

CRYSTALLODYTES PAUCIRADIATUS (PERCIFORMES),
A NEW CREEDIID FISH SPECIES FROM
EASTER ISLAND

Joseph S. Nelson and John E. Randall

Abstract.—A new species of creediid fish, *Crystallodytes pauciradiatus*, is described from Easter Island. It is distinguished from *C. cookei*, the other member of the family with scales only along the lateral line, in having only 30–32 dorsal-fin rays and 48–52 lateral-line scales. The new species represents an eastern extension in the range of the family. *Crystallodytes cookei*, previously reported from Hawaii and Enderbury and Tau islands, is reported here also from the Pitcairn Group (Pitcairn, Henderson, and Ducie islands), Swains Island in northern American Samoa, and perhaps Tahiti. The creediid *Chalixodytes tauensis* is recorded from Pitcairn and Mangareva. A key to the species of the family is presented.

Some 14 species are recognized in the Indo-West Pacific family Creediidae (Nelson 1983). One of the seven genera, *Crystallodytes*, is currently considered to be monotypic, although the nominal species is recognized with two subspecies, *C. cookei cookei* Fowler from Hawaii, and *C. cookei enderburyensis* Schultz from Enderbury Island (Phoenix Islands) and Tau Island (American Samoa) in the South Pacific. *Crystallodytes cookei* is distinguished from all other creediids in having scales only along the lateral line. Relatively little is known of the biology of *Crystallodytes*; Leis (1982) described its spawning time, eggs, larvae, and occurrence in the plankton. We describe here a second species of *Crystallodytes*, from Easter Island, distinguished from the other species primarily in having fewer meristic parts.

Measurements were made to the nearest 0.1 mm with needle-point dial calipers and are expressed as thousandths (0/00) of standard length (SL). The pectoral ray count excludes the short dorsal splint. Vertebral counts were made from radiographs. Material of the new species is deposited in the following museums: AMNH, American Museum of Natural History, New York; AMS, Australian Museum, Sydney; BPBM, Bernice P. Bishop Museum, Honolulu; CAS, California Academy of Sciences, San Francisco; USNM, National Museum of Natural History, Smithsonian Institution, Washington, D.C. Material utilized of *C. cookei* is from BPBM. Collections of *Crystallodytes pauciradiatus* and *C. cookei enderburyensis* consist primarily, if not exclusively, of females.

Crystallodytes pauciradiatus, new species
Figs. 1–2

Holotype.—BPBM 6734, female, 31.3 mm SL, Easter Island, off Ahu Akapu, depth 10.7 m, sand, 7 Feb 1969.

Paratypes (all females unless otherwise noted).—AMNH 49554, 2 specimens, 34.1 and 30.4 mm SL, taken with BPBM 6733. AMS I.24606-001, 2 specimens,

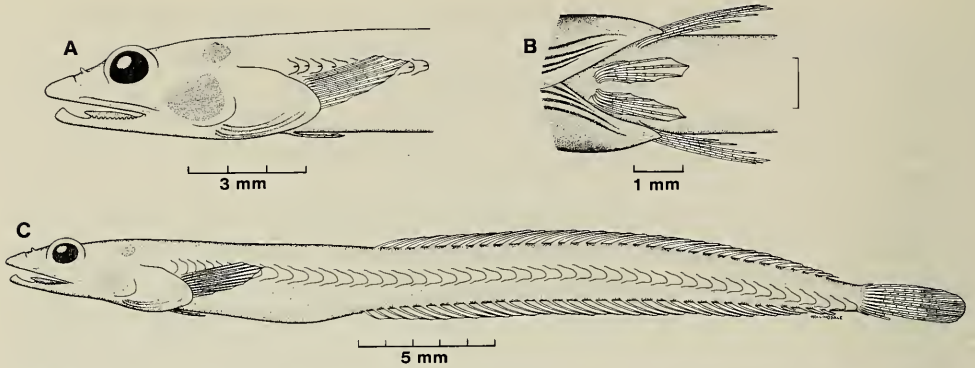


Fig. 1. *Crystalloodytes pauciradiatus*, holotype BPBM 6734, 31.3 mm SL. A, Lateral view of head region; B, Ventral view of pelvic fin region; C, Lateral view.

