Papéis Avulsos de Zoologia

PAPÉIS AVULSOS ZOOL., S. PAULO, 30(11): 137-170 30.XII.1976

ON THE SPECIES OF THE GENUS *SYMPHURUS* FROM THE BRAZILIAN COAST, WITH DESCRIPTIONS OF TWO NEW SPECIES (OSTEICHTHYES, PLEURONECTIFORMES, CYNOGLOSSIDAE)

NAERCIO A. MENEZES [1]
GILDA DE QUADROS BENVEGNÚ [2]

INTRODUCTION

The Western Atlantic species of the genus *Symphurus* were reviewed by Ginsburg (1951), and only two forms cited for the Brazilian coast: *S. diomedianus* and *S. plagusia tessellata*. *S. jenynsi,* although actually recorded only from Argentina and Uruguay was considered a common species on the coast of South America. Since then, other species have been recognized in Brazilian waters. In the list of flatfishes from Brazil, Carvalho et al. (1968), in addition to the last two species mentioned by Ginsburg, included *S. pterospilotus, S. jenynsi,* and *S. plagusia plagusia*. This work, however, is largely based on data compiled from the literature and there is no indication that the authors examined specimens of those species. More recently, Roux (1973) based on the material collected by the R/V "Calypso" on the Atlantic coast of South America, identified *S. parvus, S. pterospilotus, S. diomedianus, S. plagusia tessellata, S. jenynsi,* and *S. plagiusa* from Brazil, and Benvegnú (1973) recognized three species in southern Brazil: *S. jenynsi, S. trewavasae,* and *Symphurus* sp.

Further examination of the specimens listed by Benvegnú (l. c.) as *Symphurus* sp. revealed they represent an undescribed species. In an attempt to determine its relationships we studied all the *Symphurus* material deposited in our collection, which led us to the conclusion that the present knowledge of the species from the Brazilian coast is unsatisfactory. A comparative study of the material revealed the presence of another undescribed species and that *S. parvus, S. plagiusa,* and *S. pterospilotus* apparently do not occur in Brazilian waters. It became

1. Museu de Zoologia, Universidade de São Paulo, Caixa Postal 7172, 01000 São Paulo.
2. Estagiária do Museu de Zoologia, Universidade de São Paulo. Biologista do Grupo Executivo do Desenvolvimento da Indústria da Pesca, Rio Grande do Sul.

evident, as demonstrated by Topp & Hoff (1972) that in the study of the tonguefishes the data on depth ranges and maximum sizes are extremely important for the recognition and characterization of the species.

The purpose of this work is to determine which species of *Symphurus* occur on the Brazilian coast and to provide basic information for their identification. The two new species are described and ecological data are presented for most of the species.

We are grateful to Dr. Charles Roux of the Muséum National D'Histoire Naturelle, Paris for the loan of specimens collected on the Brazilian coast by the R/V "Calypso" and to Dr. Stanley H. Weitzman of the National Museum of Natural History, Washington, D.C. for lending the holotype of *Symphurus pterospilotus*. Miss Emiko Kawakami of the Instituto Oceanográfico da Universidade de São Paulo supplied specimens collected during recent cruises of the R/V "Prof. W. Besnard". Drs. Paulo E. Vanzolini and José Lima de Figueiredo of this Museum read and criticized the manuscript. For the photographs we thank Mr. Giro Pastore.

Methods and materials

In this study we examined 956 specimens from the Museu de Zoologia da Universidade de São Paulo (MZUSP) and the Muséum National D'Histoire Naturelle, Paris (MNHN). The localities are listed in the species accounts. The material listed by stations was collected by the R/V "Prof. W. Besnard" of the Instituto Oceanográfico da Universidade de São Paulo, unless otherwise stated.

Measurements and counts were made according to the methods described by Ginsburg (1951), except for trunk length, predorsal distance, snout length, eye diameter, and gape length which are defined as follows:

Trunk length — standard length minus head length.

Predorsal distance — from the tip of the snout to the origin of the dorsal fin.

Snout length — from its tip to the anterior margin of the lower eye.

Eye diameter — the horizontal diameter of the lower eye.

Gape — is the distance between the tip of the premaxillary and the angle of the mouth.

All measurements were taken with a caliper and recorded to the nearest tenth of a millimeter.

In the study of meristic and morphometric variation sexes were initially handled separately but since no significant differences were found, males and females were grouped in the samples. Meristic and morphometric data of the species represented by large numbers of specimens were obtained from a sample of about 30 individuals, all size classes and localities being represented. Regressions were computed by routine methods and all proved to be linear.

Since most of the species are well known from the literature, only a diagnosis is presented for each species, with exception of the new species which are fully described. Complete synonymies of the species are outside the scope of this work, therefore synonyms are included only when material from the area under consideration proved to have been misidentified.

KEY TO THE SPECIES OF *Symphurus* FROM THE BRAZILIAN COAST

1 — 108-114 rays in the dorsal fin; 92-97 rays in the anal fin; 109-124 rows of scales along the side of the body ..... *S. jenynsi*
82-100 rays in the dorsal fin; 66-84 rays in the anal fin; 76-99 rows of scales along the side of the body 2

2 — Basal part of the interradial membranes of the dorsal and anal fins with a small orifice (fig. 2); 82-86 rays in the dorsal fin; 66-72 rays in the anal fin; a black spot at the caudal region, before the origin of the caudal fin ... *S. kyaropterygium,* sp. n.
Interradial membranes of the dorsal and anal fins without a small orifice; 86-100 rays in the dorsal fin; 72-84 rays in the anal fin; caudal region without black spot 3

3 — 94-100 rays in the dorsal fin; 79-84 rays in the anal fin ..... *S. plagusia*
86-93 rays in the dorsal fin; 72-78 rays in the anal fin ..... *S. trewavasae*

4 — Dorsal and anal fins with conspicuous black spots; base of the caudal fin without black spot; 84-96 rows of scales along the side of the body ..... *S. diomedianus*
Dorsal and anal fins without black spots; a small but distinct black spot at the base of the caudal fin; 94-99 rows of scales along the side of the body ..... *S. ginsburgi,* sp. n.

Symphurus jenynsi Evermann & Kendall

(Fig. 1)

Symphurus jenynsi Evermann & Kendall, 1907: 108.

Specimens studied (31): MZUSP 12503-6 (4) — St. 1643; 33°46'S., 53°17'W., 15 m; Jan. 16, 1972; MZUSP 12515 (1) — 28°21'S., 48°19'W., 75 m; Jan. 13, 1957; MZUSP 12516 (1) — St. 1851; 29°51'S., 49°37'W., 45 m; Aug. 4, 1972; MZUSP 12517-8 (2) — Uruguay; July 29-30, 1972; MZUSP 12519-20 (2) — St. 1915; 35°00'S., 54°50'W., 24 m; Oct. 29, 1972; MZUSP 12526-8 (3) — St. 1877; 34°05'S., 53°30'W., 20 m; Aug. 14, 1972; MZUSP 12535 (1) — St. 1868; 35°33'S., 53°48'W., 58 m; Aug. 12, 1972; MZUSP 12536-7 (2) — St. 1853; 30°14'S., 50°09'W., 21 m; Aug. 8, 1972; MZUSP 12553 (1) — St. 1852; 29°43'S., 49°55'W., 24 m; Aug. 5, 1972; MZUSP 12555-6 (2) — St. 1732; 31°27'S., 51°05'W., 17 m; April 12, 1972; MZUSP 12561 (1) — St. 1697; 29°30'S., 48°57'W., 91 m; Jan. 30, 1972; MZUSP 12562 (1) — St. 1699; 29°13'S., 49°35'W., 20 m; Jan. 31, 1972; MZUSP 12563 (1) — St. 1687; 30°16'S, 50°09'W., 22 m; Jan. 28, 1972; MZUSP 12565-6 (2) — St. 1699; 31°45'S., 51°26'W., 15 m; Jan. 22, 1972; MZUSP 12582 (1) — St. 1662; 32°20'S., 51°22'W., 52 m; Jan. 21, 1972; MZUSP 12584-6 (3) — St. 1660; 32°28'S., 52°15'W., 15 m; Jan. 20, 1972; MZUSP 12593-4 (2) — St. 1651; 33°22'S., 52°47'W., 14 m; Jan. 18, 1972; MZUSP 12611 (1) — St. 1189; 28°42'S., 48°54'W., 36 m; Aug. 17, 1970.

There are in our collection 399 additional specimens (16.0-265.0 mm S.L.) ranging from 29°13' to 35°33'S.

Diagnosis

Dorsal rays 108-114, anal rays 92-97, caudal rays 9-10 (usually 10, rarely 9), lateral scale rows 106-124.

General ground color in alcohol, light brown with irregular dark cross bands, some of which are incomplete; the number of dark cross bands is extremely variable: we counted a minimum of 10 and a maximum of 20. The dorsal and anal fins are pale anteriorly, becoming progressively darker posteriorly, their posterior third and the caudal fin being almost completely dark.

The regression data are shown in graphs 9-17 and table 3.

Remarks

S. jenynsi can be easily distinguished from the other species by the high counts of the dorsal and anal fins and of the lateral scale rows (Graphs 2, 3, 4). Our data indicate it is the largest tonguefish present in Brazilian waters, several individuals reaching a length beyond 250 mm. Graph 8 shows it has a wide depth range, occurring from 12 to 190 meters, but since small (young) and large (adult) specimens are mostly concentrated between 12 and 60 meters, we may conclude that the species is predominantly found in relatively shallow waters. The available record of catches indicate that the specimens of *S. jenynsi* occurred more frequently and in greatest numbers at depths between 12 and 25 meters.

Distribution

S. jenynsi occurs from Eastern Brazil to Argentina but is predominantly found in colder waters. On the Brazilian coast there are only two records North of Florianópolis (28°21'S): one at 26°14'S (coast of the state of Paraná) and another at 22°27'S (near Cabo Frio, Rio de Janeiro). The bulk of the specimens were caught between Santa Catarina and Uruguay.

Symphurus kyaropterygium, sp. n.

(Fig. 2)

Symphurus parvus (not of Ginsburg, 1951: 192) Roux, 1973: 175

Holotype: MZUSP 12425, male; St. 2277, Santa Catarina; 26°34'S., 48°10'W., 50-54 m; May 14, 1975.

Paratypes: MZUSP 12783 (1), female; Baía da Ilha Grande, Rio de Janeiro; May, 1966; MZUSP 12784 (1), female; Ilhabela, São Sebastião, São Paulo; October, 1925; MZUSP 12913 (1), male; St. 2330, São Paulo; 24°57'S., 45°32'W., 52-69 m; Feb. 26, 1975; MZUSP 12914-15 (2), males; St. 2387, São Paulo; 25°33'S., 46°42'W., 55 m; May 17, 1975; MZUSP 12916 (female), 12917 (male); St. 2391, São Paulo; 25°11'S., 46°13'W., 49-54 m; May 20, 1975; MZUSP 12918 (1), male; St. 2393, São Paulo; 24°35'S., 45°59'W., 57-59 m; May 20, 1975; MNHN 1975-265 (2); Calypso St. 137, São Paulo; 24°18'S., 45°22'W., 66 m; Dec. 11, 1961; MNHN 1975-266 (1); Calypso St. 143, São Paulo; 24°34'S., 46°31'W., 45 m; Dec. 14, 1961; MNHN 1975-267 (1); Calypso St. 152, Rio Grande do Sul; 31°24'S., 50°36'W., 66 m; Dec. 17, 1961.

Diagnosis

Dorsal rays 80-86, anal rays 66-72, caudal rays 10, lateral scale rows 77-85; basal part of the interradial membranes of the dorsal and anal fins with a small orifice; a black spot at the caudal region in front of the base of the caudal fin.

Description

Body relatively small (S.L. 32.4-117.0 mm). Dorsal and ventral outlines about evenly curved.

Eyes small, about equal to the length of the short snout and very close together, virtually not separated by an interorbital space; lower eye situated slightly more posterior than upper. Mouth small, the gape very short, equal to the length of the snout; posterior angle of the mouth under the anterior border of the lower eye. Teeth small, bristle-like, present on the upper and lower jaws, but best developed on the blind side; on the eyed side, the upper jaw teeth are arranged in one row which extends slightly beyond the anterior half of the premaxillary and the dentary teeth are also in a single row slightly longer than the premaxillary row; on the blind side the premaxillary and dentary teeth are in bands formed by several rows of teeth which are more numerous posteriorly and extend for the entire length of the bones; dentary and premaxillary considerably more curved on the blind side.

