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Revision of the Manefish Genera *Caristius* and *Platyberyx* (Teleostei: Percomorpha: Caristiidae), with Descriptions of Five New Species

Duane E. Stevenson¹ and Christopher P. Kenaley²

The family Caristiidae, commonly known as manefishes or veiflins, includes several species of mesopelagic, oceanic fishes found throughout the major ocean basins of the world. We present herein the second part of our revision of the family, including all of the “large-mouth” species, which are distinguished from other members of the family by having a narrow suborbital space and a long upper jaw that extends to mid-orbit or beyond and which is visible externally, not covered by the thin bones of the suborbital series. This group, which is comprised of the genera *Platyberyx* and *Caristius*, is described in full, including descriptions of five new species. The genus *Platyberyx*, which includes six species, three of which are newly described, is distinguished from all other caristiid genera by the presence of a conspicuous lateral line with large scales. The genus *Caristius*, with four species, two of which are newly described, is distinguished from *Platyberyx* by the absence of a conspicuous lateral line and by the presence of serrated ventral caudal-fin rays. Species in both genera are distinguished from each other on the basis of meristics, morphometrics, dentition, and gill-raker morphology. Most of the species described here are relatively widespread; species of *Platyberyx* appear to be more common in the Atlantic basin, while *Caristius* is more common in the Pacific.

THE desperate need for a taxonomic revision of the percomorph family Caristiidae has been widely recognized for decades (Scott et al., 1970; Heemstra, 1986; Post, 1990; Hartel and Triant, 1998; Paxton, 2001). These mesopelagic fishes, known as manefishes or veiflins, are found throughout the oceans of the world, but appear to be relatively uncommon. Most authors have recognized either the single genus *Caristius* (Post, 1990) or have included all known species in the two genera *Caristius* and *Platyberyx* (Maul, 1949; Post, 1986). However, Trunov et al. (2006) recently erected the genus *Paracaristius* to accommodate their newly described *P. heemstrai*, although they designated *P. maderensis* (Maul, 1949) as the type species for the genus. *Paracaristius* was distinguished from all other caristiids by the expanded suborbital series, jaw morphology, and dentition (Trunov et al., 2006).

As part of an ongoing comprehensive revision of the family, Stevenson and Kenaley (2011) described three more caristiid species. They recognized the suite of morphological characters that Trunov et al. (2006) used to diagnose *Paracaristius* and that the three new species shared that morphology. However, recognizing unique characteristics of the dentition, dorsal-fin origin and support, lateral-line morphology, and other characters, they considered *P. heemstrai* sufficiently different from all other caristiids to warrant placement in its own genus. Because Trunov et al. (2006) had designated *P. maderensis* as the type species of *Paracaristius*, Stevenson and Kenaley (2011) erected another new genus, *Neocaristius*, for *P. heemstrai* and to include their three new species along with *P. maderensis* in the genus *Paracaristius*. Together, the genera *Neocaristius* and *Paracaristius* include all known “small-mouth” species of Caristiidae, which are distinguished by an expanded suborbital series, overlapping bones of the upper jaw that create a broad space between the orbit and the mouth, and a short upper jaw, extending approximately to midorbit.

The remaining species of the Caristiidae are the “large-mouth” forms, characterized by a narrow suborbital space and long upper jaw, extending to or beyond mid-orbit

(Stevenson and Kenaley, 2011). Some authors (Maul, 1949, 1954; Post, 1986; Kukuev et al., 2012) have recognized two genera in this group, *Platyberyx* and *Caristius*, while others (Post, 1990; Trunov et al., 2006) have considered *Platyberyx* a synonym of *Caristius*. Until recently, this group included five nominal species: *Pteraclis macropus* Bellotti, 1903; *Caristius japonicus* Gill and Smith, 1905; *Platyberyx opalescens* Zugmayer, 1911; *Pteraclis fasciatus* Borodin, 1930; and *Caristius groenlandicus* Jensen, 1941. Kukuev et al. (2012) described two additional species (*Platyberyx maui* and *Caristius andriashevi*) from the eastern Atlantic, established an unjustified neotype for *P. opalescens*, and provided diagnoses for *Platyberyx* and *Caristius*. However, their conclusions were based on limited material, and they did not examine all relevant type specimens. Most recently, Britz and Hartel (2012) provided additional evidence that *Pteraclis fasciatus* Borodin is a senior synonym of *Caristius groenlandicus* Jensen, as suggested by Hartel and Triant (1998).

This work is the second of a two-part series and together with Stevenson and Kenaley (2011) constitutes a complete worldwide revision of the Caristiidae. Stevenson and Kenaley (2011) covered the genera *Neocaristius* and *Paracaristius*, which together represent the “small-mouth” forms. This paper covers the “large-mouth” forms, represented by the genera *Platyberyx* and *Caristius*, including the forms recently described by Kukuev et al. (2012) and reflecting the synonymy proposed by Britz and Hartel (2012). Here we describe five new species, correct some misconceptions propagated by Kukuev et al. (2012), and refine the generic diagnoses for *Platyberyx* and *Caristius* to reflect a more global perspective than that presented in the regional treatment of Kukuev et al. (2012).

MATERIALS AND METHODS

Methods of counting and measuring follow Hubbs and Lagler (1958), except that body depth is measured through the dorsal insertion of the pectoral fin. The last two rays of

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Table 1. Meristics and Proportional Morphometrics of Known Species of *Platyberyx*.

	<i>Platyberyx andriashevi</i>			<i>Platyberyx mauii</i>			<i>Platyberyx opalescens</i>		
	Range	Mean	<i>n</i>	Range	Mean	<i>n</i>	Range	Mean	<i>n</i>
Standard length (mm)	32–196		18	110–126		2	30–125		29
Vertebrae	14–16 + 22–24 (36–39)	15.1 + 22.8 (37.9)	16	15–16 + 18 (33–34)	15.5 + 18 (33.5)	2	14–16 + 17–19 (32–34)	15.0 + 17.9 (32.8)	29
Dorsal-fin rays	31–35	32.9	16	28	28	2	27–29	28.0	27
Anal-fin rays	20–22	21.1	16	17	17	2	17–19	18.0	28
Pectoral-fin rays	17–18	17.6	16	17–18	17.5	2	17–20	18.4	27
Vomerine teeth	3–12	6.9	15	11–12	11.5	2	5–26	15.1	27
Palatine teeth	3–12	7.2	15	12–16	14	2	5–20	10.5	27
Upper-jaw teeth	12–35	22.4	12	40		1	30–98	60.6	26
Lower-jaw teeth	11–26	19.7	7	52		1	27–90	48.9	26
Gill rakers	5–8 + 12–15 (18–22)	(20.3)	15	6 + 14 (20)	(20)	2	6–8 + 14–17 (20–24)	(21.6)	26
As %SL									
Body depth	37.9–49.6	43.6	18	45.6–52.2	48.9	2	52.3–63.6	57.9	13
Head length	24.2–39.9	30.4	18	30.4–33.9	32.1	2	38.2–48.8	41.5	13
Predorsal length	8.3–22.3	13.8	18	16.9–18.5	17.7	2	6.3–24.6	15.5	11
Prepectoral length	11.6–42.8	30.8	18	34.2–35.3	34.7	2	39.3–49.7	42.7	13
Prepelvic length	22.4–39.6	30.6	18	31.3–32.8	32.0	2	30.4–48.2	39.6	13
Pectoral-fin base	5.3–11.5	7.1	17	7.7–7.8	7.7	2	8.2–11.0	9.7	12
Preal length	44.6–58.1	49.5	18	55.1–55.5	55.3	2	54.8–64.0	59.7	13
Dorsal-fin base	65.9–80.8	75.1	18	75.4–79.1	77.2	2	65.1–76.5	71.4	13
Anal-fin base	31.6–53.3	43.2	18	34.6–40.8	37.7	2	29.4–38.8	35.1	13
Peduncle length	12.0–18.9	14.9	18	12–13.6	12.8	2	11.5–17.8	14.1	13
Peduncle depth	8.5–12.8	11.2	18	12.3–15.5	13.9	2	11.4–15.4	13.2	13
As %HL									
Upper-jaw length	58.8–74.7	65.6	18	53.5–66.8	60.1	2	46–65.9	54.7	11
Lower-jaw length	56.2–84.6	65.5	18	51.6–60.2	55.9	2	48.7–60.9	55.9	11
Bony-orbit width	40.0–52.6	43.6	18	41.2–44.2	42.7	2	44.9–61.5	51.9	13

the dorsal and anal fins articulate with the same pterygiophore and are here counted as a single element. Meristic data were obtained from standard and digital radiographs. Anomalous counts obtained from damaged fins are denoted by an asterisk (*) and are not included in ranges; lateral-line scale counts are not included in tables because the full series is rarely intact, and even complete series of scale pockets are rarely visible. Morphometric data are reported as percent head or standard length (HL and SL). Body measurements, rounded to the nearest 0.1 mm, were made with digital calipers. Counts and proportions for all species are summarized in Tables 1 and 2; counts in the text are presented as a range, with the holotype value in parentheses. Only subadults and adults larger than 20 mm SL were included in the study. Sex was determined by microscopic examination of gonads. Institutional abbreviations are as listed by Sabaj Pérez (2010).

Platyberyx Zugmayer, 1911

Type species.—*Platyberyx opalescens* Zugmayer, 1911, by monotypy.

Diagnosis.—*Platyberyx* is distinguished from all other caristiid genera by the presence of a conspicuous lateral line with large scales (vs. an inconspicuous lateral line with small scales). It is further distinguished from *Caristiis* by having simple lower caudal-fin rays (vs. serrated lower caudal rays),

and from *Neocaristiis* and *Paracaristiis* by a narrow suborbital space, with suborbital series not expanded to cover upper jaw (vs. wide suborbital space, with suborbital series expanded to cover upper jaw), and large mouth, with upper jaw extending to or beyond mid-orbit (vs. small mouth, with upper jaw extending approximately to mid-orbit).

Description.—Head laterally compressed, deep; anterior profile rounded, steeply sloping; snout extremely short. Nasal organ opening through two separate nares, both subcircular and without tubes, anteroventral opening generally smaller; olfactory rosette conspicuous. Eye moderate to large, covered with thick sclera. Suborbital space narrow, without scales, perforated by horizontally oriented suborbital lateralis canal and series of vertical canals. Opercular series thin and delicate, partially scaled; opercular flap rounded; exposed posterior margin of preopercle smooth. Cephalic lateralis system extensive, consisting of supraorbital, occipital, suborbital, preopercular, and mandibular canals and pores.

Mouth moderate to large, oblique; premaxilla partially hidden by suborbital shield; lower jaw deep, with broadly rounded anteroventral margin. Dentary and premaxillary teeth conical, often flexible in preserved specimens, curved posteriorly and slightly medially. Vomerine teeth present; palatine teeth usually present. Dorsal and ventral oral valves broad, with lateral margins tapering to attachment with oral roof and floor. Branchial chamber heavily pigmented. Gill

Table 1. Extended.

<i>Platyberyx paucus</i> , new species			<i>Platyberyx pietschi</i> , new species			<i>Platyberyx rhyton</i> , new species		
Range	Mean	<i>n</i>	Range	Mean	<i>n</i>	Range	Mean	<i>n</i>
21–100		4	34–93		4	146		1
14–15 + 16–17 (31)	14.3 + 16.3 (31)	4	15 + 18–20 (33–35)	15 + 19 (34)	3	15 + 19 (34)		1
24–26	25	4	30–31	30.3	3	30		1
15–16	15.8	4	18–19	18.3	4	18		1
16–17	16.5	4	17–18	17.5	4	18		1
1–6	3.5	4	8–10	9	4	11		1
Absent	NA	4	6–10	8.5	4	14		1
42		1	32–45	37.7	3	40		1
37		1	16–30	23	2	34		1
6–7 + 14–16 (21–23)	(21.8)	4	6–7 + 13–14 (19–21)	(20.3)	4	6 + 15 (21)		1
52.1–68.3	59.2	4	45.6–53.0	49.2	4	45.3		1
39.9–54.1	45.2	3	33.4–41.3	38.2	4	30.6		1
17.2–29.0	23.5	3	16.9–25.9	21.4	4	14.9		1
45.8–53.9	50.7	3	39.6–44.4	42.4	4	31.4		1
39.3–49.4	44.8	3	36.1–52.7	42.2	4	27.6		1
7.8–10.6	8.9	4	7.1–9.7	8.5	4	7.2		1
65.3–72.9	68.8	3	54.5–64.7	60.2	4	52.9		1
61.0–71.7	65.8	4	62.9–68.7	66.2	4	76.0		1
29.1–37.7	33.8	4	28.7–37.3	34.3	4	36.8		1
12.1–14.8	13.3	4	13.5–17.4	15.2	4	13.5		1
14.5–16.6	15.2	4	10.7–14.6	12.3	4	13.2		1
49.8–71.0	58.7	3	58.6–69.4	64.8	4	56.9		1
48.8–57.3	53.1	2	55.6–70.7	61.7	4	57.6		1
49.1–51.4	50.1	3	43.7–51.9	48.7	4	47.2		1

rakers on first arch in two series: lateral series of rakers relatively longer, medial series more stout and rounded. Pseudobranch present. Pharyngeal teeth small and conical; three distinct upper pharyngeal tooth patches, borne on pharyngobranchials 2–4; lower pharyngeal tooth patch borne on ceratobranchials 5. Dorsal surface of hyoid series smooth, without papillae or projections; articulation of interhyal and posterior ceratohyal without fleshy folds.

Body laterally compressed, deep, rectangular to elongate; caudal peduncle short and deep. Scales imbricate, cycloid and distinctly annulated. Exposed posterior margin of postcleithrum bearing one to several large axillary scales. Lateral line conspicuous, with large tubular pored scales. Dorsal fin large, delicate, base extending nearly entire length of body; dorsal-fin rays unsegmented, anterior rays unbranched, posterior rays branched; anteriormost dorsal-fin pterygiophores radiating anteriorly, not perpendicular to body axis, with proximal tips placed posteriorly. Anal fin large, delicate, originating approximately at mid-body and inserting slightly posterior to dorsal-fin insertion, consisting of soft unsegmented rays. Bases of dorsal and anal fins flanked along their entire length by a thin, scaled sheath, extending well onto posteriormost rays of both fins. Caudal fin truncate to slightly emarginated, heavily pigmented, with scales covering proximal portion of rays; ventral caudal rays not serrated; ventral procurrent caudal-fin rays laterally flattened, blade-like, with or without hook-like process. Pectoral fin delicate, elongate, fan-like; longest rays extending beyond

anal-fin origin; pectoral-fin base oblique, anterodorsal insertion well below lateral midline. Pelvic fin delicate, elongate, with one spine and five rays, flanked by shallow depression extending along ventral midline between pelvic-fin base and anal-fin origin.

