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Larval development of *Etropus longimanus* (Paralichthyidae) and *Symphurus trewavasae* (Cynoglossidae) off the Buenos Aires coast, Argentina

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SUMMARY: The larval development of *Etropus longimanus* and *Symphurus trewavasae* (Pleuronectiformes) off the Buenos Aires coast was described. Both species have an elongated body; however, as the total length of *Etropus longimanus* larvae increased, their body became deeper. In *Symphurus trewavasae* the intestine was noticeably coiled. In *E. longimanus* the notochord flexion started at 3.9 mm and was completed at 5.0 mm standard length (SL). Vertebral formation began in larvae with a 4.6 mm SL and the definitive number of vertebrae (34-39) was observed in larvae of 4.8 mm SL. The dorsal fin had two elongated rays and the pelvic fins had only one. In *Symphurus trewavasae* the notochord flexion began at 5.9 mm and was completed at 8.0 mm SL. Migration of the right eye was completed in the metamorphic stage at 10.5 mm SL. Vertebral column ossification finished in flexion larvae of 6-7 mm SL, with a total number of 48-50 vertebrae. Four elongated rays of similar length were observed on the dorsal fin.

Keywords: Pleuronectiformes, early development, larvae, flatfish, tonguefish, SW Atlantic.

RESUMEN: DESARROLLO LARVAL DE *ETROPUS LONGIMANUS* (PARALICHTHYIDAE) Y *SYMPHURUS TREWAVASAE* (CYNOGLOSSIDAE) EN LA COSTA BONAERENSE, ARGENTINA. – Se describe el desarrollo larvario de *Etropus longimanus* y *Symphurus trewavasae* (Pleuronectiformes) que habitan la costa de Buenos Aires. El cuerpo de las larvas de ambas especies es alargado, pero en *Etropus longimanus* la altura del cuerpo se incrementa con el crecimiento. El tubo digestivo de *Symphurus trewavasae* es considerablemente enrollado. La flexión del urostilo en larvas de *E. longimanus* se inició cerca de los 3.9 mm y finalizó cerca de los 5 mm de longitud estándar (LS). Se observaron vértebras definidas en larvas de 4.6 mm LS y el número definitivo (34-39) se visualizó en individuos de 4.8 mm LS. Se distinguen dos radios largos al inicio de la aleta dorsal y uno en la pélvica. En *Symphurus trewavasae* la flexión del urostilo comenzó cerca de los 5.9 mm LS y finalizó aproximadamente a los 8.0 mm LS. La migración del ojo derecho hacia el lado izquierdo de la cabeza finalizó en el estadio de metamorfosis (10.5 mm LS). La osificación de la columna vertebral se completó en larvas entre los 6 y 7 mm LS, con un número total de 48-59 vértebras. Al inicio de la aleta dorsal se distinguen 4 radios largos con igual longitud.

Palabras clave: Pleuronectiformes, desarrollo temprano, larvas, lenguado, lengüita, Atlántico Sudoccitental.

INTRODUCTION

In the southwestern Atlantic Ocean the order Pleuronectiformes is represented by more than 20 flatfish species (Menni *et al*. 1984) that mainly inhabit between 34° and 47°S (Fabré and Díaz de Astarloa 1996), and form large concentration areas in the Argentinean-Uruguayan Common Fishing Zone (AUCFZ) (Fabré and Díaz de Astarloa 2001). There is one species of *Etropus* (Paralichthyidae) and two species of *Symphu-*

rus (Cynoglossidae) on the Argentine continental shelf (Cousseau and Denegri 1997, Munroe 1998).

Etropus longimanus (Norman 1933) is a small-sized flatfish (maximum reported size is 155 mm) occurring on soft bottoms, from the coastline to 190 m depths, and is one of the five paralichthyid species that inhabit the area. It occurs from Cabo Frio (Brazil) as far south as northern Patagonia, Argentina (Figueiredo and Menezes 2000). It has no commercial importance because of its small average size and low abundance compared to the other paralichthyid flatfishes caught in the area, such as *Paralichthys orbignyanus, P. isosceles, P. patagonicus* and *Xystreurys rasile* (Díaz de Astarloa 2002).

The tonguefish *Symphurus trewavasae* (Chabanaud 1948) is also a small-sized species reported to attain a maximum size of ca. 139 mm (Menezes and Benvegnu 1976). 85% of the specimens were collected by Munroe (1998) in the southwestern Atlantic inner continental shelf from southeastern Brazil to central Argentina. It has no commercial importance. Kurtz and Matsuura (1994) described the development of *S. trewavasae* off the Brazilian continental shelf.

Larvae of *Etropus* are difficult to distinguish and are often ignored or classified as "unidentified bothids" in species composition analyses. Moreover, there is no information on the early life cycle of pleuronectiforms in the Argentine Sea. Therefore, in this paper we described the larval development of the flatfish *Etropus longimanus* and the tonguefish *Symphurus trewavasae* collected off Buenos Aires.