30.4 and 30.2 mm SL, taken with BPBM 6733. BPBM 6733, 3 specimens, 32.5, 32.3, and 31.7 mm SL (disarticulated while clearing and staining following taking of measurements and counts), Easter Island, west coast off south end of Hanga Roa, depth 12.2 m, sand near rocks, 10 Feb 1969. BPBM 29656, 28.7 mm SL, taken with the holotype. CAS 54946, 2 specimens, 27.5 and 27.3 mm SL, taken with BPBM 6733. USNM 266462, 5 specimens (3 of uncertain sex), Easter Island, Mataveri 0 Tai, depth 6.1 m, black and white sand, 2 Feb 1969.

Non-type material.—The following material was too small to obtain comparable measurements and counts. BPBM 6735, 2 specimens, taken with USNM 266462. BPBM 29657, 6 specimens, taken with BPBM 6733. BPBM 29658, 2 specimens, disarticulated while clearing and staining, taken with BPBM 6733.

All specimens were collected with rotenone by one of us (JER), accompanied by G. R. Allen or G. R. Allen and B. A. Baker.

Diagnosis.—A creediid with scales only along the lateral line and having 30–32 dorsal-fin rays, 48–52 lateral-line scales, and 50–53 vertebrae. The only other species with scales confined to the lateral line is the congeneric *Crystalloodytes cookei*, which has a larger number of meristic parts (see key). The only other creediids with a comparable number of dorsal-fin rays are *Limnichthys polyactis* and *L. rendahli* of New Zealand, and the only species with a comparable number of lateral-line scales and vertebrae is *Tewara cranwellae*, also of New Zealand.

Description.—Morphometric and meristic data are given in Tables 1–4. Snout relatively elongate, sloping gradually in dorsal profile. Upper jaw with fleshy extension, projecting beyond lower jaw; maxilla extending posteriorly to behind eye; posterior tip of maxilla rounded. Bony dorsal projection on symphysis of lower jaw. Lower jaw bordered by 1 row of short cirri, about 10–18 per side in specimens 27–34 mm in length. Eyes dorsolateral; total interorbital width about 16–22% SL, bony width much less. Ventral opercular flap overlapping branchiostegal membrane and extending far forward; posterior portion of gill cover overlapping base of pectoral fin. Branchiostegal rays 7. Subopercle heavily splintered, interopercle moderately splintered. Scales present only along lateral line. Lateral line arising at upper edge of gill cover, running above pectoral fin, descending gradually and reaching ventral profile only posteriorly; scales behind pectoral fin

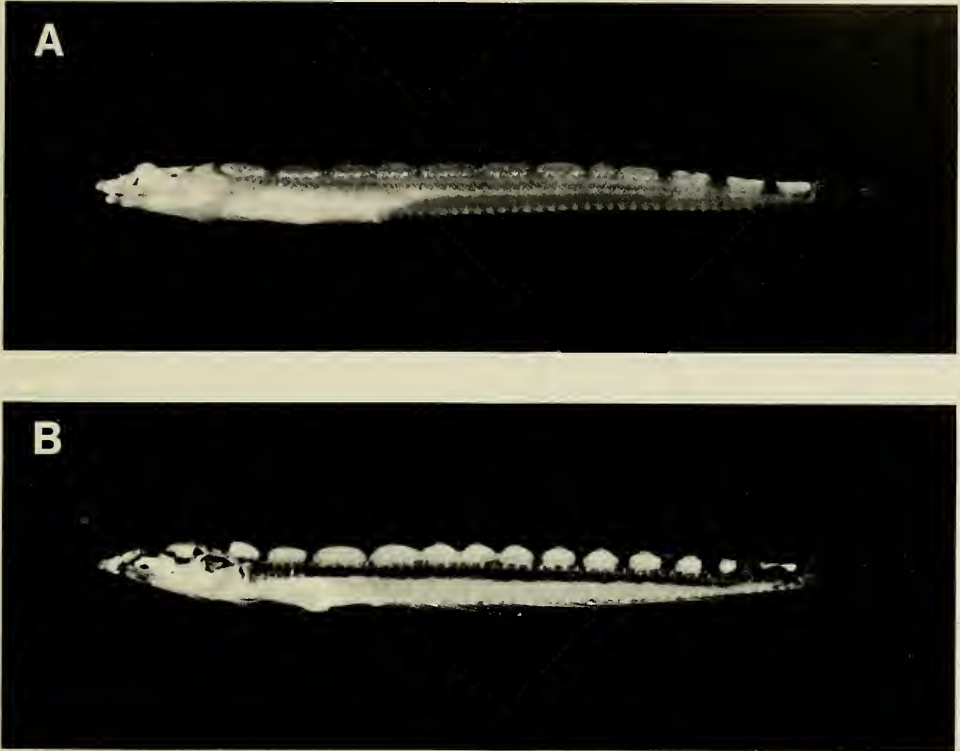


Fig. 2. *Crystalloodytes pauciradiatus*, showing pigmentation pattern in fresh specimens. A, Holotype, BPBM 6734; B, Paratype (30 mm SL when fresh), USNM 266462.