Peritoneum dusky to black. Viscera unpigmented except for scattered melanophores on mesenteries. Pyloric caeca long, fingerlike. Swim bladder absent.

Remarks.—The genus *Platyberyx* includes at least six species, three of which are newly described here. Zugmayer's (1911) original description of *Platyberyx* was very brief and provided no characters to distinguish the genus from other taxa. Regan (1912:637), remarking upon the differences between *Caristius japonicus* and *Platyberyx opalescens*, noted that "As the former was in poor condition, not much importance can be attached to the supposed absence of the lateral line, which is well developed in the latter." Although they did not examine the type specimens of the type species of the two genera, Kukuev et al. (2012) provided diagnoses for both *Platyberyx* and *Caristius*, distinguishing them from each other on the basis of dentition (jaw teeth small, numerous, and mobile vs. larger, fewer, and immobile; vomer and palatine teeth numerous vs. relatively few) and meristics (dorsal-fin rays 25–32 vs. 32–37; anal-fin rays 17–19 vs. 19–23). They also noted that the lateral line in *Platyberyx* is present, but did not use this as a diagnostic character, as their *Caristius andriashevi* displays a prominent lateral line.

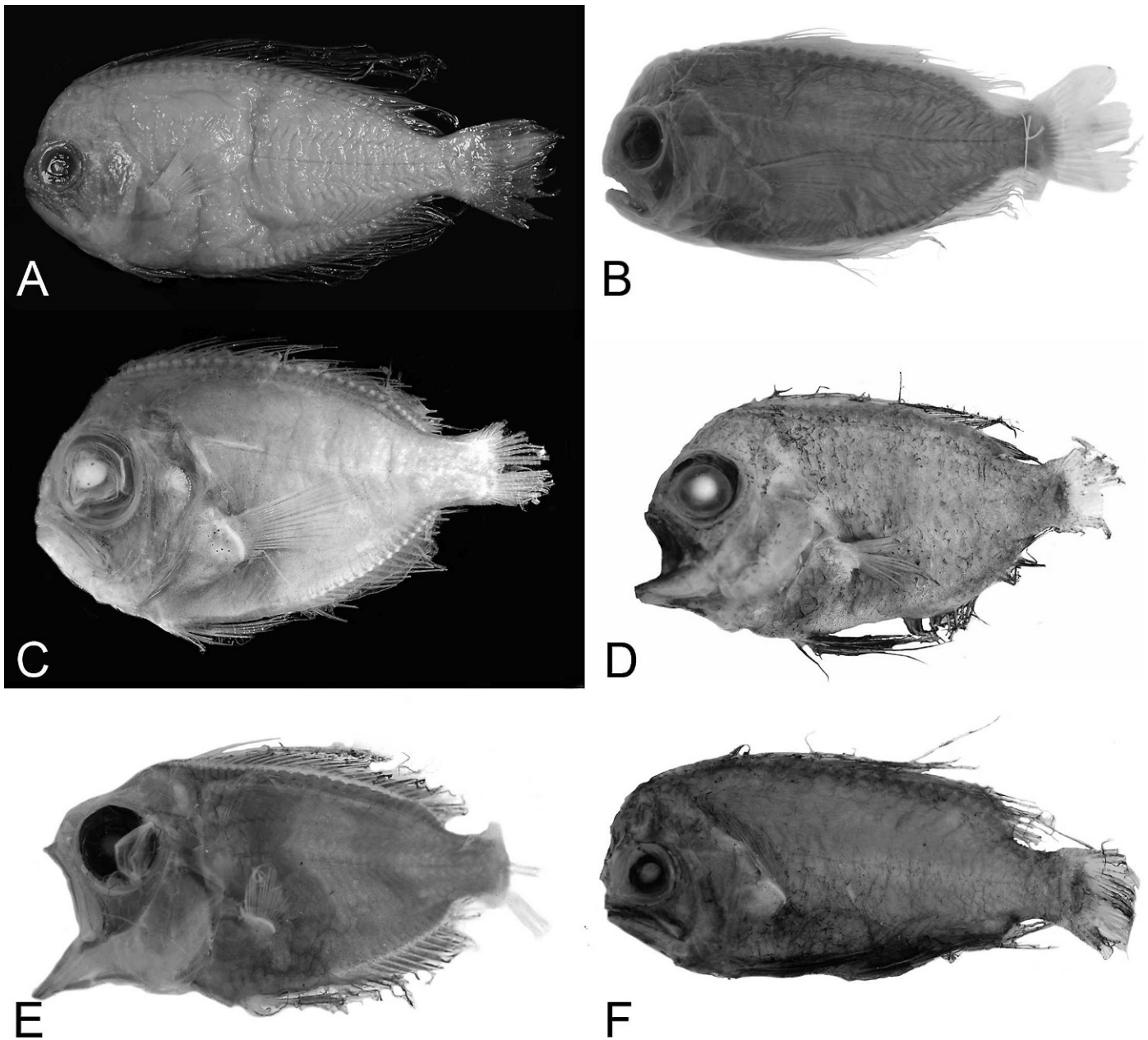


Fig. 1. (A) *Platyberyx andriashevi*, AMS I.21367-009, 163 mm SL; (B) *P. mauli*, MMF 2345, 110 mm SL; (C) *P. opalescens*, MOM 0091-1179, holotype, 51 mm SL; (D) *P. paucus*, new species, UW 151229, holotype, 89 mm SL; (E) *P. pietschi*, new species, UF 208616, holotype, 89 mm SL; and (F) *P. rhyton*, new species, NSMT-P59274, holotype, 146 mm SL.

In general, we agree that the teeth in species of *Platyberyx* tend to be smaller and more numerous than those of *Caristius*, and are also much less rigidly fixed in the jaws. It is also true that the meristics are generally lower in species of *Platyberyx* than those of *Caristius*. However, the placement of *P. andriashevi* (*C. andriashevi* of Kukuev et al., 2012) is problematic in this context, as it has dentition and meristics more typical of *Caristius*. We believe that the caudal osteology of this form unites it more convincingly with other lateral-line bearing species, and by extension the genus is more appropriately defined by lateral-line morphology and caudal osteology than by meristics and quantitative dentition characters. In addition, the holotypes of both type species are in relatively good condition and characters associated with the lateral line and caudal complex are easily observable and distinguishable between

the two taxa. Given the limited information contained in the original descriptions of the type species, the redefinition of these genera by Kukuev et al. (2012), without reference to type material and on the basis of very few specimens, has only added to the taxonomic confusion surrounding these taxa.

Etymology.—From the Greek *platy*, meaning “flat,” and *Beryx*, a genus of beryciform fishes.

***Platyberyx andriashevi* (Kukuev et al., 2012)**

Figures 1A, 2, 3; Table 1

Caristius andriashevi Kukuev et al., 2012:195.

Holotype.—ZIN 52278, 185 mm, S Atlantic, 18°22'S, 11°17'E, 1160–1145 m (not examined).

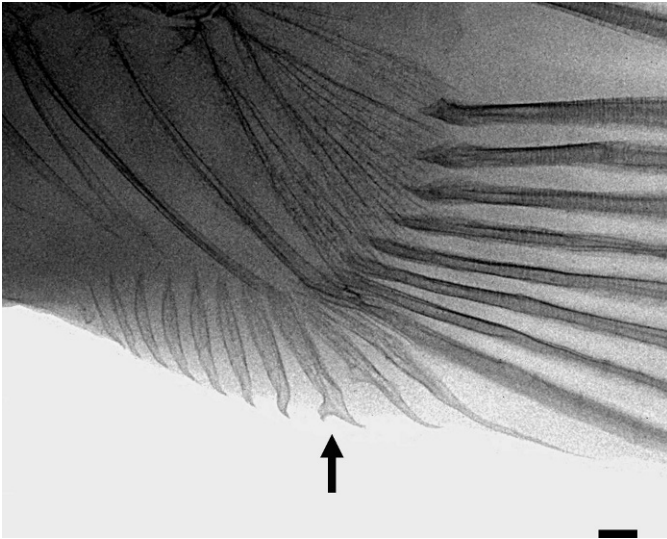


Fig. 2. Radiograph showing hook-shaped process on third posteriormost ventral procurrent caudal-fin ray of *Platyberyx andriashevi*, UF 228442, 157 mm SL. Scale bar = 1 mm.

Paratypes.—ZMMU 14331, 155 mm, S Atlantic, 4°08'S, 10°27'E, 700 m; AtlantNIRO uncatalogued, 167 mm, NW Atlantic, 56°30'N, 37°W, <2200 m (not examined).

Additional material.—AMS I.21367-009, 163 mm (♂), SW Pacific, off Australia, 33°16'S, 153°8'E, 0–750 m, 28 November 1979; BMNH 2005.4.28.4, 95 mm, NE Atlantic, off Madeira, 32.25°N, 15°W; BMNH 2005.4.28.5, 32 mm, W Indian Ocean, 12.62°S, 67.363°E; BMNH 2008.3.20.3, 133 mm, NE Atlantic, 17.493°N, 24.942°W; CAS 224889, 93 mm (♂), SE Atlantic, R/V *Dr Fridtjof Nansen* Sta. 109, 522–531 m, 11 March 2007, T. Iwamoto; CAS 230836, 149 mm

(♂), SE Atlantic, R/V *Dr Fridtjof Nansen* Sta. 90, 742–775 m, 9 March 2007, T. Iwamoto; CAS 230840, 118 mm, SE Atlantic, R/V *Dr Fridtjof Nansen* Sta. 3, 1°41.18'N, 7°28.74'E, 51–48 m, 11 May 2010; IORAS 2783, 155 mm (♂), central N Pacific, 30°N, 172°E, 11 February 1974; LACM 31165-1, 157 mm (♀), NE Pacific, off California, San Pedro Basin, 7.8 miles, 353° T from Long Point Light, 33.608°N, 118.434°W, R/V *Velero IV*, 26 May 1970; NMNZ 37715, 158 mm (♂), SW Pacific, 35°39'S, 165°56'E, 950 m; NMVA 5932, 87 mm, Australia, 40 km SE of Ulladulla, 35°27'S, 150°52'E, 18 May 1988; NMVA 22137, 196 mm, Australia, off western Tasmania, 40°59'S, 143°49'E, 3 May 2001; UF 213863, 92 mm, NW Atlantic, SE of Miami, 25°33'N, 79°48'W, 418–820 m, 15 October 1962; UF 217572, 38 mm, NW Atlantic, Gulf of Mexico, 23°54'N, 82°21'W, 1135–1184 m, 1 December 1964; UF 228442, 157 mm, Caribbean Sea, off Jamaica, NW of Montego Bay, 18°47'N, 78°16'W, 4777–4822 m, 9 July 1970; USNM 215659, 96 mm, central N Pacific, off Oahu, 21°15'N, 158°15'W, 700–740 m, 5 November 1972; USNM 215662, 149 mm, central N Pacific, off Oahu, 21°20'N, 158°20'W, 750–800 m, 2 March 1971; USNM 215666, 135 mm, central N Pacific, off Oahu, 21°15'N, 158°15'W, 720–905 m, 25 May 1972.

Diagnosis.—A species of *Platyberyx* distinguished from all congeners by having unusually high meristics: a combination of 36 or more vertebrae, 31 or more dorsal-fin rays, and 20 or more anal-fin rays. *Platyberyx andriashevi* can be further distinguished from all congeners, except *P. paucus* and *P. pietschi*, by the presence of laterally flattened, bladelike ventral procurrent caudal rays, and an anteriorly directed hook-like process on the third posteriormost ventral procurrent caudal ray.

Counts.—(18 specimens) Vertebrae 14–16 + 22–24 = 36–39; dorsal-fin rays 31–35; anal-fin rays 20–22; pectoral-fin rays

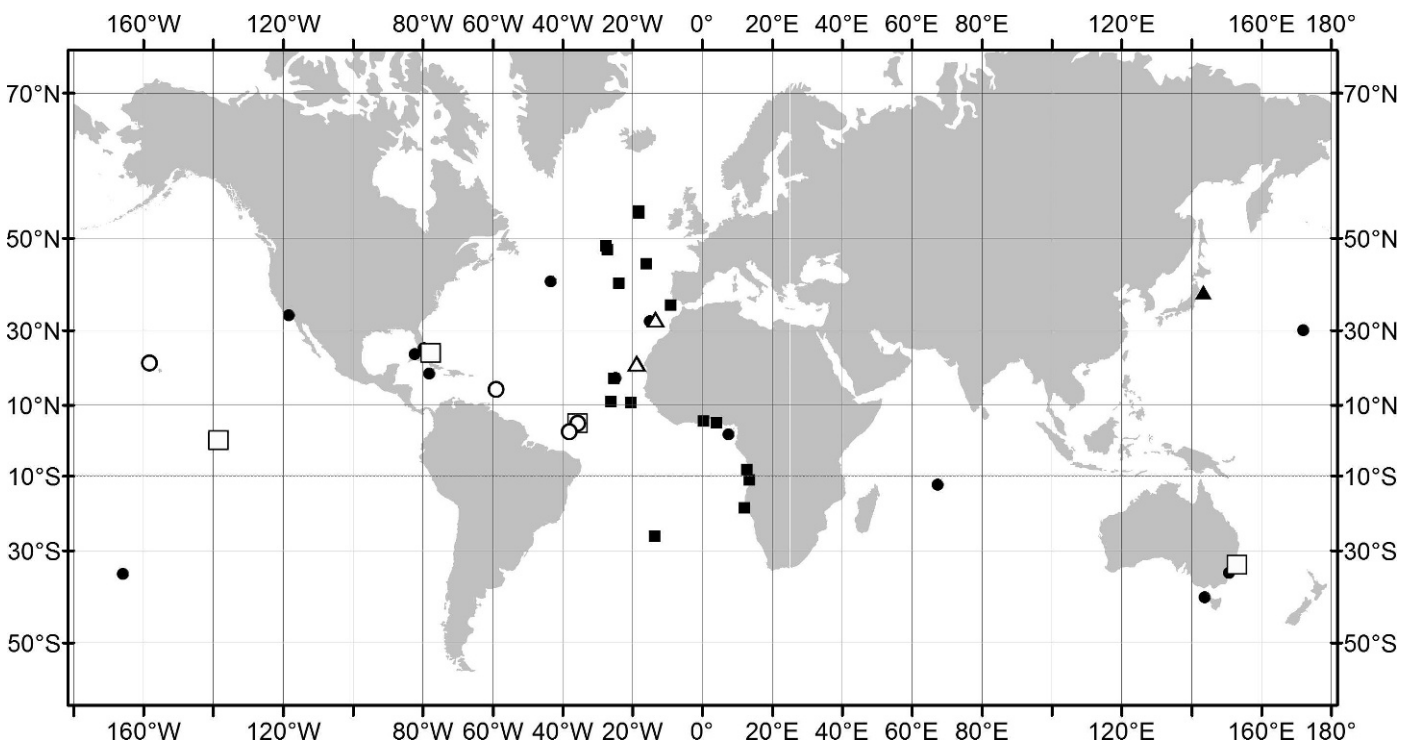


Fig. 3. Distribution of material examined of *Platyberyx andriashevi* (closed circles), *P. maui* (open triangles), *P. opalescens* (closed squares), *P. paucus*, new species (open circles), *P. pietschi*, new species (open squares), and *P. rhyton*, new species (closed triangles).