Nostrils tubular, the anterior situated in front of the lower eye and much longer than the posterior, which is a thicker but shorter tube situated in front of and between the eyes; the anterior nostril on the eyed side is about equal to half of the length of the snout and longer than its fellow on the blind side.

Scales ctenoid, covering practically all the body and present also on the upper part of the lower eye and the lower part of the upper eye; the cteni are about equally developed on both sides of the fish; there are 77-85 rows of scales along the eyed side of the body.

Dorsal fin with 80-86 rays, beginning on the level of the anterior margin of the upper eye; from about the seventh ray backward, the membrane which connects the rays of the dorsal fin shows a series of orifices in its basal part. Anal fin with 66-72 rays, its origin under the 13th or 14th dorsal fin rays; the membranous basal part of the anal fin is also perforated and the orifices extend for the entire length of the fin. Pelvic fin situated on the ventral midline of the isthmus, with 4 rays; the tip of the posteriormost pelvic fin ray extends slightly beyond the origin of the anal fin. Caudal fin with 10 rays, except for one specimen which had an abnormal caudal fin with 7 rays.

Color in alcohol, light brown. The center of the scales tends to be darker so that narrow dark stripes along longitudinal rows of scales are sometimes visible on certain parts of the body. There are no well defined dark spots on the vertical fins but the rays are variously pigmented, becoming darker posteriorly. The caudal fin is pale. There is a large and vertically elongated black spot in front of the base of the caudal fin.

The regression data are presented in graphs 9-17 and table 5.

Named *kyaropterygium* from the Greek kyaros = eye of a needle, and pterygium = fin, in reference to the orifice in the basal part of interradial membranes of the dorsal and anal fins.

Relationships

The presence of small orifices along the membranous basal part of the dorsal and anal fins separates *S. kyaropterygium,* sp. n. from any other species of the genus *Symphurus*. With respect to number of dorsal, anal, and caudal fin rays and the presence of a black spot near the caudal fin base, it is more closely related to *S. parvus,* but in addition to the above mentioned difference, both species can be distinguished on the basis of meristic characters. Graph 5 shows that *S. kyaropterygium,* sp. n. has more lateral rows of scales and more dorsal and anal fin rays on the average. There is also a difference in the maximum size attained by both species. According to Topp & Hoff (1972: 87), *S. parvus* probably reaches the maximum size of about 78.0 mm and a 37.0 mm specimen from Florida was considered a maturing female. A 110 mm specimen of *S. kyaropterygium,* sp. n. is a male; a 85.5 mm female had undeveloped ovaries indicating that this species reaches full maturity at comparatively larger sizes than *S. parvus*.

Remarks

The examination of 4 specimens identified by Roux (1973: 175) as *S. parvus,* revealed they are identical to *S. kyaropterygium,* sp. n. in all morphological characters.

The depth range (36-39 meters) of *S. kyaropterygium* overlaps in part that of *S. trewavasae* (Graph 8) but since our new species is represented by fewer specimens, we cannot say that both species occupy the same bathymetric zone. *S. trewavasae* apparently ranges into deeper waters.

Distribution

S. kyaropterygium, sp. n. is known from Baía da Ilha Grande, Rio de Janeiro (about 23°S, 44°30'W) to Rio Grande do Sul (31°24'S, 50°36'W).

Symphurus plagusia (Bloch & Schneider)

(Fig. 3)

Pleuronectes plagusia Bloch & Schneider, 1801: 162.

Specimens studied (30): MZUSP 3673 (1) — Angra dos Reis, Rio de Janeiro; Oct., 1945; MZUSP 10028 (1) — Angra dos Reis, Rio de Janeiro; March 5, 1956; MZUSP 12612 (1) — Ilha da Moela, Santos, São Paulo; Aug., 1961; MZUSP 12634-6 (3) — Atafona, Rio de Janeiro; July, 1963; MZUSP 12645 (1) — 04°18'S., 50°51'W., April 25, 1957; MZUSP 12646 (1) — Praia do Guarujá, São Paulo; Oct. 31, 1961; MZUSP 12648 (1) — Ubatuba, São Paulo; Dec., 1969; MZUSP 12649-50 (2) — Aracaju, Sergipe; July, 1961; MZUSP 12655 (1) — Cananéia, São Paulo; Aug. 24, 1949; MZUSP 12656 (1) — Ilhéus, Bahia; MZUSP 12657 (1) — Ilha dos Alcatrazes, São Paulo, March, 1964; MZUSP 12658-9 — Baixio Grande, Cananéia, São Paulo; Sept. 20, 1949; MZUSP 12661-3 (3) — Praia de Itaguá, Ubatuba, São Paulo; Feb. 7-10, 1970;

MZUSP 12669 (1) — St. 2306; 23°05'S., 43°36'W., 32 m; May 23, 1975; MZUSP 12673-5 (3) — Santos, São Paulo; Feb. 14, 1960; MZUSP 12677 (1) — Baixio, Cananéia, São Paulo; Nov. 30, 1960; MZUSP 12687 (1) — around praia do Jabaquara, Ilha de São Sebastião, São Paulo; Oct. 25, 1961; MZUSP 12690-1 (2) C in front of Rio Doce, Espírito Santo; 16 m; Aug. 11, 1969; MZUSP 12694-6 (3) — Baía da Ilha Grande, Rio de Janeiro; May, 1966.

There are in our collection 229 (71.0-200.0 mm S.L.) additional specimens, ranging from about 11° to 25°S.

Diagnosis

Dorsal rays 94-100, anal rays 79-84, caudal rays 10-13 (usually 12, rarely 10, 11 or 13), lateral scale rows 89-98.

Background color in alcohol, light brown with 7-8 irregular but distinct dark cross bands; the first two bands are fairly constant in position, the first always crossing the head behind the eyes, and the second crossing the anterior part of the trunk, just behind the opercle; the last dark band is located in front of the caudal base and between it and the first two, there are 4 or 5 bands. In recently preserved fishes there are narrow longitudinal dark stripes passing through the center of the sacles, from about behind the head to the base of the caudal fin. The dorsal and anal fins are pale anteriorly, becoming gradually darker from about the middle of the body backwards, so that the posterior third of these fins and the caudal fin are almost black.

The regression data are presented in graphs 9-17 and table 2.

Remarks

Ginsburg (1951: 189) recognized two subspecies of this species: *S. plagusia plagusia,* occurring in the West Indies and Central America, and *S. plagusia tessellata* on the coasts of Brazil and Uruguay. Carvalho et al. (1968: 22) described both subspecies from Brazilian waters, but a comparison of all the samples from the different localities along the Brazilian coast revealed no significant differences. Actually, our material agrees well with *S. plagusia tessellata* but recent data from Palacio (1974: 87) indicate that both forms occur in Colombian waters and this suggests that the subspecific status proposed by Ginsburg (l.c.) will have to be reinvestigated. For this reason we did not identify our material down to the subspecific level.

S. plagusia is closest to *S. diomedianus* and *S. ginsburgi*, sp. n. in the number of lateral scale rows (Graph 4) but differs from these and all the other species in the number of dorsal and anal fin rays (Graphs 2, 3) and also with respect to some morphometric characters (Graphs 9-17). It is the second largest species found in Brazilian waters, our largest specimen reaching the standard length of 205.5 mm.

Distribution

Along the Brazilian coast, *S. plagusia* ranges from 04°18'S to 26°49'S.

S. plagusia is perhaps the most abundant tonguefish in Northeastern and Eastern Brazil and although we have no specimens from Southern Brazil, there are indications that this species extends as far

south as Uruguay and Argentina (Ginsburg, 1951: 200; Lazzaro, 1973). Thus, it seems that two shallow-water species are found in Southern Brazil: *S. plagusia* and *S. jenynsi*. However, there is evidence indicating that these two species occupy different depth zones. The large majority of the specimens of *S. jenynsi* in our collection were caught during the cruises of the R/V "Prof. W. Besnard" to Southern Brazil, at stations between 12 and 190 meters. Since at this depth range not a single specimen of *S. plagusia* was taken, it is reasonable to assume that in Southern Brazil it probably occurs only in very shallow waters. In the northern part of its range, *S. plagusia* is commonly found in estuaries, bays, etc., but it does occur also in deeper waters for we have specimens from 16 meters (in front of Rio Doce), 20 meters (Ilha da Moela, Santos) and 32 meters (23°05'S-43°36'W). We believe that the extension of *S. plagusia* into the depth range of *S. jenynsi* in the north is possible only because the latter is not abundant in the area. Extensive collections made during the cruises carried out from Torres (29°S) to Cabo Frio (22°S) revealed the presence of *S. jenynsi* only at two stations; we take this to represent sporadic occurrences of a species which is largely concentrated in the cooler waters of southern South America.

Symphurus trewavasae Chabanaud

(Fig. 4)

Symphurus trewavasae Chabanaud, 1948: 508

Specimens studied (30): MZUSP 12442 (1) — St. 1007; 22°33'S., 41°24'W., 47 m; May 24, 1970; MZUSP 12443 (1) — St. 1143; 22°53'S., 41°43'W., 60 m; Aug. 7, 1970; MZUSP 12450 (1) — St. 1155; 28°28'S., 48°29'W., 78 m; May 3, 1970; MZUSP 12451 (1) — St. 1165; 24°23'S., 45°25'W., 71 m; Aug. 12, 1970; MZUSP 12452 (1) — St. 1173; 25°43'S., 47°06'W., 76 m; Aug. 14, 1970; MZUSP 12453-4 (2) — St. 1182; 27°01'S., 48°06'W., 60 m; Aug. 16, 1970; MZUSP 12455-6 (2) — St. 1191; 28°43'S., 48°30'W., 82 m; Aug. 18, 1970; MZUSP 12457-8 (2) — St. 1645; 34°11'S., 52°19'W., 58 m; Jan. 16, 1972; MZUSP 12469-70 (2) — St. 1677; 31°09'S., 50°43'W., 20 m; Jan. 26, 1972; MZUSP 12476 (1) — St. 1706; 29°33'S., 48°57'W., 96 m; April 6, 1972; MZUSP 12478 (1) — St. 1699; 29°13'S., 49°35'W., 20 m; Jan. 30, 1972; MZUSP 12480-2 (3) — St. 1723; 30°55'S., 50°11'W., 90 m; April 10, 1972; MZUSP 12485 (1) — St. 1743; 33°50'S., 51°51'W., 65 m; April 19, 1972; MZUSP 12490 (1) — St. 1845; 29°37'S., 48°41'W., 135 m; Aug. 2, 1972; MZUSP 12492 (1) — St. 1863; 31°15'S., 50°27'W., 85 m; Aug. 7, 1972; MZUSP 12493-4 (2) — St. 1880; 34°34'S., 52°25'W., 80 m; Aug. 15, 1972; MZUSP 12495 (1) — St. 1881, 34°45'S., 52°05'W., 179 m; Aug. 15, 1972; MZUSP 12496 (1) — St. 1898; 33°08'S., 50°55'W., 105 m; Aug. 19, 1972; MZUSP 12497 (1) — St. 1907, 32°07'S., 50°40'W., 91 m; Aug. 21, 1972; MZUSP 12498-9 (2) — St. 1921; 35°11'S., 52°47' W., 97 m; Oct. 30, 1972; MZUSP 12501 (1) — St. 1922; 35°00'S., 53°06'W., 47 m; Oct. 30, 1972; MZUSP 12502 (1) — St. 1940; 32°51'S., 51°26'W., 59 m; Nov. 3, 1972.

There are in our collection 126 additional specimens (19.0-139.0 mm S.L.) ranging from 22°53' to 35°33'S.

Diagnosis

Dorsal rays 86-93, anal rays 72-78, caudal rays 10-11 (usually 10, rarely 11), lateral scale rows 76-87.

Ground color in alcohol, light brown, with irregular dark cross bands; in most of the specimens the three dark bands situated between the posterior part of the head and the caudal region are always complete and conspicuous; the others are faint and sometimes incomplete, but one or two situated anterior to the first and one posterior to the third conspicuous dark bands, are visible. The dorsal, anal and caudal fins are pale but the rays of these fins are variously pigmented.

The regression data are shown in graphs 9-17 and table 4.

