rastrinus* species complex: *C. rastrinus* (□), *C. trachysoma* (), *C. acanthodes* (♦), and *C. pellucidus* (▲).

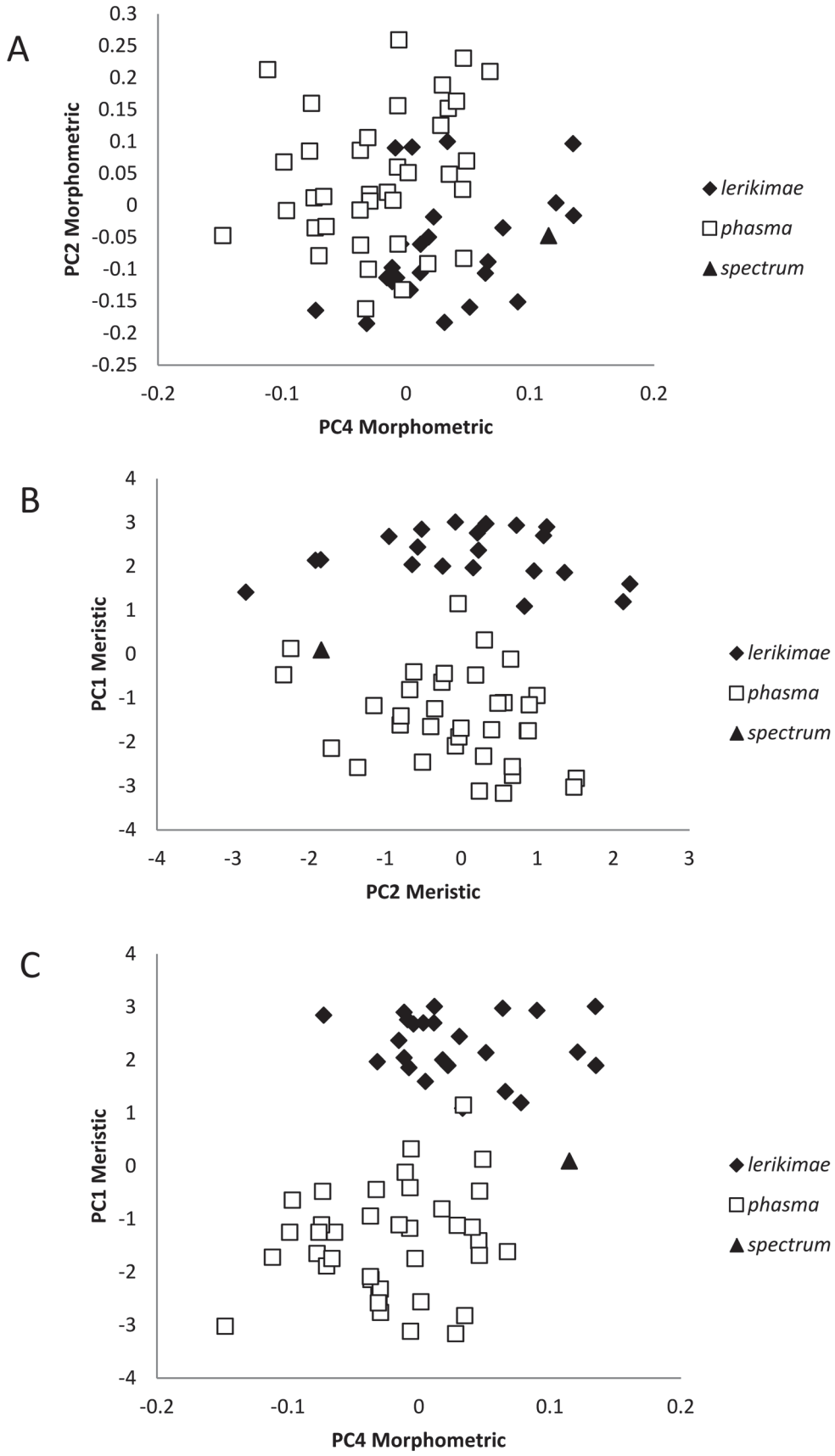

FIGURE 8. Plots of principal component scores for (A) morphometric, (B) meristic, and (C) combined morphometric and meristic characters of eastern Pacific and Arctic species of the *Careproctus rastrinus* species complex lacking a postorbital pore: *C. lerikimae* **n. sp.** (♦), *C. phasma* (□), *C. spectrum* (▲).

TABLE 4. Factor loadings for principal components (PC) analysis of morphometric and meristic characters of eastern Pacific and Arctic species of the *Careproctus rastrinus* species complex lacking a postorbital pore: *C. phasma, C. spectrum,* and *C. lerikimae* **n. sp.**

	PC1	PC2	PC3	PC4
Morphometric				
Standard length	0.2976	0.1113	-0.0747	-0.0178
Head length	0.2785	0.0465	-0.0108	-0.0106
Greatest body depth	0.3482	0.2396	0.0905	-0.2330
Snout length	0.3120	0.2160	0.0182	-0.3938
Orbit length	0.2067	-0.0278	-0.1392	0.5607
Fleshy interorbital width	0.3162	-0.7207	-0.4626	-0.2618
Predorsal length	0.2943	0.1055	0.0672	-0.0247
Preanal length	0.2876	0.1461	-0.0399	0.3066
Snout to anus length	0.2170	0.1885	-0.0530	0.4065
Maxilla length	0.2727	-0.2052	-0.1405	0.2885
Gill slit length	0.3388	-0.3423	0.8078	-0.0096
Pelvic disc length	0.2588	0.3660	-0.2668	-0.2530
Meristic				
Dorsal-fin rays	0.4878	0.1031		
Anal-fin rays	0.4932	0.0756		
Pectoral-fin rays	0.0685	-0.7554		
Precaudal vertebrae	-0.1561	0.6291		
Caudal vertebrae	0.4997	-0.0039		
Total vertebrae	0.4900	0.1314		

Discussion

Although members of what we have herein called the *C. rastrinus* species complex are generally considered either closely related due to their morphological similarity (Kido 1988) or treated as a monophyletic group (Kai *et al.* 2011a), our morphological evidence suggests they may comprise two or three lineages. One lineage comprises species with a postorbital pore present: *C. rastrinus*, *C. trachysoma*, *C. scottae*, *C. pellucidus*, and perhaps *C. acanthodes*. A second lineage includes those in which the pore is absent—*C. phasma*, *C. lerikimae*, and, probably, *C. spectrum*—and may be more closely related to the *C. dubius* group of Chernova (2014b). *Careproctus acanthodes*, previously considered synonymous with *C. rastrinus* (Kido 1988), may be a plesiomorphic member of the lineage containing *C. rastrinus* or more distantly related. While the postorbital pore is present in *C. acanthodes*, the upper lobe of the pectoral fin is longer than the lower lobe and all distal radials of the pectoral fin are present as well, unlike all other members of the complex. Until the phylogenetics of the Liparidae and especially *Careproctus* are better understood, we treat all species as being members of the *C. rastrinus* species complex.

Key to the species of the *Careproctus rastrinus* complex

1a. Postorbital pore present; prickles dense, closely spaced. 2
1b. Postorbital pore absent; prickles widely scattered or absent. 6
2a. Peritoneum gray, stomach gray. . . . . .*Careproctus rastrinus* Gilbert & Burke (Sea of Okhotsk)
2b. Peritoneum pale, stomach dark or pale 3
3a. Stomach dark. 4
3b. Stomach pale 5
4a. Orbit small, 4 to 6 times in head length; pelvic disc 50 to 80% of orbit length; body dark or pale . . . . . .