MATERIALS AND METHODS

A total of 153 fish larvae of *Etropus longimanus* and 33 of *Symphurus trewavasae* were collected during research cruises conducted by INIDEP (Instituto Nacional de Investigation y Desarrollo Pesquero) in 1998, 2000 and 2001 at a fixed station (36°28'S 54°48'W). Samples were taken with a Bongo net with a 300 and 500 µm mesh size and a Nackthai net, a German modification of the Gulf V high speed sampler (Nellen and Hempel 1969), with a 400 µm mesh size. Ichthyoplankton samples were fixed in a solution of 5% formalin to seawater.

The following measurements were recorded according to Neira *et al.* (1998): body length (BL), notochord length (NL), standard length (SL), body depth (BD), eye diameter (ED), head length (HL), head depth (HD), preanal length (PAL), and predorsal length (PDL). Preserved larvae were measured to the nearest 0.1 mm with an ocular micrometer fitted to a dissecting microscope. Shrinkage was not considered in the measurements. Specimens were divided into developmental stages according to Sumida *et al.* (1979).

The equation $y = a\ x^b$ was applied to determine whether the different body parts have allometric or isometric growth in relation to SL or HL, where x is HL or SL, y is the morphometric measurement under analysis, a the intercept (expected value of y at $x = 1$) and b the slope. The confidence intervals (at the 95% significance level) of the allometric parameter were calculated. In addition, each morphometric measurement was calculated as a proportion of SL (morphometric index, I %).

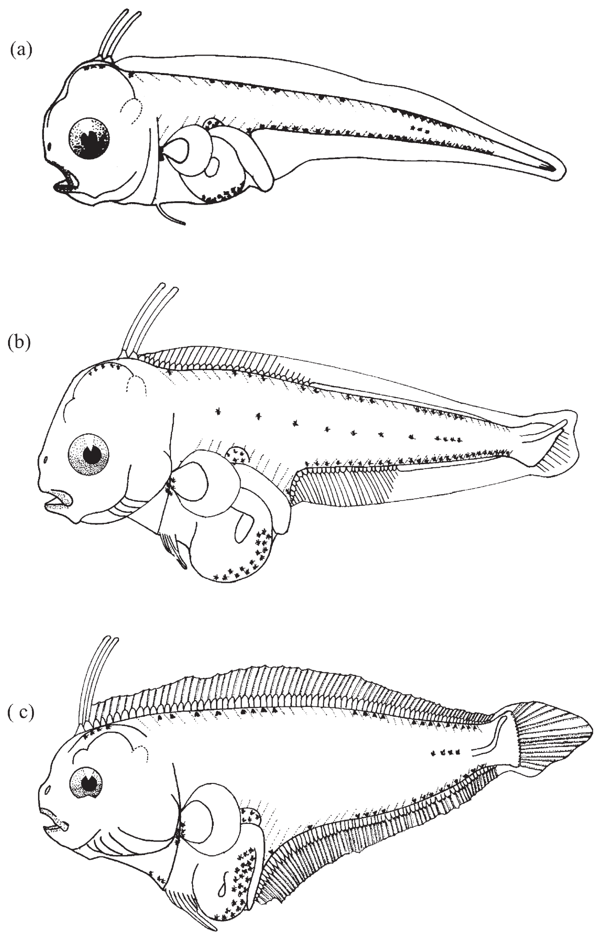

FIG. 1. – *Etropus longimanus* larval development: (a): preflexion larvae (2.8 mm NL); (b): larvae in flexion (4.9 mm SL) and (c): postflexion larvae (8.9 mm SL).

Thirty-eight larvae of *Etropus longimanus* and 18 of *Symphurus trewavasae* were cleared and double stained with alcian blue for cartilage and alizarin red for bone, according to Potthoff (1984) and Taylor and Van Dyke (1985), and then examined for meristic and osteological features. Whenever possible, the number of vertebrae and fin rays were recorded. The total number of myomeres was also counted. In *S. trewavasae* larvae, the number of dorsal pterygiophores inserting into the first five interneural spaces was recorded as the interdigitation pattern according to Munroe (1992). Pigmentation pattern, morphometric, meristic and osteological features were analyzed on the left side of the body. The different developmental stages were illustrated according to Trnski and Leis (1991).

RESULTS

Etropus longimanus

General morphological features and pigmentation

The smallest larva collected was 2.8 mm NL. During the preflexion stage (2.8-4.2 mm NL) the larval body was relatively elongated, but as the body size increased in length, larvae became deeper bodied (Fig. 1a). Three to five internal melanophores appeared above the hindbrain and small external ones along the lower and upper jaws (Fig. 1a-c). There were several melanophores along the ventral and lateral surface of the abdomen, so that pigmentation increased with larval size (Fig. 1a-c). There were small melanophores at the base of the pectoral fin. The gas bladder was heavily pigmented, with four or five distinct melanophores (Fig. 1a-c).

