Larvae of *Dactylopsaron dimorphicum* (Perciformes: Percophidae) from oceanic islands in the southeast Pacific

Mauricio F. Landaeta
Laboratorio de Oceanografía Pesquera y Ecología Larval
Departamento de Oceanografía
Universidad de Concepción
Casilla 160-C
Concepción, Chile

Francisco J. Neira
Faculty of Fisheries and Marine Environment
Australian Maritime College
PO Box 21
Beaconsfield, Tasmania 7270, Australia

Leonardo R. Castro
Laboratorio de Oceanografía Pesquera y Ecología Larval
Departamento de Oceanografía, Universidad de Concepción
Casilla 160-C
Concepción, Chile
E-mail addres (for L. R. Castro, contact author): lecastro@udec.cl

Percophids are a family of small marine benthic fishes common over soft bottoms from inshore to the outer slopes in tropical to temperate regions of the Atlantic and in the Indo-West and southeast Pacific (Reader and Neira, 1998; Okiyama, 2000). Five species belonging to four genera have been recorded around the Salas y Gómez Ridge in the southeast Pacific, all of which are endemic to the area except for *Chrionema chryseres*, a species which also occurs off the Hawaiian Islands and Japan (Parin, 1985, 1990; Parin et al., 1997). Of these five species, larval stages have been described only for *Osopsaron karlik* and *Chrionema pallidum* (Belyanina 1989, 1990).

Dactylopsaron dimorphicum (Parin and Belyanina, 1990) is a dwarf percophid (29 mm maximum body length) previously recorded only at the Cupole (26°S; 86°W) and Baral (25°S; 96°W) seamounts located to the west of the Salas y Gómez Ridge and at the junction of this and the Nazca Ridge, respectively, at depths of 240–345 m (Parin, 1990; Parin et al., 1997). Adults of this monotypic genus differ from other percophids in that the first dorsal fin is positioned at the back of the head and is in line with the mid-operculum, 8–10 digitiform processes are present on the posterior upper opercular margin, and expanded lobes are present at the distal end of the medial branchiostegal rays (Parin, 1990). This species is sexually dimorphic, males have a thicker and much longer first dorsal-fin spine than females (Parin, 1990). There is no information on their reproductive biology and eggs are unknown (Watson et al., 1984).

We describe the postflexion larvae of *D. dimorphicum* using material collected around Salas and Gómez and Easter Islands in the southeast Pacific. We also provide information on the spatial distribution of this species around both islands, and on how to distinguish the larvae from those of teleosts with similar larvae in the area. This note constitutes the first record of *D. dimorphicum* off Easter Island, as well as the first record of the larvae in nearshore waters of both Pacific islands.

Methods

Field work

Larvae were obtained during an oceanographic expedition (CIMAR-5) to Easter Island (27°10′S; 109°20′W) and Salas y Gómez Island (26°30′S; 105°20′W), approximately 3750 km west of Chile, in November 1999. Samples were collected onboard the Chilean navy research vessel *AGOR Vidal Gormaz* by using a bongo sampler equipped with two conical nets (0.6-m diameter mouth openings, 3 m long, 350-µm mesh size). The mouth of each net was fitted with an OSK flowmeter to estimate volume of water filtered. Tows were carried out for 10 min obliquely to the surface from either the maximum permissible depth in shallow (<200 m) stations or from 400 m in deeper stations. Samples around Easter Island were obtained at 10 stations located approximately one nautical mile (nmi) from the coast both during day and night, and along four transects (NW–SE and NE–SW) each containing four stations located at 3, 7, 12, and 20 nmi offshore (Fig. 1). Samples around Salas y Gomez Island were obtained along four transects (N–S and E–W), each containing four stations at 1, 3, 6, and 10 nmi offshore (Fig. 2). Additionally eight deep stations (>1500 m) were also sampled between Easter and Salas y Gómez islands. All samples were fixed in 5% formalin and later preserved in 70% ethanol. Water volume sampled per tow ranged between 112.6 and 517.7 m^3. Larval abundances were standardized to 1000 m^3 and mapped by using SURFER® (Golden Software, Golden, CO). Statistical analyses were performed using STATISTICA (StarSoft, Inc., Tulsa, OK).