Remarks

S. trewavasae was described by Chabanaud (1948: 508) from Cabo Frio, Brazil. Ginsburg (1951: 185) considered it as probably identical to *S. plagiusa* but suggested that the two species "should be directly compared in greater detail". We have in our collection 6 specimens of *S. plagiusa* from Florida; comparing them and Ginsburg's data with *S. trewavasae,* we found they should be considered as different species. They are, indeed, very closely related, judging from meristic and morphometric characters, although *S. trewavasae* has, on the average, more dorsal and anal fin rays, more lateral rows of scales (Graph 6), a shorter gape and a larger eye (Graphs 14, 16). The difference in the size of the eyes had been already noticed by Chabanaud (l.c.), when comparing *S. trewavasae* with *S. plagiusa* and *S. plagusia*. The most significant differences, however, are concerned with coloration and depth ranges. *S. plagiusa* has a characteristic large dark spot on the upper part of the opercle, which was considered unique by Ginsburg (1951: 196). This spot is never present in any of the specimens of *S. trewavasae*. *S. plagiusa* is considered a shallow water tonguefish which is commonly found in bays, and shallow coastal waters, at depths between 2 and 14 fathoms (Ginsburg, 1951: 196); according to Topp & Hoff (1972: 90) the usual bathymetric limit for the species is about 6 meters. *S. trewavasae* is not a shallow water species. Our specimens were caught at depths betweeen 12 and 190 meters and graph 8 shows that the species is mostly concentrated between 40 and 110 meters. Small (young) specimens are found in relatively shallow waters (12 to 38 meters) in association with specimens of *S. jenynsi* and both young and adult specimens occur sporadically in deeper waters (120 to 190 meters). Thus, it is clear that *S. plagiusa* and *S. trewavasae* live in entirely different bathymetric zones. On the Brazilian coast, it seems that the depth zone corresponding to that in which *S. plagiusa* is found is occupied by *S. plagusia*.

There is also a difference in the maximum size attained by both species. Specimens of *S. plagiusa* from Florida are known to reach between 109 to 166 mm (Topp & Hoff, 1972: 89) and this size range exceeds that of our specimens of *S. trewavasae* (19 to 139 mm) Three of our specimens (90, 105 and 139 mm) are fully mature females so that we believe the maximum size of *S. trewavasae* to be around 140 mm.

We are convinced that *S. plagiusa* does not occur along the Brazilian coast and that all the references to this species in this area or even farther south are probably based on specimens of *S. trewavasae*. Therefore, *S. plagiusa* described by Roux (1973: 176) from southern Brazil and by Lazzaro (1973) from Argentina are in all probabilities referrable to *S. trewavasae*.

Distribution

S. trewavasae extends from eastern Brazil to Argentina. The northernmost record of the species (22°53'S) roughly corresponds to Cabo Frio, Rio de Janeiro.

Symphurus ginsburgi, sp. n.

(Fig. 5)

Symphurus pterospilotus (not of Ginsburg, 1951: 194) Roux, 1973: 175.

Holotype: MZUSP 12339, male; St. 1728, Rio Grande do Sul; 31°31'S., 49°52'W., 200 m; April 11, 1972.

Paratypes (87): MZUSP 12314-5 (2) — St. 1146; 23°15'S., 42°24'W., 111 m; Aug. 8, 1970; MZUSP 12316-9 (4) — St. 1648; 34°06'S., 51°33'W., 180 m; Jan. 18, 1972; MZUSP 12320 (1) — St. 1664; 32°46'S., 50°25'W., 200 m; Jan. 21, 1972; MZUSP 12321 (1) — St. 1692; 30°20'S., 48°37'W., 194 m; Jan. 30, 1972; MZUSP 12322 (1) — St. 1695; 29°48'S., 48°22'W., 188 m; Jan. 30, 1972; MZUSP 12323-6 (4) — St. 1708; 29°50'S., 48°24'W., 200 m; April 4, 1972; MZUSP 12327, 12899-901 (4) — Extra trawl between stations 1711 and 1712; 30°26'S., 48°50'W., 150 m; April 7, 1972; MZUSP 12328-33 (6) — St. 1718; 30°36'S., 49°25'W., 145 m; April 9, 1972; MZUSP 12334 (1) — St. 1721; 31°14'S., 49°35'W., 177 m; April 10, 1972; MZUSP 12335, 12902-3 (3) — St. 1722; 31°02'S., 49°52'W., 135 m; Oct. 4, 1972; MZUSP 12336-8, 12340-8 (12); all taken with the holotype; MZUSP 12349-65 (17) — St. 1740; 34°28'S., 51°50'W., 169 m; April 19, 1972; MZUSP 12366-9 (4) — St. 1742; 34°01'S., 51°32'W., 175 m; April 19, 1972; MZUSP 12370 (1) — St. 1846; 29°53'S., 48°19'W., 194 m; Aug. 3, 1972; MZUSP 12371-5 (5) — St. 1856; 34°42'S., 49°03'W., 192 m; Aug. 6, 1972; MZUSP 12376 (1) — St. 1859; 31°03'S., 49°46'W., 144 m; Aug. 6, 1972; MZUSP 12377-84 (8) — St. 1881; 34°45'S., 52°05'W., 179 m; Aug. 15, 1972; MZUSP 12385-9 (5) — St. 1883; 34°27'S., 51°50'W., 175 m; Aug. 15, 1972; MZUSP 12390 (1) — St. 1891; 33°39'S., 51°07'W., 200 m; Aug. 17, 1972; MZUSP 12391-3 (3) — St. 1908; 32°21'S., 50°13'W., 180 m; Aug. 21, 1972; MZUSP 12394-5 (2) — St. 1909; 31°58'S., 50°02'W., 184 m; Aug. 21, 1972; MZUSP 12396 (1) — St. 1920; 35°18'S., 52°32'W., 150 m; Oct. 30, 1972; MNHN 1975-270 (3) — Calypso St. 104; 23°08'S., 42°30'W., 103 m; Dec. 2, 1961.

Diagnosis

Dorsal rays 87-95, anal rays 73-81, caudal rays 10–12 (usually 12, rarely 10 or 11); lateral scale rows 94–99; a small but distinct black spot on the base of the caudal fin.

Description

Body small (22.8-90.0 mm S.L.). Dorsal outline slightly more curved than ventral.

Eyes small, the orbital diameter shorter than the length of the snout; lower eye slightly more posterior than upper. Mouth small, the gape short, slightly longer than the length of the snout, but not reaching the middle of the lower eye. Teeth present on both jaws but best developed and more numerous on the blind side; the arrangement of the teeth on the jaws is identical to that of *S. kyaropterygium,* sp. n.

Nostrils tubular, identical in shape, position and length to those of *S. kyaropterygium*.

Scales ctenoid, the cteni on the eyed side slightly better developed than on the blind side; the scales are present all over the body and head and extend to the anterior and posterior parts of the narrow interorbital region; there are 87-99 rows of scales along the side of the body.

Dorsal fin with 87-95 rays, beginning at the level of the middle of the upper eye. Anal fin with 73-81 rays, its origin under the 14th or 15th rays of the dorsal fin. Pelvic fin with 4 rays, the longest ray reaching beyond the insertion of the second anal fin ray when the pelvic fin is depressed. Caudal fin with 10-12 rays (normally 12, rarely 10 or 11).

Color in alcohol, light brown with 4 irregular dark cross bands; these bands tend to be darker in their upper and lower parts and somewhat blurred in the middle, except the second one which is almost continuous and more uniform in color. There are small dark dots scattered throughout the body. The dorsal and anal fins are pale anteriorly, but from about the level of the first dark cross band back their bases become darker, forming, in some specimens, a continuous narrow dark stripe; in other specimens this dark stripe is not conspicuous. Caudal fin pale, with a small and very characteristic spot on its base.

The regression data are given in graphs 9-17 and table 1.

This species is named in honour of Isaac Ginsburg, in recognition of his contribution to the knowledge of the genus *Symphurus*.

Relationships

Among the species of *Symphurus* only *S. ginsburgi,* sp. n., *S. urospilus,* and *S. pterospilotus* have a dark spot on the caudal fin. The shape and the position of this spot readily distinguish *S. ginsburgi* from the other two species. According to Ginsburg (1951: 193-194) the caudal spot in *S. urospilus* is large and located nearer to the distal margin than to the base of the fin and in *S. pterospilotus* (holotype examined) it is elongate and located near the middle of the fin. In *S. ginsburgi,* the caudal spot is small, nearly round and situated on the base of the fin. In addition, there are differences in the number of fin rays and scale rows. *S. ginsburgi* has normally 12 rays in the caudal fin, 73-81 anal fin rays, and 94-99 lateral rows of scales. These counts for *S. urospilus* are respectively 11, 68-71 and 73-77, and for *S. pterospilotus* 11, 75 and 88.

Taking into consideration the number of caudal fin rays, the arrangement of teeth on the lower jaw and depth ranges, *S. ginsburgi,* sp. n. would be more closely related to *S. piger* (Goode & Bean), *S. pusillus* (Goode & Bean) and *S. marginatus* (Goode & Bean), characterized by Ginsburg (l.c.) as a group of deep-water species; however, graph 7 shows it can be distinguished from those species by meristic counts.

Remarks

S. ginsburgi, sp. n. can be considered a small tonguefish, our largest individuals reaching the length of 90 mm. Three specimens, 58.4, 69.7 and 79.3 mm long, are ovigerous females and the eggs are fully mature, so that the maximum size attained by this species probably does not greatly exceed 90 mm. Our records indicate it is a deep-water species which occurs at depths between 130-200 meters (graph 8).

Distribution

Our specimens of *S. ginsburgi,* sp. n. were collected from about Cabo Frio (23°15'S) to Maldonado, Uruguay (35°18'S).

Symphurus diomedianus (Goode & Bean)

(Fig. 6)

Aphoristia diomediana Goode & Bean, 1885: 589.

Specimens studied (8): MZUSP 827 (1) — Ilha de São Sebastião, São Paulo; 1915; MZUSP 12785 (1) — Ilhabela, São Paulo; MZUSP 12422-4 (3) — St. 2300; 23°30'S., 45°00'W., 26 m; May 22, 1975; MNHN 1975-269 (3) — Calypso St. 89; 18°18'S., 38°53'W., 38 m; Nov. 29, 1961.

Diagnosis

Dorsal rays 90-92, anal rays 73-77, caudal rays 10, lateral scale rows 84-96; posterior third of the dorsal and anal fins with conspicuous black spots.

General ground color in alcohol, light brown with irregular ill defined dark markings, sometimes in form of incomplete dark cross bands. Dorsal and anal fins pale anteriorly but becoming darker, almost black at their posterior third, where a variable number of black spots are clearly visible. In most of our specimens 3 to 4 black spots are present on the posterior part of the dorsal and anal fins. In some specimens dark marks situated at regular intervals on the anterior part of the dorsal and anal fins are also visible. The caudal fin is dark and in some specimens there is an indistinct dark spot near the middle of the fin.

The regression data are shown in graphs 9-17 and table 7.

Remarks

The presence of dark spots on the posterior part of the dorsal and anal fins is a good character to separate *S. diomedianus* from all other species from the Brazilian coast. Such spots are also present in *S. pterospilotus* described by Ginsburg (1951) from off Isla de Flores, Uruguay, and *S. sumptuosus,* described by Chabanaud (1948: 509) from Rio de Janeiro. The latter was considered by Ginsburg (1951: 194-195) synonymous with *S. diomedianus*. According to Ginsburg (l.c.) *S. pterospilotus* would differ from both *S. diomedianus* and *S. sumptuosus* in having a well defined spot nearly centered on the caudal fin, and probably in the number of caudal fin rays (11 against 10 in *diomedianus* and *sumptuosus*). Examination of the holotype of *S. pterospilotus* shows that it has, in fact, the caudal spot and 11 caudal fin rays and that in addition to the 4 black spots on the posterior part of the dorsal and anal fins described by Ginsburg, there are anterior dark marks, making the color pattern of these fins very similar to that described in detail by Chabanaud (l.c.) for *S. sumptuosus*. According to the original and subsequent descriptions (including Ginsburg's), *S. diomedianus* has only the posterior spots on the dorsal and anal fins, and although the number of these spots vary to some extent (see Topp & Hoff, 1972: 78-79, fig. 28) they are apparently restricted to the posterior end of both fins. Thus, it seems that with respect to the spotted pattern of the dorsal and anal fins, *S. pterospilotus* and Chabanaud's *S. sumptuosus* are more closely related to each other than to *S. diomedianus;* in this case, the only reason to include *sumptuosus* in the synonymy of *diomedianus* would be the absence of a black spot on the caudal fin of both species.