At the preflexion stage, there were two dash-like clusters of pigment along the dorsal margin of the tail between myomers 6-11 and 23-31 (Fig. 1a). One melanophore per myomer (from myomer 8 to 38 approximately) was observed on the midventral line of the body (Fig. 1a). Three or four internal pigments also appeared along the notochordal line between myomers 24 and 27 (Fig. 1a).

Notochord flexion was completed at 5.0 mm SL (flexion stage, 4.2-5.3 mm SL). During the flexion stage, larvae became more pigmented. Internal notochordal pigment consisted in a series of 11 stellated chromatophores between the gas bladder and myomer 27 (Fig. 1b).

The biggest individual that was collected was 10.5 mm SL. During the postflexion stage (5.5-10.5 mm SL), there were two dash-like clusters of pigment along the ventral margin of the tail between myomers 20-23 and 27-35, and there was a series of small melanophores along the distal tips of anal pterygiophores (Fig. 1c). Less melanophores were observed on the anterior region of the ventral margin, with the consequent formation of two main groups. The first group was constituted by four melanophores located very close to the middle of the ventral body margin, and the second group (separated from the first group by three myomers) was composed of nine melanophores that almost reached the end of the anal fin (Fig. 1c). There were a few melanophores before the base of the pelvic fin (Fig. 1c).

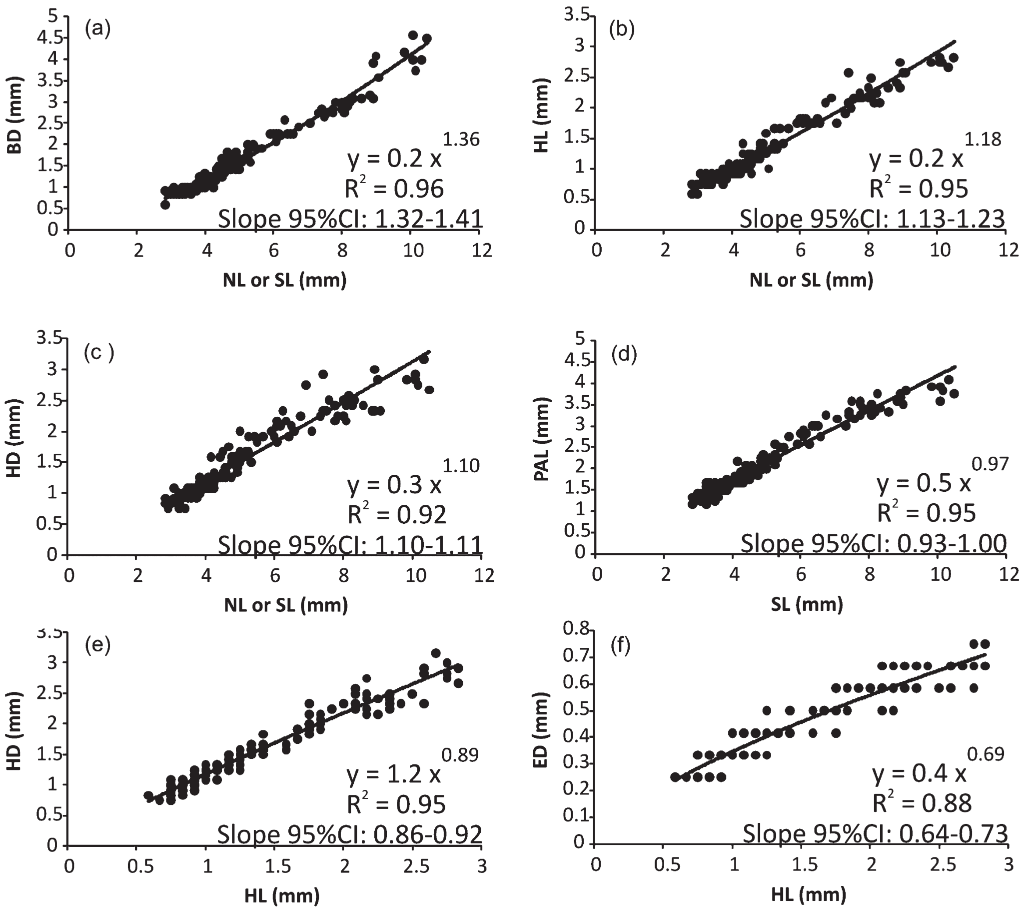

FIG. 2. – Regression between (a): body depth (BD); (b): head length (HL); (c): head depth (HD); (d): preanal length (PAL) and notochordal length (NL) or standard length (SL); and between (e): head depth (HD); (f): eye diameter (ED) and head length (HL) of *Etropus longimanus* larvae. Values in parenthesis are 95% CI of the slope.

TABLE 1. – Morphometric index (I%) calculated for *Etropus longimanus* and *Symphurus trewavasae*. BD: body depth; HD: head depth; HL: head length; NL: notochordal length; n: number of measurements; PAL: preanal length; SL: standard length.

