

## 14.

## Western Atlantic Tonguefishes with Descriptions of Six New Species.

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(Plates I-III).

The main object of the investigation here recorded, was to determine the species of *Symphurus* inhabiting the east coast of the United States, particularly the Gulf coast, and to elaborate the specific characters by which they are distinguishable. However, in order to properly understand, define and distinguish those species, it was found necessary to study all the species from the western Atlantic, including the West Indies.

The specimens forming the basis of this account are those in the U. S. National Museum, the Museum of Comparative Zoology and the Bingham Oceanographic Collection. Also, a valuable collection made by the U. S. Fish and Wildlife Service research boat *Pelican* which obtained specimens of four of the new species here described, including a good sample of *civitatum* from the coast of Louisiana.

All the available specimens of the western Atlantic only were studied in detail. For comparative purposes, I also examined in detail, in the National Museum, one specimen each of the following species from the American Pacific coast, namely, *fasciolaris*, *atramentatus*, *leei*, *sechurae*, *paitensis*, *atricauda* and *elongatus*, type specimens of the five species named first. All these specimens represent species which are different from those in the western Atlantic. As the intraspecific variability of the Pacific species was not determined, their relationship to one another and to the Atlantic species is not discussed in this paper.

One species, *Symphurus trewavasae* Chabanaud (*Bull. Mus. Paris*, (2) 20:508, 1948), from Brazil, is not included, as none of the specimens examined, judged by their characters and locality of capture, coincide with Chabanaud's account. According to the figures given in the original account, *trewavasae* about agrees with *plagiusa* in the number of caudal rays and scales and proportional measurements. In comparing his species with *plagiusa* and *plagiusa*, Chabanaud calls special attention to its supposedly large eye. However, in 5 specimens of *plagiusa* measured, the eye varies from 11 to 15 per cent. of the head. This range includes that of *trewavasae* given in its account. The numbers of dorsal and anal rays of *trewavasae* average a

little higher than in *plagiusa*, but the two species widely overlap in these counts. The specimens on which *trewavasae* is based were collected in deeper water than that in which *plagiusa* lives on the coast of the United States. These two species should be directly compared in greater detail.

The other western Atlantic species described by Chabanaud in the same paper, *S. sumptuosus*, is apparently based on a specimen of *diomedianus*, and that name is placed below in its synonymy.

***Symphurus* Rafinesque.**

*Symphurus* Rafinesque, *Indice D'Ittiologia Siciliana*, p. 52, 1810 (genotype *Symphurus nigrescens* Rafinesque by subsequent designation)—Jordan & Goss, *Rep. U. S. Comm. Fish.* 1886:321, 1889 (*Symphurus nigrescens* Rafinesque designated as genotype).

Sinistral, strongly compressed; symmetrically shaped; greatest depth in anterior half of length, the depth nearly uniform for a considerable distance, thence tapering both ways; the anterior taper moderate; posterior taper beginning at about end of anterior two-thirds of standard length, varying a little both ways, except in *jenynsi* at about the middle, the depth decreasing rapidly to caudal base. Eyes small, slightly smaller than short snout; the two eyes separated by a very narrow interorbital space in small specimens, touching each other or very nearly so in the larger specimens; anterior margin of upper eye slightly in advance of that of lower, infrequently both about aligned on same vertical. Snout short and very blunt, the anterior profile forming a nearly continuous broad curve. Mouth very small, its posterior angle under anterior margin of lower pupil, varying slightly both ways, except slightly more backward in *civitatum* and *plagiusa*; asymmetrical, moderately curved on eyed side, notably curved on blind side. Anterior nostril on eyed side a well developed tubule, placed at some distance in front of lower eye, the tubule short on blind side; posterior nostril with a raised edge, placed directly in front of and between the eyes. Dentition chiefly developed on blind side, the teeth rather small, subequal or the outer teeth moderately larger, in bands; band in upper jaw of nearly

uniform and moderate width; band in lower jaw shorter and wider, shaped somewhat like the segment of a circle or moderately crescentic with the straight or slightly curved margin entad and the well curved margin ectad; dentition on eyed side very moderately or poorly developed, the teeth small, few or moderate in number, eyed side of upper jaw with a narrow band of teeth at symphysis in 2-3 irregular rows, tapering backward to one row, or one row throughout, or a small group of a few teeth near symphysis; eyed side of lower jaw with one row, or with very few teeth, or altogether toothless, depending on the species and intraspecific individual variability. Opercle separated by a posterior emargination into two lobes, the upper lobe smaller. Branchiostegal membranes united, their point of union at base of ventral fin. Isthmus free. Pseudobranchiae very moderate. No slit behind fourth gill arch. Gill rakers nearly obsolete, indicated as slight, uneven, variable protuberances on gill arch (not examined in all species). Body and head with ctenoid scales, those on anterior part of head becoming more or less embedded; caudal scaled at its base, the scales continued backward in rows between the rays for some distance, scaleless distally; dorsal and anal with short rows of small scales along the proximal part of the rays. Lateral line absent. Dorsal origin over eye; dorsal and anal continuous with caudal. Pelvic fin unpaired, placed at isthmus, normally having 4 rays (the rays counted in 364 specimens representing all species, only 3 variants, one each in *diomedianus*, *plagiusa* and *jenynsi*, having 3 rays). Pectoral absent. All rays segmented and unbranched.

Most characters in the preceding description of the genus are nearly common to the several species examined, and are not repeated under the species descriptions. Also, the western Atlantic species of *Symphurus* are unusually uniform in their structure, and not many characters are available for the purpose of distinguishing the separate species. For these two reasons, the species descriptions given below are very brief.