In our material, three specimens recently collected off Rio de Janeiro (MZUSP 12422-4) have the posterior spots and anterior marks on the dorsal and anal fins, but the anterior dark marks are faint and hardly perceptible in the other specimens which have been kept in alcohol for a long time; in at least one specimen, a black spot on the caudal is distinguishable against the dark background color of the fin. Actually, this caudal spot is not entirely located on the caudal fin: its lower edge reaches the last two or three anal fin rays. It certainly represents the last spot of the series present on the anal fin, and based on this fact it is possible to conclude that the position of the spot which Ginsburg characterized as nearly centered on the caudal fin varies considerably. We also noticed that there is a tendency for the spots to become indistinct in specimens that have very dark fins and this has already been observed by Ginsburg (1951: 194) in *S. diomedianus*. Apparently then, the spotted pattern of the dorsal and anal fins is variable and the presence of a spot on the caudal fin may not represent a reliable character.

Since there are no significant differences in both meristic and morphometric characters among *S. diomedianus, S. sumptuosus,* and *S. pterospilotus* (the presence of 11 caudal fin rays in the single specimen of *S. pterospilotus* is negligible because this count varies in many species of *Symphurus*), and the last two are known only from the holotypes, we believe that a single species, characterized by the presence of black spots on the dorsal and anal fins, should be recognized. However, a definite conclusion can be reached only after a comparative study, based on fresh materials from the Western Atlantic. For this reason, we provisionally consider our specimens as *S. diomedianus*.

Data from the literature indicate that *S. diomedianus* is abundant and very common in the northern part of its range. According to Topp & Hoff (l.c.) it is "the most common tonguefish between 37-73 meters on the southern Florida shelf". It can be considered a relatively large species, the largest known specimen reaching 207.0 mm S.L. (Ginsburg, l.c.). Our specimens ranged from 70.0-162.0 mm S.L. and a 144.5 mm female proved to be fully mature.

The available depth records suggest that *S. diomedianus* is found from 3-5 meters (Moe & Martin, 1965: 149) to 183 meters (Longley & Hildebrand, 1941: 9) but, as mentioned above, at least in some cases it is mostly concentrated between 37-73 meters. On the Brazilian coast, six specimens occurred from 26-38 meters.

Distribution

In the Western Atlantic *S. diomedianus* is known from North Carolina to Brazil. Along the Brazilian coast there are records for Bahia (Roux, 1973: 176), Rio de Janeiro and Vitoria (Ginsburg, 1951: 195). Our specimens are from off Rio de Janeiro, Ilhabela and Ilha de São Sebastião.

It seems that on the coast of Brazil, *S. diomedianus* is more common in the northeastern and eastern regions that in the southern region. During the extensive collections made by the R/V "Prof. W. Besnard" from Rio Grande do Sul up to Rio de Janeiro, involving depths from about 10 to 200 meters, only 3 specimens were caught, near Rio de Janeiro. Since it is one of the most abundant species on the northern part of its range, we are led to the conclusion that apparently there is a decrease in abundance from north to south.

References

Benvegnú, G. de Q.

1973. Relação dos peixes teleósteos, in: Relatório sobre a segunda pesquisa oceanográfica e pesqueira do Atlântico Sul entre Torres e Maldonado (Lat. 29°S-35°S) — Programa Rio Grande do Sul II. *Publção esp. Inst. oceanogr. Univ. São Paulo 3* (1): 489-500.

Bloch, M. E. & J. G. Schneider

1801. *Systema Ichthyologiae iconibus ex illustratum...* ix + 584 pp., 110 pls. Berolini.

Carvalho, J. P., L. R. Tommasi & M. D. Novelli

1968. Lista dos linguados do Brasil. *Contrções Inst. oceanogr. Univ. São Paulo,* ser. ocean. biol. (14): 1-26.

Chabanaud, P.

1948. Description de quatre espéces inédites du genre *Symphurus. Bull. Mus. natn. Hist. nat.*, Paris, 2.° ser. *20* (6): 508-511.

Evermann, B. W. & W. C. Kendall

1906. Notes on a collection of fishes from Argentina, South America, with description of three new species. *Proc. U.S. Nat. Mus. 31* (1482): 67-108, 4 figs.

GINSBURG, I.

1951. Western Atlantic tonguefishes with descriptions of six new species. *Zoologica*, N.Y., *36* (14): 185-201, 3 pls.

GOODE, B. & T. H. BEAN

1885. Descriptions of new fishes obtained by the United States fish commission mainly from deep water of the Atlantic and Gulf coasts. *Proc. U.S. Nat. Mus. 8* (37): 589-592.

LAZZARO, G. E.

1973. Presencia de *Symphurus plagiusa* (Linné, 1766) Jordan y Goss, 1889 en águas de la Plataforma Argentina (Pleuronectiformes, Cynoglossidae). *Physis* Secc. A, Buenos Aires, *32* (85): 245-249, 1 fig.

LONGLEY, W. H. & S. F. HILDEBRAND

1941. Systematic catalogue of the fishes of Tortugas, Florida, with observations on color, habits, and local distribution. *Papers Tortugas Lab., Carnegie Inst. Washington Publ. 34*: xiii + 331 pp., 34 pls.

MOE, M. A., Jr. & G. T. MARTIN

1965. Fishes taken in monthly trawl samples offshore of Pinellas county, Florida, with new additions to the fish fauna of Tampa Bay area. *Tulane Stud. Zool. 12* (4): 129-151, 5 figs.

PALACIO, F. J.

1974. Peces colectados en el Caribe Colombiano por la Universidad de Miami. *Bol. Mus. Mar, Bogotá*, (6): 1-137.

ROUX, C.

1973. Campagne de la Calypso au large des côtes atlantiques de l'Amérique du Sud (1961-1962) (1) 26. Poissons téléostéens du plateau continental brésilien. *Res. scient. camp. "Calypso"* (10): 1-207, 55 figs.

TOPP, R. W. & F. H. HOFF, Jr.

1972. Flatfishes (Pleuronectiformes). *Mem. Hourglass Cruises 4* (2): 1-135, 39 figs.

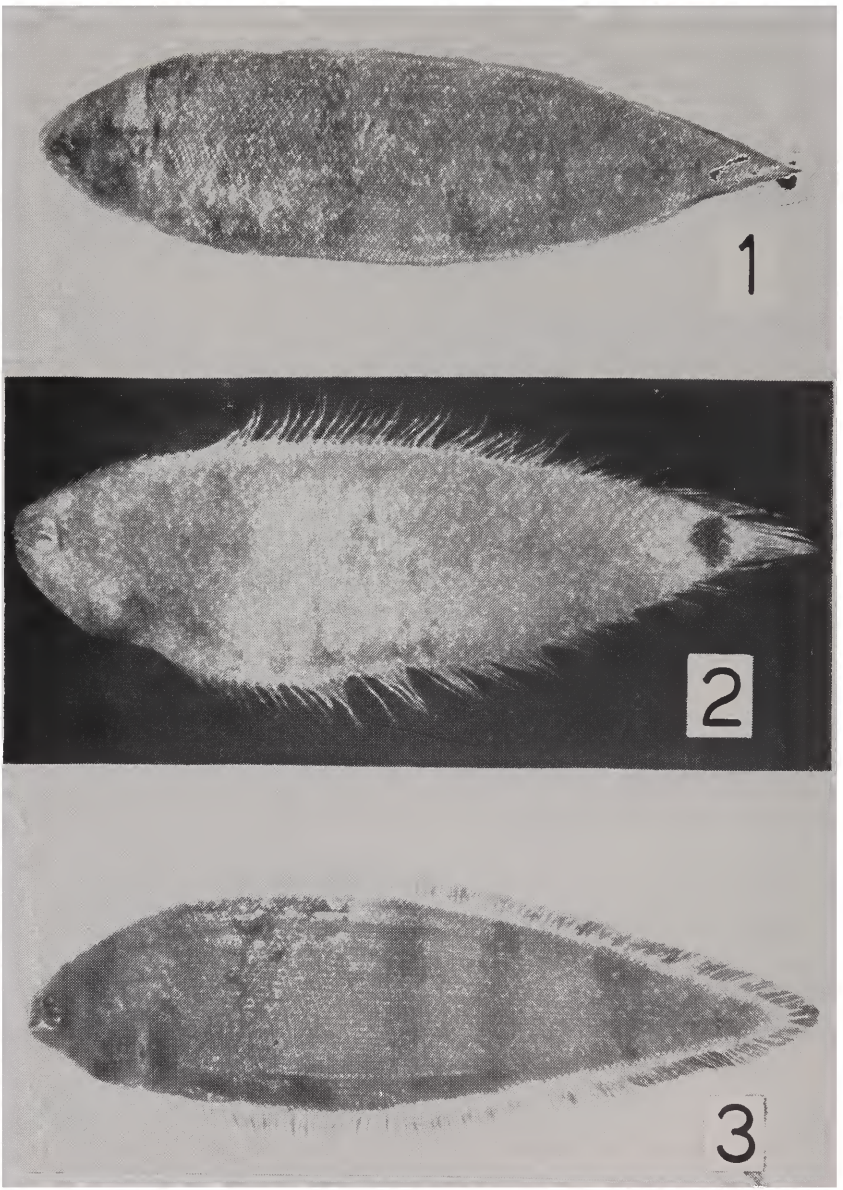


Fig. 1. *Symphurus jenynsi* Evermann & Kendall, 170 mm S.L., MZUSP 12507. Fig. 2. *S. kyaropterygium,* sp. n., 110.6 mm S.L., MZUSP 12425, holotype. Fig. 3. *S. plagusia* (Bloch & Schneider), 145.5 mm S.L., MZUSP 12648.

