Japan. J. Ichthyol.
41(2): 141-148, 1994

魚類学雑誌
41(2): 141-148, 1994

Early Development of Four Tonguefishes of the Genus *Symphurus* (Osteichthyes: Cynoglossidae) from the Southern Brazil

Frederico W. Kurtz[1] and Yasunobu Matsuura[2]

[1] Universidade Santa Ursula, Departamento de Biologia Animal
Rua Fernando Ferrari 75, Rio de Janeiro, 22231, Brazil
[2] Universidade de São Paulo, Instituto Oceanográfico
Cidade Universitária, Butantã, São Paulo 05508, Brazil

(Received November 24, 1993; in revised form May 21, 1994; accepted May 26, 1994)

Abstract Using the ichthyoplankton samples collected in the southeastern Brazil Bight (from 23°S to 29°S), morphological development of four species of *Symphurus* larvae and pre-settlement juveniles are described. Larvae of four species are identified based on distribution pattern of pigment on the dorsal and ventral margins of trunk and the length of first five dorsal fin rays. All four species have a crest consisting of elongated dorsal rays. *Symphurus ginsburgi* larvae have one short first dorsal finray followed by four long rays and a pair of melanophores are visible on the dorsal and ventral margins of the trunk at about one-third of body length from preflexion stage. Only *S. ginsburgi* of the four species reported has a conical appendix attached to the trailing gut coil. *Symphurus kyaropterygium* also has one short dorsal finray followed by four long rays, but can be distinguished from the former species by pigment pattern, i.e. there are four groups of melanophores along the dorsal margin of the trunk. *Symphurus tessellatus* has one short finray followed by two long rays and seven groups of melanophores on the dorsal margin of the trunk. *Symphurus trewavasae* has four long dorsal finrays and six groups of melanophores along the dorsal margin of the trunk.

Tonguefishes of the genus *Symphurus* belong to the Cynoglossidae which includes three other genera: *Cynoglossus*, *Arelia* and *Paraplagusia*. In the western Atlantic only genus *Symphurus* is known to occur (Menon, 1977; Nelson, 1984; Munroe, 1991).

Literature on the early life history of *Symphurus* is scarce. Of 71 species of *Symphurus* only the eggs of *S. atricauda* have been described (Ahlstrom et al., 1984). Larvae of six species have been described, but most of these are from incomplete series. Kyle (1913) described the larvae of *S. lactea* (=*S. nigrescens*), *S. ligulatus* and *S. pusillus*, based on samples collected in the Mediterranean and adjacent seas. Hildebrand and Cable (1930) described the larvae of *S. plagiusa* taken from the coast of North Carolina, but Olney and Grant (1976) suggested that those specimens smaller than 6 mm were misidentified. Pertseva-Ostroumova (1965) presented a series of larvae of *S. orientalis* collected in the Gulf of Tonkin. Larvae of *S. atricauda* were described based on samples collected in the California waters (Moser, 1981; Ahlstrom et al., 1984).

Eight species of *Symphurus* are known from the Brazilian coast: *S. diomedeanus* (Goode and Bean, 1885), *S. ginsburgi* Menezes and Benvegnú, 1976, *S. jenynsi* Evermann and Kendall, 1907, *S. kyaropterygium* Menezes and Benvegnú, 1976, *S. marginatus* (Goode and Bean, 1885), *S. plagusia* (Schneider, in Bloch and Schneider, 1801), *S. tessellatus* (Quoy and Gaimard, 1824) and *S. trewavasae* Chabanaud, 1948. However, there are no descriptions of larvae of these species.

In this paper we describe in detail the morphological development of four species of *Symphurus* larvae collected in the southeastern Brazilian Bight and compare them with known *Symphurus* larvae.

Material and Methods

Larvae used in this study were collected during five survey cruises conducted in the southeastern Brazilian Bight between Cabo Frio (23°S) and Cabo Santa Marta Grande (29°S). Sampling was conducted using 60 cm Bongo nets, following the method described by Smith and Richardson (1977).

Larvae were fixed in a 10% formalin solution.

Larvae were examined under a dissecting microscope and measured using an ocular micrometer attached to the objective lens. Notochord length (NL) and standard length (SL) were measured from the tip of upper jaw to the end of the notochord and to the posterior end of the hypural, respectively. Identifications were made linking the juvenile stages with the distinct larval series. Four species of *Symphurus* (*ginsburgi*, *kyaropterygium*, *tessellatus* and *trewavasae*) were identified and preliminary information on *S. jenynsi* was also presented for comparative purposes.

Larval stages are divided in three, according to the state of notochord flexion: preflexion, flexion and postflexion stages (Ahlstrom et al., 1976). Metamorphosis starts with the appearance of a crevice on the frontal area and ends with complete migration of the right side eye to the left side and acquisition of the juvenile form.