Larval identification and processing

Postflexion larvae were identified as those of *Dactylopsaron dimorphicum* by a combination of dorsal and anal-fin meristics (D. IV [III–V] + 22 [20–22]

Manuscript approved for publication 15 January 2003 by Scientific Editor.
Manuscript received 4 April 2003 at NMFS Scientific Publications Office.
Fish Bull. 101:693–697 (2003).

and A. 24 [23–25]; Table 1), and by the presence of the unique digitiform opercular processes (Parin, 1990; Okiyama, 2000). Identification was verified by using fin meristics from cleared and stained specimens (Potthoff, 1984).

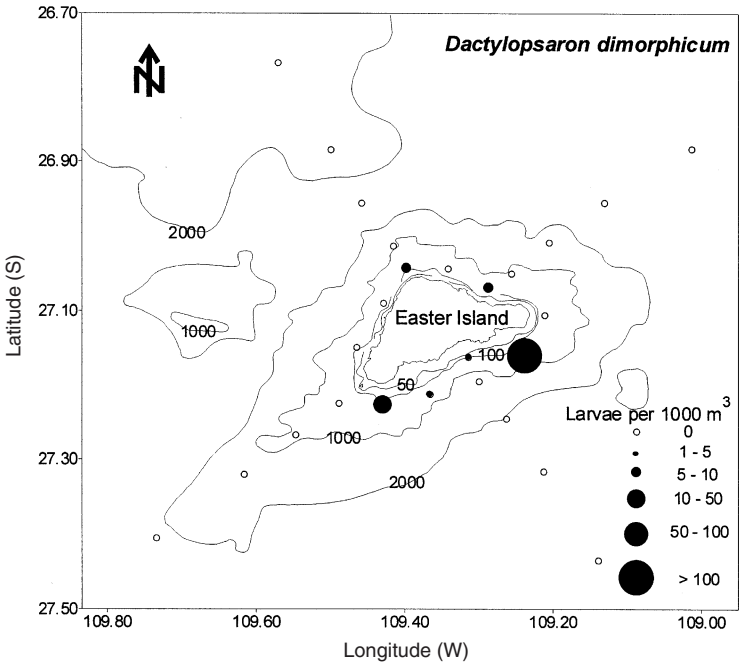

Figure 1

Spatial distribution of postflexion larvae of *Dactylopsaron dimorphicum* (numbers/1000 m^3) around Easter Island in November 1999.

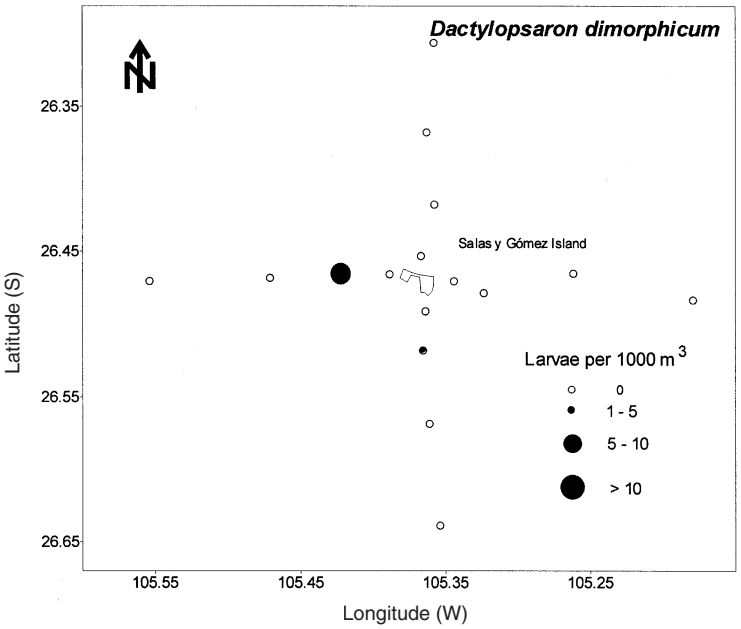

Figure 2

Spatial distribution of postflexion larvae of *Dactylopsaron dimorphicum* (numbers/1000 m^3) around Salas y Gómez Island in November 1999.