17–18; vomerine teeth 3–12; palatine teeth 3–12; gill rakers 5–8 + 12–15 = 18–22.

Description.—Anterior profile of head rounded. Eye small, diameter one-third to one-half HL. Mouth large; upper jaw extending anteriorly beyond lower; posterior margin of upper jaw extending slightly beyond posterior margin of orbit; anguloarticular-quadrangle articulation at posterior margin of orbit. Dentary and premaxillary teeth moderate in size, in single row, decreasing in size posteriorly. Vomerine and palatine teeth present, slightly recurved, similar in shape to jaw teeth, although somewhat smaller; vomerine teeth in transverse row; palatine teeth in single row, length approximately twice length of vomerine row. Skin on dorsal surface of basihyal smooth, without papillae. Dorsal and ventral oral valves without papillae.

Gill rakers on first arch in two series: rakers of lateral series long with rounded tips, closely spaced, moderately pigmented, each with 1–3 bristles at tip and 1–2 small nodules along dorsomedial margin, each bearing one or more bristles; rakers of medial series short, stout, rounded, tips covered with small bristles. Lateral and medial rakers separated by heavily pigmented fold of tissue. Pseudobranch with approximately 20 filaments equal in size and shape to gill filaments. Upper pharyngeal tooth patches each bearing approximately 5–10 short conical teeth, arranged in single row on anterior and middle tooth patches, in two parallel rows on posterior tooth patch; lower pharyngeal tooth patch with many short teeth; left and right lower pharyngeals divided by ridge of densely packed columnar papillae. Skin on ventromedial surface of pterygoids bearing single row of fleshy nodules, decreasing in size posteroventrally.

Body somewhat elongate, maximum depth at or near vertical through pectoral-fin base. Caudal peduncle relatively elongate, length approximately twice depth. Scales small, covering entire body, including isthmus and predorsal region, as well as base of pectoral and caudal fins; a few scales of much larger size just posterior to pectoral-fin base. Lateral line originating at posterodorsal margin of opercle, arching posteriorly toward dorsal-fin base and extending to caudal fin, consisting of over 40 elongate, enlarged, pore-bearing scales. Dorsal fin originating over midorbit. Ventral procurent caudal rays laterally flattened, bladelike; anteriorly directed hook-shaped process present on third posteriormost ventral procurent ray (Fig. 2). Pelvic fins originating under preopercle, extending beyond anal-fin origin. Peritoneum black.

Distribution.—Examined specimens were collected throughout the Pacific and Atlantic Oceans, as well as the Indian Ocean (Fig. 3). The specimen reported by Brickle and Laptikhovskiy (2002) from the Falkland Islands is probably *P. andriashevi* due to its high meristics (35 dorsal-fin rays and 21 anal-fin rays) and prominent lateral line.

Remarks.—The generic placement of this species is somewhat problematic. Its relatively high meristics and rigidly fixed jaw teeth argue for placement within *Caristius*, as stated by Kukuev et al. (2012). However, it also has a conspicuous lateral line, and its caudal skeleton is similar to that of *P. paucus* and *P. pietschi*. We interpret the presence of a conspicuous lateral line as a synapomorphy of the genus *Platyberyx*, and the presence of the caudal spur and flattened

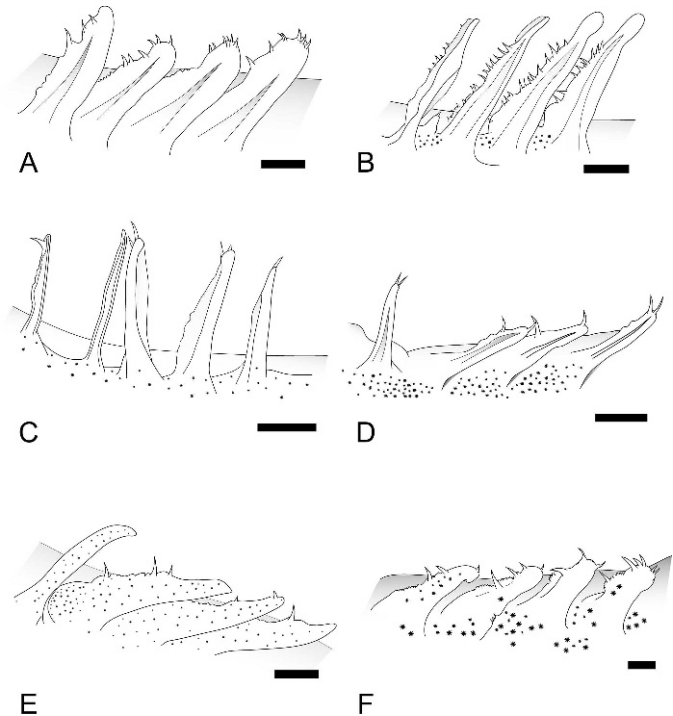


Fig. 4. Lateral view of lateral series of gill rakers of (A) *Platyberyx mauli* (MMF 2345, 110 mm SL), (B) *P. opalescens* (AMS I.25858-007, 73 mm SL), (C) *P. pietschi*, new species (UF 208616, holotype, 89 mm SL), (D) *P. rhyton*, new species (NSMT-P 59274, holotype, 146 mm SL), (E) *Caristius fasciatus* (LACM 57210, 160 mm SL), and (F) *C. meridionalis*, new species (NMNZ-P 25944, 260 mm SL). Scale bars = 1 mm.

procurent rays as a synapomorphy of a group of species within *Platyberyx*, and therefore we include this form in *Platyberyx*.

Etymology.—Named in honor of the Russian ichthyologist Dr. Anatoli Petrovich Andriashev (1910–2009).

Platyberyx mauli Kukuev et al., 2012

Figures 1B, 3, 4A; Table 1

Platyberyx opalescens, non Zugmayer, 1911.—Maul, 1949:27.
Platyberyx mauli Kukuev et al., 2012:192. Type locality: eastern central Atlantic, off Morocco.

Holotype.—ZIN 54972, 140 mm, eastern central Atlantic, off Morocco, 29°29'N, 10°51'W, 849 m, 7 May 2005, S. Y. Gulyugin (not examined).

Additional material.—BMNH 2003.5.30.4, 126 mm, NE Atlantic, off Mauritania, 21.152°N, 18.147°W; MMF 2345, 110 mm (♂), NE Atlantic, off Madeira, near Camara de Lobos.

Diagnosis.—A species of *Platyberyx* distinguished from *P. paucus* by having a greater number of dorsal-fin rays (28 vs. 24–25), anal-fin rays (17 vs. 15–16), pectoral-fin rays (17–18 vs. 16–17) and vertebrae (33–34 vs. 31); and *P. andriashevi* by having fewer dorsal-fin rays (28 vs. 31–37), anal-fin rays (17 vs. 19–22), and vertebrae (33–34 vs. 36–39); and from both species (as well as *P. pietschi*) by caudal-fin morphology (ventral caudal spur absent, procurent rays cylindrical vs. ventral caudal spur present, procurent rays flattened,

bladelike). It is further distinguished from *P. pietschi* by having a shorter prepectoral length (<36% vs. >39% SL), longer dorsal-fin base (75–79% vs. 63–69% SL), and larger mouth (upper jaw extending approximately to posterior margin of orbit vs. mid-orbit). It is distinguished from *P. opalescens* by having a smaller body depth (46–52% vs. 52–64% SL), shorter head length (<34% SL vs. >38% SL), smaller eye (41–44% HL vs. 45–62% HL), shorter prepectoral length (<36% vs. >39% SL), and larger mouth (upper jaw extending approximately to posterior margin of orbit vs. mid-orbit); and from *P. rhyton* by gill-raker morphology (stout, rounded, with many small bristles concentrated near tip of raker vs. narrow, bladelike, with a few bristles concentrated near tip), dentition (jaw teeth in multiple rows vs. single row), and structure of pharyngeal papillae (multifid papillae near dorsal pharyngeal teeth and throughout mouth vs. dorsal pharyngeal papillae saclike, multifid papillae absent inside mouth).

Counts.—(2 specimens) Vertebrae 15–16 + 18 = 33–34; dorsal-fin rays 28; anal-fin rays 17; pectoral-fin rays 17–18; vomerine teeth 11–12; palatine teeth 12–16; gill rakers 6 + 14 = 20.

Description.—Anterior profile of head rounded. Eye small, diameter less than one-half HL. Mouth moderate; upper jaw extending anteriorly beyond lower; posterior margin of upper jaw extending nearly to posterior margin of orbit; anguloarticular-quadrate articulation near posterior margin of orbit. Dentary and premaxillary teeth small, in dense patches of 10–15 teeth at premaxillary and dentary symphyses, decreasing to 2 rows along most of dentigerous surface, and a single row posteriorly. Vomerine and palatine teeth present, slightly recurved, similar in shape to jaw teeth, though somewhat larger; vomerine teeth in V-shaped row; palatine teeth in single row, length approximately equal to vomerine row. Skin on dorsal surface of basihyal, dorsal and ventral oral valves, and inner surfaces of mouth covered with multifid papillae.

Gill rakers on first arch in two series: rakers of lateral series stout, with rounded tips, closely spaced, each with 3–10 bristles near tip (Fig. 4A); rakers of medial series short, stout, rounded, their tips densely covered with small bristles. Lateral and medial rakers separated by heavily pigmented fold of tissue. Pseudobranch with approximately 20 filaments equal in size and shape to gill filaments. Upper pharyngeal teeth similar in size and shape to jaw teeth; anterior tooth patch bearing 16 teeth, arranged in 2–3 indistinct rows; middle tooth patch bearing 21 teeth in 3–4 rows; posterior tooth patch smaller, with 14 teeth arranged in multiple rows; lower pharyngeal tooth patch with many short teeth; left and right lower pharyngeals divided by ridge of densely packed columnar papillae. Skin on ventromedial surface of pterygoids bearing single row of shrub-like nodules, decreasing in size posteroventrally.

Body somewhat elongate, maximum depth at or near vertical through pectoral-fin base. Caudal peduncle relatively short, length approximately equal to depth. Scales covering entire body, including isthmus and predorsal region, as well as base of pectoral and caudal fin; scales in branchiostegal region, isthmus, and pectoral-fin base much larger than other body scales. Lateral line originating at posterodorsal margin of opercle, arching posteriorly toward dorsal-fin base and extending to caudal fin, consisting of approximately 30 elongate, enlarged, pore-bearing scales.

Dorsal fin originating over posterior portion of orbit. Ventral procurent caudal rays cylindrical, without hook-shaped process. Pelvic fins originating under preopercle, extending beyond anal-fin origin. Peritoneum black (faded in preservation).

Distribution.—The only known specimens were collected in the eastern central Atlantic. Maul's (1949) specimen was collected off Madeira (Fig. 3), and the holotype was collected off Morocco (Kukuev et al., 2012).

Remarks.—A specimen of this species was reported as *Platyberyx opalescens* and illustrated by Maul (1949:28). Kukuev et al. (2012) described this form as a distinct species, but established a ZIN specimen as the holotype, as they believed the specimen figured by Maul (1949) to be lost. In fact, the specimen is not lost; it is present at the Museu Municipal do Funchal (MMF 2345), along with the type material on which Maul (1949) based the description of *Paracaristius maderensis*. Maul's specimen agrees closely with the holotype in all particulars except for having more gill rakers (20 vs. 16) and fewer vomerine teeth (11 vs. "approximately 20"), though these discrepancies do not constitute unusually large meristic ranges for a caristiid species. The "oval depression" reported by Kukuev et al. (2012) on the ventral surface of the body posterior to the pelvic fins is present on MMF 2345, but is not noteworthy. There is no evidence of a "light organ," as speculated by Kukuev et al. (2012), in this depression in either MMF 2345 or BMNH 2003.5.30.4, rather it appears to be the result of the skin adhering to the posterior elements of the pelvic girdle.

Etymology.—Named in honor of Günther Edmund Maul (1909–1997), who published an illustration of this species in 1949.

Platyberyx opalescens Zugmayer, 1911

Figures 1C, 3, 4B; Table 1

Platyberyx opalescens Zugmayer, 1911:8. Type locality: eastern central Atlantic, off Portugal.—Jordan, 1919:334.—Post, 1986:748.—Santos et al., 1997.—Porteiro et al., 1999:42.—Tweddle and Anderson, 2008:11.—Kukuev et al., 2012 (neotype established in error).

Caristius opalescens.—Nielsen, 1979:339.—Post, 1990:765.—Brickle and Laptikhovskiy, 2002:493.—Trunov et al., 2006:442.

Holotype.—MOM 0091-1179, 51 mm, NE Atlantic, off Portugal, 36°06'N, 9°W, 0–3660 m, 8 September 1910.

Additional material.—AMS I.25858-007, 2, 73 (♀)–80 (♂) mm, N Atlantic, 54°25'N, 18°9'W, 0–800 m, 6 July 1986; BMNH 2012.4.3.1, 50 mm, NE Atlantic, 20°41.1'N, 17°59.6'W; BMNH 2012.4.3.2, 44 mm, 17°33.6'N, 25°18.8'W; BMNH 2012.4.3.3, 30 mm, SE Atlantic, 10°49.7'S, 20°23.9'W; CAS 222925, 67 mm, SE Atlantic, off Angola, 11°14'S, 13°28'E, 521–524 m, 4 April 2005; CAS 222934, 71 mm, SE Atlantic, off Angola, 8°17'S, 12°42'E, 617–632 m, 15 April 2005; CAS 224970, 77 mm (♂), SE Atlantic, R/V *Dr Fridtjof Nansen* Sta. 74, 730–719 m, 7 March 2007; CAS 230835, 84 mm (♀), SE Atlantic, 614–621 m, 8 March 2007; CAS 230839, 82 mm, SE Atlantic, R/V *Dr Fridtjof Nansen* Sta. 91, 630–620 m, 10

March 2007; CAS 230841, 115 mm (♀), SE Atlantic, R/V *Dr Fridtjof Nansen* Sta. 8, 1°33.46'N, 7°15'E, 81–80 m, 12 May 2010; IORAS 02794, 49 mm, SE Atlantic, 18°54'S, 12°E, 500 m; ZMH 112426, 125 mm, N Atlantic, 11°1'N, 26°7'W, 550 m; ZMH 119123, 36 mm, N Atlantic, 41°2'N, 23°52'W, 2000 m; ZMH 120747, 105 mm, N Atlantic, 47°52'N, 27°8'W, 1370 m; ZMH 120761, 7, 83–118 mm, N Atlantic, 48°35'N, 27°32'W, 1000 m; ZMH 120773, 53 mm, N Atlantic, 45°2.6'N, 16°6.7'W, 3200 m; ZMH 122872, 115 mm, N Atlantic, 54°43'N, 18°12'W, 800 m; ZMH 122914, 2, 76–88 mm, N Atlantic, 54°44.4'N, 18°19.1'W, 800 m; NMNZ P35922, 62 mm, S Atlantic, 26°21.8'S, 13°35.7'W, 580–654 m; UF 219978, 53 mm, central Atlantic, off Nigeria, SE of Lagos, 5°9'N, 4°4'E, 500–740 m, 27 May 1965.