Results

Morphology

Preflexion stage.—The larvae of four species in this stage are very similar, having a transparent and laterally compressed body. The notochord is straight and the body is surrounded by a finfold from the supraoccipital region to the anus. Identification of individual species was made based on differences in pigment patterns. During this stage it is possible to see formation of the first two elongate rays of dorsal fin in four species (Fig. 1). In the smallest larvae a pair of membranous pectoral fins and pigmented eyes are located symmetrically on both sides of the body. Digestive tracts are curled, forming a loop which is projected ventrally. Only *Symphurus ginsburgi* has a conical appendix located on the ventral side of the protruded abdomen. The preflexion stage ends at about 6.15–7.00 mm NL.

Flexion stage.—In this stage the body form of the four species is still similar, but starts to show a difference in length of first dorsal fin rays (Fig. 2). *Symphurus trewavasae* has four elongate rays, and *S. kyaropterygium* and *S. ginsburgi* have a short first dorsal fin ray followed by four elongate rays. *Symphurus tessellatus* has a short first dorsal fin ray followed by two elongate rays and *S. jenynsi* has three long fin rays. All dorsal and anal fin rays are

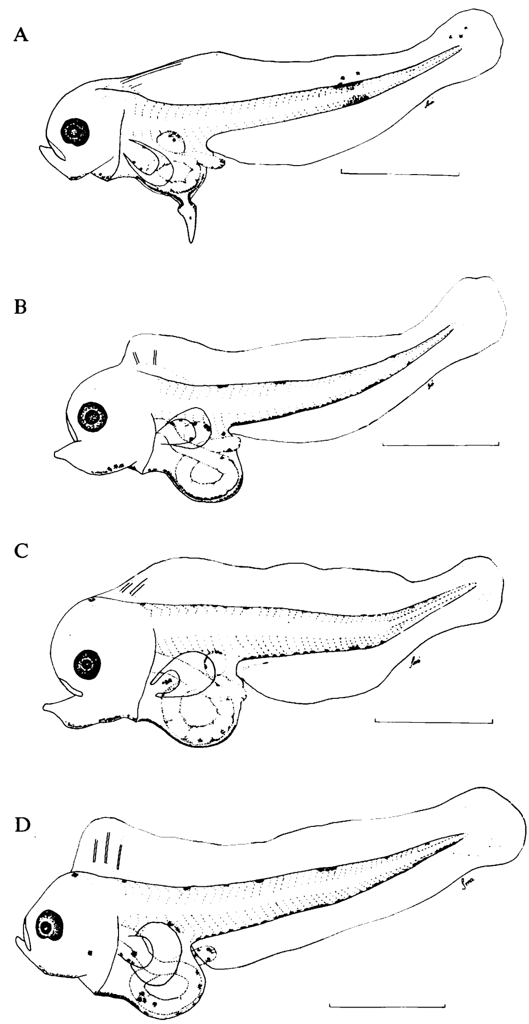

Fig. 1. Preflexion stage of *Symphurus* larvae. A) *S. ginsburgi* (3.65 mm); B) *S. kyaropterygium* (3.45 mm); C) *S. tessellatus* (3.60 mm); D) *S. trewavasae* (3.90 mm NL). Scale bars = 1 mm.

already formed with the exception of the caudal fin rays. In this stage the right ventral fin appears at the mid-ventral margin of the body posterior to the cleithral symphysis and no left ventral fin is observed. The pterygiophores of the dorsal and anal fins are also visible. Formation of the hypural is initiated at notochord flexion.

The eyes are large and symmetrically positioned at both sides of head and the six branchiostegal rays are present. In all four species the abdomen projects ventrally beyond the anal fin. The posterior part of the digestive tract projects slightly from the abdom-