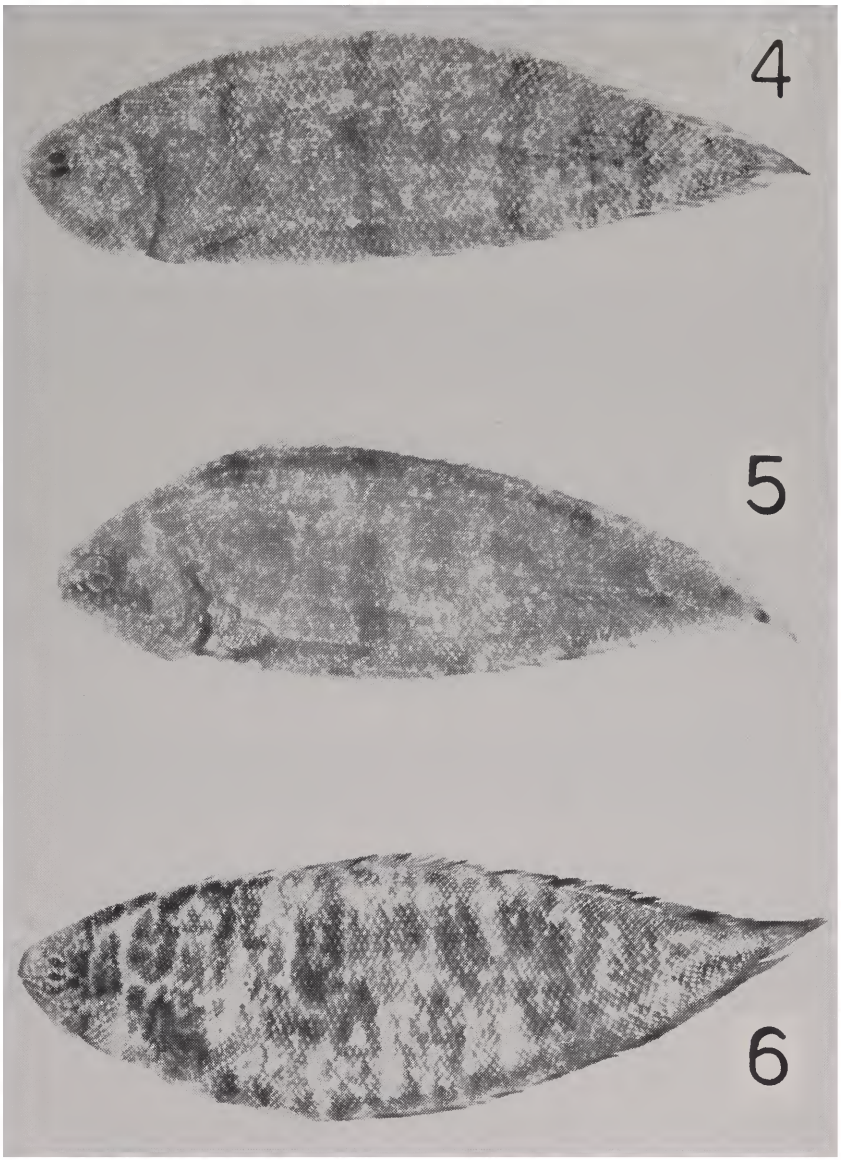
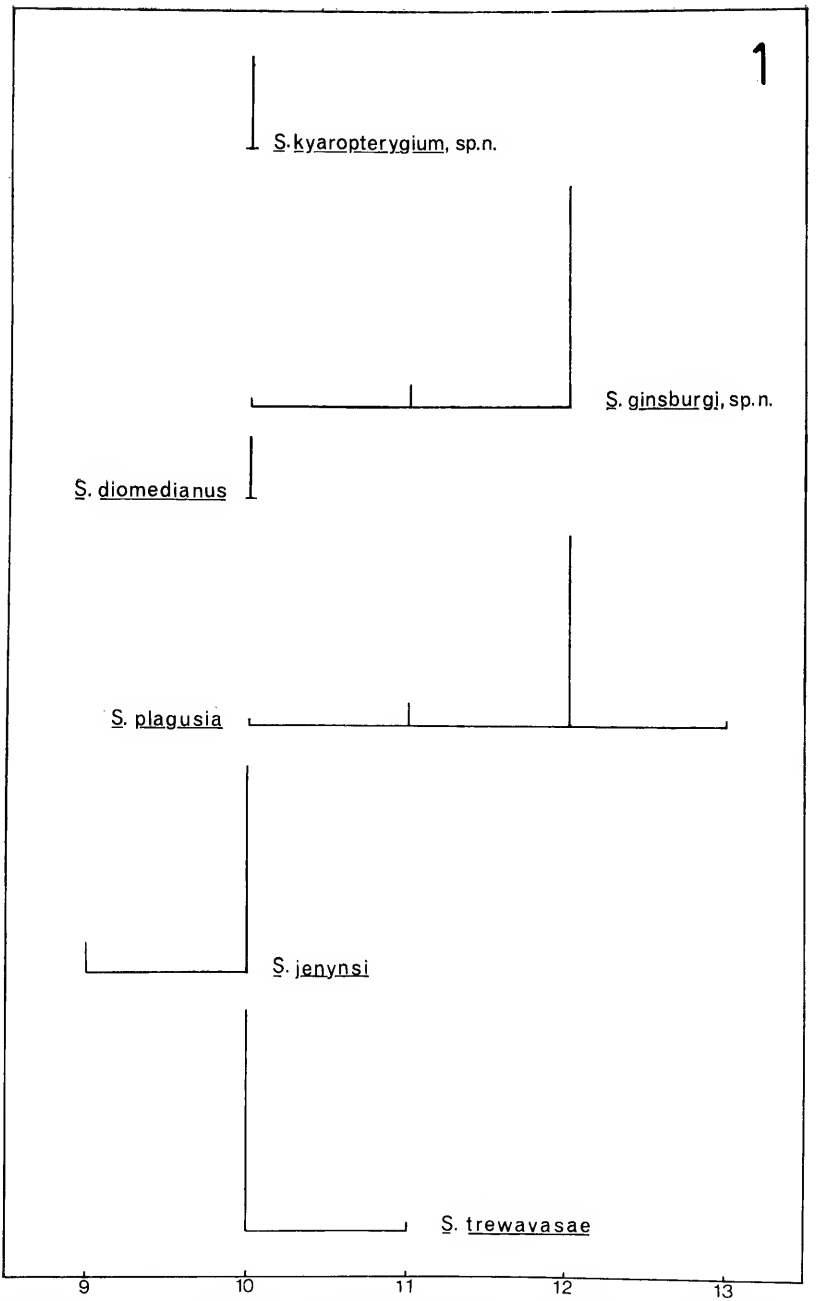
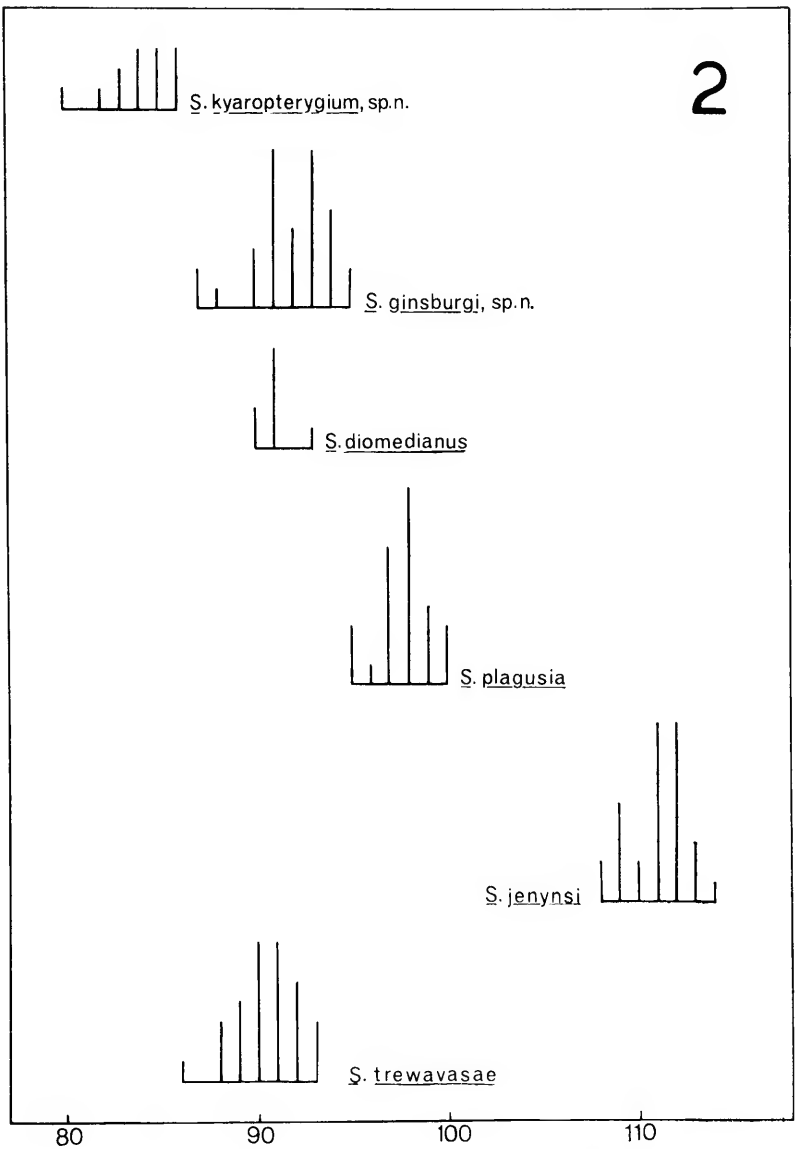


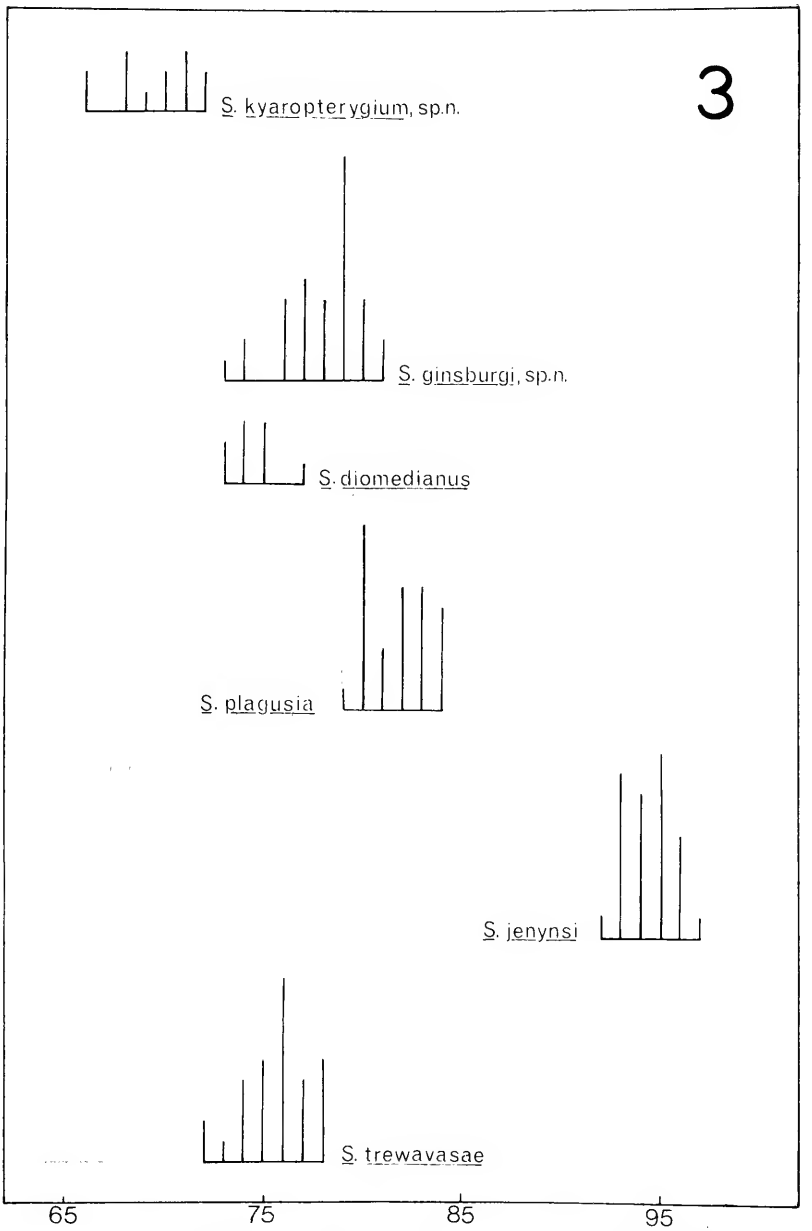
Fig. 4. *Symphurus trewavasae* Chabanaud, 90.9 mm S.L., MZUSP 12458.
Fig. 5. *S. ginsburgi,* sp. n., 77.2 mm S.L., MZUSP 12396, paratype.
Fig. 6. *S. diomedianus* (Goode & Bean), 130.5 mm S.L., MZUSP 12424.



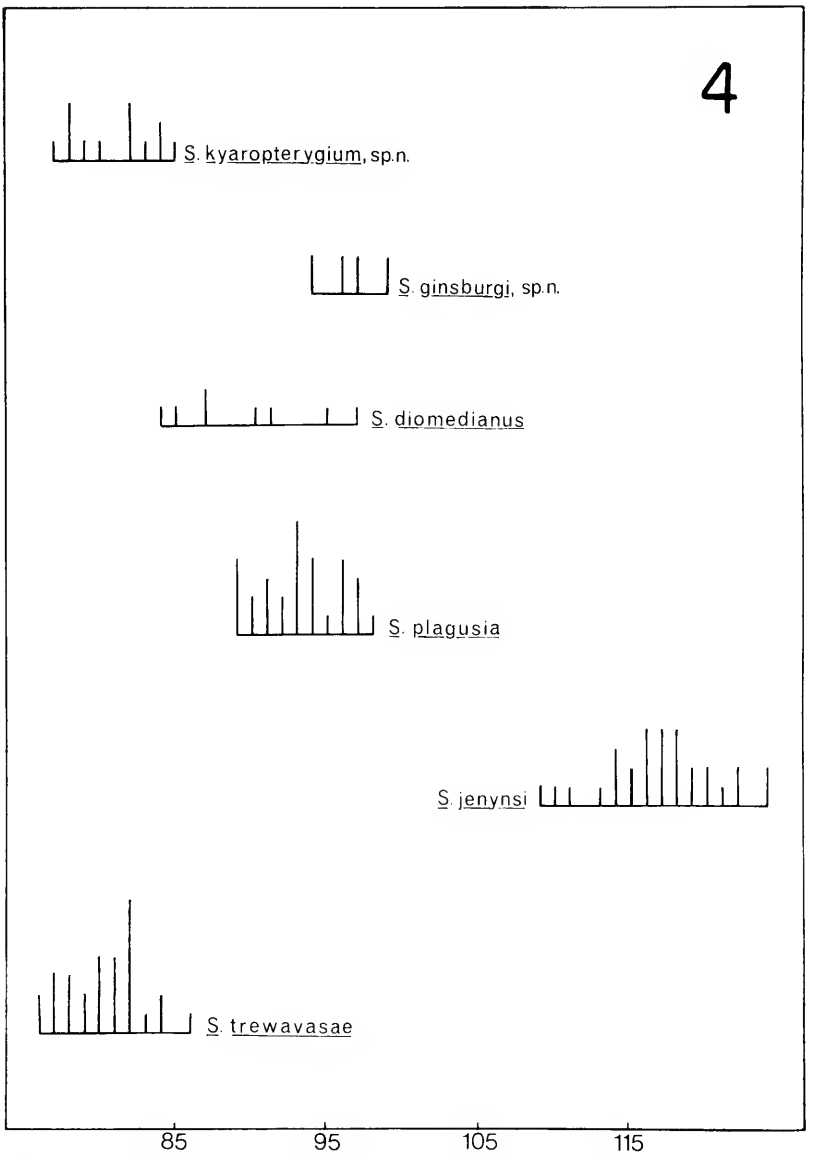
Graph 1. Caudal fin rays, frequency distributions of the species of *Symphurus* from the Brazilian coast.