Diagnosis.—A species of *Platyberyx* distinguished from *P. paucus* by having a greater number of dorsal-fin rays (27–29 vs. 24–25), anal-fin rays (17–19 vs. 15–16), pectoral-fin rays (17–20 vs. 16–17), and vertebrae (32–34 vs. 31); and *P. andriashevi* by having fewer dorsal-fin rays (27–29 vs. 31–37), anal-fin rays (17–19 vs. 19–22), and vertebrae (32–34 vs. 36–39); and from both species by caudal-fin morphology (ventral caudal spur absent, procurrent rays cylindrical vs. ventral caudal spur present, procurrent rays flattened, bladelike). It is distinguished from *P. rhyton* and *P. maui* by morphometrics, including a deeper body (52–64% vs. 45–52% SL), longer head length (>38% vs. <34% SL), longer prepectoral length (>39% vs. <36% SL), and smaller mouth (upper jaw extending approximately to mid-orbit vs. posterior margin of orbit); and from *P. pietschi* by caudal-fin morphology (ventral caudal spur absent, procurrent rays cylindrical vs. ventral caudal spur present, procurrent rays flattened, bladelike) and gill-raker morphology (bristles on gill rakers small and uniform vs. small bristles and large spikes on rakers).

Counts.—(29 specimens) Vertebrae 14–16 (15) + 17–19 (19) = 32–34 (34); dorsal-fin rays 27–29 (29); anal-fin rays 17–19 (19); pectoral-fin rays 17–20; vomerine teeth 5–26; palatine teeth 5–20; gill rakers 6–8 + 14–17 = 20–24.

Description.—Anterior profile of head rounded. Eye large, diameter approximately one-half HL. Mouth moderate; upper jaw extending anteriorly beyond lower; posterior margin of upper jaw extending to or slightly beyond mid-orbit; anguloarticular-quadrangle articulation at mid-orbit. Dentary and premaxillary teeth small, curved posteriorly and slightly medially, in single row except for dense patches of 10–15 teeth at premaxillary and dentary symphyses, teeth on posterior half of dentary arranged in pairs. Vomerine and palatine teeth present, slightly recurved, similar in shape to jaw teeth, although somewhat larger; vomerine teeth in V-shaped row; palatine teeth in single row, length approximately equal to vomerine row. Skin on dorsal surface of basihyal smooth, heavily pigmented, without papillae. Dorsal and ventral oral valves without papillae.

Gill rakers on first arch in two series: rakers of lateral series long, bladelike, with rounded tips, closely spaced, moderately pigmented, each with many short bristles somewhat evenly spaced along dorsomedial margin (Fig. 4B); rakers of medial series short, stout, rounded, tips densely covered with small bristles. Lateral and medial rakers separated by heavily pigmented fold of tissue. Pseudobranch with approximately 20 filaments equal in size and shape to gill

filaments. Upper pharyngeal tooth patches each bearing 10–20 short conical teeth, arranged in single row on anterior tooth patch and multiple rows on middle and posterior tooth patches; lower pharyngeal tooth patch with many short conical teeth; left and right lower pharyngeals divided by ridge of densely packed columnar papillae. Skin on ventromedial surface of pterygoids bearing single row of shrub-like nodules, decreasing in size posteroventrally.

Body somewhat elongate, maximum depth at or near vertical through pectoral-fin base. Caudal peduncle relatively short, length approximately equal to depth. Scales small, covering entire body, including isthmus and predorsal region, as well as base of pectoral and caudal fins; scales in branchiostegal region, isthmus, and pectoral-fin base much larger than other body scales. Lateral line originating at posterodorsal margin of opercle, arching posteriorly toward dorsal-fin base and extending to caudal fin, consisting of 25–30 elongate, enlarged, pore-bearing scales. Dorsal fin originating over posterior portion of orbit. Ventral procurrent caudal rays cylindrical, without hook-shaped process. Pelvic fin originating under preopercle, extending beyond anal-fin origin. Peritoneum black.

Distribution.—Examined specimens were all collected from the eastern Atlantic, from 55°N to 27°S latitude (Fig. 3). Another specimen collected from the Antarctic (LACM 10664-4, 70 mm, 59°45'S, 78°35'W) is probably *P. opalescens*, but it has an unusually large mouth, extending well beyond the posterior margin of the orbit. We provisionally include it in *P. opalescens* until more material from the region becomes available.

Remarks.—Kukuev et al. (2012) believed the holotype of this species to be lost, and established a neotype (ZIN 54971). However, Zugmayer's (1911) holotype is not lost and is, in fact, in good condition at the Museum of Oceanography of Monaco (see Fig. 1C). Therefore, the establishment of a neotype is unwarranted and the ZIN specimen has no type status.

Etymology.—From the Latin *opalus*, for an opal.

***Platyberyx paucus*, new species**

Figures 1D, 3; Table 1

Holotype.—UW 151229, 89 mm (♂), central N Pacific, Hawaiian Islands, station Waianae, 21.279°N, 158.257°W, R/V *Kilo Moana*, 19 August 2011.

Paratypes.—MCZ 66458, 21 mm, N Atlantic, 14°29'N, 59°4'W, R/V *Atlantis II*, 30 April 1966; ZMH 25948, 70 mm, N Atlantic, off Brazil, 5°24'N, 35°28'W, 22 July 1974; ZMH 112588, 100 mm, N Atlantic, off Brazil, 3°33'N, 38°W, 23 July 1974.

Diagnosis.—A species of *Platyberyx* distinguished from all congeners by having lower meristics: 31 vertebrae, 24–26 dorsal-fin rays, and 15–16 anal-fin rays; and by the absence of palatine teeth. *Platyberyx paucus* can be further distinguished from all congeners, except *P. andriashevi* and *P. pietschi*, by the presence of laterally flattened, bladelike ventral procurrent caudal rays, and an anteriorly directed hook-like process on the third posteriormost ventral procurrent caudal ray.

Counts.—(4 specimens) Vertebrae 14–15 + 16–17 = 31; dorsal-fin rays 24–26 (25); anal-fin rays 15–16 (16); pectoral-fin rays 16–17 (16); vomerine teeth 1–6 (5); palatine teeth 0; gill rakers 6–7 + 14–16 = 21–23 (21).

Description.—Anterior profile of head rounded, slightly concave above orbit. Eye moderate in size, diameter approximately one-half HL. Mouth moderate; upper jaw extending anteriorly beyond lower; posterior margin of upper jaw extending approximately to mid-orbit; anguloarticular-quadrangle articulation at mid-orbit. Dentary and premaxillary teeth minute, in single row except for small patch at premaxillary and dentary symphyses, decreasing in size posteriorly. Vomerine teeth present, slightly recurved, similar in size to jaw teeth, in transverse row; palatine teeth absent, replaced by rows of multifid papillae. Skin overlying dorsal surface of basihyal sparsely covered with multifid papillae. Dorsal and ventral oral valves with multifid papillae.

Gill rakers on first arch in two series: rakers of lateral series long with rounded tips, closely spaced, moderately pigmented, each with many small bristles distributed along dorsomedial margin; rakers of medial series short, stout, rounded, their tips covered with many small bristles. Lateral and medial series separated by sparsely pigmented fold of tissue. Pseudobranch with approximately 20 filaments equal in size and shape to gill filaments. Upper pharyngeal tooth patches each bearing approximately 5–10 short conical teeth, arranged in 2–3 rows on each patch; lower pharyngeal tooth patch with many short teeth; left and right lower pharyngeals divided by v-shaped patch of multifid papillae. Skin on ventromedial surface of pterygoids bearing single row of small, densely pigmented multifid papillae.

Body somewhat deep, ovoid, maximum depth at or near vertical through pectoral-fin base. Caudal peduncle relatively short, length approximately equal to depth. Scales small, covering entire body, including isthmus and predorsal region as well as base of pectoral and caudal fins; a few scales of much larger size just posterior to pectoral-fin base. Lateral line originating at posterodorsal margin of opercle, arching posteriorly toward dorsal-fin base and extending to caudal fin, consisting of approximately 35 elongate, enlarged, pore-bearing scales. Dorsal fin originating over preopercle. Ventral procurent caudal rays laterally flattened, blade-like; anteriorly directed hook-shaped process present on third posteriormost ventral procurent ray (as in *P. andriashevi*, see Fig. 2). Pelvic fins originating under preopercle, extending beyond anal-fin origin. Peritoneum silvery, with black melanophores.

Distribution.—The only known specimens have been collected from the central North Pacific and western North Atlantic (Fig. 3).

Etymology.—From the Latin *paucus*, meaning few or little, in reference to the unusually low meristics.

***Platyberyx pietschi*, new species**

Figures 1E, 4C; Table 1

Holotype.—UF 208616, 89 mm, Bahamas, SW of Exuma Cays, 24°6'N, 77°17'W, 720 m, 22 February 1961.

Paratypes.—AMS I.21367-011, 34 mm, Australia, 33°16'S, 153°8'E, 0–750 m, 28 November 1979; IORAS 2777, 56 mm, central Pacific, 0°3'S, 139°20'W; ZMH 25949, 93 mm, N Atlantic, off Brazil, 5°24'N, 35°28'W, 22 July 1974.

Diagnosis.—A species of *Platyberyx* distinguished from *P. paucus* by having greater number of dorsal-fin rays (30–31 vs. 24–26), anal-fin rays (18–19 vs. 15–16), pectoral-fin rays (17–18 vs. 16–17), and vertebrae (33–35 vs. 31); and from *P. andriashevi* by having fewer dorsal-fin rays (30–31 vs. 31–37), anal-fin rays (18–19 vs. 19–22), and vertebrae (33–35 vs. 36–39). *Platyberyx pietschi* can be distinguished from all other congeners by the presence of an anteriorly directed hook-like process on the third posteriormost ventral procurent caudal ray, and can further be distinguished from *P. opalescens* by the presence of small bristles and larger spikes on the gill rakers (vs. small bristles only), and from *P. rhyton* and *P. maui* by the greater prepectoral (>39% SL vs. <36% SL) and prepelvic (>36% SL vs. <33% SL) length, shorter dorsal-fin base (<70% SL vs. >75% SL), and smaller mouth (upper jaw extending to midorbit vs. posterior margin of orbit).

Counts.—(4 specimens) Vertebrae 15 + 18–20 (18) = 33–35 (33); dorsal-fin rays 30–31 (30); anal-fin rays 18–19 (18); pectoral-fin rays 17–18 (18); vomerine teeth 8–10 (10); palatine teeth 6–10 (8); gill rakers 6–7 (6) + 13–14 (13) = 19–21 (19).

Description.—Anterior profile of head sloping, slightly concave. Eye large, diameter approximately one-half HL. Mouth moderate; upper jaw extending anteriorly beyond lower; posterior margin of upper jaw extending to or beyond mid-orbit; anguloarticular-quadrangle articulation at or posterior to mid-orbit. Dentary and premaxillary teeth small, curved posteriorly and slightly medially, in single row. Vomerine and palatine teeth present, slightly recurved, similar in shape to jaw teeth, although somewhat smaller; vomerine teeth in chevron-shaped patch; palatine teeth in single row, length approximately twice that of vomerine row. Skin on dorsal surface of basihyal heavily pigmented, with or without papillae. Dorsal and ventral oral valves with or without papillae. Pronounced medial gap between right and left premaxilla, with single large papilla in gap slightly posterior to jaw teeth.

Gill rakers on first arch in two series: rakers of lateral series long, blade-like, with rounded tips, sparsely pigmented, each with one or two long spikes at tip (Fig. 4C); rakers of medial series short, stout, rounded, with several small bristles. Lateral and medial rakers separated by pale fold of tissue. Pseudobranch with approximately 15 filaments equal in size and shape to gill filaments. Upper pharyngeal tooth patches each bearing 5–10 short conical teeth, arranged in two distinct rows; lower pharyngeal tooth patch with many short conical teeth; left and right lower pharyngeals divided by ridge of densely packed columnar papillae. Skin on ventromedial surface of pterygoids bearing many small simple nodules, decreasing in size posteroventrally, extending anteromedially directly anterior to anteriormost pharyngobranchial tooth patch.

Body somewhat elongate, maximum depth at or near vertical through pectoral-fin base. Caudal peduncle relatively short, length approximately equal to depth. Scales moderate in size, covering entire body, including isthmus

and predorsal region, as well as base of pectoral and caudal fin. Lateral line originating at posterodorsal margin of opercle, arching posteriorly toward dorsal-fin base and extending to caudal fin, consisting of approximately 30 elongate, enlarged, pore-bearing scales. Dorsal fin originating over posterior portion of orbit. Ventral procurent caudal rays laterally flattened, bladeliike, exposed; anteriorly directed hook-shaped process present on third posterior-most ventral procurent ray. Pelvic fin originating under posterior margin of opercle, extending beyond anal-fin origin. Peritoneum heavily pigmented.

Distribution.—Examined specimens were collected from the central Pacific and western South Pacific, as well as the western North Atlantic (Fig. 3).

Remarks.—Another specimen from the central Atlantic (IORAS 2785, 80 mm) is similar to *P. pietschi*, but has a much larger mouth, reduced procurent caudal rays, and gill rakers with prominent spike-like bristles. This specimen may represent another undescribed species, but is in extremely poor condition. We refer it to *Platyberyx* sp. until additional material becomes available.

Etymology.—The specific epithet honors Dr. Theodore W. Pietsch for his extensive body of work on deepwater fishes and for the critical role he has played in furthering the careers of many young ichthyologists, present authors included.

***Platyberyx rhyton*, new species**

Figures 1F, 3, 4D; Table 1

Holotype.—NSMT-P59274, 146 mm (♀), NW Pacific, off Honshu, 39°2'N, 143°30'E, 650–677 m, K. Kawaguchi, 30 July 1996.