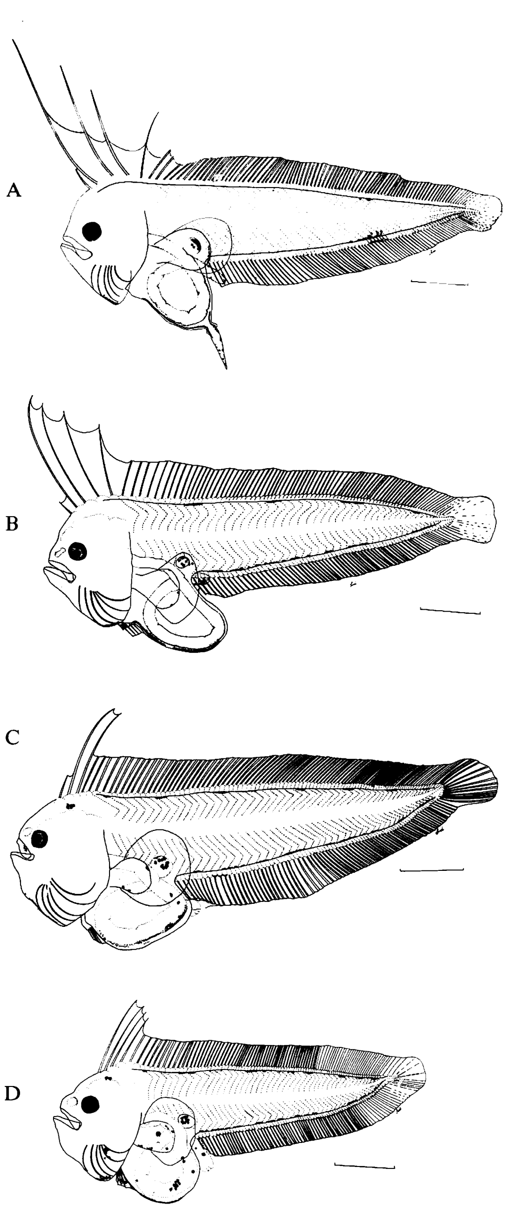

Fig. 2. Flexion stage of *Symphurus* larvae. A) *S. ginsburgi* (7.60 mm); B) *S. kyaropterygium* (7.00 mm); C) *S. tessellatus* (7.40 mm); D) *S. trewavasae* (6.00 mm NL). Scale bars = 1 mm.

inal cavity, and the anal tube is flexed to the right side of the body. The anal aperture opens close to the anal fin origin. *S. tessellatus* ends this stage at the smallest size (8.00 mm NL) and *S. ginsburgi* at the largest size (9.25 mm NL) among the four species.

Postflexion stage.—Dorsal and anal fin rays are

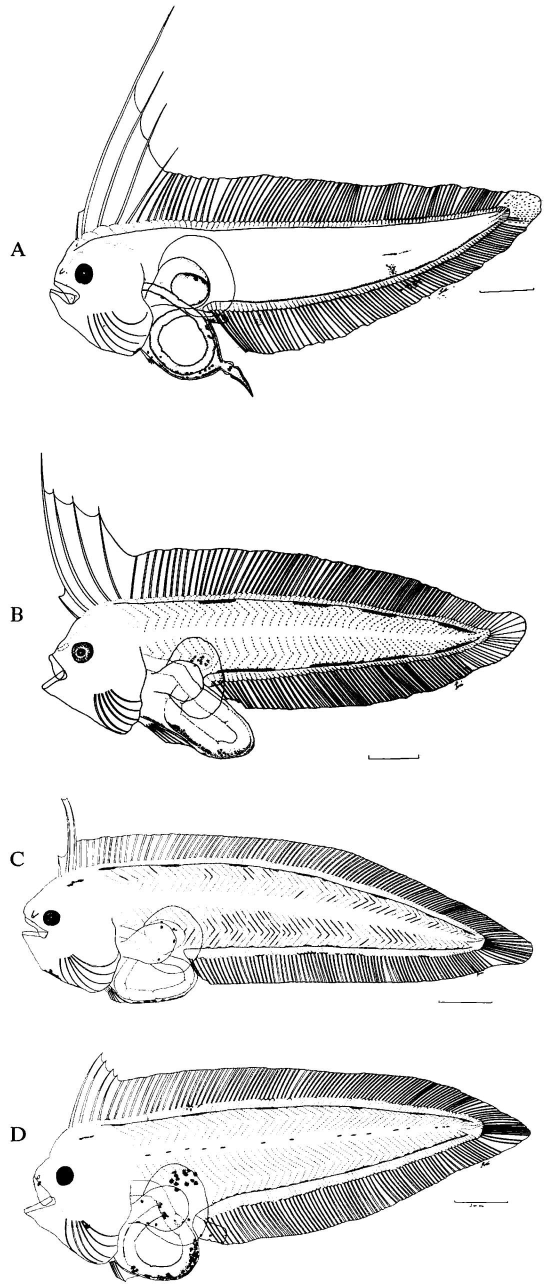

Fig. 3. Postflexion stage of *Symphurus* larvae. A) *S. ginsburgi* (9.25 mm); B) *S. kyaropterygium* (9.40 mm); C) *S. tessellatus* (9.00 mm); D) *S. trewavasae* (8.90 mm SL). Scale bars = 1 mm.

already formed by postflexion stage, consequently identification of postflexion larvae can be made by counting fin ray. The first several dorsal fin rays are