. . . . . .*Careproctus trachysoma* Gilbert & Burke (Sea of Japan)

4b. Orbit large, 2.5 to 4 times in head length; pelvic disk 25 to 50% of orbit length; body pale . . . . . .*Careproctus pellucidus* Gilbert & Burke (Pacific Ocean, off Japan)

5a. Lower lobe of pectoral fin long, longer than upper lobe, extending to anal-fin origin; body robust . . . . . *Careproctus scottae* Chapman & DeLacy (Eastern Bering Sea, Aleutian Islands, and Gulf of Alaska)

5b. Lower lobe of pectoral-fin moderate, shorter than upper lobe, extending just beyond anus; body slender.. . . . . .*Careproctus acanthodes* Gilbert & Burke (Sea of Japan and Sea of Okhotsk)

6a. Orbit large, 3 times in head length; prickles absent . . . . . *Careproctus spectrum* Bean (Gulf of Alaska)

6b. Orbit not large, less than 3 times in head length; prickles present, widely spaced 7

7a. Body uniformly pale, pink to light orange, without scattered melanophores; dorsal-fin rays 56 or less, anal-fin rays 49 or less . . . . . *Careproctus phasma* Gilbert (Bering Sea)

7b. Body pale, pink, light orange, to light gray, with scattered melanophores; dorsal-fin rays 56 or more; anal-fin rays 48 or more. . . . . *Careproctus lerikimae* Orr, Kai & Nakabo, new species (Beaufort Sea)

TABLE 4. Factor loadings for principal components (pc) analysis of morphometric and meristic characters of western Pacific Species of the *Careproctus rastrinus* species complex: *C. rastrinus*, *C. trachysoma, C. acanthodes*, and *C. pellucidus*.

	PC1	PC2	PC3
Morphometric			
Standard length	0.2711	0.0118	-0.0865
Head length	0.2409	0.1114	-0.0022
Greatest body depth	0.3074	0.0108	0.0631
Snout length	0.2719	0.0221	0.2305
Orbit length	0.1966	-0.3793	0.3851
Fleshy interorbital width	0.2407	0.1544	0.2135
Predorsal length	0.2508	-0.0209	0.0544
Preanal length	0.2828	0.0135	0.0434
Snout to anus length	0.2293	0.1608	-0.0548
Maxilla length	0.2358	0.0256	-0.0189
Pectoral fin length	0.2519	0.0530	-0.2483
Lower pectoral-fin lobe length	0.4020	-0.4162	-0.6484
Gill slit length	0.3225	-0.0291	0.4755
Pelvic disc length	0.1529	0.7843	-0.1586
Meristic			
Dorsal-fin rays	0.4590	0.0155	
Anal-fin rays	0.4550	-0.0385	
Pectoral-fin rays	0.2184	-0.9263	
Precaudal vertebrae	0.3156	0.3344	
Caudal vertebrae	0.4600	0.0811	
Total vertebrae	0.4726	0.1479	

Non-type material examined

***Careproctus rastrinus*. Sea of Okhotsk:** FAKU 131690, 1 (335.6 mm); HUMZ 60737, 1 (196.2 mm), west of Kamchatka, 53ºN, 155ºE; HUMZ 57670, 1 (203.0 mm); HUMZ 60766, 1 (214.3 mm), east of Sakhalin, 51ºN, 145ºE; HUMZ 67947, 1 (228.3 mm), Sea of Okhotsk; HUMZ 67318, 1 (227.0 mm); HUMZ 46506, 1 (293.6 mm), west of Kamchatka; HUMZ 67542, 1 (285.0 mm); HUMZ 60739, 1 (166.4 mm), west of Kamchatka; FAKU 131691, 1 (385.6 mm); FAKU 131689, 1 (303.0 mm); FAKU 131688, 1 (291.9 mm); FAKU 131687, 1 (320.7 mm); HUMZ 132429, 1 (374.3 mm); HUMZ 124297, 1 (265.1 mm), 44.32ºN, 144.15ºE; HUMZ 124363, 1 (198.7 mm); HUMZ 124177, 124208, 2 (200.0–258.0 mm), 44.46ºN, 144.22ºE; HUMZ 46214, 1 (350.1 mm), Kamchatka

[Sea of Okhotsk?]; HUMZ 121526, 1 (105.9 mm); HUMZ 121527, 1 (92.6 mm); HUMZ 121533, 1 (72.0 mm); HUMZ 60772, 1 (149.2 mm), east of Sakhalin; HUMZ 60764, 1 (136.0 mm), east of Sakhalin; HUMZ 121362, 1 (123.0 mm); HUMZ 60770, 1 (150.2 mm), east of Sakhalin; HUMZ 121525, 1 (134.1 mm); HUMZ 60761, 1 (126.5 mm), east of Sakhalin; HUMZ 60767, 1 (127.0 mm), east of Sakhalin.

***Careproctus trachysoma*. Sea of Japan**: FAKU 130800, 130846, 2 (207.0–214.4 mm), Taiza, Kyoto, 36.1ºN, 135.1ºE; FAKU 131542–131558, 131560, 17 (101.6–238.2 mm); NMCI-P 1978, 1 (193.8 mm), Saikai, Ishikawa, 37.14ºN, 136.5ºE; NMCI-P 1905-06, 2 (190.0–232.1 mm), Saikai, Ishikawa, 37.14ºN, 136.5ºE; NMCI-P 1823, 1860, 1907, 1909, 5 (160–229.4 mm), 37.14ºN, 136.5ºE; UW 117106 (ex FAKU 131402–04), 3 (200.0–264.8 mm), Taiza, Kyoto, 36.1ºN, 135.1ºE; FAKU 131180, 1 (144.0 mm), 36.1ºN, 135.1ºE; FAKU 131179, 131181, 2 (178.1–229.2 mm), 36.1ºN, 135.1ºE; FAKU 131130, 1 (244.4 mm), 36.1ºN, 135.1ºE; FAKU 131131, 1 (194.4 mm), 37.14ºN, 136.5ºE; FAKU 131132, 1 (169.2 mm), 37.14ºN, 136.5ºE; NMCI-P 1913, 1966, 2 (107.3–226.8 mm), Saikai, Ishikawa, 37.14ºN, 136.5ºE.