Diagnosis.—A species of *Platyberyx* distinguished from *P. paucus* by having a greater number of dorsal-fin rays (30 vs. 24–26), anal-fin rays (18 vs. 15–16), pectoral-fin rays (18 vs. 16–17), and vertebrae (34 vs. 31); and *P. andriashevi* by having fewer dorsal-fin rays (30 vs. 36–39), anal-fin rays (18 vs. 19–22), and vertebrae (34 vs. 36–40); and from both species (as well as *P. pietschi*) by caudal-fin morphology (ventral caudal spur absent, procurent rays cylindrical vs. ventral caudal spur present, procurent rays flattened, bladeliike). It is further distinguished from *P. pietschi* by having a shorter prepectoral length (<32% vs. >39% SL), longer dorsal-fin base (76% vs. 63–69% SL), and larger mouth (upper jaw extending approximately to posterior margin of orbit vs. mid-orbit). It is distinguished from *P. opalescens* by having a smaller body depth (45% vs. 52–64% SL), shorter head length (31% SL vs. >38% SL), shorter prepectoral length (31% vs. 39–50% SL), and larger mouth (upper jaw extending approximately to posterior margin of orbit vs. mid-orbit); and from *P. maui* by gill-raker morphology (narrow, bladeliike, with a few bristles concentrated near tip vs. stout, rounded, with many bristles concentrated near tip of raker), dentition (jaw teeth in single row vs. multiple rows), and structure of pharyngeal papillae (dorsal pharyngeal papillae saclike, multifid papillae absent inside mouth vs. multifid papillae near dorsal pharyngeal teeth and throughout mouth).

Count.—Vertebrae 15 + 19 = 34; dorsal-fin rays 30; anal-fin rays 18; pectoral-fin rays 18; vomerine teeth 11; palatine teeth 14; gill rakers 6 + 15 = 21.

Description.—Anterior profile of head rounded. Eye moderate in size, diameter approximately one-half HL. Mouth large; upper jaw extending anteriorly beyond lower; posterior margin of upper jaw extending to posterior margin of orbit; anguloarticular-quadrangle articulation at posterior margin of orbit. Dentary and premaxillary teeth moderate in size, in single row, decreasing in size posteriorly. Vomerine and palatine teeth present, slightly recurved, similar in size and shape to jaw teeth; vomerine teeth in transverse row; palatine teeth in single row, length approximately twice length of vomerine row. Skin on dorsal surface of basihyal smooth, without papillae. Dorsal and ventral oral valves without papillae.

Gill rakers on first arch in two series: rakers of lateral series long with rounded tips, closely spaced, moderately pigmented, each with 1–3 bristles at tip and occasionally one additional bristle along dorsomedial margin (Fig. 4D); rakers of medial series short, stout, rounded, their tips covered with small bristles. Lateral and medial rakers separated by heavily pigmented fold of tissue. Pseudobranch with approximately 20 filaments equal in size and shape to gill filaments. Upper pharyngeal tooth patches each bearing approximately 5–10 short conical teeth, arranged in single row on anterior and middle tooth patches, in two indistinct rows on posterior tooth patch; lower pharyngeal tooth patch with approximately 10 large teeth arranged in two rows; left and right lower pharyngeals not divided by ridge. Skin on ventromedial surface of pterygoids bearing single row of fleshy nodules, decreasing in size posteroventrally.

Body somewhat elongate, maximum body depth at or near vertical through pectoral-fin base. Caudal peduncle relatively short, length approximately equal to depth. Scales small, covering entire body, including isthmus and predorsal region, as well as base of pectoral and caudal fins; a few scales of much larger size just posterior to pectoral-fin base and along ventral midline. Lateral line originating at posterodorsal margin of opercle, arching posteriorly toward dorsal-fin base and extending to caudal fin, consisting of about 25 elongate, enlarged, pore-bearing scales. Dorsal fin originating over midorbit. Ventral procurent caudal rays cylindrical, without hook-shaped process. Pelvic fins originating under preopercle, extending beyond anal-fin origin. Peritoneum dark.

Distribution.—The holotype and only known specimen of *P. rhyton* was collected from the western North Pacific off Honshu Island, Japan (Fig. 3).

Etymology.—From the ancient Greek word ρυτόν, for a wide-mouth container for fluids, referring to the relatively large mouth of this species.

***Caristius* Gill and Smith, 1905**

Elephenor Jordan, 1919:330.—Type species: *Pteraclis macropus* Bellotti, 1903, by original designation and monotypy.

Type species.—*Caristius japonicus* Gill and Smith, 1905, by monotypy.

Diagnosis.—*Caristius* is distinguished from *Neocaristius* and *Paracaristius* by the narrow suborbital space, with suborbital

series not expanded to cover upper jaw (vs. wide suborbital space, with suborbital series expanded to cover upper jaw). It is distinguished from *Platyberyx* by having an inconspicuous lateral line with small scales (vs. a conspicuous lateral line with large scales) and serrated lower caudal-fin rays (vs. simple lower caudal rays).

Description.—Head laterally compressed, deep; anterior profile angular to rounded, steeply sloping to vertical; snout extremely short. Nasal organ opening through two separate nares, both subcircular and without tubes; anteroventral opening generally smaller and more rounded; olfactory rosette conspicuous. Eye small to moderate, covered with thick sclera. Suborbital space narrow, perforated by horizontally oriented suborbital lateralis canal and series of vertical canals. Opercular series thin and delicate, partially scaled; opercular flap rounded; exposed posterior margin of preopercle smooth. Cephalic lateralis system extensive, consisting of supraorbital, occipital, suborbital, preopercular, and mandibular canals and pores.

Mouth moderate to large, oblique; premaxilla partially hidden by suborbital shield; lower jaw deep, with broadly rounded anteroventral margin. Dentary and premaxillary teeth conical, often flexible in preserved specimens. Vomerine and palatine teeth present. Dorsal and ventral oral valves broad, with lateral margins tapering to attachment with oral roof and floor. Branchial chamber moderately to heavily pigmented. Gill rakers on first arch in two series: lateral rakers relatively longer, medial rakers more stout and rounded. Pseudobranch present. Pharyngeal teeth small and conical to long and needle-like; three distinct upper pharyngeal tooth patches borne on pharyngobranchials 2–4; lower pharyngeal tooth patch borne on ceratobranchials 5.

Body laterally compressed, deep, rectangular to ovoid or elongate; caudal peduncle short and deep. Scales small, imbricate, cycloid and distinctly annulated, covering entire body, including isthmus and predorsal region, as well as base of pectoral and caudal fin. Exposed posterior margin of postcleithrum bearing one to several large axillary scales. Lateral line inconspicuous or invisible to naked eye. Dorsal fin large, delicate, base extending nearly entire length of body; dorsal-fin rays unsegmented, anterior rays unbranched, posterior rays branched; anteriormost dorsal-fin pterygiophores radiating anteriorly, not perpendicular to body axis, with proximal tips placed posteriorly. Anal fin large, delicate, originating approximately at mid-body and inserting slightly posterior to dorsal-fin insertion, consisting of soft unsegmented rays. Bases of dorsal and anal fins flanked along entire length by a thin, scaled sheath, extending well onto posteriormost rays of both fins. Caudal fin truncate to slightly emarginated, heavily pigmented, with scales covering proximal one-third or more of rays; lower margin of ventral caudal rays serrated (Fig. 5); ventral procurrent caudal-fin rays cylindrical, without hook-like process. Pectoral fin delicate, elongate, fan-like; longest rays extending beyond anal-fin origin; pectoral-fin base oblique, anterodorsal insertion well below lateral midline. Pelvic fin delicate, elongate, with one spine and five rays, flanked by deep depression extending along ventral midline between pelvic-fin base and anal-fin origin.

Peritoneum dusky to black. Viscera unpigmented except for scattered melanophores on mesenteries. Pyloric caeca long, fingerlike. Swim bladder absent.

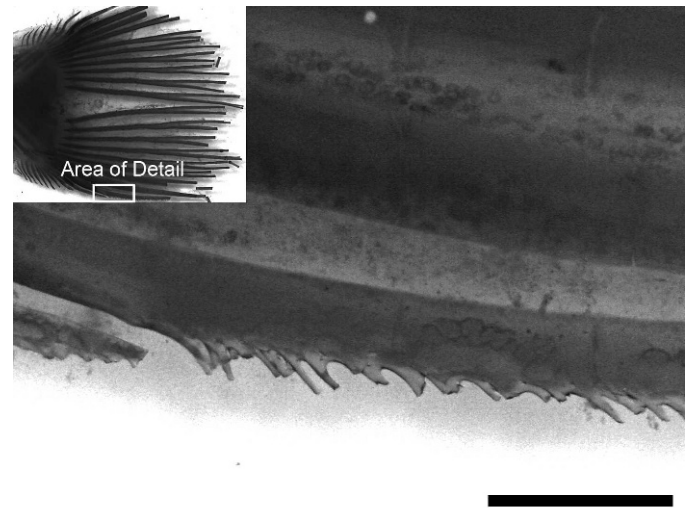


Fig. 5. Ventral caudal-fin rays of *Caristius meridionalis*, new species (IORAS 02778, 82 mm SL, CS). Scale bar = 1 mm.

Remarks.—The genus *Caristius* includes at least four species, two of which are here described as new. Gill and Smith (1905) established this genus (and the family Caristiidae) for *Caristius japonicus*, a new species that they briefly described based on a specimen collected in Kagoshima Bay in southern Japan. Jordan and Thompson (1914) considered *Pteraclis macropus* Bellotti, 1903 to be more similar to *Caristius* than other *Pteraclis* in terms of scale morphology and in the position of the anal and pelvic fins, and therefore listed it as *Caristius macropus*. Later Jordan (1919) reversed his position, considering the species “allied to the Pteraclidae” (p. 330), and created the genus *Elephenor* and the family Elephenoridae for this species. However, Norman (1930) believed that there was “little justification for placing *C. macropus* in a distinct genus” (p. 344), let alone a distinct family, and recognized *C. macropus* and *C. japonicus* as congeneric species, synonymizing the genus *Elephenor* with *Caristius*. Although the holotype of *C. macropus* has since been destroyed (see below), all subsequent authors have considered the two genera synonymous.

Kukuev et al. (2012) distinguished *Caristius* from *Platyberyx* on the basis of dentition and meristics (see Remarks for *Platyberyx*). Although it is generally true that species of *Caristius* tend to have fewer teeth than those of *Platyberyx* and they are more rigidly fixed in the jaws, most forms exhibit considerable within-species variation and frequency distributions overlap to the extent that tooth counts are rarely useful as diagnostic characters at either the species or genus level. In addition, the jaw teeth in one species of *Caristius* (*C. digitus*) are clearly depressible, and the relative mobility of the teeth in several species of both genera appears to be somewhat variable. The meristic ranges that Kukuev et al. (2012) reported for *Caristius* are generally supported by our data, but *Platyberyx andriashevi* has similarly high meristics, which limits the generic utility of these characters. Kukuev et al. (2012) did not remark on osteological characters and characterized the lateral line in *Caristius* as “well developed or not expressed” (Kukuev et al., 2012:195). The caudal osteological characters presented here provide a compelling argument for shared ancestry among the species we have included in *Caristius* and is congruent with the absence of a conspicuous series of lateral-line scales.

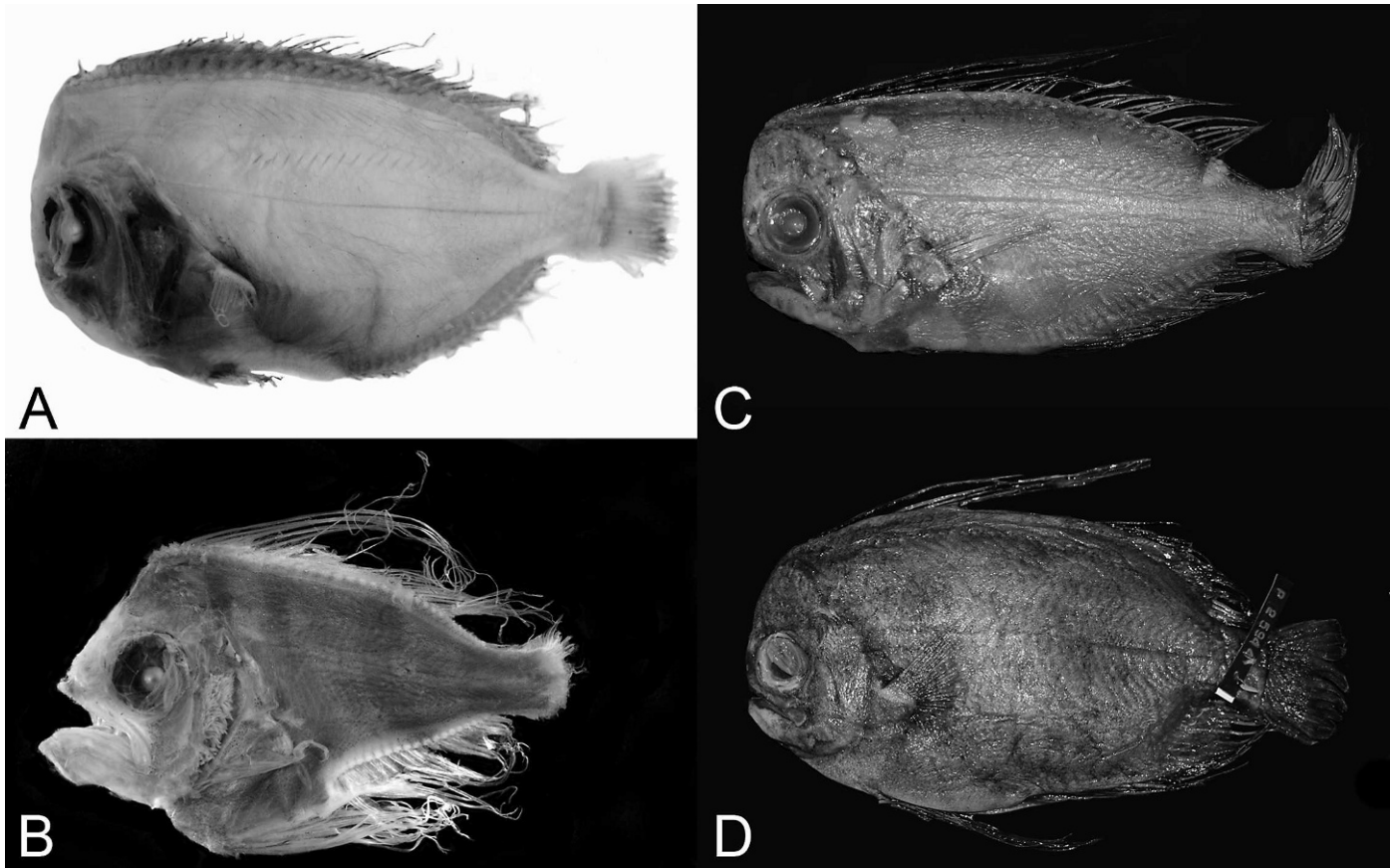


Fig. 6. (A) *Caristius digitus*, new species, AMS I.20316-038, holotype, 90 mm SL; (B) *C. fasciatus*, MCZ 32120, lectotype, 36 mm SL; (C) *C. macropus*, UW 25832, 176 mm SL; and (D) *C. meridionalis*, new species, NMNZ P25944, holotype, 260 mm SL.