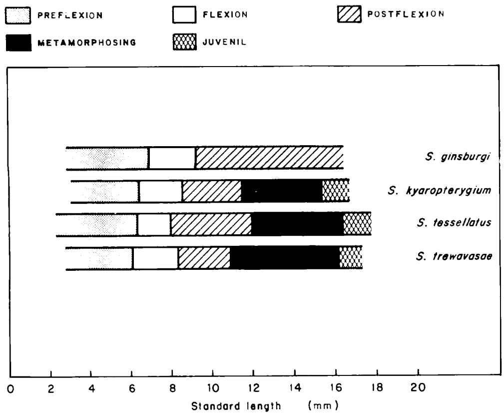

Fig. 4. Representation of each developmental stage in four species of *Symphurus.*

still elongate as in the earlier stage (Fig. 3). The second dorsal fin ray of *Symphurus ginsburgi* is slightly longer than that of *S. kyaropterygium*, but both species have a short first dorsal fin ray followed by four elongate rays. *S. tessellatus* has a short first dorsal fin ray followed by two elongate rays and *S. trewavasae* has four elongate rays. The notochord is completely flexed and hypural bones are formed and support the caudal fin rays. The right ventral fin is also formed with four fin rays and is positioned close to the cleithral symphysis.

The eyes are relatively large and positioned symmetrically on both sides of body. The nasal organ is tubular, positioned above the maxilla. In *S. tessellatus* the extremity of the nasal organ reaches the upper margin of the maxilla. The mouth is large with filiform teeth on both sides of the maxilla. The left maxilla of *S. tessellatus* is slightly curved.

The loop of digestive tract is still long in the four species and the anal orifice opens at the right side of the body.

Metamorphosing stage.—The size at the beginning of this stage varies among individuals, probably because of variation in the environmental stimuli which induce metamorphosis (Tucker, 1982). The size of the metamorphosing stage of *S. kyaropterygium* which shows a small crevice at the frontal margin of the head, varies from 11.5 mm to 15.7 mm SL. In *S. tessellatus* the smallest specimens of this stage are usually between 12.3 and 12.5 mm SL, but we have a smaller specimen (11.7 mm SL) at an advanced metamorphosing stage. The smallest specimens of *S. trewavasae* undergoing metamorphosis vary from 10.8 to 14.8 mm SL. The end of this stage was

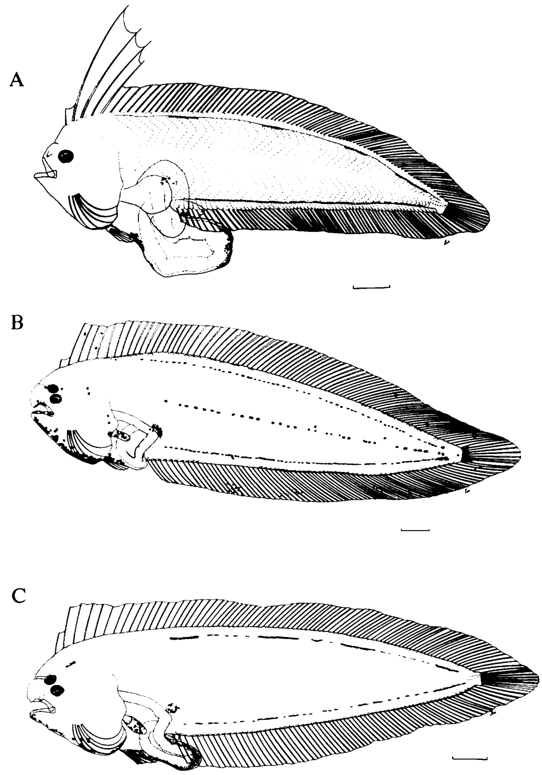

Fig. 5. Metamorphosing stage of *Symphurus kyaropterygium.* A) 11.25 mm; B) 13.15 mm; C) 15.50 mm SL. Scale bars = 1 mm.

observed in one specimen of *S. kyaropterygium* at 15.6 mm SL and *S. tessellatus* at 16.4 mm SL. In *S. trewavasae* it varies from 12.7 to 16.4 mm SL. No metamorphosing larva of *S. ginsburgi* were found. Figure 4 shows variation in size of different developmental stages of four species. During this stage, larvae undergo several remarkable morphological changes allowing transition from the planktonic life of the larva to the benthic life assumed by juvenile and adult stage. These modifications are similar in all three species observed (Figs. 5, 6, and 7).

Metamorphosis starts with the appearance of a crevice at the anterior margin of head dorsal to the eyes. With the development of this crevice, the right side eye starts to migrate to the left side through the crevice and finally comes above the left eye. Later, the crevice space closes.