	Etropus longimanus				*Symphurus trewavasae*			
NL or SL	HL		HD		BD		PAL	
(mm)	I %	n	I %	n	I %	n	I %	n
2.0	22.9	5	28.6	5	28.0	5	55.5	2
3.0	24.3	39	28.3	39	27.6	39	43.6	8
4.0	25.5	51	30.5	56	31.4	52	46.3	6
5.0	27.3	11	32.6	11	34.5	11	44.7	5
6.0	29.0	11	33.7	11	36.1	9	47.3	4
7.0	28.2	13	30.8	13	36.6	12	44.2	3
8.0	27.5	11	29.5	11	37.4	11	39.4	3
9.0	28.2	2	27.3	2	40.9	2	39.3	1
10.0	27.0	5	28.0	5	40.7	5	32.4	1

Etropus longimanus larvae were moderately elongate at the beginning of their development. Table 1 shows the indices related to SL that most clearly indicate body transformation, and Fig. 2 shows the morphometric regressions. BD showed a positive allometric growth pattern with respect to SL ($P<0.01$), increasing from 27.5% NL to 41% SL (Fig. 2a, Table 1). HL increased in relation to SL, also following a positive allometric growth pattern ($P<0.01$) (Fig. 2b), increasing from 23% NL to 29% SL in fish larvae up to 6 mm SL (Table 1). Subsequently, HL remained approximately constant (Table 1). HD showed a positive allometric growth pattern with respect to SL ($P<0.05$) (Fig. 2c). It increased from 28.5% NL to 33.7% SL in fish larvae up to 6 mm SL and then decreased to 28% SL in larvae of 10 mm SL (Table 1). HD showed a negative allometric growth pattern with respect to HL ($P<0.01$) (Fig. 2e). PAL (Fig. 2d) increased isometrically with respect to the SL ($P>0.05$). ED showed a negative allometric growth pattern in relation to HL ($P<0.01$, Fig. 2f).

TABLE 2. – Sequence of appearance and number of myomeres, vertebrae and fin rays of *Etropus longimanus* larvae.

Body length (mm)	Larval stages	Total myomeres	Total vertebrae	Dorsal rays	Anal rays	Pelvic rays	Caudal rays
2.8	Preflexion	37		2	15	1	
3.1	Preflexion			2			
3.2	Preflexion	35		2			
3.3	Preflexion	36		2			
3.3	Preflexion	37		2		1	
3.3	Preflexion	41		2		1	
3.3	Preflexion	38		2			
3.3	Preflexion	37		2			
3.5	Preflexion	34		2			
3.7	Preflexion	38		2			
3.8	Preflexion	38		2		1	
3.9	Preflexion	39		2			
3.9	Preflexion	37		2			
4.2	Preflexion	33		2		3	
4.2	Preflexion	34		2		1	
4.2	Flexion			2			
4.5	Flexion	36		44	35	1	12
4.6	Flexion	38	38	44	25	3	12
4.6	Flexion			2			
4.7	Flexion	37		52			
4.8	Flexion	37	20	21	7	4	10
4.8	Flexion	36	36	69	53	1	17
5.0	Flexion	36		29	22	1	10
5.1	Flexion	37		63	49	4	11
5.5	Postflexion	36	36	70	51	6	17
6.1	Postflexion	35	35	73	59	4	17
6.3	Postflexion	36	36	70	54	6	17
6.5	Postflexion	37	37	75	65	6	17
7.3	Postflexion	38	38	73	56	6	17
8.0	Postflexion	39	39	70	57	6	17
8.0	Postflexion	35	35	73	60	6	16
8.0	Postflexion	35	35	75	66	6	17
8.1	Postflexion	36	36	65	54	6	17
8.1	Postflexion	35	35	75	60	6	17
8.3	Postflexion	34	34	68	64	6	17
8.3	Postflexion	36	36	74	66	6	17
8.9	Postflexion	34	34	77	59	6	17
9.1	Postflexion	34	34	74	61	6	17

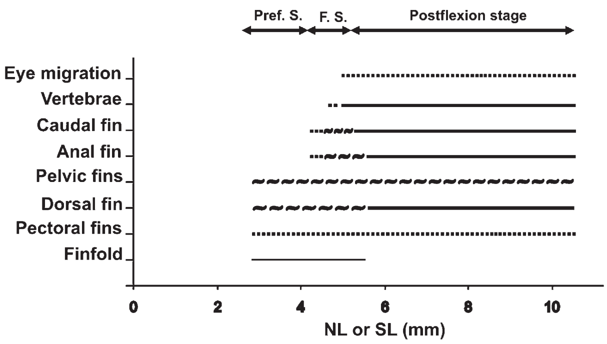

FIG. 3. – Sequence of the development of morphological characters in early life stages of *Etropus longim* in relation to notochordal length (NL) or standard length (SL): start of development of the character (▬ ▬ ▬ ▬); appearance of fin rays (~~~~); character completely developed (———). Pref. S.: preflexion stage; F. S.: flexion stage.

Fins and meristic features

33 to 41 myomers were observed from the beginning of the preflexion stage. Vertebral ossification began in the flexion stage (4.6 mm SL) (Table 2). Ossification started from the head towards the posterior part of the body and the definitive number of vertebrae (34-39, without urostyle) was observed in larvae of 4.8 mm SL (flexion stage) (Fig. 3, Table 2).