Etymology.—Presumably named after *Carystus*, a demi-god of Greek mythology.

***Caristius digitus*, new species**

Figures 6A, 7, 8; Table 2

Holotype.—AMS I.20316-038, 90 mm, SW Pacific, off Australia, 34°20'S, 151°56'E, 14 December 1977.

Paratypes.—IORAS 02787, 185 mm, SW Indian Ocean, off South Africa, 34°7'S, 44°50'E, 1210–1260 m, 29 July 1976.

Diagnosis.—A species of *Caristius* distinguished from all congeners by the presence of multiple fingerlike papillae present along dorsal margin of hyoid arch and at articulation of interhyal and posterior ceratohyal; elongate pharyngobranchial teeth (vs. short, stout pharyngobranchial teeth); and high gill raker counts (22–26 vs. 18–22).

Counts.—(2 specimens) Vertebrae 18 + 20 = 38; dorsal-fin rays 34; anal-fin rays 21; pectoral-fin rays 18; vomerine teeth 0–1 (1); palatine teeth 2–3 (3); gill rakers 6–8 (8) + 16–18 (18) = 22–26 (26).

Description.—Anterior profile of head rounded. Eye large, diameter approximately one-half HL. Mouth large; upper jaw extending anteriorly beyond lower; posterior margin of upper jaw extending to posterior margin of orbit; anguloarticular-quadrangle articulation at posterior margin of orbit.

Dentary and premaxillary teeth small, curved posteriorly and slightly medially, arranged in single row except for small patches at premaxillary and dentary symphyses, decreasing in size posteriorly. Vomerine and palatine teeth slightly recurved, similar in size to largest jaw teeth (vomerine teeth absent in paratype). Skin on dorsal surface of basihyal densely covered with small papillae. Dorsal and ventral oral valves with small papillae.

Gill rakers on first arch in two series: rakers of lateral series long with pointed tips, moderately pigmented, each with 1 or 2 long bristles at tip; rakers of medial series short, stout, with 2 or 3 long bristles at tip. Lateral and medial rakers separated by dark fold of tissue. Pseudobranch with 10–15 filaments equal in size and shape to gill filaments. Upper pharyngeal tooth patches with elongate, needle-like teeth (Fig. 7): anterior tooth patch bearing 11 teeth in one indistinct row; middle tooth patch bearing 16 teeth in 2 indistinct rows; posterior tooth patch smaller, with 13 teeth arranged in several indistinct rows. Lower pharyngeal tooth patch with approximately 20 large teeth arranged in triangular pattern; left and right lower pharyngeals not divided by ridge. Skin on ventromedial surface of pterygoids bearing approximately 12 small, saclike fleshy nodules. Dorsal surface of hyoid series with 3 fingerlike papillae.

Body somewhat ovoid, maximum depth at or near vertical through pectoral-fin base. Caudal peduncle relatively short, length approximately equal to depth. Lateral line inconspicuous, with small pored scales. Dorsal fin originating over anterior orbit. Pelvic fins originating under opercular margin, extending beyond anal-fin origin. Peritoneum black.

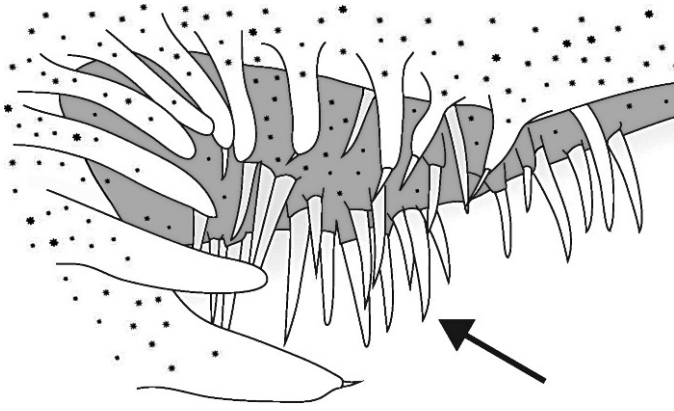


Fig. 7. Upper pharyngeal teeth and gill rakers (right side) of *Caristius digitus*, new species, AMS I.20316-038, holotype, 90 mm SL.

Distribution.—Examined specimens were collected off the east coast of Australia and from the southern Indian Ocean (Fig. 8).

Etymology.—From the Latin word *digitus*, meaning finger, for the fingerlike papillae on the dorsal surface of the hyoid.

***Caristius fasciatus* (Borodin, 1930)**

Figures 6B, 8; Table 2

Pteraclis fasciatus Borodin, 1930:91. Type locality: NW Atlantic, 41°20'N, 43°29'W.—Borodin, 1931:84.

Caristius groenlandicus Jensen, 1941:49. Type locality: Davis Strait, west Greenland.—Scott et al., 1970:175–177.—Heemstra, 1986:636.—Scott and Scott, 1988:386.—McAllister, 1990:150.—Post, 1990:765.—Okamura et al., 1995:186.—Brickle and Laptikhovskiy, 2002:492.—Moore et al., 2003:227.—Bray et al., 2006:1188.—Kukuev et al., 2012.

Platyberyx groenlandicus.—Post, 1990:765.—Trunov, 1999:495.—Møller et al., 2010:58.

Caristius fasciatus.—Hartel and Triant, 1998:746.—Britz and Hartel, 2012.

Lectotype.—MCZ 32120, 36 mm, NW Atlantic, 41°20'N, 43°29'W, 1500 m (designated by Borodin, 1931).

Additional material.—ARC 7739, 123 mm (♂), NW Atlantic, 41°58'N, 55°42'W, 600–859 m, 29 September 1987; ARC 17054, 21 mm, NW Atlantic, 41°27'N, 62°13'W, 51–197 m, 22 October 1988; ARC 19073, 170 mm (♂), NW Atlantic, 41°45'N, 60°01'W, 700 m, 8 June 1989; ARC 23969, 175 mm, unplaced; ARC 8600874, 140 mm, NW Atlantic, 42°49'N, 62°09'W, 920–930 m, 6 November 1978; ARC 8600876, 133 mm, NW Atlantic, 43°49'N, 55°56'W, 888 m, 30 October 1984; LACM 57210-1, 160 mm (♂), NW Atlantic, off Nova Scotia, 43°43.5'N, 58°44.9'W; ROM 26008, 165 mm, NW Atlantic, Georges Bank, 146 m, 20 April 1966; ROM 26552, 160 mm, NW Atlantic, N of Grand Banks, 50°30'N, 49°30'W, 0–1000 m, 12 July 1968; ROM 26553, 158 mm, NW Atlantic, S of Flemish Cap, 46°N, 44°30'W, 0–1000 m, 18 July 1968; ROM 26554, 210 mm, NW Atlantic, E of Grand Banks, 45°30'N, 47°30'W, 0–1025 m, 19 July 1968; ROM 26555, 195 mm, NW Atlantic, S of Grand Banks, 42°30'N, 50°W, 0–1100 m, 24 July 1968; ROM 26556, 195 mm, NW Atlantic, E of Grand Banks, 45°30'N, 47°30'W, 0–1025 m, 19 July 1968; ROM 26557, 215 mm, NW Atlantic, E of Flemish Cap, 47°30'N, 43°W, 0–1000 m, 17 July 1968; ROM 26582, 165 mm, NW Atlantic, S of Grand Banks, 42°30'N, 50°W, 0–1100 m, 24 July 1968; ZMUC 4019, holotype of *Caristius groenlandicus*, 150 mm, western North Atlantic, Davis Strait, west Greenland, 62°53'N, 54°15'W, 1660 m, 9 June 1909; ZMUC 40115, 123 mm, NW Atlantic, off Greenland, 60°30'N, 46°W, 25 November 1983.

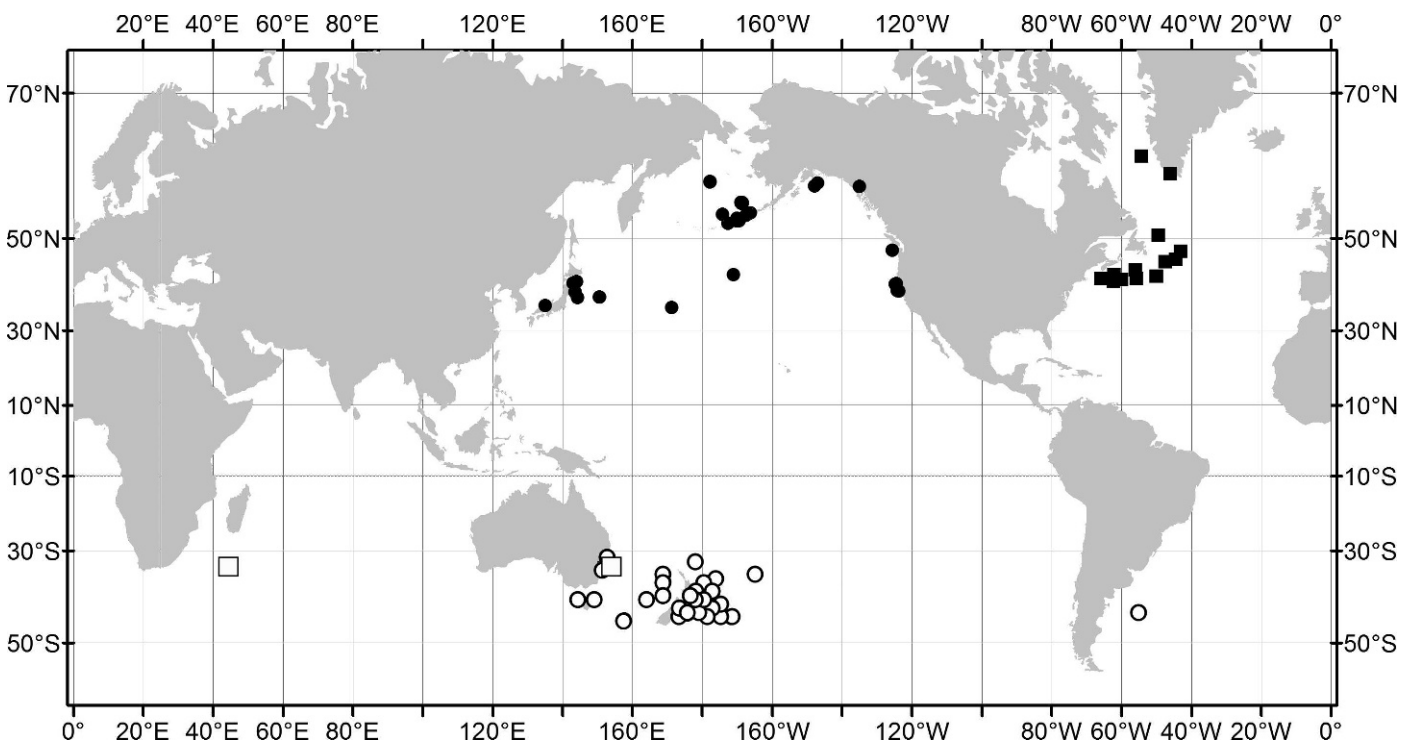


Fig. 8. Distribution of material examined of *Caristius digitus*, new species (open squares), *C. fasciatus* (closed squares), *C. macropus* (closed circles), and *C. meridionalis*, new species (open circles).

Table 2. Meristics and Proportional Morphometrics of Known Species of *Caristius*.

	<i>Caristius digitus</i> , new species			<i>Caristius fasciatus</i>			<i>Caristius macropus</i>			<i>Caristius meridionalis</i> , new species		
	Range	Mean	n	Range	Mean	n	Range	Mean	n	Range	Mean	n
Standard length (mm)	90–185		2	21–215	15.9 + 20.5	16	25–330		43	40–270		49
Vertebrae	18 + 20 (38)	18 + 20 (38)	2	15–17 + 19–21 (35–38)	(36.4)	15	14–17 + 21–24 (37–40)	15.7 + 22.5 (38.1)	35	15–17 + 21– 24 (37–41)	16.3 + 22.8 (39.1)	49
Dorsal-fin rays	34	34	2	31–34	32.7	15	32–36	33.7	38	35–39	36.3	47
Anal-fin rays	21	21	2	18–21	19.7	15	21–23	21.5	40	20–24	22.1	49
Pectoral-fin rays	18	18	2	16–18	17.6	15	16–19	17.3	43	17–20	18.3	49
Vomerine teeth	0–1	0.5	2	2–19	4.6	14	2–14	5.7	40	3–16	7.7	49
Palatine teeth	2–3	2.5	2	4–8	5.1	14	3–12	6.9	40	4–13	7.8	49
Upper-jaw teeth	26–28	27	2	12–23	17.9	9	26–55	40.6	25	23–54	38.2	47
Lower-jaw teeth	16–28	22	2	10–25	16.9	11	20–53	33.6	27	18–50	33.2	47
Gill rakers	6–8 + 16–18 (22–26)	(24)	2	5–6 + 13–15 (18–21)	(19.3)	14	4–7 + 13–16 (18–22)	(20.6)	42	5–6 + 13–15 (18–21)	(19.9)	47
As % SL												
Body depth	55.3–56.0	55.6	2	43.0–63.4	50.2	13	44.7–67.0	54.7	39	45.7–66.1	54.2	43
Head length	28.4–32.7	30.6	2	23.1–45.4	28.9	14	22.6–39.4	28.6	40	23.3–40.6	27.3	43
Predorsal length	4.7–11.8	8.2	2	4.1–15.4	8.6	13	1.8–16.8	7.0	39	2.2–15.9	7.3	41
Prepectoral length	31.0–36.5	33.7	2	25.5–43.0	30.6	14	23.0–42.3	29.7	40	23.9–41.5	28.5	41
Prepelvic length	30.3–36.5	33.4	2	26.4–50.7	32.6	14	24.3–50.8	31.7	40	25.3–45.1	31.0	41
Pectoral-fin base	7.4–8.6	8.0	2	6.1–13.7	7.8	14	5.6–10.4	7.1	40	5.7–9.9	7.4	40
Prenal length	58.7–66.6	62.6	2	52.7–62.9	57.9	14	47.5–58.8	53.1	40	48.3–63	54.7	41
Dorsal-fin base	82.8–85.1	84.0	2	67.5–84.3	79.9	13	54.0–88.8	81.8	39	76.0–90.9	84.3	41
Anal-fin base	40.2–40.4	40.3	2	34.6–50.8	40.5	14	38.1–47.8	43.9	40	38.0–48.3	43.2	41
Peduncle length	12.1–14.1	13.1	2	11.4–14.9	13.1	14	11.9–16.7	13.9	40	10.7–15.2	13.3	41
Peduncle depth	13.8–14.2	14.0	2	10.9–16.1	13.6	14	9.6–13.9	12.5	40	9.9–16.0	13.4	41
As % HL												
Upper-jaw length	48.1–50.7	49.4	2	54.7–60.5	58.1	13	49.3–72.7	59.5	40	50.6–73.5	60.6	41
Lower-jaw length	54.1–54.1	54.1	2	53.2–72.2	61.1	14	52.4–68.0	58.7	40	48.6–70.8	60.6	41
Bony-orbit width	47.2–52.0	49.6	2	43.6–51.3	47.1	14	40.8–51.5	45.5	40	38.6–54.9	46.4	43

Diagnosis.—A species of *Caristius* distinguished from *C. macropus* and *C. meridionalis* by having fewer and larger teeth (25 or fewer in each jaw and 4–7 in palatine vs. 18 or more and 3–13, respectively) and fewer vertebrae (35–38 vs. 37–41). It can be distinguished from *C. digitus* by the absence of a series of fingerlike papillae inside the opercle (0 or 1 papilla in *C. fasciatus*), the short conical pharyngeal teeth (vs. elongate pharyngeal teeth), and fewer gill rakers (18–21 vs. 22–26).