The anterior elongate dorsal rays also diminish in size during metamorphosis and become the same size as the other dorsal rays. The protruded abdomen

A

B

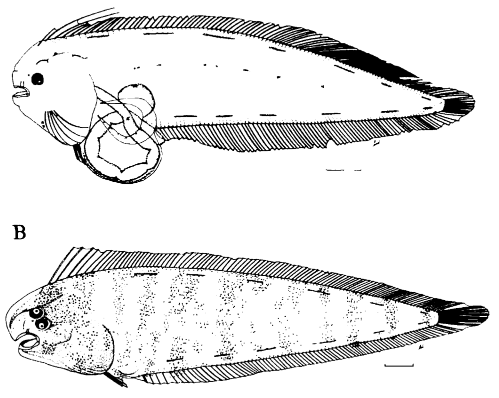

Fig. 6. Metamorphosing stage of *Symphurus tessellatus.* A) 12.30 mm; B) 16.40 mm SL. Scale bars = 1 mm.

A

B

C

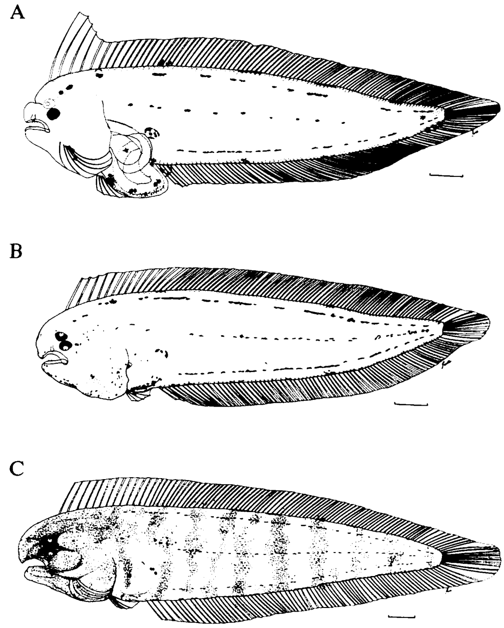

Fig. 7. Metamorphosing stage of *Symphurus trewavasae.* A) 13.25 mm; B) 12.65 mm; C) 16.15 mm SL. Scale bars = 1 mm.

containing the looped digestive tract also diminishes in size and becomes completely enclosed in the body cavity. At this stage the beginning of scale formation also starts on the mid-lateral region of the trunk.

Pigmentation

Preflexion stage.—All four species have some melanophores on the dorsal and ventral margins of the trunk, on the ventral surface of the digestive tract forward to the hyoid region, and on the dorsal side of the gas bladder. Small melanophores are scattered over the membranous pectoral fin.

In *S. tessellatus*, *S. trewavasae* and *S. jenynsi* one melanophore is present over the mesencephalic region. *Symphurus trewavasae* larvae have one melanophore at the base of the branchiostegal membrane between the 5th and 6th rays. In *S. kyaropterygium*, *S. tessellatus* and *S. trewavasae*, a series of small melanophores is visible along the ventral margin of the trunk. On the dorsal margin similar melanophores are present, but these are more scattered. In *S. ginsburgi* a batch of melanophores is present along the body midline at the junction of myosepta. These are specially evident on the posterior one-third of the trunk. There are also some melanophores over the ventral appendix of this species.

Flexion stage.—Pigment is similar to the preflexion stage. Small melanophores on the digestive tract, dorsal side of the air bladder and the pectoral fin are present in all four species. The large melanophore over the mesencephalon is clear in *S. tessellatus* and *S. trewavasae* larvae, but there are no melanophores on the cephalic region in *S. ginsburgi* and *S. kyaropterygium.* One distinct melanophore is present at the same position on the branchiostegal rays of S. trewavasae larvae.

S. kyaropterygium, *S. tessellatus* and *S. trewavasae* have several groups of small melanophores along the dorsal margin of trunk, but the number of melanophores is distinct in each species: 4 in *S. kyaropterygium*, 6 in *S. trewavasae* and 7 in *S. tessellatus* larvae. *S. jenynsi* larvae have five groups of melanophores along the dorsal margin of trunk. Along the ventral margin of the trunk the melanophores are almost continuous in four species, except *S. ginsburgi* which has a distinct group of melanophores on the dorsal and ventral margins of the trunk.

Postflexion stage.—The pigment pattern of this stage is almost identical to that of the flexion stage. The numbers of melanophores along the dorsal margin of the trunk remain the same in all three species. A series of internal pigments appears along the vertebral column in *S. trewavasae* and *S. ginsburgi* larvae, but the latter species has them in the posterior half of body only.