A total of 55 postflexion larvae of *D. dimorphicum* (8.2–15.3 mm standard length) were examined to describe morphometrics, meristics, and pigmentation. Three larvae (9.1, 13.1 and 13.4 mm SL) were cleared and stained following the method of Potthoff (1984). Terminology and morphometric measurements follow Neira et al. (1998). Measurements were made to the nearest 0.01 mm by using a dissecting microscope fitted with an eyepiece micrometer. Body length (BL, Neira et al., 1998) in postflexion larvae corresponds to standard length (SL), i.e. tip of snout to posterior margin of hypurals. Measurements of body depth (BD), head length (HL), and preanal length (PAL) were converted to a percentage (%) of SL (Table 2). Eye diameter (ED) and snout length (SnL) were converted to a percentage (%) of HL. Pigment described refers solely to melanin. Illustrations were made with the aid of a camera lucida.

Results

Description of larvae

Postflexion larvae of *Dactylopsaron dimorphicum* are elongate (BD 13.1–18.3%; Table 2), and have a moderate to large head (HL 28.6–36.7%) and an elongate snout (Fig. 3). Eyes are round and pigmented by 8.2 mm SL. The mouth is large, protrusible, and has a long ascending premaxillary process giving a characteristic "duckbill" appearance. Small villiform teeth are present along the premaxilla and dentary. There are no head spines. The digitiform processes on the upper opercular margin are present in larvae >13.2 mm SL; the lower, rearward-directed process that reaches the end of the pectoral-fin base in adults was still forming in the largest larva examined (15.3 mm SL). The branchiostegal membranes are free from the ithsmus. The short first dorsal fin is located at the nape and lies in line with the mid-operculum; pterygiophores of the five first-dorsal fin spines in two of the cleared and stained larvae (13.1 and 13.4 mm SL) were located between the neural spines of the second and third trunk vertebrae. The 9.1-mm-SL cleared and stained larva possessed only 15 of the 17–20 pectoral-fin rays, and first dorsal-fin spines were developing. The elongate pelvic fins are thoracic, i.e. inserted in front of the pectoral-fin bases. Lateral line scales begin to form at >13 mm SL. Larvae are unpigmented, although a few had a small melanophore at the base of the 17 or 18th dorsal-fin ray. There are 31–35 myomeres. The number of vertebrae in the cleared and stained larvae is 34–35 (11–12 + 22–24).

Larval distribution

Postflexion *D. dimorphicum* larvae were collected within 6 nmi off both Easter and Salas and Gómez

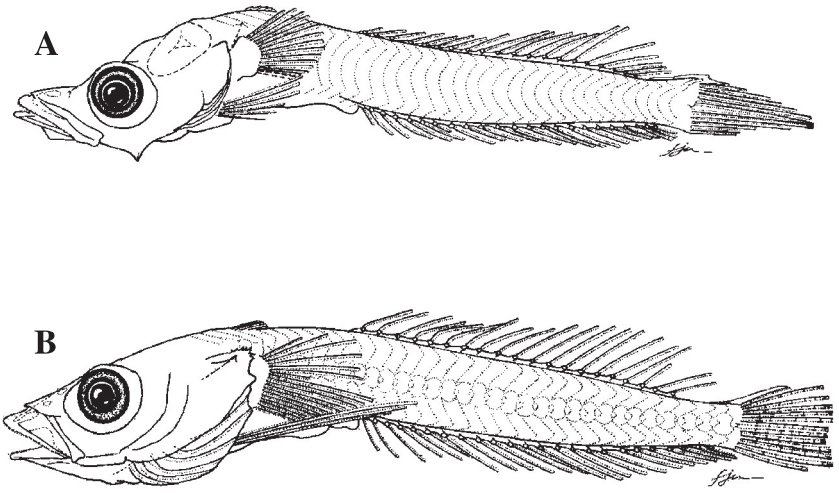

Figure 3

Postflexion larvae of *Dactylopsaron dimorphicum* collected around Easter Island in November 1999. (**A**) 8.5 mm SL; (**B**) 14.8 mm SL. Illustrated by F. J. Neira.

Table 1

Meristic counts of percophid species recorded in submarine ridges of Salas y Gómez Island in the southeastern Pacific (from Parin [1985, 1990] and Okiyama [2000]).

	Dorsal	Anal	Pectoral	Pelvic	Caudal (branched)	Vertebrae
Chrionema chryseres	VI +16	26	23	I, 5	15 (11)	27–28
Chrionema pallidum	VI +14–15	18	20–22	I, 5	15 (11)	27–28
Dactylopsaron dimorphicum	IV [III-V] + 22 [20–22]	24 [23–25]	18 [17–20]	I, 5	14 (8)	34–35[1]
Enigmapercis acutirostris	II +21	25	21	I, 5	15 (8–9)	—
Osopsaron karlik	V-VI +19–20	22–23	19–20	I, 5	14	32

[1] This study.