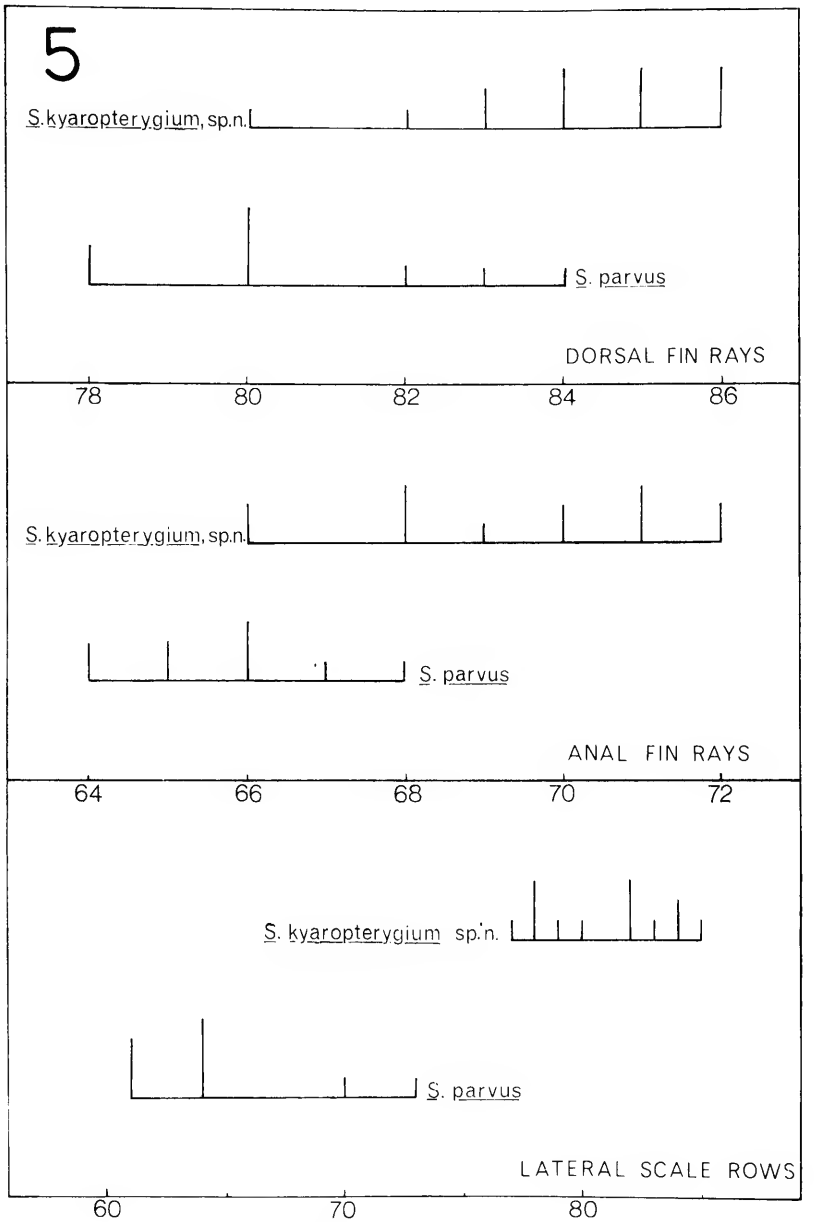
Graph 2. Dorsal fin rays, frequency distributions of the species of *Symphurus* from the Brazilian coast.



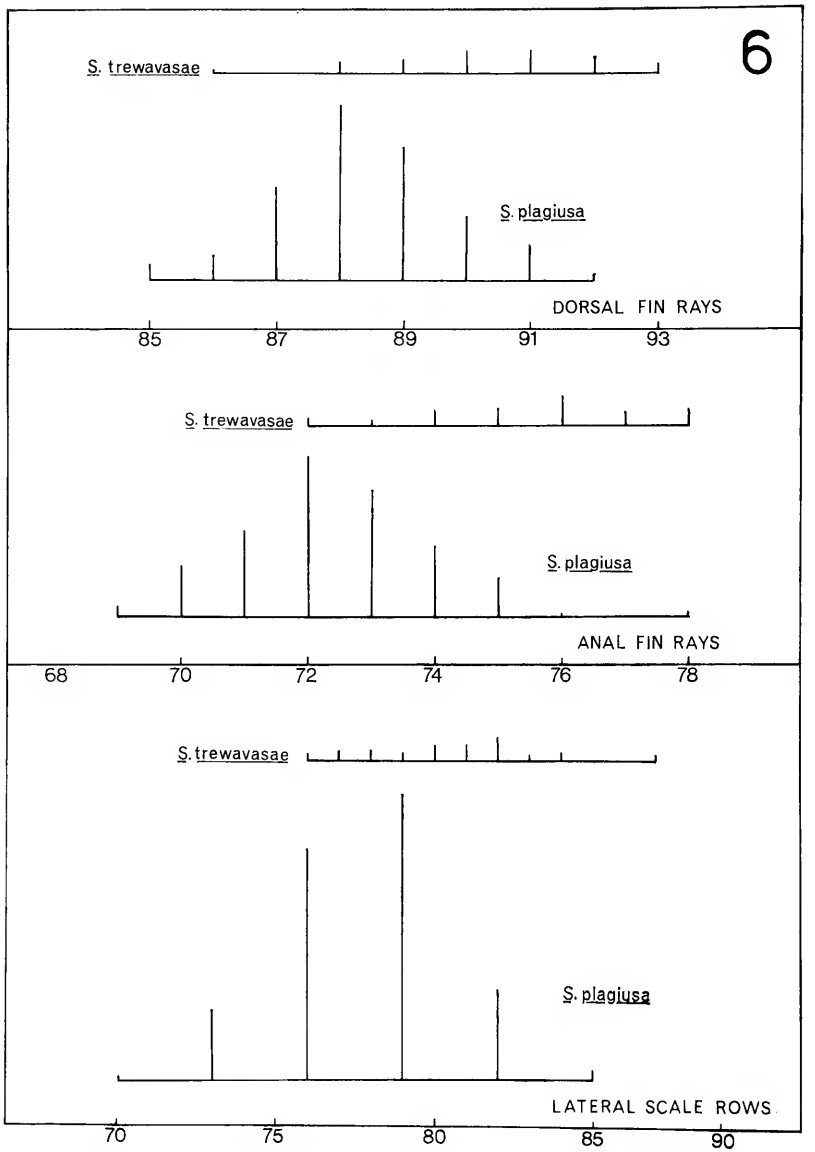
Graph 3. Anal fin rays, frequency distributions of the species of *Symphurus* from the Brazilian coast.



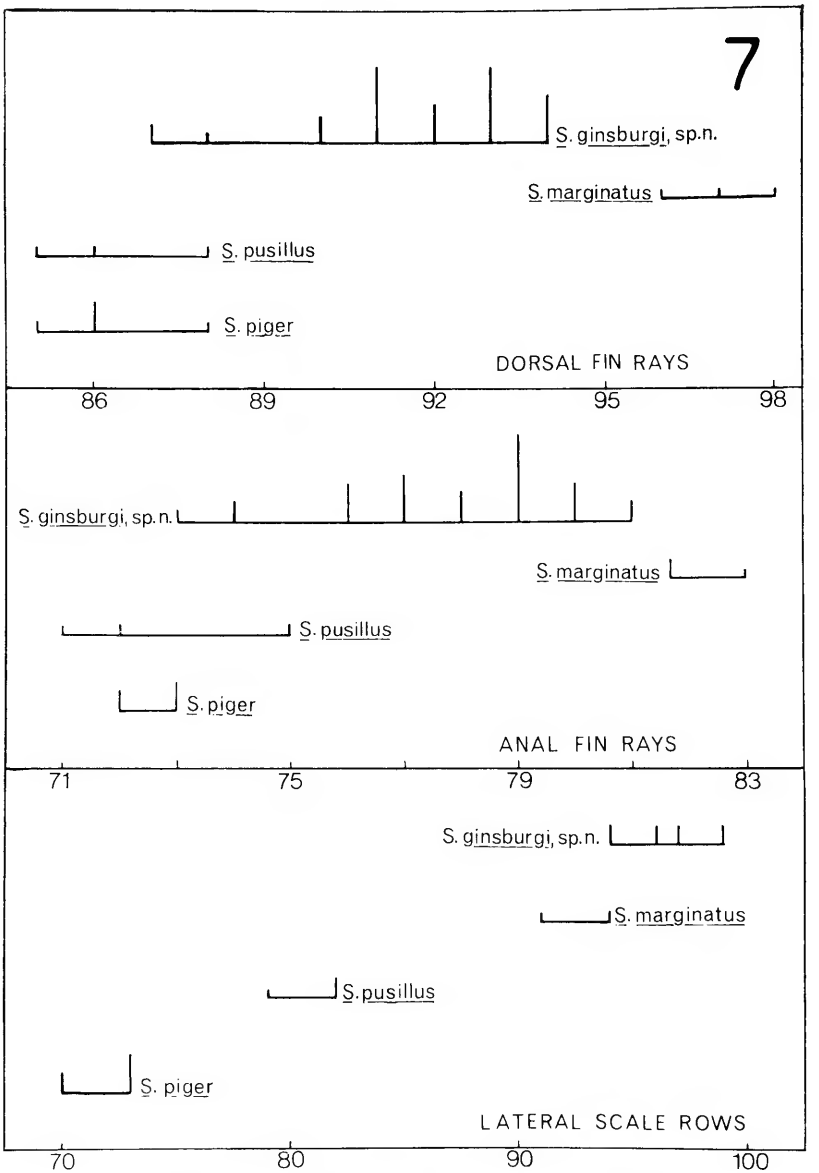
Graph 4. Lateral scale rows, frequency distributions of the species of *Symphurus* from the Brazilian coast.



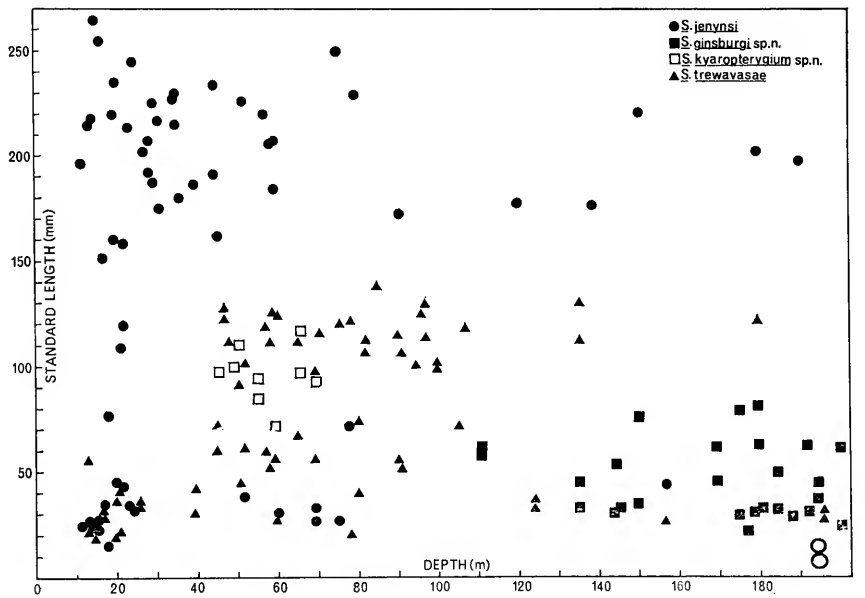
Graph 5. Fin ray and lateral scale counts, frequency distributions of *Symphurus kyaropterygium*, sp. n. and *S. parvus* (data from Ginsburg, 1951).