Fin development

In preflexion larvae, finfolds and pectoral fin buds were the first parts of the fins observed. The finfold was gradually lost as the other fins developed (Fig. 1, Fig. 3). The development of the dorsal fin began at the preflexion stage (2.8 mm SL) (Fig. 3). It had two elongated rays that remained during all larval developmental stages (Table 2). The dorsal fin attained the final number of rays at the beginning of the postflexion stage (69-70 rays) (Fig. 3, Table 2). Pelvic fins had only one ray during the preflexion stage (2.8 mm SL) (Fig. 1a), increasing to three rays during flexion (Fig. 1b), and were completely formed with six rays (Table 2) at the beginning of the postflexion stage (Fig. 3). The only elongated fin ray was the third ray of this fin (Fig. 1c). The development of the anal fin began at the flexion stage and attained its final number of rays (65-66) (Table 2) at the beginning of the postflexion stage (Fig. 3). The caudal fin had 10-17 rays during the flexion stage (Fig. 3) and reached its definitive number (17 rays) in the postflexion stage (Table 2). The pectoral fin ossification was not complete at the end of the postflexion stage (Figs. 1c, 3).

Symphurus trewavasae

General morphological features and pigmentation

The smallest larva collected (preflexion larva) was 2.8 mm NL. In all developmental stages the larval body was compressed and ribbon-like. The body depth (BD) remained similar with the increment of body size and the eyes were very small. The intestine was noticeably coiled in all developmental stages. The gas bladder was heavily pigmented, with three or four distinct melanophores (Fig. 4a-d).

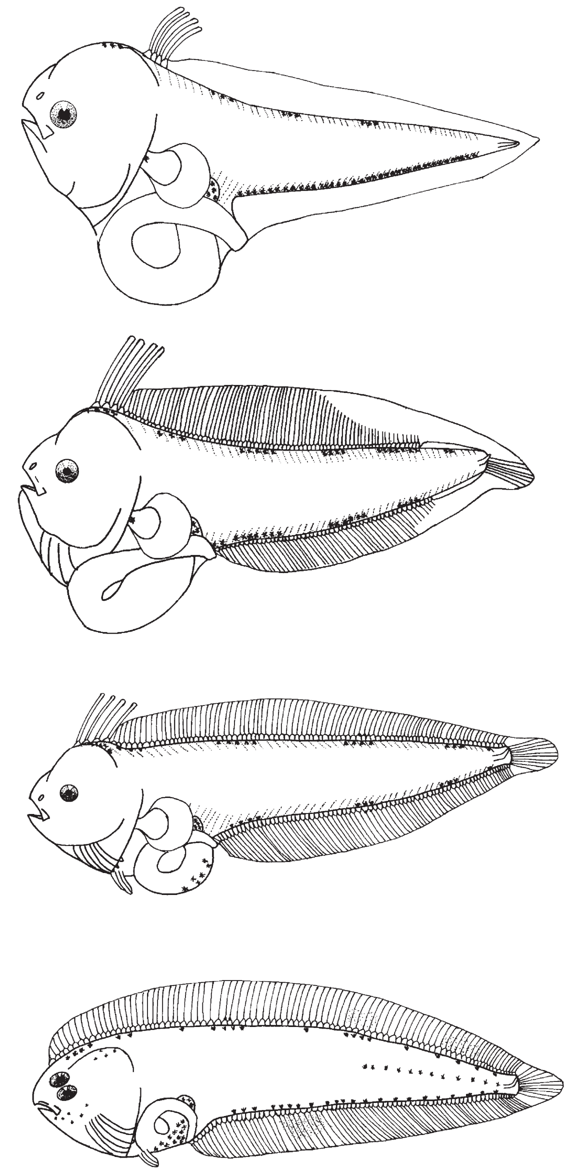

FIG. 4. – *Symphurus trewavasae* larval development: (a): preflexion larvae (2.8 mm NL); (b): larvae in flexion (5.8 mm SL); (c): postflexion larvae (8.6 mm SL) and (d): metamorphosis larvae (10.5 mm SL).

At the preflexion stage (2.8-3.7 mm NL), there were three dash-like clusters of pigment along the dorsal margin of the body between myomers 7-10, 17-19 and 29-31 (Fig. 4a). One melanophore per myomer, from myomer 11 to approximately 49, was observed on the ventral margin of the tail (Fig 4a). Four internal melanophores appeared above the hindbrain before the insertion of the elongated rays of the dorsal fin (Fig 4a). One melanophore was found at the base of the pectoral fin (Fig 4a-b).