Table 2

Standard length range (mm), and mean values (±1 SD) of selected body proportions (given as a percentage of body length) of postflexion larvae of *Dactylopsaron dimorphicum* from Easter and Salas y Gomez islands in the southeastern Pacific Ocean (n=55).

Standard length (mm)	8.2–15.3
Head length (%SL)	28.6–36.7 (32.3 ±3.3)
Eye diameter (%HL)	18.2–24.7 (22.0 ±3.1)
Snout length (%HL)	25.6–36.2 (31.0 ±5.5)
Body depth (%SL)	13.1–18.3 (15.3 ±2.2)
Preanal length (%SL)	45.4–56.9 (49.5 ±4.0)

Islands (Figs 1 and 2). Around Easter Island, larvae were caught only in nearshore stations (<2 nmi) over the narrow shelf and were more abundant along the southern edge.

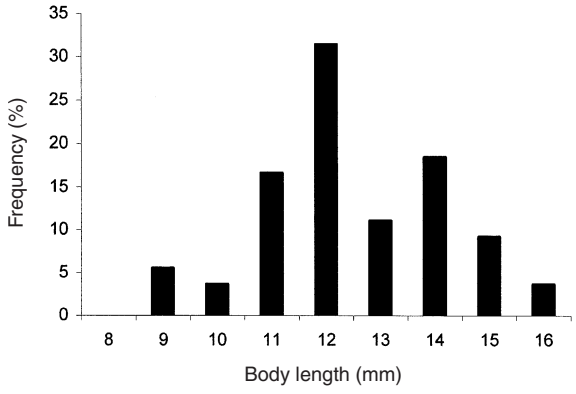

Figure 4

Combined body length (SL, mm) frequency distribution of postflexion larvae of *Dactylopsaron dimorphicum* around Easter Island and Salas y Gómez Island in November 1999.

The highest larval concentrations (>100 larvae/1000 m^3) occurred at the southeastern tip of the island and averaged 27 ±46 larvae/1000 m^3 (Fig. 1). No significant differences were found between day and night larval concentrations (Kruskal-Wallis test=0.047; P>0.05). Around Salas and Gómez Island, larvae were caught only at two stations 6 nmi west and south of the island, and in mean concentrations <10 larvae 1000/m^3 (Fig. 2). No larvae were caught in any of the eight stations sampled between the two islands. Body lengths of larvae caught in both islands ranged from 8 to 16 mm SL, and over 30% of the larvae were around 12 mm SL (Fig. 4).

Discussion

Postflexion larvae of *D. dimorphicum* are likely to be confused with those of four other co-occurring percophid species (see Table 1), and those of the creediid *Crystallodytes pauciradiatus* that occur in the same region (Castro and Landaeta, 2002) and have similar bodies with little or no pigment. In the case of the percophids, the digitiform opercular processes exclusive to *D. dimorphicum*, together with dorsal and anal-fin meristics, should be sufficient to distinguish between postflexion larvae of all species. Larval *C. pauciradiatus* can be identified by using myomere counts (56–58 vs. 31–35 in *D. dimorphicum*) and their small, early forming posterior preopercular spines (Reader et al., 2000).

Our collection of *D. dimorphicum* larvae at Easter Island, some 453 km to the southwest of Salas y Gomez Island where it was first described (Parin, 1990), constitutes the first record for Easter Island, thereby extending the known range of this species over the South Pacific plate. Despite numerous past fish surveys around Easter Island (i.e. Randall and Cea-Egaña, 1984; Mujica, 1993), adults of this dwarf percophid had not been reported there, a fact that could be attributed to factors such as collection methods, depth of surveys, and the very small size of these larvae. However, the presence and abundance of larval *D. dimorphicum* reported in this study, and the fact that they were among the five most abundant larval taxa caught around Easter Island (Castro and Landaeta, 2002), implies the existence of a well-established breeding population. Biogeographically, this finding also suggests that larval drift could play an important role in the expansion of this and other fish species that have pelagic larvae in this region of the southeast Pacific. In this context, it is perhaps relevant that expansions of fish ranges are not uncommon in this region, even though both Easter and Salas y Gomez Islands lie in different biogeographic provinces (Parin et al., 1997). A good example is the pentacerotid *Pentaceros decacanthus*, which was regarded as endemic of the Nazca and Salas y Gómez Ridges until it was recorded in Easter Island (Parin and Kotlyar, 1988).