***Careproctus scottae*. Bering Sea**: UW 150784, 1 (70.8 mm), 60.6058ºN, 178.8216ºW, 235 m depth, J. W. Orr, 3 July 2008, F/V *Vesteraalen*, cruise 200801, haul 99; UW 43055, 1 (233.0 mm), 55.2ºN, 167.7667ºW, 315 m depth, D. W. Kessler, 11 April 1976, NOAA Ship *Miller Freeman*, cruise 197601, haul 32; UW 117457, 1 (44.6 mm), 56.2775ºN, 169.4345ºW, 248 m depth, 11 September 1997, NOAA Ship *Miller Freeman*, cruise 9MF97, haul 152; UW 112562, 1 (180.3 mm), 60.1754ºN, 174.3703ºW, 99 m depth, 12 July 2000, F/V *Arcturus*, cruise 200001, haul 182; UW 117933, 1 (204.0 mm), 58.9901ºN, 170.4839ºW, 71 m depth, 30 June 2008, F/V *Arcturus*, cruise 200801, haul 110; UW 28335, 6 (156.2–198.6 mm), 60.9993ºN, 177.6477ºW, 137 m depth, 9 July 1980, F/V *Ocean Harvester*, cruise 198001, haul 189; UW 28340, 2 (194.3–194.6 mm), 60.6662ºN, 176.366ºW, 117 m depth, T. Sample, 8 July 1980, F/V *Ocean Harvester*, cruise 198001, haul 183; UW 117354, 1 (245.3 mm), 58.32463ºN, 172.9258ºW, 108 m depth, 26 June 1999, F/V *Aldebaran*, cruise 199901, haul 141; UW 117355, 1 (186.7 mm), 59.6581ºN, 177.0984ºW, 169 m depth, T. Sample, 10 July 1999, F/V *Aldebaran*, cruise 199901, haul 186; UW 117353, 2 (197.2–204.3 mm), 59.9943ºN, 174.6112ºW, 108 m depth, 21 July 1997, F/V *Arcturus*, cruise 199701, haul 167; UW 41960, 1 (229.6 mm), 60.4333ºN, 178.8167ºW, 390 m depth, R. A. Rowlett, 5 November 1984, *Hamayoshi Maru No. 63*, cruise 926, haul 36; UW 117348, 1 (253.2 mm), 59.6627ºN, 173.2447ºW, 97 m depth, G. R. Hoff, 24 June 1999, F/V *Aldebaran*, cruise 199901, haul 131; UW 117344, 1 (100.2 mm), 60.165ºN, 178.02ºW, 150 m depth, 29 July 1995, R. Brodeur, R/V *Oshoro Maru*, cruise 199501, bottom trawl 8; UW 117352, 1 (238.8 mm), 58.6726ºN, 171.7366ºW, 94 m depth, 9 July 1997, F/V *Arcturus*, cruise 199701, haul 126; UW 117347, 1 (129.2 mm), 57.0989ºN, 170.2308ºW, 23 July 1997, NOAA Ship *Miller Freeman*, 10MF97, haul 2, sta. 051488, bottom trawl, large mesh, net 1; UW 117341, 1 (204.4 mm), 59.8303ºN, 173.5758ºW, 96 m depth, 23 June 1999, F/V *Aldebaran*, cruise 199901, haul 130; UW 117342, 1 (75.6 mm), 55.3356ºN, 167.5487ºW, 148 m depth, 24 June 1997, F/V *Arcturus*, cruise 199701, haul 78; UW 117349, 2 (208.8–213.6 mm), 60.6670ºN, 178.1574ºW, 159 m depth, E. Acuña & T. Sample, 8 July 1999, F/V *Aldebaran*, cruise 199901, haul 178; UW 117351, 1 (219.0 mm), 59.4989ºN, 173.4770ºW, 103 m depth, G. R. Hoff, 24 June 1999, F/V *Aldebaran*, cruise 199901, haul 132; UW 28350, 1 (223.4 mm), 60.345ºN, 178.1917ºW, 157 m depth, M. Levenson, 6 November 1980, R/V *Ekvator*, cruise 198001, haul 247; UW 117921, 1 (97.4 mm), 59.66573ºN, 176.5128ºW, 136 m depth, L. L. Britt & E. Acuña, 21 July 2008, F/V *Aldebaran*, cruise 200801, haul 199; UW 117939, 5 (87.0–205.0 mm), 60.6682ºN, 176.7696ºW, 129 m depth, L. L. Britt, 18 July 2008, F/V *Aldebaran*, cruise 200801, haul 184; UW 117914, 1 (123.9 mm), 56.0423ºN, 168.3796ºW, 221 m depth, D. E. Stevenson, 30 July 2008, F/V *Vesteraalen*, cruise 200801, haul 180; UW 117913, 1 (164.0 mm), 54.8230ºN, 166.8373ºW, 262 m depth, D. E. Stevenson, 3 August 2008, F/V *Vesteraalen*, cruise 200801, haul 194; UW 117928, 2 (190.0 mm), 60.9966ºN, 177.6364ºW, 135 m depth, L. L. Britt, 18 July 2008, F/V *Aldebaran*, cruise 200801, haul 180; UW 154440, 1 (81.1 mm), 59.5231ºN, 178.0785ºW, 228 m depth, J. W. Orr, 30 June 2008, F/V *Vesteraalen*, cruise 200801, haul 88; UW 117925, 3 (75–178.0 mm), 61.3338ºN, 176.9286ºW, 116 m depth, L. L. Britt, 17 July 2008, F/V *Aldebaran*, cruise 200801, haul 179; UW 117922, 2 (200.0–210.0 mm), 60.6783ºN, 178.1968ºW, 161 m depth, L. L. Britt, 19 July 2008, F/V *Aldebaran*, cruise 200801, haul 186; UW 117910, 2 (122.0–125.0 mm), 54.7749ºN, 166.3207ºW, 209 m depth, D. E. Stevenson, 3 August 2008, F/V *Vesteraalen*, cruise 200801, haul 197; UW 28336, 1 (107.0 mm), 58.15ºN, 172.0167ºW, 97 m depth, W. Hirschberger, 8 July 1979, M/V *Discovery Bay*, cruise 197902, haul 6; UW 28343, 3 (105.0–136.2 mm), 54.9833ºN, 165.7333ºW, 121 m depth, W. Hirschberger, 18 June 1978, M/V *Paragon II*, cruise 197801, haul 1; UW 117912, 2 (93.4–126.8 mm), 55.0349ºN, 167.3565ºW, 208 m depth, D. E. Stevenson, 1 August 2008, F/V *Vesteraalen*, cruise 200801, haul 189; UW 117935, 4 (105.0–220.0 mm), 60.3397ºN,