Metamorphosing stage.—During this stage, the planktonic pigment pattern is lost and adult pigmen-

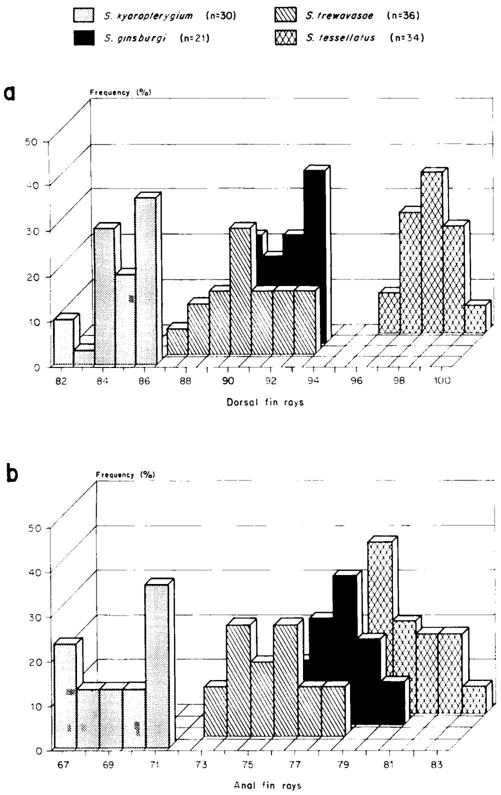

Fig. 8. Frequency distribution of dorsal fin rays (a) and anal rays (b) for four *Symphurus* species.

tation develops on left side of body. The internal melanophore on the mesencephalon of postflexion *S. tessellatus* and *S. trewavasae* is replaced by heavy pigmentation over the cephalic region. *Symphurus kyaropterygium* larvae also start to develop pigmentation over the cephalic region, but less intensively than noted for the other species.

Pigmentation along the dorsal and ventral margins of the trunk becomes more intense and continuous in three species. No information is available for *S. ginsburgi.* At the beginning of this stage a series of melanophores along the vertebral column is visible on both sides of body, but later a vertical band of pigments appears on the left side of the body in *S. tessellatus* and *S. trewavasae*, as is typical of adult specimens.

Meristic characters

Numbers of caudal fin rays are constant in the four species: *S. trewavasae* and *S. kyaropterygium* have ten and *S. ginsburgi* and *S. tessellatus* have twelve rays. Figure 8 shows the frequency distribution of dorsal and anal fin rays for the four species. *S. kyaropterygium* has the lowest numbers of dorsal and anal fin rays and *S. tessellatus* has the highest numbers. The range of anal fin rays of *S. tessellatus* (79–83) overlaps partially with that of *S. ginsburgi* (76–80) and the range of dorsal fin rays of *S. trewavasae* (87–93) overlaps almost entirely with that of *S. ginsburgi* (90–93).

Discussion

From eight known species of *Symphurus* in the Brazilian waters (Menezes and Benvegnú , 1976; Munroe, 1991), only four species described here are common over study area. No *S. diomedeanus* larva was collected in this area, because its main habitat is northeastern Brazil (Menezes and Benvegnú, 1976). *Symphurus* larvae with a short first dorsal ray following two long rays were identified as *S. tessellatus*, since the meristic characters (ranges of dorsal fins, anal fins and vertebral counts) coincided with those of *S. tessellatus.* Because of their shallow water habitats, only small number of *S. jenynsi* larvae and no *S. plagusia* larva were collected in this survey.

Identification of *Symphurus* larvae was made based on pigment patterns and meristic characteristics. Early stage *S. ginsburgi* larvae can be identified easily by the presence of the peculiar conical appendix on the ventral side of the abdominal wall. This appendix presents at least until the size of the largest larvae examined (=16.45 mm SL). A similar appendix on the abdominal wall is known for *S. nigrescens* (originally described as *S. lactea*) from the Mediterranean water (Kyle, 1913), but its function is not known. These two species show other similar morphological characteristics during their larval development, e.g. short first dorsal ray followed by four elongate rays and two batches of melanophores on the dorsal and ventral margins of the posterior one third of the trunk. Numbers of dorsal and anal fin rays also overlap each other: *S. ginsburgi*=D 87–95 and A 73–81, *S. nigrescens*=D 83–94 and A 71–78. These morphological similarities probably suggest a close phylogenetic relationship of two species. Munroe (1991) argued for this based on ID patterns more than other features.

Larvae of preflexion stage of four species have very similar morphological characteristics with ex-

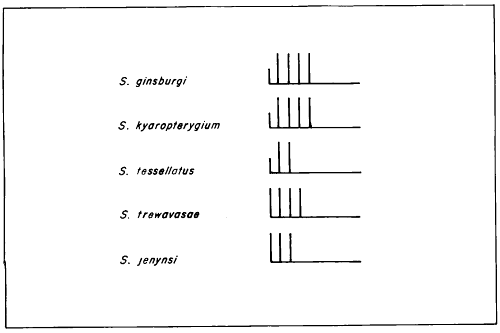

Fig. 9. Schematic representation of elongated anterior dorsal fin rays of five *Symphurus* species.

ception of *S. ginsburgi* larvae. To identify preflexion larvae, pigmentation on the cephalic region can be used. *S. kyaropterygium* larvae has no melanophore on the mesencephalon and lacks the appendix found in *S. ginsburgi*. *S. trewavasae* and *S. tessellatus* larvae have one melanophore on the mesencephalon, but the former can be distinguished from the latter by the presence of one melanophore at the base of branchiostegal (between 5th and 6th rays).