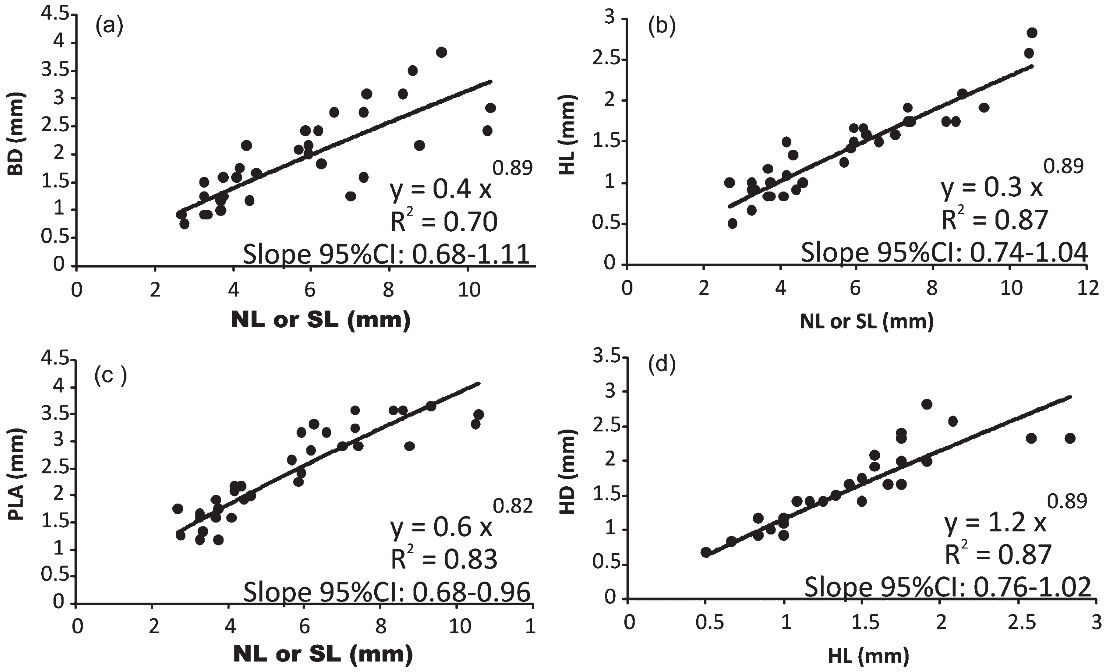

FIG. 5. – Regression between (a): body depth (BD); (b): head length (HL); (c): preanal length (PAL) and notochordal length (NL) or standard length (SL); and between (d): head depth (HD) and head length (HL) of *Symphurus trewavasae* larvae. Values in parenthesis are 95% CI of the slope.

Notochord flexion started at 5.9 mm and was completed at 7.4 mm SL (flexion stage). There were five dash-like clusters of pigment along the dorsal margin of the body between myomers 3-5, 12-16, 24-27, 33-39 and 44-45 (Fig. 4b). Along the ventral margin of the tail, three dash-like clusters of pigment were observed between myomers 8-17, 25-30 and 36-39 (Fig. 4b). There were four internal melanophores above the hindbrain under the insertion of the elongated rays of the dorsal fin (Fig 4b).

At the postflexion stage (8.3-9.3 mm SL), the gut was relatively shorter than before. Several melanophores were present along the ventral and lateral surface of the abdomen, which increased in pigmentation with larval size (Fig. 4c-d). There were four dash-like clusters of pigment along the dorsal margin of the body between myomers 1-3, 12-16, 27-30 and 41-43. Few melanophores were observed on the ventral margin of the tail, with the consequent formation of three main groups. The first group consisted of four melanophores between myomers 13 and 16, the other two groups were composed of three melanophores located between myomers 28-30 and 40-42 respectively (Fig. 4c). There were two small melanophores on the distal tips of dorsal pterygiophores 56 and 57, and two of them on the distal tips of ventral pterygiophores 35 and 36 (Fig. 4c).

Migration of the right eye was completed in the metamorphic stage (it started at 10.5 mm SL), leaving both eyes to the left side of the head. The gut became shorter and more heavily pigmented (Fig. 4d). The protruding gut was incorporated into the ventral body profile (Fig. 4d).

During metamorphosis, larval pigmentation was lost and the adult pigmentation developed. At the beginning of this stage, the pigmentation intensified over the cephalic region. Pigmentation along the ventral margin of the tail became more continuous and series of internal pigments appeared along the vertebral column in the posterior half of the body. Along the dorsal margin of the tail, there were four dash-like clusters of pigment between myomers 4-8, 14-16, 31-36 and 52-55, and there were two small melanophores on the distal tips of dorsal pterygiophores 33 and 34 (Fig. 4d). Two groups of small pigments were also observed on the dorsal fin between rays 52-55 and 68-75, and another group on the anal fin between rays 20 and 28 (Fig. 4d).