177.3740ºW, 147 m depth, L. L. Britt & E. Acuña, 19 July 2008, F/V *Aldebaran*, cruise 200801, haul 188; UW 113526, 2 (148.3–163.8 mm), 56.5573ºN, 172.0973ºW, 279 m depth, J. W. Orr, 26 July 2004, F/V *Northwest Explorer*, cruise 200401, haul 176; UW 113906, 8 (95.9–152.4 mm), 55.1243ºN, 167.5251ºW, 206 m depth, J. W. Orr, 30 July 2004, F/V *Northwest Explorer*, cruise 200401, haul 197; UW 113726, 7 (93.1–151.4 mm), 55.7091ºN, 168.8126ºW, 225 m depth, J. W. Orr, 21 July 2004, F/V *Northwest Explorer*, cruise 200401, haul 162; UW 28332, 4 (164.0–195.0 mm), 61.0002ºN, 176.9803ºW, 119 m depth, 9 July 1980, F/V *Ocean Harvester*, cruise 198001, haul 188; UW 117938, 6 (62.3–188.5 mm), 60.6697ºN, 177.5335ºW, 146 m depth, 19 July 2008, F/V *Aldebaran*, cruise 200801, haul 187; UW 22384, 1 (308 mm), 54.3167ºN, 166ºW, F/V *Tae Baek No. 29*, cruise 214, J. Wimberley; UW 28278, 1 (150 mm), 57.3333ºN, 171.4667ºW, 97 m depth, 23 August 1979, R/V *Oregon*, cruise 197902, haul 163; UW 28288, 1 (145 mm), 52.4167ºN, 174.2ºE, 130 m depth, F/V *Marlin*, M. Mather; UW 28329, 1 (138 mm), 56.5ºN, 167.5667ºW, 6 July 1979, *Nisshin Maru No. 2*, W. A. Palsson; UW 28330, 1 (150 mm), 59.0189ºN, 171.0008ºW, 14 July 1979; UW 28336, 1 (110 mm), 58.15ºN, 172.0167ºW, 97 m depth, 8 July 1979, M/V *Discovery Bay*, cruise 197902, haul 6; UW 28348, 1 (215 mm), 60.3767ºN, 177.3683ºW, 165 m depth, 6 November 1980, R/V *Paragon II*, cruise 198001, haul 246, M. Levenson; UW 28354, 1 (235 mm), 59.3267ºN, 177.3333ºW, 168 m depth, 29 October 1980, *Ekvator*, cruise 198001, haul 188; UW 28360, 1 (280 mm), 55ºN, 167ºW, J. Linville; UW 41402, 1 (170 mm), 56.6167ºN, 172.35ºW, 180 m depth, 22 November 1981, *Yakushi Maru No. 31*, 624 JS84, haul 37, J. Parkhurst; UW 41403, 1 (410 mm), 54.5667ºN, 166.5833ºW, 445 m depth, 17 September 1982, *Akebono Maru #15*, 833 JS42, haul 132, J. Parkhurst; UW 41404, 1 (312 mm), 56.9833ºN, 173.6833ºW, 540 m depth, *Orient Maru No. 3*; 616 JSAV; UW 41411, 1 (350 mm), 54.5167ºN, 172.35ºW, 460 m depth, *Akebono Maru #15*, 833 JS42, haul 132, J. Parkhurst; UW 41627, 1 (280 mm), 59.4833ºN, 176.65ºW, 140 m depth, 10/1/1987, 140 m *Koei Maru*, longline, cruise 56, set 1, S. Tollefson; UW 41715, 1 (mm), 63.3557ºN, 176.3328ºW, 84 m depth, 3 July 1990, *Novokotovsk*, cruise 199001, haul 341; UW 111968, 13 (96–155 mm), 54.7975ºN, 166.4428ºW, 205 m depth, 12 June 2004, F/V *Northwest Explorer*, cruise 200401, haul 20; UW 111973, 2 (170–330 mm), 54.6107ºN, 165.6901ºW, 355 m depth, 6 June 2004, F/V *Northwest Explorer*, cruise 200401, haul 2, D. E. Stevenson; UW 111974, 6 (92–130 mm), 55.4006ºN, 168.0256ºW, 233 m depth, 17 June 2004, F/V *Northwest Explorer,* cruise 200401, haul 44; UW 112505, 1 (90 mm), 54.9985ºN, 166.3679ºW, 141 m depth, 10 June 2000, F/V *Arcturus*, cruise 200001, haul 55; UW 112553, 2 (75–82 mm), 55.3314ºN, 167.5545ºW, 147 m depth, 10 June 2000, F/V *Arcturus*, cruise 200001, haul 52, D. Nichol; UW 113493, 6 (80–193 mm), 60.5981ºN, 178.8204ºW, 235 m depth, 10 July 2004, F/V *Northwest Explorer*, cruise 200401, haul 121, D. E. Stevenson; UW 116016, 1 (220 mm), 54.67ºN, 166.35ºW, 328 m depth, *Zuiyo Maru*, C. Iten; UW 116461, 1 (112 mm), 56.0359ºN, 168.3841ºW, 221 m depth, 7 June 2002, F/V *Morning Star*, cruise 200202, haul 12, J. W. Orr; UW 116471, 1 (145 mm), 57.8372ºN, 173.892ºW, 505 m depth, 20 June 2002, F/V *Morning Star*, cruise 200202, haul 48; UW 116850, 1 (227 mm), 61.3292ºN, 174.3579ºW, 80 m depth, 22 July 1997, F/V *Arcturus*, cruise 199701, haul 172; UW 117911, 1 (155 mm), 54.7433ºN, 165.4134ºW, 205 m depth, 4 August 2008, F/V *Vesteraalen*, cruise 200801, haul 198, D. E. Stevenson; UW 117917, 1 (222 mm), 59.9948ºN, 175.9495ºW, 130 m depth, 21 July 2008, F/V *Arcturus*, cruise 200801, haul 195, L. L. Britt & E. Acuña; UW 117920, 1 (127 mm), 59.3334ºN, 176.4043ºW, 135 m depth, 22 July 2008, F/V *Aldebaran*, cruise 200801, haul 202, L. L. Britt & E. Acuña; UW 117923, 1 (195 mm), 56.6674ºN, 160.358ºW, 58 m depth, 21 July 2008, F/V *Aldebaran*, cruise 200801, haul 198, L. L. Britt & E. Acuña; UW 117924, 1 (185 mm), 60.1044ºN, 173.7726ºW, 89 m depth, 15 July 2008, F/V *Arcturus*, cruise 200801, haul 171; UW 117926, 1 (200 mm), 61.0005ºN, 176.9943ºW, 122 m depth, 18 July 2008, F/V *Aldebaran*, cruise 200801, haul 181, L. L. Britt; UW 117927, 1 (210 mm), 61.3427ºN, 176.3386ºW, 106 m depth, 17 July 2008, F/V *Aldebaran*, cruise 200801, haul 178, L. L. Britt; UW 117930, 1 (mm), 60.6561ºN, 174.1189ºW, 87 m depth, 15 July 2008, F/V *Arcturus*, cruise 200801, haul 173; UW 117990, 1 (123 mm), 58.9326ºN, 177.9217ºW, 213 m depth, 29 June 2008, F/V *Vesteraalen*, cruise 200801, haul 83, J. W. Orr; UW 117992, 1 (210 mm), 58.3598ºN, 175.4499ºW, 286 m depth, 28 June 2008, F/V *Vesteraalen*, cruise 200801, haul 78, J. W. Orr; UW 118504, 4 (122–175 mm), 61.9880ºN, 173.7571ºW, 64 m depth, 22 July 1997, F/V *Arcturus*, cruise 199701, haul 175; UW 119045, 8 (235 mm), 61.0102ºN, 177.6282ºW, 135 m depth, 17 July 2009, R/V *Arcturus*, cruise 200901, haul 183; UW 119046, 1 (160 mm), 60.0045ºN, 177.2341ºW, 136 m depth, 18 July 2009, R/V *Arcturus*, cruise 200901, haul 187; UW 119048, 1 (100 mm), 59.3326ºN, 176.3997ºW, 136 m depth, 18 July 2009, R/V *Arcturus*, cruise 200901, haul 190; UW 119054, 5 (90–220 mm), 60.0047ºN, 177.9410ºW, 141 m depth, 18 July 2009, R/V *Arcturus*, cruise 200901, haul 186; UW 119055, 3 (180–245 mm), 60.0047ºN, 177.9410ºW, 139 m depth, F/V *Aldebaran*, cruise 200901, haul 162, S. Kotwicki; UW 119057, 2 (195–200 mm), 61.0113ºN,