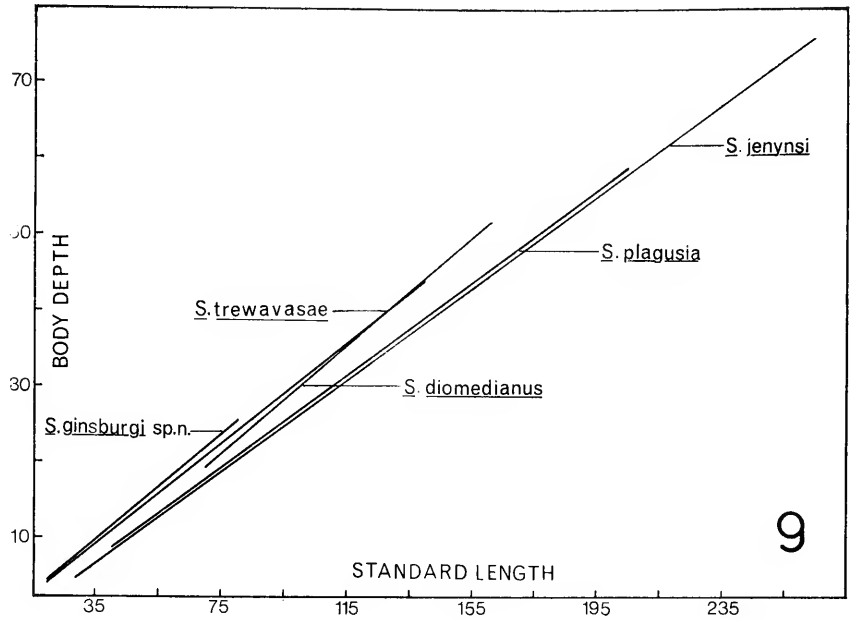
Graph 6. Fin ray and lateral scale counts, frequency distributions of *Symphurus trewavasae* and *S. plagiusa* (data from Ginsburg, 1951).

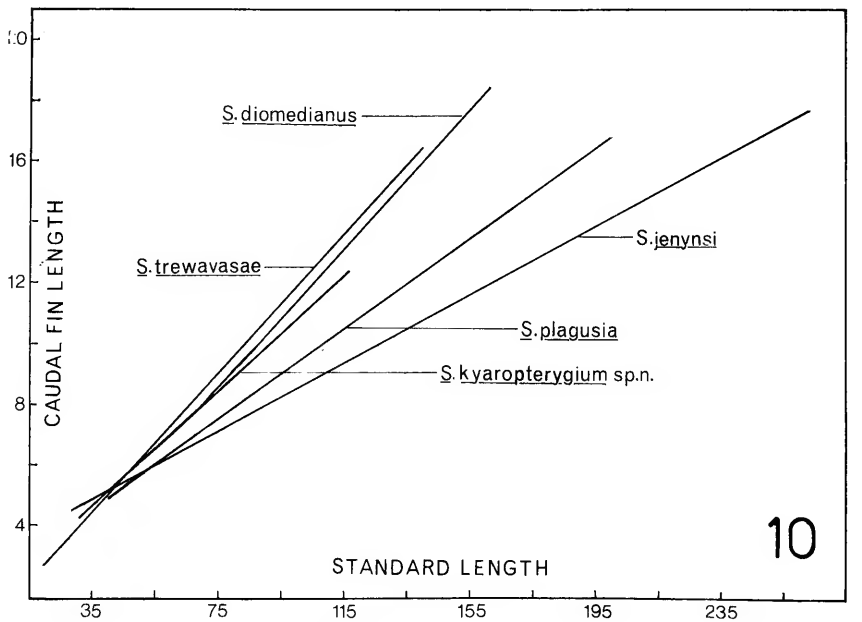


Graph 7. Fin ray and lateral scale counts, frequency distributions of *Symphurus ginsburgi*, sp. n. and *S. piger, S. pusillus* and *S. marginatus* (data from Ginsburg, 1951).

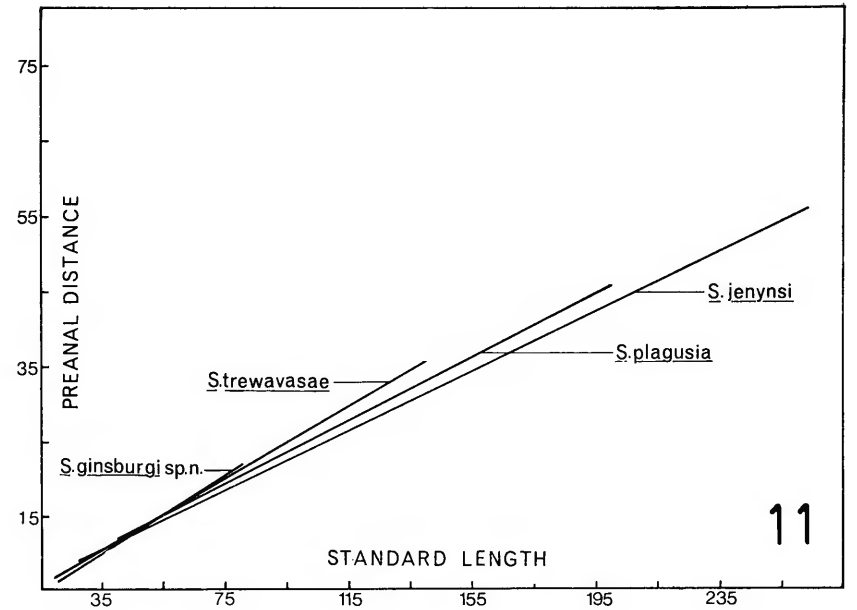


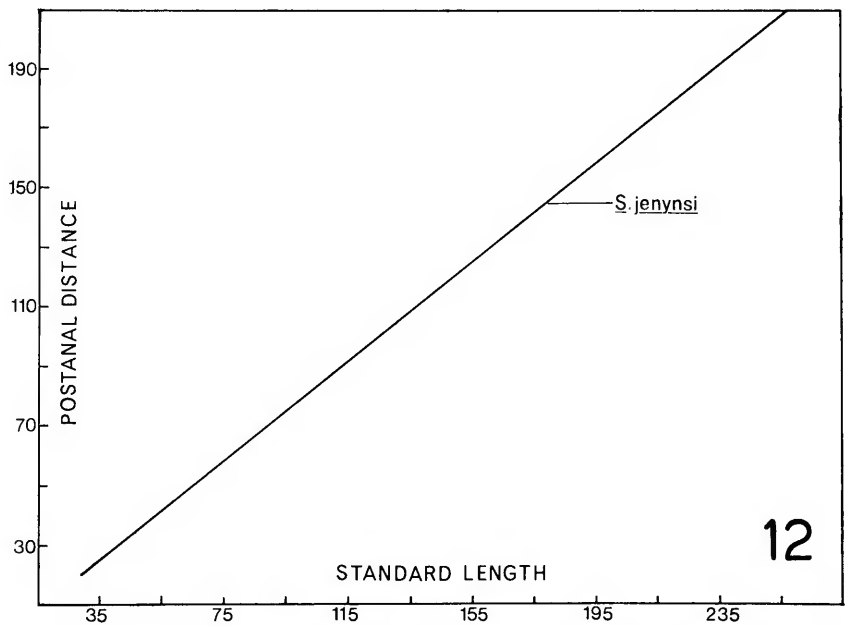
Graph 8. Scatter diagram showing size distribution in relation to depth for the species of *Symphurus* from the Brazilian coast, except *S. diomedianus* (represented by too few specimens) and *S. plagusia* (a near shore species predominantly found in very shallow waters). For any given depth only the maximum and the minimum sizes (S.L.) of the specimens were considered.



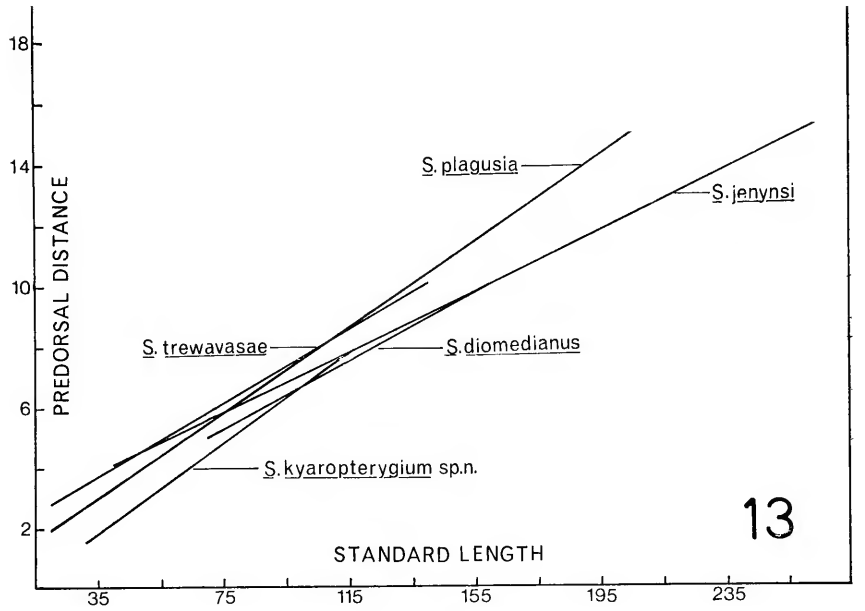


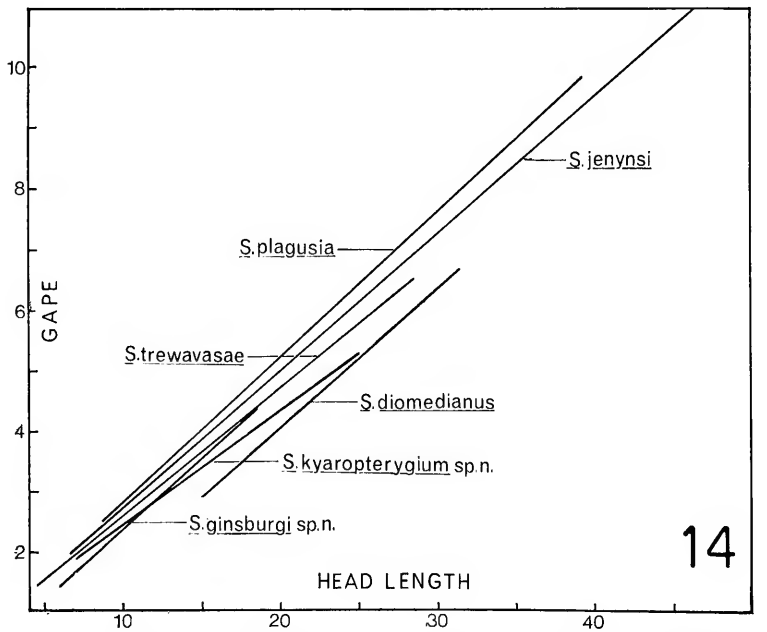
Graph 9. Regression of body depth on standard length for the species of *Symphurus* from the Brazilian coast, except *S. kyaropterygium*, sp. n., omitted because it overlaps almost perfectly *S. trewavasae*. Graph 10. Regression of caudal fin length on standard length for the species of *Symphurus* from the Brazilian coast, except *S. ginsburgi*, sp. n. which nearly coincides with *S. diomedianus*.