At the end of preflexion stage, the larvae of each species can be distinguished based on the length of anterior dorsal rays. *S. tessellatus* larvae have one short dorsal ray followed by two longer rays, *S. trewavasae* larvae have four anterior elongate rays and larvae of *S. ginsburgi* and *S. kyaropterygium* have one short ray followed by four longer rays (Fig. 9). Larvae of *S. jenynsi* have three anterior elongate rays. Presence or absence of a first short dorsal ray in *Symphurus* larvae has not been described in detail in previous papers (Ahlstrom et al., 1984; Olney and Grant, 1976). All known larvae of other genera of the family Cynoglossidae, *Cynoglossus*, *Arelia* and *Paraplagusia*, have two elongate anterior dorsal rays (Ahlstrom et al., 1984).

Beginning with the flexion stage, differences in pigment patterns along the dorsal margin of the trunk become more evident: *S. kyaropterygium* = four, *S. jenynsi* = five, *S. trewavasae* = six, and *S. tessellatus* = seven groups of melanophores. In previous papers, pigment patterns on the dorsal margin of *Symphurus* larvae were not clearly described, except for *S. plagiusa* which has four groups of melanophore (Olney and Grant, 1976). For comparative purposes, morphological characteristics of known *Symphurus* larvae are shown in Table 1.

Metamorphosis brings fundamental changes in body shape. Adults lack elongated dorsal rays, protruded abdomens, and pectoral fins. Descriptions of metamorphosing stages of *Symphurus* larvae are scarce in the literature, since the number of metamorphosing larvae collected in plankton samples is normally small. Sufficient numbers of metamorphosing larvae of three species (*S. trewavasae*, *S. kyaropterygium*, and *S. tessellatus*) were collected to describe morphological change during the metamorphosing stage. The largest postflexion larva of *S. ginsburgi* was 16.25 mm SL, but no metamorphosing larva was taken. When compared with the other three species, metamorphosis of *S. ginsburgi* will probably be found to occur at a larger size. This may be attributed to the habitat of the adult which lives in

Table 1. Comparisons of selected morphological characteristics of known *Symphurus* larvae

Species	Combination of anterior short and long dorsal fin rays	Pigments on mesencephalic region	Group of pigments on dorsal margin of trunk	Conical appendix on abdominal wall	Authors
S. ginsburgi	1+4	absent	1	present	this paper
S. kyaropterygium	1+4	absent	4	absent	this paper
S. tessellatus	1+2	present	7	absent	this paper
S. trewavasae	0+4	present	6	absent	this paper
S. jenynsi	0+3	present	5	absent	this paper
S. plagiusa	1+4 or 5	present	4	absent	Hildebrand & Cable, 1930; Olney & Grant, 1976
S. atricauda	0+3	present	indistinct	absent	Ahlstrom, et al., 1984
S. orientalis	0+5	absent	indistinct	absent	Pertseva-Ostroumova, 1965
S. nigrescens	0+4 or 5	absent	1	present	Kyle, 1913; Padoa, 1956
S. ligulatus	0 or 1+4 or 5	absent	indistinct	absent	Kyle, 1913; Padoa, 1956
S. pusillus	1+4	absent	indistinct	absent	Kyle, 1913

deeper waters (Menezes and Benvegnú , 1976). Moser (1981) demonstrated that the pleuronectiforms which live in deep waters are largest and consequently may have a longer planktonic period, which may increase the possibility of successful settlement. Tucker (1982) showed that *Citharichthys cornutus* and *C. gymnorhinus*, two deep water species, metamorphose at a larger size than those of *C. spilopterus* which lives in shallow water. Sumida et al. (1979) also showed there is a close relationship between adult habitats and larval size: *Pleuronectis ritteri*, a shallow water species, metamorphosed at a smaller size than *P. decurrens*, a deep water species.

Acknowledgments

The senior author received the scholarships of the CAPES (Coordenação de Aperfeiçoamento de Pessoal de Ensino Superior) and the FAPERJ (Fundação de Amparo à Pesquisa do Rio de Janeiro), and the junior author received the research fellowship of the CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico) during this study. Figures were drawn by Maria Imaculada F. Oliveira. Special thanks go to Dr. Geoffrey Moser of the Southwest Fishery Center and Dr. Thomas A. Munroe of the National Museum of Natural History for revision and critical reading of the manuscript.