176.3071°W, 111 m depth, 17 July 2009, F/V *Aldebaran*, cruise 200901, haul 177, S. Kotwicki; UW 119063, 2 (210–240 mm), 59.3139°N, 174.4251°W, 120 m depth, 13 July 2009, F/V *Arcturus*, cruise 200901, haul 163, L. L. Britt; UW 119065, 1 (95 mm), 55.3444°N, 167.5498°W, 146 m depth, 19 June 2009, F/V *Aldebaran*, cruise 200901, haul 75; UW 119066, 1 (190 mm), 59.5003°N, 172.8610°W, 93 m depth, 5 July 2009, F/V *Arcturus*, cruise 200901, haul 150; UW 119067, 1 (95 mm), 54.9796°N, 166.3364°W, 143 m depth, 19 June 2009, F/V *Aldebaran*, cruise 200901, haul 72; UW 119069, 1 (225 mm), 59.0094°N, 171.1047°W, 78 m depth, 29 June 2009, F/V *Aldebaran*, cruise 200901, haul 124; UW 119070, 1 (240 mm), 59.3223°N, 172.4767°W, 88 m depth, 1 July 2009, F/V *Aldebaran*, cruise 200901, haul 129; UW 119082, 1 (205 mm), 59.6662°N, 176.4968°W, 135 m depth, 19 July 2009, F/V *Aldebaran*, cruise 200901, haul 189; UW 119094, 1 (200 mm), 60.3355°N, 174.6856°W, 102 m depth, 15 July 2009, F/V *Aldebaran*, cruise 200901, haul 168; UW 119096, 1 (215 mm), 60.0194°N, 173.3165°W, 74 m depth, 14 July 2009, F/V *Aldebaran*, cruise 200901, haul 164; UW 119097, 2 (185–200 mm), 59.9944°N, 173.9381°W, 96 m depth, 14 July 2009, F/V *Aldebaran*, cruise 200901, haul 165; UW 119306, 6 (230–330 mm), 54.7219°N, 165.7323°W, 267 m depth, 6 June 2008, F/V *Vesteraalen*, cruise 200801, haul 3; UW 119516, 1 (291 mm), 54.5710°N, 165.7016°W, 367 m depth, 26 February 2001, F/V *Northwest Explorer*, cruise 200101, haul 25, R. C. Harrison; UW 119061, 1 (190 mm), 59.6442°N, 175.1231°W, 126 m depth, 14 July 2009, F/V *Arcturus*, cruise 200901, haul 168; UW 119666, 4 (103–135 mm), 54.7747°N, 166.3173°W, 209 m depth, 7 August 2004, F/V *Northwest Explorer*, cruise 200401, haul 231, J. W. Orr; UW 119667, 2 (90–110 mm), 55.4595°N, 168.2023°W, 243 m depth, 28 July 2004, F/V *Northwest Explorer*, cruise 200401, haul 186, J. W. Orr; UW 150783, 4 (125–145 mm), 54.7619°N, 165.9870°W, 209 m depth, 8 June 2008, F/V *Vesteraalen*, cruise 200801, haul 9, L. L. Britt; UW 150784, 1 (70 mm), 60.6057°N, 178.8216°W, 235 m depth, 3 July 2008, F/V *Vesteraalen*, cruise 200801, haul 99, J. W. Orr; UW 150786, 6 (125–275 mm), 54.7166°N, 165.5306°W, 253 m depth, 6 June 2008, F/V *Vesteraalen*, cruise 200801, haul 1, L. L. Britt; UW 150794, 1 (110 mm), 59.8521°N, 178.7904°W, 248 m depth, 6 July 2008, F/V *Vesteraalen*, cruise 200801, haul 113, J. W. Orr; UW 150796, 1 (182 mm), 59.5089°N, 173.5°W, 103 m depth, 2 July 2008, F/V *Arcturus* cruise 200801, haul 123, L. L. Britt; UW 150814, 1 (92 mm), 57.1388°N, 173.8036°W, 229 m depth, 4 June 2010, F/V *Vesteraalen*, cruise 201001, haul 8, D. E. Stevenson; UW 150893, 1 (85 mm), 56.0640°N, 169.4890°W, 248 m depth, 18 June 2008, F/V *Vesteraalen*, cruise 200801, haul 55; UW 150894, 1 (77 mm), 61.0088°N, 176.3041°W, 112 m depth, 18 July 2008, F/V *Aldebaran*, cruise 200801, haul 182, L. L. Britt; UW 151304, 2 (91–108 mm), 59.6505°N, 174.4428°W, 114 m depth, 17 July 2011, F/V *Alaska Knight*, cruise 201101, haul 163, L. L. Britt; UW 151322, 1 (195 mm), 60.9989°N, 175.5155°W, 102 m depth, 21 July 2011, F/V *Alaska Knight*, cruise 201101, haul 179, L. L. Britt; UW 28319, 1 (238 mm), 60°N, 177°W, 320 m depth, C. Dewitt; UW 28327, 2 (200–235 mm), *Seitoku Maru*, haul 51, A. Snow; UW 28328, 1 (225 mm), 54.72°N, 165.83°W, 260 m depth, M/T *Bogar*, C. Dorworth; UW 28334, 2 (205–215 mm), 60.47°N, 179.117°W, 300 m depth, M/V *Discovery Bay*, cruise 197901, haul 47, C. M. Lynde, 17 July 1979. **Aleutian Islands**: UW 117458, 1 (95.8 mm), 52.2131°N, 179.9512°W, 97 m depth, W. C. Flerx, 23 June 2000, F/V *Vesteraalen*, cruise 200001, haul 135; UW 116265, 2 (124.4–143.6 mm), 53.1129°N, 168.9891°W, 262 m depth, J. W. Orr, 11 June 2006, F/V *Gladiator*, cruise 200601, haul 18; CAS 47480, 2 (125–137 mm), 52.2728°N, 175.8745°E, 254 m depth, T. Iwamoto, 14 August 1980, *Hatsue Maru No. 62*, cruise 198001, haul 88; UW 116856, 1 (134.4 mm), 53.9601°N, 166.5092°W, 132 m depth, W. C. Flerx, 23 May 2000, F/V *Vesteraalen*, cruise 200001, haul 16; UW 116859, 1 (123.2 mm), 51.7989°N, 175.1957°W, 273 m depth, K. Pearson, 14 June 2000, F/V *Dominator*, cruise 200001, haul 95; UW 116860, 1 (127.8 mm), 51.7882°N, 175.3016°W, 264 m depth, K. Pearson, 14 June 2000, F/V *Dominator*, cruise 200001, haul 96; UW 116858, 1 (99.9 mm), 53.1120°N, 168.9929°W, 257 m depth, J. W. Orr, 25 May 2000, F/V *Dominator*, cruise 200001, haul 32; UW 116857, 1 (123.5 mm), 51.7882°N, 175.3016°W, 264 m depth, K. Pearson, 14 June 2000, F/V *Dominator*, cruise 200001, haul 96; UW 47849, 1 (97.3 mm), 51.6159°N, 179.1042°W, 285 m depth, E. S. Brown, 16 July 2002, F/V *Vesteraalen*, cruise 200201, haul 188; UW 116841, 4 (139.7–175.8 mm), 52.6466°N, 170.2027°W, 234 m depth, J. W. Orr, 15 June 2006, F/V *Gladiator*, cruise 200601, haul 35; UW 116853, 3 (67.4–112.7 mm), 52.4138°N, 174.2834°E, 261 m depth, E. S. Brown, 12 July 2000, F/V *Vesteraalen*, cruise 200001, haul 198; UW 155110, 2 (135.0–165.0 mm), 51.8654°N, 178.3730°E, 234 m depth, W. C. Flerx & N. E. Roberson, 11 July 2010, F/V *Sea Storm*, cruise 201001, haul 115; UW 116862, 1 (154.9 mm), 52.2756N, 173.1217°W, 255 m depth, J. W. Orr, 3 June 2000, F/V *Dominator*, cruise 200001, haul 66; UW 116854, 5 (130.4–153.3 mm), 51.8153°N, 174.9788°W, 257 m depth, K. Pearson, 13 June 2000, F/V *Dominator*, cruise 200001, haul 93; UW 110296, 1 (182.0 mm), 52.1873°N, 173.5792°E, 271 m depth, 12 September 1991, F/V *Green Hope*, cruise 199101, haul 140; KU 27997, 1 (109.8 mm), 51.7696°N, 177.6929°E, 243 m depth, K. Shaw, 28 July 1997, F/V