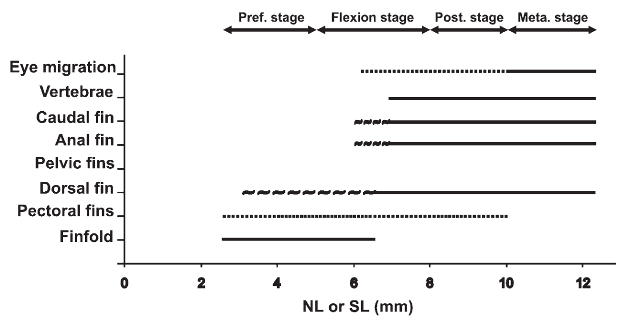

FIG. 6. – Sequence of the development of morphological characters in early life stages of *Symphurus trewavasae* in relation to notochordal length (NL) or standard length (SL): start of development of the character (▬ ▬ ▬ ▬); appearance of fin rays (〰〰); character completely developed (▬▬▬). Pref. stage: preflexion stage; Post. stage: postflexion stage; Meta. stage: metamorphosis stage.

Table 3. – Sequence of appearance and number of myomeres, vertebrae and fin rays of *Symphurus trewavasae* larvae.

Body length (mm)	Larval stages	Total myomeres	Total vertebrae	Dorsal rays	Anal rays	Pelvic rays	Caudal rays
2.8	Preflexion	47					
3.3	Preflexion	46		4			
3.3	Preflexion	45		4			
3.3	Preflexion	47					
3.7	Preflexion	48		4			
3.7	Preflexion						
5.1	Flexion	45	45	84	68		5
6.2	Flexion	48	37	85	71		7
6.3	Flexion	48	45	86	72		7
6.6	Flexion	48	48	87	72		8
7.0	Flexion	48	48	89	76	4	10
7.3	Flexion	48	48	88	73	4	10
7.3	Flexion	49	49	82	74	4	10
7.4	Flexion	50	50	86	75		10
8.3	Postflexion	48	48	90	75	4	10
8.6	Postflexion	48	48	91	77	4	10
9.3	Postflexion	49	49	87	70	4	10
10.5	Metamorphosic	49	49	90	74	4	10

Table 1 includes the indices related to SL that most clearly represent the body transformation, and Fig. 5 shows the morphometric regressions. *Symphurus trewavasae* larvae were moderately elongate during all their development. BD and HL growth was isometric throughout larval development (P>0.05) (Figs. 5a and 5b respectively). PAL increased with respect to SL, following a negative allometric growth pattern (P<0.05) (Fig. 5c), decreasing from 55.5% NL to 32.5% SL in fish up to 10 mm SL (Table 1). HD increased isometrically with respect to HL (P>0.05) (Fig. 5d).

Fins and meristic features

The examined specimens of *Symphurus trewavasae* had a total of between 45 and 50 myomers (mode: 48 myomers). Vertebral column ossification started previously. A total of 48-50 vertebrae (without urostyle) was recorded in 6.6-7.4 mm SL flexion larvae (mode 48 vertebrae) (Fig. 6, Table 3). The interdigitation pattern of the tonguefish species was 1-3-2-2-2 (100%, n=10).

Fin development

At the beginning of the preflexion stage, finfold and pectoral fin buds were present (Figs. 4a, Fig. 6). The finfold was gradually lost (Figs. 4b, 4c, 6). Dorsal fin development began in preflexion larvae (3.3 mm NL) with four elongated rays at the start of the dorsal fin, which remained to the postflexion stage (Fig. 4a-c). The dorsal fin attained the final number of rays (82-91) in the postflexion stage (Fig. 6, Table 3). In the metamorphosis stage, the elongated rays disappeared (Fig. 4d). During the flexion stage the anal and caudal fins began developing (6.2 mm SL) (Figs. 4b, 6, Table 3) and reached the final number of rays in specimens of 7 mm NL with 70-77 rays in the anal fin and 10 rays in the caudal fin (Table 3). The development of the pelvic fins was complete in specimens of 7 mm NL (4 rays) (Fig. 6, Table 3). The pectoral fins were reabsorbed at metamorphosis (Figs. 4d, Fig. 6).

DISCUSSION

In this description, the main identification characters, such as the meristic characteristics and pigmentation pattern, were analyzed so that *Etropus longimanus* and *Symphurus trewavasae* larvae can be recognized.

In general, species of the genus *Etropus* have 2 or 3 elongated rays on the dorsal fin (Ahlstrom *et al.* 1984). In this study we detected 2 rays on the dorsal fin and 1 on the pelvic fins. Tucker (1982) found the same number of elongated rays; however, they were at the second and third positions on the dorsal fin and the second position on the ventral fin. Only one species of *Etropus*, *E. longimanus*, is recognized on the Argentine continental shelf (Cousseau and Denegri 1997).

Although the general pigmentation pattern observed in *Etropus longimanus* was similar to that found for most of the species of these genera (Ahlstrom *et al.* 1984), during the preflexion stage, internal notochordal pigment consisted of a series of three fine dashes along the dorsal surface and was shorter than the pattern observed by Tucker (1982) in *Etropus crossotus*. In *E. crossotus*, some pigments were observed on each side of the symphysis of the lower jaw, the posterior margin of the articular and at the junction of the left and right branchiostegal membranes (Tucker 1982), but in *E. longimanus*, there were only a few internal melanophores over the hindbrain in the head during all the development stages. In *E. longimanus* no pigments were observed in the elongated rays, although Tucker (1982) found melanophores at the distal end of them.