elongate, with rounded posterior margin, not trilobate. Base of pelvic fins slightly anterior to base of pectoral fins; inter-pelvic distance small, less than length of base of pelvic fin; pelvic fins each with 1 spine and 5 soft rays. Dorsal, anal, pectoral, and pelvic rays unbranched. Branched caudal rays 8, countable in only one specimen. Teeth along upper and lower jaws ending well before anterior tip; small isolated patch of vomerine teeth on each side. Iliac spurs (Nelson 1979) elongate and curved and with short posteriorly-directed processes at midline. Last haemal and neural spines relatively narrow.

The color pattern is not apparent in the preserved material. However, in a color transparency and a black and white photograph of the holotype taken at capture by one of us (JER) the body is whitish with 12 short dorsal saddles (described in field notes as consisting of yellow spots edged in dark red-orange) with a faint trace of a lateral band. In a black and white photograph of a 30 mm specimen of USNM 266462, originally part of BPBM 6735, there are 13 dorsal saddles (each with a central light area) with some extending ventrally to join the conspicuous lateral band. Color notes of fresh material of BPBM 6733 describe the yellowish spots in the dorsal saddles as being edged with dull orange to dark brown.

Etymology.—The specific name *pauciradiatus* (Latin) is for the low number of dorsal, anal, and pectoral rays relative to *Crystalloodytes cookei*.

Discussion.—The new Easter Island form is more similar to *Crystalloodytes*

Table 1.—Proportional measurements of the species and subspecies of *Crystalloides* in thousandths of standard length.

Character	<i>C. pauciradiatus</i>				<i>C. cooki cooki</i>		<i>C. c. enderburyensis</i>										
	Holotype	Paratypes n = 15 range		All $\bar{x} \pm SD$	n = 4 range	$\bar{x} \pm SD$	n = 17 range	$\bar{x} \pm SD$									
		31.3	26.3–34.1						73	65–84	430	427–455	422	401–434	75	75–99	217
Standard length (mm)			30.1 \pm 2.2	34.3–41.8		38.3 \pm 3.3	34.2–43.2	39.1 \pm 3.9									
Body depth			72.8 \pm 4.7	65–78		73.5 \pm 5.9	65–88	77.2 \pm 5.8									
Predorsal length			443 \pm 12.6	350–377		368 \pm 12.4	325–379	357 \pm 14.7									
Preal length			416 \pm 10.2	368–371		370 \pm 1.3	354–413	379 \pm 15.2									
Pectoral fin length			86.6 \pm 7.5	92–99		95.0 \pm 3.2	93–111	102 \pm 4.1									
Head length			217 \pm 7.9	190–197		193 \pm 3.0	192–222	202 \pm 7.7									
Head width			69.0 \pm 4.2	66–71		68.3 \pm 2.6	61–82	72.3 \pm 5.8									
Snout length			48.4 \pm 2.6	36–45		40.5 \pm 3.9	43–53	47.9 \pm 3.1									
Length of orbit			40.0 \pm 2.8	32–36		34.7 \pm 1.9	36–43	38.6 \pm 2.2									

Table 2.—Frequency distribution of number of pectoral-fin rays in the species and subspecies of *Crystallodytes*.

Species	9	10	11	12	13	\bar{x}	n
<i>C. pauciradiatus</i>	7	7	2			9.7	16
<i>C. cookei cookei</i>		2	2			10.5	4
<i>C. c. enderburyensis</i>				11	6	12.4	17

cookei cookei from the Hawaiian Islands than it is to its geographically nearest neighbor *C. c. enderburyensis* in the meristic characters examined. The difference between *C. c. cookei* and the new form is greater than that between the two recognized subspecies of *C. cookei* in three of the five variable meristic characters.