Vesteraalen, cruise 199701, haul 183; UW 116851, 1 (125.6 mm), 52.0821ºN, 179.3595ºE, 313 m depth, K. Pearson, 23 June 2000, F/V *Dominator*, cruise 200001, haul 137; UW 116855, 2 (136.2–141.3 mm), 51.6349ºN, 176.2665ºW, 233 m depth, K. Pearson, 16 June 2000, F/V *Dominator*, cruise 200001, haul 106; UW 48118, 1 (167.0 mm), 51.7866ºN, 178.116ºW, 156 m depth, 14 July 1997, F/V *Vesteraalen*, cruise 199701, haul 139; UW 116861, 1 (248.0 mm), 51.4596ºN, 178.6107ºE, 346 m depth, K. Pearson, 1 July 2000, F/V *Dominator*, cruise 200001, haul 161; UW 116852, 1 (140.3 mm), 51.8854ºN, 175.1983ºW, 156 m depth, K. Pearson, 17 June 2000, F/V *Vesteraalen*, cruise 200001, haul 104; UW 112056, 1 (147 mm), 52.5481ºN, 170.1046ºW, 238 m depth, 14 June 2004, F/V *Sea Storm*, cruise 200401, haul 32, J. W. Orr; UW 112061, 1 (150 mm), 51.9551ºN, 175.2663ºW, 92 m depth, 29 June 2004, F/V *Sea Storm*, cruise 200401, haul 89, R. N. Clark; UW 112064, 5 (98–150 mm), 1.6371ºN, 176.2576ºW, 235 m depth, 1 July 2004, F/V *Sea Storm*, cruise 200401, haul 95, N. W. Raring; UW 112064(c/s), 1 (126 mm), 51.6371ºN, 176.2576ºW, 235 m depth, 1 July 2004, F/V *Sea Storm*, cruise 200401, haul 95, N. W. Raring; UW 112067, 1 (330 mm), 51.6104ºN, 178.8605ºW, 321 m depth, 5 July 2004, F/V *Sea Storm*, cruise 200401, haul 118, J. Conner; UW 46654, 1 (125 mm), 52.3083ºN, 175.8022ºW, 255 m depth, 9 August 1997, F/V *Dominator*, cruise 199701, haul 242; UW 47844, 5 (97–145 mm), 51.7862ºN, 175.336ºW, 262 m depth, 11 June 2002, F/V *Vesteraalen*, cruise 200201, haul 59, R. N. Clark; UW 47846, 2 (140–152 mm), 52.1516ºN, 175.6259ºW, 208 m depth, 13 June 2002, F/V *Vesteraalen*, cruise 200201, haul 67, R. N. Clark; UW 47850, 3 (90–142 mm), 51.9631ºN, 178.1881ºE, 258 m depth, 5 July 2002, F/V *Vesteraalen*, cruise 200201, haul 149, A. Abookire; UW 47854, 2 (130–140 mm), 51.7862ºN, 175.336ºW, 262 m depth, 11 June 2002, F/V *Vesteraalen*, cruise 200201, haul 59, R. N. Clark; UW 48116, 1 (290 mm), 51.6107ºN, 177.1438ºW, 306 m depth, 11 July 1997, F/V *Vesteraalen*, cruise 199701, haul 127, M. Zimmerman; UW 48117, 1 (295 mm), 54.2376ºN, 165.9087ºW, 59 m depth, 12 June 1997, F/V *Dominator*, cruise 199701, haul 5, W. C. Flerx; UW 48126, 3 (270–280 mm), 54.3802ºN, 165.7917ºW, 246 m depth, 11 June 1997, F/V *Dominator*, cruise 199701, haul 3, R. C. Harrison; UW 110055, 1 (340 mm), 51.3687ºN, 178.9022ºE, 168 m depth, 3 September 1991, F/V *Ocean Hope*, cruise 199101, haul 162; UW 110157, 8 (185–270 mm), 51.9015ºN, 178.201ºE, 265 m depth, 4 September 1991, F/V *Ocean Hope*, cruise 199101, haul 168; UW 110290, 2 (181–193 mm), 51.9055ºN, 178.134ºE, 229 m depth, 19 September 1991, F/V *Green Hope*, cruise 199101, haul 156; UW 110295, 1 (128 mm), 51.8965ºN, 178.2418ºE, 221 m depth, 20 September 1991, F/V *Ocean Hope*, cruise 199101, haul 160; UW 111906, 6 (120–153 mm), F/V *Sea Storm*, cruise 200401; UW 111921, 1 (305 mm), 51.6519ºN, 178.4573ºW, 351 m depth, 4 July 2004, F/V *Sea Storm*, cruise 200401, haul 113; UW 112507, 2 (240–280 mm), 52.0720ºN, 179.7367ºW, 326 m depth, 22 June 2000, F/V *Dominator*, cruise 200001, haul 132, K. Pearson; UW 112629, 1 (87 mm), 51.2527ºN, 179.2008ºE, 151 m depth, 20 July 2004, F/V *Gladiator*, cruise 200401, haul 172; UW 112654, 5 (100–180 mm), 51.7865ºN, 175.3348ºW, 264 m depth, 28 June 2004, F/V *Gladiator*, cruise 200401, haul 85; UW 112687, 1 (145 mm), 51.6178ºN, 179.092ºW, 277 m depth, 5 July 2004, F/V *Sea Storm*, cruise 200401, haul 119, R. N. Clark; UW 112690, 1 (260 mm), 52.5275ºN, 172.9399ºE, 213 m depth, 29 July 2004, F/V *Sea Storm*, cruise 200401, haul 217, J. Stark; UW 112696, 3 (285–315 mm), 51.6598ºN, 178.4928ºW, 383 m depth, 3 July 2004, F/V *Gladiator*, cruise 200401, haul 112, M. H. Martin; UW 116271, 1 (95 mm), 52.1634ºN, 179.4879ºE, 249 m depth, 13 July 2002, F/V *Vesteraalen*, cruise 200201, haul 176, A. Abookire; UW 116475, 1 (135 mm), 52.4399ºN, 173.7739ºW, 253 m depth, F/V *Sea Storm*, cruise 200201, haul 159, J. W. Orr; UW 117588, 1 (127 mm), 51.9092ºN, 178.255ºE, 265 m depth, 21 July 2004, F/V *Gladiator*, cruise 200401, haul 176, R. N. Clark; UW 118520, 1 (155 mm), 51.6068ºN, 178.8602ºW, 262 m depth, 4 July 2004, F/V *Gladiator*, cruise 200401, haul 117; UW 118521, 1 (130 mm), 52.1634ºN, 179.4879ºE, 249 m depth, 13 July 2002, F/V *Vesteraalen*, cruise 200201, haul 176, R. N. Clark; UW 118526, 1 (125 mm), 51.7865ºN, 175.3348ºW, 264 m depth, 28 June 2004, F/V *Gladiator*, cruise 200401, haul 85, G. C. Jensen; UW 119095, 1 (140 mm), 52.6953ºN, 169.8542ºW, 211 m depth, 22 May 2009, F/V *Vesteraalen*, cruise 200901, haul 3; UW 119717, 4 (100–140 mm), 52.6675ºN, 169.9173ºW, 245 m depth, 22 May 2009, F/V *Sea Storm*, cruise 200901, haul 1, P. von Szalay; UW 150775, 1 (180 mm), 51.2479ºN, 179.2124ºW, 209 m depth, 27 July 2010, F/V *Sea Storm*, cruise 201001, haul 169, K. P. Maslenikov; UW 150782, 2 (120–125 mm), 51.9926ºN, 178.0372ºW, 226 m depth, 13 July 2010, F/V *Sea Storm*, cruise 201001, haul 124, W. C. Flerx; UW 152100, 1 (135 mm), 52.5398ºN, 170.0765ºW, 236 m depth, 17 June 2012, F/V *Ocean Explorer*, cruise 201201, haul 39; UW 47843, 1 (142 mm), 52.1516ºN, 175.6259ºW, 208 m depth, 13 June 2002, F/V *Vesteraalen*, cruise 200201, haul 67, C. Rooper; UW 47847, 1 (77 mm), 52.2669ºN, 176.1273ºE, 232 m depth, 16 July 2002, F/V *Sea Storm*, cruise 200201, haul 135, J. W. Orr; UW 47851, 1 (260 mm), 52.8351ºN, 172.2973ºE, 362 m depth, 20 June 2002, F/V *Vesteraalen*, cruise 200201, haul 99, C. Rooper; UW 48119, 1 (160 mm), 51.5994ºN, 177.5987ºW, 238 m depth, 12