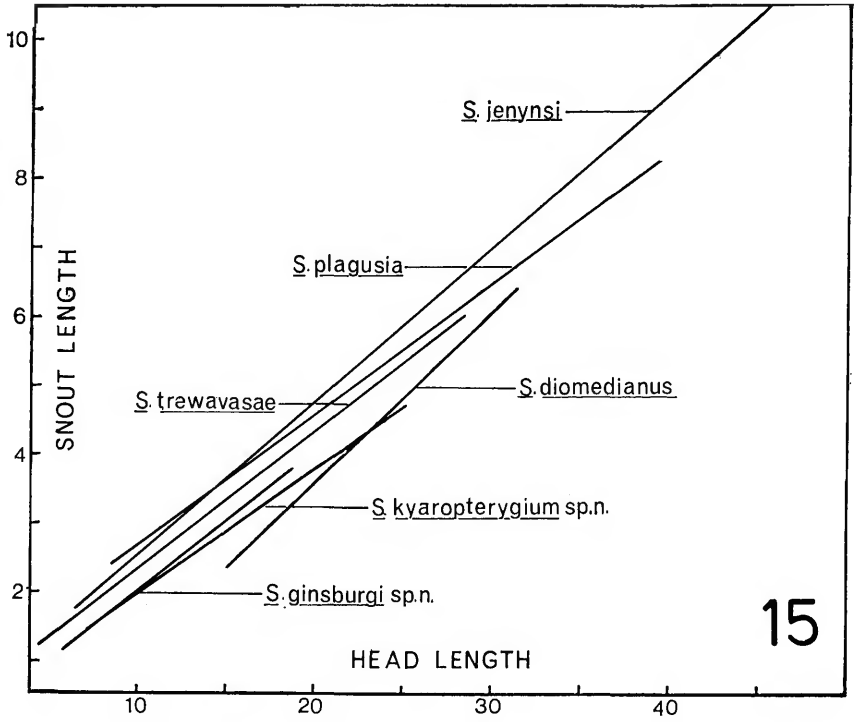


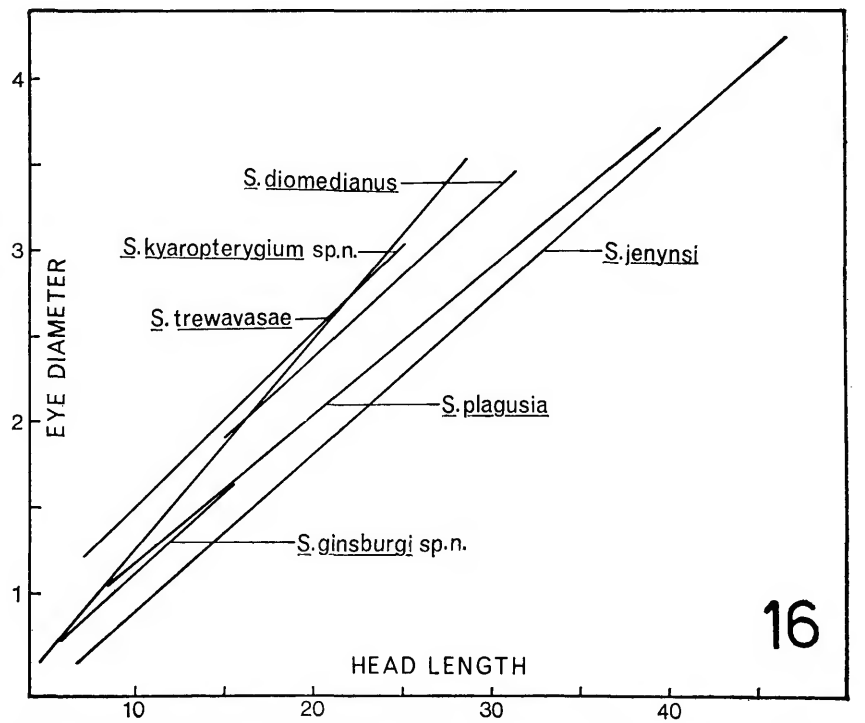
Graph 11. Regression of preanal distance on standard length for the species of *Symphurus* from the Brazilian coast, except *S. kyaropterygium*, sp. n. which nearly coincides with *S. plagusia*, and *S. diomedianus* with *S. trewavasae*. Graph 12. Regression of postanal distance on standard length for *S. jenynsi*, with which the other species nearly coincide.



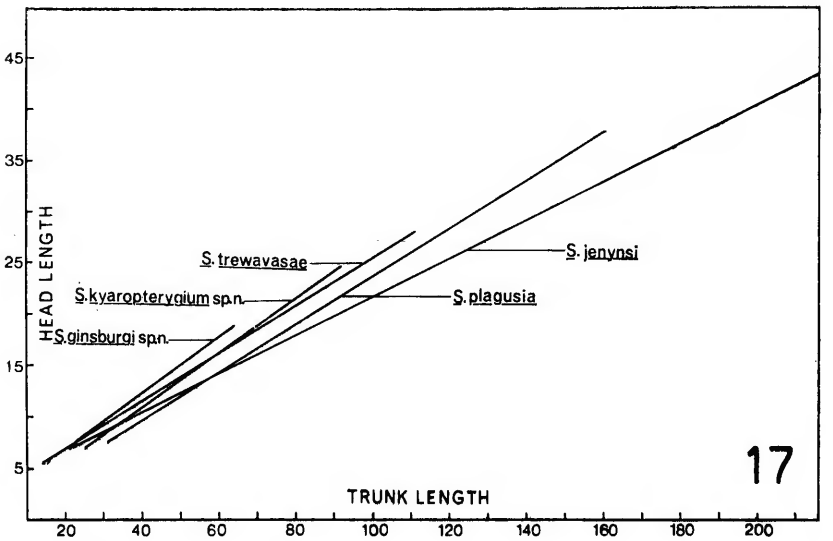


Graph 13. Regression of predorsal distance on standard length for the species of *Symphurus* from the Brazilian coast. The line of *S. ginsburgi*, sp. n. overlaps that of *S. plagusia*. Graph 14. Regression of gape on head length for the species of *Symphurus* from the Brazilian coast and for *S. plagiusa* from Florida. The line of *S. plagiusa* was omitted because it overlaps that of *S. jenynsi*.





Graph 15. Regression of snout length on head length for the species of *Symphurus* from the Brazilian coast. Graph 16. Regression of eye diameter on head length for the species of *Symphurus* from the Brazilian coast and for *S. plagiusa* from Florida. The line of *S. plagiusa* overlaps that of *S. diomedianus*.



Graph 17. Regression of head length on trunk length for the species of *Symphurus* from the Brazilian coast. The line of *S. diomedianus* coincides almost completely with that of *S. trewavasae*.

Table 1 - Regression data from *Symphurus ginsburgi* sp. n.

Regression	N	b	a	r^2
Head length x Trunk length	30	0.27 ± 0.13	1.62 ± 0.52	0.94
Body depth x Standard length	30	0.35 ± 0.005	-3.24 ± 0.28	0.99
Predorsal distance x Standard length	30	0.07 ± 0.06	0.26 ± 0.33	0.83
Preanal distance x Standard length	30	0.26 ± 0.07	0.69 ± 0.38	0.97
Postanal distance x Standard length	30	0.78 ± 0.01	-1.42 ± 0.62	0.99
Caudal fin length x Standard length	29	0.10 ± 0.005	0.56 ± 0.27	0.94
Snout length x Head length	30	0.21 ± 0.01	-0.06 ± 0.15	0.91
Eye diameter x Head length	30	0.13 ± 0.007	0.008 ± 0.08	0.93
Gape x Head length	30	0.23 ± 0.01	0.02 ± 0.17	0.90

Table 2 - Regression data from *Symphurus plagusia*

Regression	N	b	a	r^2
Head length x Trunk length	30	0.23 ± 0.008	0.21 ± 0.98	0.96
Body depth x Standard length	30	0.30 ± 0.01	-3.45 ± 1.50	0.97
Predorsal distance x Standard length	30	0.07 ± 0.003	0.55 ± 0.52	0.93
Preanal distance x Standard length	30	0.21 ± 0.008	3.65 ± 1.23	0.96
Postanal distance x Standard length	30	0.83 ± 0.01	-5.09 ± 1.50	0.99
Caudal fin length x Standard length	30	0.07 ± 0.003	1.77 ± 0.48	0.95
Snout length x Head length	30	0.19 ± 0.01	0.75 ± 0.36	0.89
Eye diameter x Head length	30	0.09 ± 0.007	0.29 ± 0.19	0.86
Gape x Head length	30	0.24 ± 0.01	0.44 ± 0.31	0.94

N - Number of specimens
b - Regression coefficient ± its standard deviation
a - Regression constant ± its standard deviation
r^2 - Coefficient of determination

Table 3 - Regression data from *Symphurus jenynsi*

Regression	N	b	a	r^2
Head length x Trunk length	31	0.18 ± 0.005	2.93 ± 0.63	0.98
Body depth x Standard length	31	0.30 ± 0.007	-3.89 ± 1.14	0.98
Predorsal distance x Standard length	31	0.05 ± 0.002	1.99 ± 0.36	0.95
Preanal distance x Standard length	31	0.20 ± 0.004	3.42 ± 0.65	0.98
Postanal distance x Standard length	31	0.82 ± 0.008	-2.90 ± 1.34	0.82
Caudal fin length x Standard length	31	0.05 ± 0.002	2.94 ± 0.35	0.96
Snout length x Head length	31	0.22 ± 0.008	0.31 ± 0.21	0.96
Eye diameter x Head length	31	0.91 ± 0.004	-0.006± 0.09	0.95
Gape x Head length	31	0.22 ± 0.009	0.51 ± 0.25	0.95

Table 4 - Regression data from *Symphurus trewavasae*

Regression	N	b	a	r^2
Head length x Trunk length	30	0.23 ± 0.007	2.16 ± 0.55	0.97
Body depth x Standard length	30	0.33 ± 0.005	-2.26 ± 0.55	0.99
Predorsal distance x Standard length	30	0.06 ± 0.004	1.57 ± 0.39	0.90
Preanal distance x Standard length	30	0.23 ± 0.007	2.12 ± 0.75	0.97
Postanal distance x Standard length	30	0.81 ± 0.001	-3.00 ± 1.16	0.99
Caudal fin length x Standard length	30	0.11 ± 0.004	0.46 ± 0.40	0.96
Snout length x Head length	30	0.20 ± 0.01	0.31 ± 0.26	0.90
Eye diameter x Head length	30	0.12 ± 0.008	0.04 ± 0.15	0.90
Gape x Head langth	30	0.21 ± 0.01	0.48 ± 0.38	0.86

Table 5 - Regression data from *Symphurus kyaropterygium* sp. n.

Regression	N	b	a	r^2
Head length x Trunk length	13	0.26 ± 0.01	0.27 ± 1.28	0.95
Body depth x Standard length	13	0.35 ± 0.01	-4.00 ± 1.16	0.98
Predorsal distance x Standard length	13	0.07 ± 0.01	-0.84 ± 1.03	0.81
Preanal distance x Standard length	13	0.23 ± 0.02	2.35 ± 2.01	0.91
Postanal distance x Standard length	13	0.82 ± 0.01	-2.96 ± 1.76	0.99
Caudal fin length x Standard length	13	0.09 ± 0.006	1.23 ± 0.64	0.94
Snout length x Head length	13	0.17 ± 0.02	0.28 ± 0.50	0.81
Eye diameter x Head length	13	0.10 ± 0.02	0.51 ± 0.41	0.69
Gape x Head length	13	0.18 ± 0.02	0.65 ± 0.48	0.83

Table 6 - Regression data from *Symphurus plagiusa*

Regression	N	b	a	r^2
Head length x Trunk length	6	0.20 ± 0.01	4.21 ± 1.06	0.98
Body depth x Standard length	6	0.32 ± 0.03	-0.70 ± 3.70	0.94
Predorsal distance x Standard length	6	0.05 ± 0.01	1.90 ± 1.22	0.82
Preanal distance x Standard length	6	0.16 ± 0.04	9.69 ± 3.69	0.81
Postanal distance x Standard length	6	0.75 ± 0.04	6.08 ± 4.22	0.98
Caudal fin length x Standard length	6	0.09 ± 0.008	1.95 ± 0.76	0.97
Snout length x Head length	6	0.16 ± 0.05	1.02 ± 0.94	0.74
Eye diameter x Head length	6	0.08 ± 0.005	0.66 ± 0.10	0.98
Gape x Head length	6	0.20 ± 0.06	0.90 ± 1.16	0.73

Table 7 - Regression data from *Symphurus diomedianus*

Regression	N	b	a	r^2
Head length x trunk length	8	0.23 ± 0.01	2.45 ± 1.19	0.98
Body depth x Standard length	8	0.35 ± 0.01	-5.47 ± 1.99	0.98
Predorsal distance x Standard length	8	0.05 ± 0.01	1.10 ± 1.44	0.79
Preanal distance x Standard length	8	0.22 ± 0.04	3.37 ± 6.19	0.77
Postanal distance x Standard length	8	0.88 ± 0.03	-8.93 ± 4.65	0.98
Caudal fin length x Standard length	7	0.11 ± 0.01	-0.25 ± 1.52	0.95
Snout length x Head length	8	0.25 ± 0.03	-1.45 ± 0.78	0.91
Eye diameter x Head length	8	0.09 ± 0.02	0.52 ± 0.54	0.75
Gape x Head length	8	0.23 ± 0.04	-0.56 ± 1.06	0.83