Counts.—(16 specimens) Vertebrae 15–17 (15) + 19–21 (21) = 35–38 (36); dorsal-fin rays 31–34 (34); anal-fin rays 18–21 (20); pectoral-fin rays 16–18 (16); vomerine teeth 2–19 (19); palatine teeth 4–8 (8); gill rakers 5–6 (6) + 13–15 (13) = 18–21 (19).

Description.—Anterior profile of head rounded to angular, with apex near dorsal-fin origin. Eye moderate in size, diameter approximately one-third to one-half HL. Mouth large; anterior extent of upper and lower jaws approximately equal in smaller specimens, upper extending anteriorly beyond lower in larger specimens; posterior margin of upper jaw extending to posterior margin of orbit; anguloarticular-quadrate articulation under posterior margin of orbit. Dentary and premaxillary teeth large, anterior teeth curved posteriorly and medially, posterior teeth curved anteriorly and slightly laterally, arranged in single row except for 1–3 additional teeth near premaxillary and dentary symphyses. Vomerine and palatine teeth slightly recurved, similar in size to largest jaw teeth. Skin on dorsal surface of basihyal smooth, with minute papillae but no series of folds. Dorsal and ventral oral valves with transverse folds.

Gill rakers on first arch in two series: rakers of lateral series long with pointed tips, short with more rounded tips in larger specimens, sparsely pigmented, each with several short bristles arranged along distal half of dorsomedial surface (Fig. 4E); rakers of medial series short, stout, with 1 or 2 bristles at tip. Lateral and medial rakers separated by fold of tissue. Pseudobranch with 15–20 filaments equal in size and shape to gill filaments. Upper pharyngeal tooth patches with tiny teeth; anterior, middle, and posterior tooth patches each bearing 1–3 teeth; lower pharyngeal tooth patch with 5–10 small teeth arranged in triangular pattern; all pharyngeal teeth obscured by fleshy folds; left and right lower pharyngeals not divided by ridge of columnar tissue. Skin on ventromedial surface of pterygoids bearing approximately 4–5 fleshy tabs with short lobes. Dorsal surface of hyoid series without fingerlike papillae, except for single papilla present at articulation of anterior ceratohyal and interhyal in some specimens.

Body somewhat triangular to ovoid, maximum depth at or near midbody. Caudal peduncle relatively short, length approximately equal to depth. Lateral line inconspicuous, but visible, consisting of approximately 45 small tubular scales, each with longitudinal median keel. Dorsal fin originating over mid-orbit. Pelvic fins originating under preopercular margin, extending beyond anal-fin origin. Peritoneum dusky.

Distribution.—Examined specimens were all collected in the western North Atlantic (Fig. 8).

Remarks.—Hartel and Triant (1998) suggested, based on meristics, that *P. fasciatus* may be a senior synonym of *C.*

groenlandicus. Britz and Hartel (2012) reported additional evidence of this synonymy, including the morphology of the lower caudal-fin rays in the lectotype of *P. fasciatus*, and we concur with their findings.

***Caristius macropus* (Bellotti, 1903)**

Figures 6C, 8; Table 2

Pteraclis macropus Bellotti, 1903:137.—Type locality: Yokohama, Japan (destroyed in 1943: Conci and Michelangeli, 1974).

Caristius japonicus Gill and Smith, 1905:249.—Type locality: Kagoshima Bay, Kyushu, Japan.—Jordan and Thompson, 1914:243.—Jordan, 1919:334.—Pequeño, 1989:61.

Caristius macropus.—Jordan and Thompson, 1914:243.—Eschmeyer et al., 1983:214.—Amaoka in Amaoka et al., 1983:129, 203.—Fujii in Masuda et al., 1984:160.—McAllister, 1990:150.—Post, 1990:765.—Okamura and Miyahara in Okamura et al., 1995:186.—Mukhametov and Volodin, 1999:426.—Balanov, 2000:850.—Sheiko and Fedorov, 2000:34.—Shinohara et al., 2001:325.—Paxton, 2001:2837.—Mecklenburg et al., 2002:655.—Parin, 2003:S9.—Mundy, 2005:378.—Csepp and Stevenson, 2006.—Trunov et al., 2006:465.—Bray et al., 2006:1189.—Tweddle and Anderson, 2008:11.—Shinohara et al., 2009:722.—Kukuev et al., 2012.

Elephenor macropus.—Jordan, 1919:334.

Platyberyx macropus.—Suzuki and Hosokawa, 1994:4.—Nakabo, 2000:817.

Holotype.—MSNM (destroyed), Yokohama, Japan.

Additional material.—USNM 61054, holotype of *Caristius japonicus*, 61 mm, western N Pacific, Japan, Kagoshima Bay, May 1903; AB 03-09, 152 mm, eastern N Pacific, Alexander Archipelago, 58°37'N, 135°2'W, 265–276 m, 8 April 2003; CAS 26785, 250 mm, eastern N Pacific, off California, 40°53'N, 124°27'W, 180 fm, 30 April 1960; CAS 59624, 245 mm, eastern N Pacific, off California, WNW of Pt. Arguello, 366 m, 13 December 1985; HUMZ 17739, 178 mm, western N Pacific, off Honshu, Aomori Prefecture; HUMZ 69161, 265 mm, western N Pacific, off Hokkaido, 980 m, 14 February 1975; HUMZ 69319, 187 mm, western N Pacific, off Honshu, Iwate Prefecture, 1260–1275 m, 21 July 1977; IORAS 02776, 85 mm, 0°3'S, 139°2'W; IORAS 02792, 145 mm, approximately 30°N, 172°E; LACM 37075, 197 mm, eastern N Pacific, off California, near Eureka; LACM 37356, 175 mm, eastern N Pacific, off California, near Mendocino; NSMT-P57659, 3, 25–44 mm, western N Pacific, off Japan, 37°59'N, 150°36'E, 0–80 m; NSMT-P59244, 265 mm, western N Pacific, off Japan, 41°18'N, 143°57'E, 550–577 m, 25 July 1996; NSMT-P59271, 270 mm (♂), western N Pacific, off Japan, 41°3'N, 143°33'E, 550–577 m, 26 July 1996; NSMT-P59272, 137 mm (♂), western N Pacific, off Japan, 39°6'N, 143°33'E, 210–240 m, 29 July 1996; NSMT-P59273, 175 mm, western N Pacific, off Japan, 39°2'N, 143°30'E, 550–578 m, 30 July 1996; NSMT-P64322, 57 mm, western N Pacific, off Japan, 20–40 m, 17 June 2002; UW 20979, 307 mm, eastern Bering Sea, 54°30'N, 165°59'W, 487 m, 20 October 1982; UW 21920, 140 mm, eastern N Pacific, off Oregon, 42°51'N, 171°1'W, 150 fm, 30 October 1989; UW 22373, 187 mm, eastern Bering Sea, 53°16'N, 169°23'W, 204 fm, 10 January 1990; UW 22391, 205 mm, eastern Bering Sea, 53°8'N, 169°30'W, 240 fm, 22 January 1991; UW 25832, 176 mm, eastern N Pacific, off California,

39°20'N, 124°8'W, 436 m, 11 November 1991; UW 40333, 245 mm, eastern Bering Sea, 53°7'N, 170°9'W, 235 fm, 25 February 1991; UW 41832, 325 mm, eastern N Pacific, 29 September 1987; UW 41927, 310 mm, eastern N Pacific, 1 May 1985; UW 44232, 185 mm, eastern Bering Sea, 52°42'N, 172°41'W, 225 fm, 22 February 1994; UW 44420, 245 mm, eastern Bering Sea, 59°20'N, 177°48'W, 320 m, 27 February 1983; UW 44441, 330 mm, eastern Bering Sea, 53°10'N, 170°W, 384 m, 10 March 1991; UW 44494, 205 mm, eastern Bering Sea, 54°N, 167°30'W, 8 February 1987; UW 47594, 300 mm, eastern Bering Sea, 53°7'N, 170°12'W, 230 fm, 25 February 1991; UW 47597, 255 mm, eastern Bering Sea, 53°29'N, 170°6'W, 220 fm, 1 March 1991; UW 47616, 263 mm, Bering Sea, 53°16'N, 170°3'W, 250 fm, 26 February 1991; UW 110708, 180 mm (♀), eastern N Pacific, 0–300 m, 23 October 1987; UW 113436, 230 mm (♀), eastern Bering Sea, 54°12'N, 174°16'W, 5 February 1984; UW 113457, 260 mm, eastern Bering Sea, 59°14'N, 177°50'W, 19 June 1984; UW 113533, 180 mm, eastern Bering Sea, 54°27'N, 166°13'W, 511 m, 6 August 2004; UW 116460, 240 mm, eastern Bering Sea, 486 m, 26 February 2006; UW 116922, 175 mm, eastern Bering Sea, 506 m, 18 March 2007; UW 116927, 235 mm, eastern N Pacific, off Washington, 342 m, 3 June 2007; UW 116933, 260 mm, eastern Bering Sea, 484 m, 26 February 2006; UW 116934, 205 mm, eastern Bering Sea, 522 m, 22 February 2006; UW 117571, 190 mm (♂), eastern N Pacific, Gulf of Alaska, 59°9.4'N, 147°1'W, 491 m, 16 March 2008; UW 117574, 200 mm, eastern N Pacific, Gulf of Alaska, 58°39'N, 147°53.7'W, 490 m, 16 March 2008; UW 151269, 145 mm, N Pacific, Emperor Seamounts, 35°31'N, 171°18'E, 263 m, 14 May 2011.

Diagnosis.—A species of *Caristius* distinguished from *C. meridionalis* by having fewer dorsal-fin rays (32–36 vs. 35–39), several short bristles along distal half of gill rakers, and occasionally a small bristle at the tip (vs. several long bristles on distal half of raker, and one or two long bristles extending from the tip of each raker), and by the morphology of the dorsal pharyngeal papillae (low folds vs. fleshy tabs and small papillae). It can be distinguished from *C. fasciatus* by the greater number of smaller teeth, higher vertebral count, and by the absence of a fingerlike papilla inside the opercle (occasionally absent in *C. fasciatus* as well); and from *C. digitus* by the absence of a series of fingerlike papillae inside the opercle, the short conical pharyngeal teeth (vs. elongate pharyngeal teeth), and fewer gill rakers (18–22 vs. 22–26).

Counts.—(43 specimens) Vertebrae 14–17 + 21–24 = 37–40; dorsal-fin rays 32–36; anal-fin rays 21–23; pectoral-fin rays 16–19; vomerine teeth 2–14; palatine teeth 3–12; gill rakers 4–7 + 13–16 = 18–22.

Description.—Anterior profile of head rounded to angular, with apex near dorsal-fin origin. Eye small, diameter approximately one-third HL. Mouth large; anterior extent of upper and lower jaws approximately equal in smaller specimens, upper extending anteriorly beyond lower in larger specimens; posterior margin of upper jaw extending to posterior margin of orbit; anguloarticular-quadrate articulation posterior to orbit. Dentary and premaxillary teeth small, anterior teeth curved posteriorly and medially, posterior teeth curved anteriorly and slightly laterally,

arranged in single row except for small patches at premaxillary and dentary symphyses. Vomerine and palatine teeth slightly recurved, similar in size to largest jaw teeth. Skin on dorsal surface of basihyal with series of folds arranged in chevron pattern. Dorsal and ventral oral valves with transverse folds.

Gill rakers on first arch in two series: rakers of lateral series long with pointed tips, more rounded in larger specimens, sparsely pigmented, each with several short bristles arranged along distal half of dorsomedial surface, some with small bristle at tip; rakers of medial series short, stout, with 2 or 3 bristles at tip. Lateral and medial rakers separated by fold of tissue. Pseudobranch with 15–20 filaments equal in size and shape to gill filaments. Upper pharyngeal tooth patches with small, conical teeth; anterior and middle tooth patches each bearing approximately 10 teeth arranged in single row; posterior tooth patch smaller, with approximately 10 teeth arranged in two rows; lower pharyngeal tooth patch with approximately 25 small teeth arranged in triangular pattern, teeth in largest specimens obscured by fleshy folds; left and right lower pharyngeals not divided by ridge of columnar tissue. Skin on ventromedial surface of pterygoids bearing approximately 4–5 fleshy folds. Dorsal surface of hyoid series without fingerlike papillae.

Body somewhat triangular to ovoid, maximum depth at or near vertical through pectoral-fin base. Caudal peduncle relatively short, length approximately equal to depth. Lateral line inconspicuous or not visible with naked eye. Dorsal fin originating over mid-orbit. Pelvic fins originating under opercular margin, extending beyond anal-fin origin. Peritoneum dusky.

Distribution.—Examined specimens were all collected in the North Pacific (Fig. 8).

Remarks.—Jordan and Thompson (1914:245) distinguished *C. macropus* from *C. japonicus* on the basis of body and fin shape (“slenderer . . . cheek deeper, the ventrals not nearly so far in front of the pectorals . . . the ventral rays longer and perhaps the dorsal and anal rays also”) and scales (“the anterior scales not enlarged”). Jordan (1919:330) placed the two species in separate families, asserting that “*P. [Pteraclis] macropus* has really very little in common with *Caristius* or *Platyberyx*,” and erected the genus *Elephenor* and the family Elephenoridae for *P. macropus*, “distinguished by its small, weak scales, and its relatively short anal fin.” Norman (1930:344) disagreed with Jordan (1919), stating that “there is no doubt that the species described by Bellotti and Gill and Smith are congeneric,” although the specimen he was actually describing was probably *Paracaristius maderensis*. Amaoka et al. (1983) were the first to suggest that *C. japonicus* is a synonym of *C. macropus*. The holotype of *C. macropus*, collected near Yokohama in Japan, has been destroyed (Conci and Michelangeli, 1974), but meristics reported by Bellotti (1903) match the only form of *Caristius* known from the western North Pacific as well as those of the holotype of *C. japonicus*. Two other species of *Caristius* (*C. digitus* and *C. fasciatus*) have similar meristics, but *C. digitus* is known only from the southern hemisphere and *C. fasciatus* is known only from the North Atlantic. Therefore, we share the opinion of Amaoka et al. (1983) and subsequent authors that *C. japonicus* is a junior synonym of *C. macropus*.