Acknowledgments

We would like to thank Paula Rosenberg and all the crew from the *AGOR Vidal Gormaz* for their help with sampling. We also thank Muneo Okiyama for his comments on identification of percophid larvae. This research was funded by the Comité Oceanográfico Nacional (CONA), Chile, and forms part of a study on distribution patterns and larval accumulation around oceanic islands headed by Leonardo Castro.

Literature cited

Belyanina, T. P.
1989. Ichthyoplankton in the regions of the Nazca and Salas y Gomez submarine ridges. J. Ichthyol. 29(5):84–90.
1990. Larvae and fingerlings of little-known benthic and benthopelagic fishes from the Nazca and Salas y Gomez ridges. J. Ichthyol. 30(6):1–11.

Castro, L. R., and M. F. Landaeta.
2002. Patrones de distribución y acumulación larval en torno a islas oceánicas: Isla de Pascua y Salas y Gómez. Cienc. Tecnol. Mar. CONA 25(1):131–145.

Mujica, A.
1993. Zooplancton de las aguas circundantes a la Isla de Pascua (27°08′S–109°26′W). Cienc. Tecnol. Mar. CONA 16:55–61.

Neira, F. J., A. G. Miskiewicz, and T. Trnski.
1998. Larvae of temperate Australian fishes. Laboratory guide for larval fish identification, 474 p. Univ. Western Australia Press, Nedlands, Australia.

Okiyama, M.
2000. Percophidae (sandfishes, duckbills). *In* The larvae of Indo-Pacific coastal fishes: an identification guide to marine fish larvae (J. M. Leis and B. M. Carson-Ewart, eds.), p. 554–560. Brill, Leiden, The Netherlands.

Parin, N. V.
1985. A new hemerocoetine fish, *Osopsaron karlik* (Percophidae, Trachinoidei) from the Nazca submarine ridge. Jpn. J. Ichthyol. 31(4):358–361.
1990. Percophid fishes (Percophidae) from the Salas y Gomez ridge (Southeast Pacific). J. Ichthyol. 30(1):68–79.

Parin, N. V., and A. N. Kotlyar.
1988. A new boarfish, *Pentaceros quinquespinis* (Pentacerotidae), from the Southeast Pacific. Vopr. Ikhtyol. 28(3): 355–360.

Parin, N. V., A. N. Mironov, and K. N. Nesis.
1997. Biology of the Nazca and Sala y Gómez submarine ridges, an outpost of the Indo–West Pacific fauna in the Eastern Pacific Ocean: composition and distribution of the fauna, its communities and history. Adv. Mar. Biol. 32: 147–242.

Potthoff, T.
1984. Clearing and staining techniques. *In* Ontogeny and systematics of fishes (H. G. Moser, W. J. Richards, D. M. Cohen, M. P. Fahay, A. W. Kendall, and S. L. Richardson, eds.), p. 35–37. Am. Soc. Ichthyol. Herpetol. Special Publication 1.

Randall, J. E., and A. Cea-Egaña.
1984. Native names of Easter Island fishes, with comments on the origin of the Rapanui people. Occas. Pap. Bernice P. Bishop Mus. 25(12):1–16.

Reader, S. E., and F. J. Neira.
1998. Percophidae: sandfishes, duckbills. *In* Larvae of temperate Australian fishes. Laboratory guide for larval fish identification (F. J. Neira, A. G. Miskiewicz, and T. Trnski, eds.), p. 358–361. Univ. Western Australia Press: Nedlands, Australia.

Reader, S. E., J. M. Leis, and D. S. Rennis.
2000. Creediidae (tommyfishes). *In* The larvae of Indo-Pacific coastal fishes. An identification guide to marine fish larvae (J. M. Leis and M. Carson-Ewart (eds.), p. 575–578. Brill, Leiden, The Netherlands.

Watson, W., A. C. Matarese, and E. G. Stevens.
1984. Trachinoidea: development and relationships. *In* Ontogeny and systematics of fishes (H. G. Moser, W. J. Richards, D. M. Cohen, M. P. Fahay, A. W. Kendall Jr., and S. L. Richardson, eds.), p. 554–561. Am. Soc. Ichthyol. Herpetol. Special Publication 1.