The occurrence on Easter Island of a new creediid represents an eastern extension for the family (to approximately 109½°W longitude) and the first recorded occurrence of a member of the family on the Nasca Plate. The nearest record of other creediids to Easter Island is that of *C. c. enderburyensis*, here recorded and well represented from Ducie, Henderson, and Pitcairn islands (based on BPBM collections, as are the following except as noted). Poorly fixed material from Tahiti may belong to this subspecies; it occurs on Swains Island, American Samoa (Scripps Institution of Oceanography 67-215). *Chalixodytes tauensis* occurs on Pitcairn and also on Mangareva of the Tuamotu Archipelago (one specimen of three from BPBM 13543 is virtually fully scaled). Oeno Island, of the Pitcairn Group, has a species of *Limnichthys*, perhaps *L. donaldsoni* (BPBM 16536).

Key to the Species of Creediidae

- 1. Pelvic-fin rays I,4 or I,3 or fins absent; lateral-line scales behind pectoral fin not trilobate or only weakly so (but with posterior lobe) 2
 - Pelvic-fin rays I,5; lateral-line scales behind pectoral fin distinctly trilobate except in *Crystallodytes* spp. where the posterior margin is rounded and without indentations 7
- 2. Pelvic fins absent; anal-fin rays 32–36 *Apodocreedia vanderhorsti* de Beaufort
- Pelvic fins present; anal-fin rays fewer than 29 or more than 35 3

Table 3.—Frequency distribution of numbers of dorsal and anal-fin rays in the species and subspecies of *Crystallodytes*.

Species	30	31	32	33	34	35	36	37	38	39	40	41	42	43	\bar{x}	n
Dorsal-fin rays																
<i>C. pauciradiatus</i>	1	6	9												31.5	16
<i>C. cookei cookei</i>							1	1	—	2					37.7	4
<i>C. c. enderburyensis</i>											6	5	4	2	41.1	17
Anal-fin rays																
<i>C. pauciradiatus</i>				1	11	4									35.2	16
<i>C. cookei cookei</i>							1	1	1	1					37.5	4
<i>C. c. enderburyensis</i>									4	10	2	1			39.0	17

Table 4.—Frequency distribution of numbers of lateral-line scales and vertebrae in the species and subspecies of *Crystallodytes* (the non-type material of *C. pauciradiatus* is included in the vertebral counts).

Species	48	49	50	51	52	53	54	55	56	57	58	59	60	\bar{x}	n
Lateral-line scales															
<i>C. pauciradiatus</i>	2	1	4	7	2									50.4	16
<i>C. cookei cookei</i>								2	2					55.5	4
<i>C. c. enderburyensis</i>										3	8	4	2	58.3	17
Vertebrae															
<i>C. pauciradiatus</i>			2	15	8	1								51.3	26
<i>C. cookei cookei</i>							1	5	3	2				55.5	11
<i>C. c. enderburyensis</i>										2	13	4	2	58.3	21

3. Dorsal-fin rays 12–16; anal-fin rays 24–28; lateral-line scales 40–47; lateral line descending abruptly behind pectoral fin to near ventral profile; body fully scaled or not 4
- Dorsal-fin rays 35–40; anal-fin rays 36–40; lateral-line scales 55–59; lateral line descending gradually; body scaleless except for lateral line, predorsal row, and caudal peduncle region [the two involved nominal species are poorly differentiated from one another and are only provisionally recognized here; one specimen of *Chalixodytes tauensis* from the Mangareva Islands is fully scaled] 6
4. Pelvic-fin rays I,3; dorsal-fin rays 12 or 13; lateral-line scales and vertebrae usually 40–42 *Creedia alleni* Nelson
- Pelvic-fin rays I,4; dorsal-fin rays 13–16; lateral-line scales and vertebrae usually 42–47 5
5. Body fully scaled; maxilla extending to about center of eye, tip forked; profile of snout sloping gradually, not strongly convex *Creedia haswelli* (Ramsay)
- Body scaleless in anterior half except for lateral line and paired predorsal row; maxilla extending well behind eye and tip blunt, not forked; profile of snout convex *Creedia partimsquamigera* Nelson
6. Dorsal-fin rays about 35–37; anal-fin rays about 36–38 *Chalixodytes tauensis* Schultz
- Dorsal-fin rays about 37–40; anal-fin rays about 37–40 *Chalixodytes chameleontoculis* Smith
7. Anal, pectoral, and most of pelvic-fin rays branched; usually 16 or 17 pectoral-fin rays, the lowermost thickened; 9 branched caudal rays; usually 18–20 dorsal-fin rays *Schizochirus insolens* Waite
- Anal, pectoral, and pelvic-fin rays unbranched; usually 10–14 pectoral-fin rays, the lowermost not thickened; 8 branched caudal rays; usually 20–42 dorsal rays 8
8. Lateral-line scales 48–60; anal-fin rays 35–41; usually 11–18 dorsal saddles 9
- Lateral-line scales 36–47; anal-fin rays 25–34; 5–12 dorsal saddles ... 11
9. Body fully scaled; body depth more than 9% of standard length *Tewara cranwellae* Griffin