Literature Cited

Ahlstrom, E. H., K. Amaoka, D. A. Hensley, H. G. Moser and B. Y. Sumida. 1984. Pleuronectiformes: development. Pages 640–670 *in* H. G. Moser, W. J. Richards, D. M. Cohen, M. P. Fahay, A. W. Kendall, Jr. and S. L. Richardson, eds. Ontogeny and systematics of fishes. Amer. Soc. Ichthyol. Herpetol., Spec. Publ. No. 1.

Ahlstrom, E. H., J. L. Butler and B. Y. Sumida. 1976. Pelagic stromateoid fishes (Pisces, Perciformes) of the eastern Pacific: kinds, distributions, and early life histories and observations on five of these from the northwest Atlantic. Bull. Mar. Sci., 26: 285–402.

Hildebrand, S. F. and L. E. Cable. 1930. Development and life history of fourteen teleostean fishes at Beaufort, N.C. Bull. U.S. Bur. Fish., 46: 383–488.

Kyle, H. M. 1913. Flat-fishes (Heterosomata). Rep. Dan. Oceanogr. Exped. Mediterr., 2(A): 1–150.

Menezes, N. A. and G. de Q. Benvegnú. 1976. On the species of the genus *Symphurus* from the Brazilian coast, with descriptions of two new species (Osteichthyes, Pleuronectiformes, Cynoglossidae). Pap. Avulsos. Dept. Zool., São Paulo, 30: 137–170.

Menon, A. G. K. 1977. A systematic monograph of the tongue soles of the genus *Cynoglossus* Hamilton-Buchanan (Pisces: Cynoglossidae). Smithson. Contrib. Zool., 238: 1–129.

Moser, H. G. 1981. Morphological and functional aspects of marine fish larvae. Pages 89–131 *in* R. Lasker, ed. Marine fish larvae. Morphology, ecology, and relation to fisheries, Univ. Washington Press, Seattle.

Munroe, T. A. 1991. Western Atlantic tonguefishes of the *Symphurus plagusia* complex (Cynoglossidae: Pleuronectiformes), with descriptions of two new species. U.S. Fish. Bull., 89: 247–287.

Nelson, J. S. 1984. Fishes of the world, 2nd ed. John Wiley and Sons, New York. XV + 523 pp.

Olney, J. E. and G. C. Grant. 1976. Early planktonic larvae of blackcheek tonguefish, *Symphurus plagiusa* (Pisces: Cynoglossidae), in the lower Chesapeake Bay. Chesapeake Sci., 17: 229–237.

Padoa, E. 1956. Heterosomata. Pages 783–877 *in* S. Lo Bianco, ed. Fauna flora Napoli: Uova, larve e stadi giovanili di teleostei, Monogr. 38.

Pertseva-Ostroumova, T. A. 1965. Larvae of flatfish from the Gulf of Tonkin. Tr. Inst. Okeanol. Acad. Nauk. USSR, 80: 177–220. (in Russian.)

Smith, P. E. and S. L. Richardson. 1977. Standard techniques for pelagic fish egg and larval surveys. FAO Fish. Tech. Pap., 175: 1–100.

Sumida, B., E. H. Ahlstrom and H. G. Moser. 1979. Early development of seven flatfishes of the eastern North Pacific with heavily pigmented larvae (Pisces: Pleuronectiformes). U.S. Fish. Bull., 77: 105–145.

Tucker, J. W., Jr. 1982. Larval development of *Citharichthys cornutus*, *C. gymnorhinus*, *C. spilopterus*, and *Etropus crossotus* (Bothidae) with notes on larval occurrence. U. S. Fish. Bull., 80: 35–73.

南ブラジル産アズマガレイ属4種の初期発育

Frederico W. Kurtz・Yasunobu Matsuura

ブラジル東南部（南緯23–29度）から得られたサンプルを用いて，アズマガレイ属（*Symphurus*）魚類4種の仔魚と着底前の稚魚の形態発育を記載した．これら4種の同定は，体幹部の背面と腹面の黒色素胞の分布パターンと第1–第5背鰭条の長さに基づいて行われた．*Symphurus ginsburgi* は短い第1背鰭条とそれに続く4本の長い背鰭条を持ち，体幹部の背面と腹面に1対の黒色素斑が出現した．また腸管に円錐形の付属物が出現したのは本種だけであった．*Symphurus kyaropterygium* も短い第1背鰭条とそれに続く4本の伸長した背鰭条を持つが，本種の体幹部の背面には黒色素斑が4個出現した．*Symphurus tessellatus* でも第1背鰭条は短いが，それに続く伸長した背鰭条は第2，第3の2本だけであった．また体幹部の背面に出現する黒色素斑は7個であった．*Symphurus trewavasae* では第1–第4背鰭条が伸長し，体幹部背面には6個の黒色素斑が出現した．