***Caristus meridionalis*, new species**

Figures 6D, 8; Table 2

Holotype.—NMNZ P25944, 260 mm, S Pacific, off New Zealand, 42°51'S, 176°17'W, 963–974 m, 21 July 1990.

Paratypes.—AMS I.20071-038, 155 mm, S Pacific, off Australia, 34°40'S, 151°15'E, 3 November 1977; AMS I.20310-012, 40 mm, S Pacific, off Australia, 33°23'S, 152°37'E, 0–625 m, 13 December 1977; AMS I.20314-062, 185 mm, S Pacific, off Australia, 33°28'S, 152°33'E, 0–900 m, 14 December 1977; AMS I.21365-003, 190 mm, S Pacific, off Australia, 33°9'S, 153°5'E, 0–750 m, 28 November 1979; AMS I.24265-004, 198 mm, S Pacific, off Australia, 33°31'S, 152°11'E, 1043–1107 m, 22 May 1984; AMS I.24787-004, 170 mm, S Pacific, off Australia, 32°5'S, 153°10'E, 1052–1125 m, 18 July 1984; AMS I.25263-003, 2, 173–182 mm, SW Pacific, off Australia, 33°46'S, 151°59'E, 877–914 m, 26 September 1984; IORAS 02778, 82 mm, S Atlantic, off Argentina, 44°7'S, 55°16'W, 650–0 m, 21 December 1971; ISRMIC 856-01, 190 mm, S Pacific, off Tasmania, 41°47'S, 144°23'E, 1290–1330 m, 8 October 1987; ISRMIC 921-01, 235 mm, S Pacific, off Tasmania, 41°37'S, 148°41'E, 950–1000 m, 17 July 1987; ISRMIC 1138-01, 225 mm, S Pacific, off Tasmania, October 1985; NMNZ P14853, 185 mm, S Pacific, off New Zealand, 44°47'S, 173°39'E, 900 m, 2 December 1983; NMNZ P15607, 155 mm, S Pacific, off New Zealand, 44°46'S, 174°5'W, 805–830 m; NMNZ P15934, 195 mm, S Pacific, off New Zealand, 40°15'S, 168°57'E, 855–867 m, 5 July 1984; NMNZ P16010, 218 mm, S Pacific, off New Zealand, 42°47'S, 176°48'W, 1021 m, 12 July 1984; NMNZ P20258, 195 mm, S Pacific, off New Zealand, 43°9'S, 174°58'W, 880–887 m, 17 July 1986; NMNZ P20301, 185 mm, S Pacific, off New Zealand, 42°47'S, 179°41'E, 26 October 1986; NMNZ P22119, 168 mm, S Pacific, off New Zealand, 39°58'S, 178°7'E, 1100–1240 m, 7 April 1988; NMNZ P23861, 235 mm, S Pacific, off New Zealand, 40°47'S, 176°53'E, 658–685 m, 22 October 1988; NMNZ P23893, 240 mm, S Pacific, off New Zealand, 44°48'S, 173°15'E, 1008–1040 m, 1 October 1988; NMNZ P23918, 255 mm, S Pacific, off New Zealand, 44°17'S, 178°56'E, 1114 m, 15 November 1988; NMNZ P23932, 255 mm, S Pacific, off New Zealand; NMNZ P25384, 210 mm, S Pacific, off New Zealand, 40°45'S, 176°45'E, February 1985; NMNZ P25844, 230 mm, S Pacific, off New Zealand, 42°45'S, 177°39'E, 821–826 m, 18 June 1990; NMNZ P27936, 190 mm, S Pacific, off New Zealand, 43°17'S, 173°58'E, 897–913 m, 6 March 1992; NMNZ P27987, 265 mm, S Pacific, off New Zealand, 44°45'S, 173°15'E, 1010–1025 m, 12 October 1991; NMNZ P31061, 240 mm, S Pacific, off New Zealand, 44°37'S, 175°46'E, 861–885 m, 18 October 1993; NMNZ P31164, 240 mm, S Pacific, 35°52'S, 165°W, 950–960 m; NMNZ P31358, 265 mm, S Pacific, off New Zealand, 39°44'S, 178°18'W, 940–1070 m; NMNZ P31897, 265 mm, S Pacific, off New Zealand, 41°31'S, 164°13'E, 1150 m, 31 March 1995; NMNZ P32951, 248 mm, S Pacific, off New Zealand, 44°42'S, 177°22'W, 1135–1157 m, 17 October 1995; NMNZ P32971, 218 mm, S Pacific, off New Zealand, 44°27'S, 179°15'W, 883–914 m, 6 November 1995; NMNZ P33435, 260 mm, S Pacific, off New Zealand; NMNZ P34175, 245 mm, S Pacific, off New Zealand; NMNZ P36958, 260 mm, S Pacific, off New Zealand, 37°6'S, 176°39'W, 894 m; NMNZ P37219, 127 mm, 44°34'S, 174°6'W, 500 m; NMNZ P37853, 230 mm, S Pacific, off New Zealand, 800–1200 m, February 2001; NMNZ P37978, 185 mm, S Pacific,

off New Zealand, 44°11'S, 174°23'E, 885–1335 m; NMNZ P38093, 210 mm, S Pacific, off New Zealand, 45°16'S, 171°45'W, 830 m; NMNZ P38214, 212 mm, S Pacific, off New Zealand, 37°23'S, 169°3'E, 1040 m, 29 March 2001; NMNZ P38849, 267 mm, S Pacific, off New Zealand, 45°28'S, 157°39'E, 800–900 m; NMNZ P39916, 170 mm, S Pacific, off New Zealand, 39°34'S, 178°15'W, 857–880 m; NMNZ P40707, 242 mm, S Pacific, off New Zealand, 37°41'S, 179°21'W.

Additional material.—NMNZ P34192, 260 mm, unplaced; NMNZ P38768, 190 mm, unplaced; NMNZ P40717, 220 mm, unplaced, 100–150 m; NMNZ P41683, 160 mm, unplaced, 10 May 2005; NMNZ P42350, 188 mm, unplaced.

Diagnosis.—A species of *Caristus* distinguished from its congeners by having a greater number of dorsal-fin rays (35–39 or more vs. 36 or fewer). Additionally, *C. meridionalis* can be distinguished from *C. macropus* by the presence of several long bristles on distal half of raker, and one or two long bristles extending from the tip of each raker (vs. several short bristles along distal half of raker, and occasionally a small bristle at the tip) and the morphology of the dorsal pharyngeal papillae (fleshy tabs and small papillae vs. low folds). It can be distinguished from *C. fasciatus* by the greater number of smaller teeth, higher vertebral count, and by the absence of a fingerlike papilla inside the opercle (occasionally absent in *C. fasciatus* as well); and from *C. digitus* by the absence of a series of fingerlike papillae inside the opercle, the short conical pharyngeal teeth (vs. elongate pharyngeal teeth), and fewer gill rakers (18–21 vs. 22–26).

Counts.—(49 specimens) Vertebrae 15–17 (16) + 21–24 (23) = 37–41 (39); dorsal-fin rays 35–39 (36); anal-fin rays 20–24 (21); pectoral-fin rays 17–20 (19); vomerine teeth 3–16 (12); palatine teeth 4–13 (10); gill rakers 5–6 (5) + 13–15 (14) = 18–21 (19).

Description.—Anterior profile of head rounded to angular, with apex near dorsal-fin origin. Eye moderate in size, diameter approximately one-half HL. Mouth large; anterior extent of upper and lower jaws approximately equal in smaller specimens, upper extending anteriorly beyond lower in larger specimens; posterior margin of upper jaw extending to posterior margin of orbit; anguloarticular-quadrate articulation posterior to orbit. Dentary and premaxillary teeth large, anterior teeth curved posteriorly and medially, posterior teeth curved anteriorly and slightly laterally, arranged in single row except for small patches at premaxillary and dentary symphyses. Vomerine and palatine teeth slightly recurved, similar in size to largest jaw teeth. Skin on dorsal surface of basihyal with series of folds arranged in chevron pattern. Dorsal and ventral oral valves with transverse folds.

Gill rakers on first arch in two series: rakers of lateral series long with pointed tips, short with more rounded tips in larger specimens, sparsely pigmented, each with several short bristles arranged along distal half of dorsomedial surface, one or two long bristles extending from tip of each raker (Fig. 4F); rakers of medial series short, stout, with 2 or 3 bristles at tip. Lateral and medial rakers separated by fold of tissue. Pseudobranch with 15–20 filaments equal in size and shape to gill filaments. Upper pharyngeal tooth patches

with small conical teeth; anterior and middle tooth patches each bearing approximately 10–15 teeth arranged in two rows; posterior tooth patch smaller, with approximately 10 teeth arranged in two rows; lower pharyngeal tooth patch with approximately 25 small teeth arranged in triangular pattern, teeth in largest specimens obscured by fleshy folds; left and right lower pharyngeals not divided by ridge of columnar tissue. Skin on ventromedial surface of pterygoids bearing approximately 4–5 fleshy tabs, each with small papillae. Dorsal surface of hyoid series without fingerlike papillae.

Body somewhat triangular to ovoid, maximum depth at or near midbody. Caudal peduncle relatively short, length approximately equal to depth. Lateral line not visible. Dorsal fin originating over mid-orbit. Pelvic fins originating under opercular margin, extending beyond anal-fin origin. Peritoneum dark.

Distribution.—Specimens examined were all collected from the South Pacific, off the coasts of Australia and New Zealand, except for IORAS 02778, which was collected in the South Atlantic off Argentina (Fig. 8). This species is probably circumglobal at southern temperate latitudes.

Etymology.—From the Latin *meridionalis*, meaning “southern,” in reference to the austral distribution of the species.

Caristius sp.

Unidentified specimens.—We have encountered three specimens that do not align with any of the descriptions presented here, but which we prefer not to describe at this time due to poor preservation. Two of the specimens, NMNZ P33461 (160 mm) and NSMT P58725 (112 mm), clearly belong to *Caristius* as defined here as they lack any evidence of a lateral line, though their meristics (dorsal-fin rays, anal-fin rays, and vertebrae) are lower than any known species of *Caristius*, and NMNZ P33461 has the lateral and medial series of gill rakers separated by a thin webbing. The third specimen, NMNZ P28761 (117 mm), with extremely long pharyngobranchial and basibranchial teeth and large scales, cannot be conclusively referred to a described genus. We defer any decision on the placement of these specimens, either in the species circumscribed here or as distinct new taxa, until examination of additional specimens that share these characters.

KEY TO THE KNOWN CARISTIID GENERA AND SPECIES OF CARISTIUS AND PLATYBERYX

- 1a. Suborbital series expanded, overlapping bones of upper jaw and forming a broad space between orbit and mouth; upper jaw short, extending approximately to mid-orbit; palatine teeth absent; vomerine teeth present or absent *Neocaristius* and *Paracaristius* (see Stevenson and Kenaley, 2011)
- 1b. Suborbital series not expanded, space between orbit and mouth narrow; upper jaw relatively long, extending to mid-orbit or beyond; palatine teeth present (except in *Platyberyx paucus*); vomerine teeth present (may be absent in *C. digitus*) 2
- 2a. Lateral line conspicuous, with enlarged pored scales; ventral caudal rays not serrated Genus *Platyberyx* 3
- 2b. Lateral line inconspicuous, without enlarged pored scales; ventral principal caudal rays serrated along ventral margin Genus *Caristius* 8
- 3a. Dorsal-fin rays 24–26; anal-fin rays 15–16; vertebrae 31; palatine teeth absent, replaced by row of multifid papillae ... *Platyberyx paucus*, new species
- 3b. Dorsal-fin rays 27 or more; anal-fin rays 17 or more; vertebrae 32 or more; palatine teeth present 4
- 4a. Dorsal-fin rays 31–35; anal-fin rays 20–22; vertebrae 36–39 *Platyberyx andriashevi*
- 4b. Dorsal-fin rays 27–31; anal-fin rays 17–19; vertebrae 32–35 5
- 5a. Mouth moderate, posterior margin of upper jaw extending approximately to mid-orbit; prepectoral length 39–50% SL; prepelvic length 30–53% SL; preanal length 55–65% SL 6
- 5b. Mouth large, posterior margin of upper jaw extending nearly to posterior margin of orbit; prepectoral length 30–35% SL; prepelvic length <33% SL; preanal length 50–56% SL 7
- 6a. Ventral caudal spur absent; gill rakers with small bristles evenly spaced along dorsomedial margin *Platyberyx opalescens*
- 6b. Ventral caudal spur present; gill rakers with combination of small bristles and larger spikes interspersed along dorsomedial margin, and single long spike at tip ... *Platyberyx pietschi*, new species
- 7a. Gill rakers stout, rounded, with many small bristles concentrated near tip and midway along raker; jaw teeth in multiple rows along most of length of dentary and premaxilla; dorsal pharyngeal papillae multifid, arborescent; conspicuous multifid papillae throughout inside of mouth ... *Platyberyx maui*
- 7b. Gill rakers narrow, bladelike, with a few bristles concentrated near tip; jaw teeth in single row; dorsal pharyngeal papillae saclike; multifid papillae absent from inside mouth *Platyberyx rhyton*, new species
- 8a. Series of fingerlike papillae present along dorsal margin of hyoid arch and at articulation of interhyal and posterior ceratohyal; pharyngeal teeth elongate, caniniform; gill rakers 22–26 *Caristius digitus*, new species
- 8b. Fingerlike papillae absent along dorsal margin of hyoid arch, or a single papilla at articulation of interhyal and posterior ceratohyal; pharyngeal teeth short, conical; gill rakers 18–22 9
- 9a. Upper and lower jaws each usually with 23 or fewer teeth; palatine teeth 4–8; total vertebrae 35–38; usually with single fingerlike papilla inside opercle at articulation of interhyal and posterior ceratohyal *Caristius fasciatus*
- 9b. Upper and lower jaws each usually with 23 or more teeth; palatine teeth 3–13; total vertebrae 37–41; no papillae inside opercle 10
- 10a. Several short bristles along distal 1/3 of gill rakers, and occasionally a small bristle at tip; ventromedial surface of pterygoid with a series of 4–5 low folds; dorsal-fin rays usually 35 or fewer; pectoral-fin rays 16–19 *Caristius macropus*
- 10b. Several long bristles on distal 1/3 of gill rakers, and 1–2 bristles extending from tip of each raker; ventromedial surface of pterygoid with a series of fleshy tabs with small papillae; dorsal-fin rays

usually 35 or more; pectoral-fin rays 17–20 *Caristius meridionalis*, new species

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