- Body scaleless except for lateral line; body depth less than 9% of standard length 10
- 10. Dorsal-fin rays 30–32; lateral-line scales 48–52
..... *Crystallodytes pauciradiatus* n.sp.
- Dorsal-fin rays 36–43; lateral-line scales 55–60
..... *Crystallodytes cookei* Fowler
- 11. Dorsal-fin rays 28 or more; anal-fin rays 30 or more 12
- Dorsal-fin rays 27 or fewer; anal-fin rays 30 (rarely) or fewer 13
- 12. Origin of anal fin in front of vertical through origin of dorsal fin; snout length usually less than half maximum body depth; cirri along either side of lower jaw usually fewer than 20, of near uniform length
..... *Limnichthys polyactis* Nelson
- Origin of anal fin beneath or behind vertical through origin of dorsal fin; snout length usually greater than half maximum body depth; cirri along either side of lower jaw usually more than 20, of alternating size posteriorly *Limnichthys rendahli* Parrott
- 13. Combined number of dorsal and anal-fin rays 50–55 (usually 52 or more); at least some of the 5–9 dorsal saddles reaching lateral band
..... *Limnichthys fasciatus* Waite
- Combined number of dorsal and anal-fin rays 45–53 (usually 51 or fewer); dorsal saddles, usually 9–11, not reaching lateral band (band may be absent) 14
- 14. Lateral-line scales 39–41; combined number of dorsal and anal-fin rays 48–53; lateral band usually present *Limnichthys nitidus* Smith
- Lateral-line scales 36–38; combined number of dorsal and anal-fin rays 46–50; lateral band usually absent *Limnichthys donaldsoni* Schultz

The above key excludes the following two forms: a new species of *Creedia* from Japan being described by Mr. Kazuhiko Shimada; a form similar to *Limnichthys fasciatus* but with fewer meristic parts. Material of the latter collected in Fiji was sent to one of us (JSN) by R. Winterbottom of the Royal Ontario Museum (ROM). It may be deserving of subspecific status or may represent a separate but undescribed species. It has the following diagnostic characters: dorsal-fin rays 22–24; anal-fin rays 25–27; vertebrae 37–40 (most with 39); two epurals; 5–8 dorsal saddles (including a faint one on nape) and a lateral band (most or all saddles join the band in specimens over 19 mm SL, but four small specimens have short saddles not reaching the band); in addition, there is a dark interorbital bar. Specimens similar to this form have been collected from New Britain and Solomon Islands, based on BPBM and ROM material, respectively, and from Lizard Island, Great Barrier Reef (taken with *L. donaldsoni*), based on AMS material. Further study and more specimens are required to determine if this material is the same form as represented by the above-mentioned Fiji specimens.

Acknowledgments

The figures were prepared, under supervision, by Diane Hollingdale, and radiographs were made by Wayne Roberts. The study was supported by grant No. A5457 of the Natural Sciences and Engineering Research Council of Canada (to JSN) and a grant (to JER) from the National Geographic Society for field work at Easter Island.

Literature Cited

- Leis, J. M. 1982. Hawaiian creediid fishes (*Crystalloides cookei* and *Limnichthys donaldsoni*): development of eggs and larvae and use of pelagic eggs to trace coastal water movement.—*Bulletin of Marine Science* 32(1):166–180.
- Nelson, J. S. 1979. Some osteological differences between the blennioid fishes *Limnichthys polyactis* and *L. rendahli*, with comments on other species of Creediidae.—*New Zealand Journal of Zoology* 6:273–277.
- . 1983. *Creedia alleni* and *Creedia partimsquamigera* (Perciformes: Creediidae), two new marine fish species from Australia, with notes on other Australian creediids.—*Proceedings of the Biological Society of Washington* 96(1):29–37.

(JSN) Department of Zoology, The University of Alberta, Edmonton, Alberta T6G 2E9, Canada; (JER) Division of Ichthyology, Bernice P. Bishop Museum, P.O. Box 19000-A, Honolulu, Hawaii 96819.