July 1997, F/V *Vesteraalen*, cruise 199701, haul 129; UW 48120, 2 (145–170 mm), 51.8081ºN, 175.2381ºW, 243 m depth, 7 July 1997, F/V *Vesteraalen*, cruise 199701, haul 108; UW 48121, 1 (125 mm), 51.5721ºN, 177.7926ºW, 240 m depth, 12 July 1997, F/V *Dominator*, cruise 199701, haul 126, R. R. Lauth; UW 48122, 1 (210 mm), 51.9083ºN, 178.2514ºE, 269 m depth, 29 July 1997, F/V *Vesteraalen*, cruise 199701, haul 189, J. W. Orr; UW 48125, 2 (165–180 mm), 51.8159ºN, 174.9749ºW, 261 m depth, 7 July 1997, F/V *Vesteraalen*, cruise 199701, haul 105; UW 48128, 1 (180 mm), 51.8208ºN, 174.7216ºW, 251 m depth, 7 July 1997, F/V *Vesteraalen*, cruise 199701, haul 104, M. Zimmerman. **Gulf of Alaska:** UW 3666, 4 (146.4–190.8 mm), Alexander Archipelago, Kupreanof Island, Frederick Sound, off Petersburg, 56.85ºN, 132.9ºW, D. S. Rustad, 1 June 1934; NMC 1967-0103, 2 (73.8–129.7 mm), Southeast Alaska, SE tip of Douglas Island, 58.3ºN, 134.5ºW, M/V *Sun Fury*, H. D. Tait, 28 March 1959; FNMH 32758, 1 (148.3 mm), Alaska, Petersburg, 56.8ºN, 133ºW, summer 1934; NMC 67-104, 1 (108.2 mm), Alaska, Frederick Sound, Thomas Bay, 57ºN, 133ºW, 20 January 1958; UW 15761, 1 (232.0 mm), Alaska, Glacier Bay; UW 7348, 2 (182.5–232.0 mm), Alexander Archipelago, Tenakee Inlet, Chatham Strait, 57.76ºN, 135.24ºW.

Careproctus acanthodes. **Sea of Japan:** UW 117962, 3 (93.7–103.7 mm), off Saikai, Ishikawa Prefecture, central Sea Of Japan, 37.14ºN, 136.5ºE; FAKU 135570–72, 3 (88.1–102.2 mm); FAKU 131146–48, 131169, 4 (90.2–92.8 mm), 37.14ºN, 136.5ºE; NMCI-P 1865, 1 (82.9 mm), 37.14ºN, 136.5ºE; FAKU 135569, 2 (68.3–79.2 mm); FAKU 134906, 1 (66.9 mm); FAKU 130588–130590, 3 (84.3–93.3 mm), 37.14ºN, 136.5ºE; NMCI-P 2090-91, 2 (91.8–96.0 mm), Saikai, Ishikawa, 37.14ºN, 136.5ºE; FAKU 130974–130977, 4 (87.8–104.7 mm), 37.14ºN, 136.5ºE. **Russia:** SU 69905 (out of SU 22371), 1 (71.1 mm), southern Sea of Okhotsk, off Cape Patience, Sakhalin Island, 48.5417°N, 145.1458°E, *Albatross* station 5021, 114 m depth, 27 September 1906.

Careproctus pellucidus. **Pacific coast of Japan:** FAKU 131325–44, 131348, 21 (92.6–168.6 mm), 37.05ºN, 141.5ºE; FAKU 130715, 1 (160.4 mm), 39ºN, 142.3ºE; HUMZ 72492, 1 (138.7 mm), 37.17ºN, 142.03ºE; HUMZ 175938, 1 (143.6 mm), Hokkaido, 42.5ºN, 144ºE; HUMZ 90316, 1 (144.4 mm), 37.05ºN, 141.5ºE; FAKU 134731, 134738, 134743, 134749, 134751, 5 (102.3–175.0 mm), Iwaki, Fukushima, ca. 37.05ºN, 141.09ºE, 300 m depth; FAKU 201664–672, 9 (124.8–151.11 mm), off Iwaki, Fukushima, 145 m depth; HUMZ 67592, 1 (285.5 mm), Hokkaido, 42.5ºN, 144ºE; HUMZ 67593, 1 (213.9 mm), Hokkaido, 42.5ºN, 144ºE; FAKU 135317, 1 (210.0 mm), off Miyako, Iwate Prefecture.

Careproctus phasma. **Bering Sea:** UW 151271, 1 (95 mm), 59.9914ºN, 175.2632ºW, 116 m depth, J. Conner, 17 July 2011, F/V *Aldebaran*, cruise 201101, haul 164; UW 114747, 1 (107 mm), 58.9863ºN, 172.4314ºW, 99 m depth, 10 July 2001, F/V *Arcturus*, cruise 200101, haul 158, E. Acuña; UW 119083, 1 (175 mm), 61.3332ºN, 175.5939ºW, 97 m depth, 15 July 2009, F/V *Arcturus*, cruise 200901, haul 173, L. L. Britt; UW 151272, 1 (75 mm), 61.6763ºN, 174.4323ºW, 77 m depth, J. Conner, 19 July 2011, F/V *Aldebaran*, cruise 201101, haul 174; UW 151291, 3 (70–85 mm), 62.0072ºN, 174.4709ºW, 73 m depth, J. Conner, 19 July 2011, F/V *Aldebaran*, cruise 201101, haul 173; UW 151292, 3 (75–95 mm), 61.3539ºN, 176.9609ºW, 116 m depth, J. Conner, 21 July 2011, F/V *Aldebaran*, cruise 201101, haul 181; UW 151293, 6 (57–200 mm), 61.3332ºN, 174.3417ºW, 78 m depth, J. Conner, 18 July 2011, F/V *Aldebaran*, cruise 201101, haul 169; UW 151294, 2 (78–85 mm), 61.3326ºN, 175.6870ºW, 97 m depth, 18 July 2011, J. Conner, F/V *Aldebaran*, cruise 201101, haul 167; UW 151295, 6 (55–130 mm), 61.3327ºN, 173.6016ºW, 73 m depth, J. Conner, 18 July 2011, F/V *Aldebaran*, cruise 201101, haul 170; UW 151296, 2 (70–128 mm), 60.3291ºN, 175.38ºW, 110 m depth, J. Conner, 17 July 2011, F/V *Aldebaran*, cruise 201101, haul 165; UW 117941, 1 (89.0 mm), 59.0006ºN, 176.3071ºW, 135 m depth, 23 July 2008, F/V *Aldebaran*, cruise 200801, haul 207; UW 41768, 1 (147.9 mm), south of St. Lawrence Is., 61.9167ºN, 175ºW, *Oshoro Maru*, bottom trawl, sta. 37, 105 m depth, M. S. Busby, 30 July 1996; UW 28349, 1 (82.4 mm), 58.8ºN, 172.7167ºW, 102 m depth, G. Smith, 13 July 1979, M/V *Paragon II*, cruise 197901, haul 207; UW 151862, 1 (68.0 mm), 60.9800ºN, 177.6242ºW, 132 m depth, L. L. Britt, 28 July 2010, F/V *Alaska Knight*, cruise 201001, haul 212; UW 150781, 1 (126.0 mm), 59.8354ºN, 172.2781ºW, 75 m depth, 2 July 2008, F/V *Aldebaran*, cruise 200801, haul 123; UW 116850, 1 (222.8 mm), 61.3292ºN, 174.3579ºW, 80 m depth, 22 July 1997, F/V *Arcturus*, cruise 199701, haul 172; UW 117934, 2 (153.7–191.0 mm), 61.6885ºN, 175.787ºW, 95 m depth, L. L. Britt, 17 July 2008, F/V *Aldebaran*, cruise 200801, haul 176; UW 154447, 2 (190.0 mm), 60.9989ºN, 175.5155ºW, 102 m depth, L. L. Britt, 21 July 2011, F/V *Alaska Knight*, cruise 201101, haul 179; UW 28342, 1 (168.1 mm), 59.6667ºN, 171.2667ºW, 70 m depth, M. Wilkins, 22 July 1978, M/V *Paragon II*, cruise 197801, haul 106; UW 151859, 1 (56.0 mm), 61.006ºN, 174.1614ºW, 84 m depth, L. L. Britt, 2 August 2010, F/V *Alaska Knight*, cruise 201001, haul 234; UW 151858, 1 (86.5 mm), 60.6682ºN, 177.5325ºW, 147 m depth, L. L. Britt, 28 July 2010, F/V *Alaska Knight*, cruise 201001,