The body depth in *Etropus longimanus* increased with size, like *E. crossotus* larvae from the northeast Atlantic and Gulf of Mexico (Tucker 1982). Most of the other morphometric characters obtained for *E. longimanus* were similar to those observed for *E. crossotus,* except for the preanal length, which grew allometrically in the latter species (Tucker 1982). *E. longimanus* completed its dorsal, anal and pelvic fins in the postflexion stage. This was different in *E. crossotus,* for which Tucker (1982) observed that these fins were completed at the end of the flexion stage. This author observed that the pectoral fins were completely developed during late metamorphosis. No larvae of *E. longimanus* in the metamorphic stage were found in this study, so we were unable to determine the size at which the development of the pectoral fins was complete.

Notochordal flexion of *Etropus longimanus* started in smaller larvae in *E. crossotus* (Tucker 1982). In both *E. longimanus* and *E. crossotus* (Tucker 1982), the development of the vertebral column was completed in the flexion stage.

Given the high risk of predation on teleost fish larvae, head spines are of great use for defence and are also considered as diagnostic elements (Neira *et al.* 1998). Species of the genus *Etropus* are characterized by one or more rows of small preopercular spines (Ahlstrom *et al.* 1984). According to Tucker (1982), some of the species, such as *E. crossotus,* have small frontal-sphenotic spines. Preopercular spines were not found in *E. longimanus.* The absence of head spines could be due to the decalcification of the bony part influencing stained spines and making them hardly visible. Vulnerability to destruction in the capture, fixation and preservation processes also needs to be considered (Munoz *et al.* 1988).

Previous studies have indicated the problems involved in identifying *Symphurus* species with overlapping meristic and morphometric characteristics (Munroe 1992, Saldierna-Martinez *et al.* 2010). There are two species of *Symphurus* that inhabit the waters off Buenos Aires. These two species have different meristic characters. *Symphurus jenynsi,* has 59 total vertebrae while *Symphurus trewavasae* has only 49 (Derisio 2004). The predominant interdigitation pattern observed in this study coincided with one of the variant patterns found by Munroe (1992) in *S. trewavasae*.

Symphurus trewavasae from southern Brazil (23-29°S), described by Kurtz and Matsuura (1994), was very similar to our description. The main difference was the developmental time of the caudal and ventral fins, observed in the postflexion stage by these authors. The differences detected in the two studies could be due to the different latitudinal distributions of the two groups.

In *Symphurus trewavasae,* the flexion stage began at 5.9 mm NL and finished at 7.4 mm SL like *S. williamsi* (Aceves-Medina *et al.* 1999). The size of the specimens at the time of metamorphosis varied between species. In *S. trewavasae* and *S. williamsi,* this stage began at 10.5 mm SL (Aceves-Medina *et al.* 1999), whereas in other species of this genus, such as S. *chabanaudi* and S. *prolatinaris,* this process occurred later (15.3 mm SL and 19.6 mm SL respectively) (Evseenko and Shtaut 2000).

The growth pattern of certain body parts is characteristic for the species. In *Symphurus trewavasae* larvae, head length and body depth followed an isometric growth pattern in relation to the SL. Conversely, *S. williamsi* showed a negative allometric growth pattern (Aceves-Medina *et al.* 1999). Like *S. williamsi* (Aceves-Medina *et al.* 1999), the preanal length followed a negative allometric growth pattern in *S. trewavasae*.

The species of the genus *Symphurus* may have the first 7 dorsal-fin rays elongated (Evseenko 1990, Aceves-Medina *et al.* 1999). *S. trewavasae* only had four rays, which remained to metamorphosis. *S. chabanaudi* and *S. prolatinaris* had 2 elongated rays on the dorsal fin (second and third) that shortened later in metamorphic larvae (Evseenko and Shtaut 2000), and S. *williamsi* had 3 elongated rays (Aceves-Medina *et al.* 1999). In *S. trewavasae,* development of the dorsal and anal fins was completed during the flexion stage, followed by the pelvic and caudal fins. This did not agree with the studies carried out by Aceves-Medina *et al.* (1999) on *S. williamsi,* for which the dorsal and anal fins developed last. The caudal fin is completed in *S. williamsi* at the beginning of the postflexion stage. The pectoral fin is reabsorbed at the end of posflexion stage (Aceves-Medina *et al.* 1999), and not in the metamorphic stage, like in *S. trewavasae*.

The range of the total number of myomeres in *Symphurus trewavasae* (45-50) matched the number of vertebrae reported for juveniles (Derisio 2004). In *S. williamsi* (Aceves-Medina *et al.* 1999) the full complement of vertebrae was recorded in the preflexion stage. In *S. trewavasae,* this occurred in the flexion stage.

Although it is difficult to identify the larvae of the species of the genera *Etropus* and *Symphurus*, the best characters for confidently identifying larvae to species level are the number of elongate dorsal rays and the number of vertebrae. The interdigitation pattern can also be considered to identify *Symphurus* spp.

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