haul 211; UW 151857, 1 (65.5 mm), 59.6613ºN, 173.2783ºW, 95 m depth, L. L. Britt, 23 July 2010, F/V *Alaska Knight*, cruise 201001, haul 186; UW 151418, 1 (62.6 mm), 61.0088ºN, 176.9635ºW, 121 m depth, 17 July 2009, F/V *Arcturus*, cruise 200901, haul 182; UW 41770, 1 (164.5 mm), 62.5ºN, 173ºW, 63 m depth, M. S. Busby, 28 July 1996, *Oshoro Maru*, south of St. Lawrence Is; UW 154843, 1 (160.4 mm), 61.0002ºN, 176.9803ºW, 119 m depth, 9 July 1980, F/V *Ocean Harvester*, cruise 198001, haul 188; UW 116378, 1 (70.1 mm), 59.6768ºN, 171.2535ºW, 74 m depth, G. R. Hoff, 3 July 2005, F/V *Arcturus*, cruise 200501, haul 127; UW 28325, 2 (76.3–100.2 mm), 59.5ºN, 172.7833ºW, 91 m depth, 14 July 1979, M/V *Paragon II*, cruise 197901, haul 212; UW 117919, 1 (151.4 mm), 62.010ºN, 175.8268ºW, 92 m depth, 17 July 2008, 78 m depth, F/V *Aldebaran*, cruise 200801, haul 175; UW 117346, 1 (77.8 mm), 60.6664ºN, 175.4575ºW, 105 m depth, 21 July 1997, F/V *Aldebaran*, cruise 199701, haul 167; UW 41771, 1 (108.1 mm), south of St. Lawrence I., 61.3333ºN, 176ºW, M. S. Busby, 29 July 1996, NOAA Ship *Miller Freeman*, bottom trawl, sta. 41; UW 117345, 1 (160.4 mm), St. Lawrence I. area, 62.5ºN, 172.9517ºW, 57 m depth, 28 July 1997, NOAA Ship *Miller Freeman*, cruise 10MF97, haul 2, bottom trawl, large mesh, sta. 28, net 1; UW 117350, 4 (70.0–134.5 mm), 61.3278ºN, 173.6006ºW, 75 m depth, 22 July 1997, F/V *Arcturus*, cruise 199701, haul 173; UW 117343, 2 (61.4–78.3 mm), 59.3348ºN, 173.1404ºW, 101 m depth, 13 July 1997, F/V *Arcturus*, cruise 199701, haul 150; UW 117462, 1 (86.1 mm), 59.6616ºN, 174.4665ºW, 115 m depth, G. R. Hoff, 21 July 1997, F/V *Arcturus*, cruise 199701, haul 166; UW 117459, 1 (90.2 mm), 60.9863ºN, 175.5439ºW, 102 m depth, G. R. Hoff, 25 July 1998, F/V *Aldebaran*, cruise 199801, haul 165; UW 117929, 1 (143.6 mm), 59.3269ºN, 170.5334ºW, 68 m depth, D. Nichol, 30 June 2008, F/V *Arcturus*, cruise 200801, haul 111; UW 28323, 1 (169.4 mm), 62.6189ºN, 173.483ºW, 67 m depth, G. Smith, 19 July 1979, *Shotoku Maru*, cruise 1979, haul 105; UW 117915, 1 (131.6 mm), 61.3210ºN, 174.3263ºW, 78 m depth, 16 July 2008, F/V *Arcturus*, cruise 200801, haul 175; UW 117461, 1 (56.6 mm), 60.3277ºN, 174.0854ºW, 92 m depth, E. Acuña, 14 July 2003, F/V *Arcturus*, cruise 200301, haul 158; HUMZ 73075, 1 (272.0 mm), 59.23ºN, 175.15ºW; UW 117456, 1 (54.3 mm), 61.3223ºN, 173.5845ºW, 74 m depth, G. R. Hoff, 20 July 2007, F/V *Aldebaran*, cruise 200701, haul 174; UW 117932, 2 (140.7–176.7 mm), 59.9943ºN, 173.9712ºW, 97 m depth, 15 July 2008, F/V *Arcturus*, cruise 200801, haul 169; UW 117931, 1 (118.1 mm), 59.6561ºN, 170.5769ºW, 66 m depth, D. Nichol, 30 June 2008, F/V *Arcturus*, cruise 200801, haul 112; UW 117936, 5 (129.1–190.6 mm), 61.6765ºN, 175.0699ºW, 85 m depth, 16 July 2008, F/V *Arcturus*, cruise 200801, haul 177; UW 117916, 1 (178.9 mm), 60.6702ºN, 173.4694ºW, 67 m depth, L. L. Britt, 15 July 2008, F/V *Aldebaran*, cruise 200801, haul 168; UW 28286, 1 (215 mm), 59.9856ºN, 172.4008ºW, 70 m depth, *Shotoku Maru*, 197901, haul 87, G. Smith; UW 28330, 1 (142 mm), 59.0189ºN, 171.001ºW, 14 July 1979, G. Small; UW 41768, 1 (160 mm), 61.9167ºN, 175ºW, 57 m depth, *Oshoru Maru*, station 37, M. S. Busby; UW 112570, 2 (125–150 mm), 59.0314ºN, 171.7894ºW, 85 m depth, 4 July 2000, F/V *Arcturus*, cruise 200001, haul 143; UW 119158, 29 (130–185 mm), 60.6676ºN, 176.7736ºW, 128 m depth, 17 July 2009, F/V *Arcturus*, cruise 200901, haul 179, L. L. Britt; UW 46616, 2 (138–230 mm), 58.6717ºN, 171.1108ºW, 83 m depth, 13 July 1996, F/V *Aldebaran*, cruise 199601, haul 139. **Gulf of Alaska:** UW 28657, 1 (75.6 mm), 56.8167ºN, 154.3667ºW, 57 m depth, 28 May 1973, NOAA Ship *John N. Cobb*, cruise 197303, haul 26; UW 154442, 1 (102.9 mm), 58.2548ºN, 151.4142ºW, 157 m depth, J. W. Orr, 29 July 2005, F/V *Northwest Explorer*, cruise 200501, haul 286; UW 153145, 1 (71.5 mm), 58.6614ºN, 151.4817ºW, 183 m depth, E. Jorgensen, 9 July 2013, F/V *Sea Storm*, cruise 201301, haul 179; UW 115764, 1 (101.0 mm), 57.2877ºN, 156.172ºW, 198 m depth, L. L. Britt, 13 June 1999, F/V *Vesteraalen*, cruise 199901, haul 126; UW 153144, 1 (76.7 mm), 58.6965ºN, 151.7285ºW, 163 m depth, E. Jorgensen, 9 July 2013, F/V *Sea Storm*, cruise 201301, haul 178; UW 154443, 2 (81.8–85.1 mm), 58.8839ºN, 150.8682ºW, 170 m depth, W. C. Flerx, 15 July 2009, F/V *Sea Storm*, cruise 200901, haul 227; UW 153143, 1 (72.0 mm), 56.6638ºN, 156.3255ºW, 196 m depth, E. Jorgensen, 24 June 2013, F/V *Sea Storm*, cruise 201301, haul 112; UW 42945, 1 (80.6 mm), east of Kodiak Is., 58ºN, 151ºW, 170–192 m depth, D. W. Kessler, 18 May 1975, R/V *Oregon*, cruise 197501, sta. 966; UW 117460, 1 (83.4 mm), 57.5254ºN, 154.7306ºW, 184 m depth, 19 June 1999, F/V *Vesteraalen*, cruise 199901, haul 140; UW 117969, 1 (84.6 mm), 55.5579ºN, 156.6955ºW, 182 m depth, J. W. Orr, 4 June 1999, F/V *Morning Star*, cruise 199901, haul 71; HUMZ 102027, 1 (138.2 mm), 55.29ºN, 156.21ºW.

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