The number of rays in the caudal, dorsal and anal fins and that of the scales are of primary importance in the identification of the species. While the intraspecific variability of these counts or the spread of their frequency distributions is moderate in comparison with other flatfishes, it is yet rather extensive, and the best way of applying these characters in practice is by reference to tables showing their frequency distributions. As far as the available material permitted, such data have been determined and are presented in Tables 1-6.

The dentition on the eyed side is of some specific value as discussed below.

Color marks are of value in distinguishing some of the species. A black spot on the opercle of *plagiusa*, and spots on the dorsal and anal fins of *diomedianus*, are of limited value, as a majority but not all specimens,

in both species, have these marks developed. A well marked spot on the caudal is present in the specimens examined of *urospilus* and *pterospilotus*, the latter also having spots on the dorsal and anal. Wide cross bands on the body often constitute a prominent feature of specimens of *Symphurus*. However, in three species, *plagiusa*, *civitatum* and *plagusia*, of which fair or good samples were examined, including many recently preserved specimens, this color pattern depends on individual variation, although the relative frequency of occurrence of banded individuals appears to differ also with the species. Within the range of every one of the three species, the bands are well marked, or absent altogether, or present in various incomplete stages of development.

Proportional measurements, on the whole, are also rather uniform and are of only limited value in separating the species. Five measurements have been determined on a rather small number of specimens and are given under the accounts of the species as follows, named in order of their taxonomic importance: depth, caudal, head, preanal and postanal. Two species, *marginatus* and *nebulosus*, are markedly slender. The depth might also prove to be of value in distinguishing *pelicanus*, *piger* and *pusillus* from one another and from their close relatives, on examination of adequate samples of those three species. The caudal is notably short in *jenynsi* and *tessellata* and rather long in *pelicanus*. The other measurements do not differ much with the species, although a determination of adequate samples will likely show average differences, that is, divergent frequency distributions of various degrees of intergradation.

Two terms here used in stating proportional measurements, not commonly used in descriptive ichthyology, have the following meaning: preanal and postanal, the distance from the anal origin to the point of contact of a vertical tangent with the anterior curvature of the head, and the caudal base, respectively. The head was measured on the eyed side between the above point of contact and that of the upper lobe of the opercle. All proportional measurements are expressed as a percentage of the standard length. Under the accounts of some species where figures for proportional measurements are segregated by two size groups, those for the smaller specimens are given in parenthesis.

Three of the characters here used to distinguish the species, the numbers of caudal rays and scales, and the dentition on the eyed side, need to be discussed briefly.

*Caudal fin ray count.* The number of rays in the caudal fin differs with, and is of much importance in the classification of, the species of *Symphurus*. Every species of which good and fair samples were examined has a normal or decidedly predominating count. For instance, the normal count in *plagiusa* is 10, while in *plagusia* and *civitatum* it is 12. As the caudal is continuous with the

TABLE 1.

Frequency Distribution of the Number of Caudal Rays in Western Atlantic Species of *Symphurus*.

Species	Distribution					
	9	10	11	12	13	14
<i>minor</i>		15	1			
<i>parvus</i>		8	1			
<i>pelicanus</i>				3		
<i>urospilus</i>			2			
<i>pterospilotus</i>			1			
<i>diomedianus</i>		17	1			
<i>plagiusa</i>	3	334	8			
<i>piger</i>				5		
<i>pusillus</i>				3		
<i>marginatus</i>				4		
<i>civitatium</i>			2	36		
<i>plagusia</i>			1	23	1	
<i>tessellata</i>			2	31	1	
<i>jenynsi</i>	2	19				
<i>nebulosus</i>						3

dorsal and anal fins, some practice is required in order to distinguish the caudal rays from the last ray of the other two fins. The caudal rays have their bases on a nearly straight transverse line, sometimes somewhat irregularly curved, and are closely approximated. The last dorsal or anal ray is more widely spaced from its adjacent caudal ray and its base is placed slightly more forward. After a little practice, the caudal rays may be distinguished by these slight peculiarities of structure, in nearly every fish, with very few somewhat doubtful individual specimens. The outermost caudal ray, both above and below, may be further distinguished in most specimens by another slight peculiarity of structure. Its base is somewhat broader than that of the other caudal rays and a little above its proximal end it has a slight burr-like outward projection. This is fairly evident, except in the small specimens, and it is somewhat better marked in some species than others.

Some of the caudal rays are occasionally irregular in structure, such irregularities being of three kinds, as follows: (1) A ray is sometimes incomplete, only a proximal portion of variable length being developed, sometimes as a short stump. (2) Only a small basal ossicle is present while the rest of the ray is undeveloped. In such instances the space between the two adjacent fully developed rays is usually somewhat greater than that between the other rays. It seems evident that in such variants a potential ray failed

to develop. There is no sharp line of division between the preceding two categories, as these irregular rays occur in all degrees of imperfect development, from being represented by a mere, very small basal ossicle, to one in which only a moderate distal part remains undeveloped. (3) Two adjacent rays at a variable distance above their bases merge and become a single ray distally.

For the purpose of this statistical study and in Table 1, the partly developed ray, or the undeveloped ray represented by the basal ossicle only, were included in the count, and the two merged rays were counted separately. Such variants are not numerous and their numbers are stated under the accounts of the separate species. In *plagiusa* a total of 25 such variants was found in 345 specimens examined, or about 7 per cent. In this species the irregularity occurring most often falls in the above category (2) and the least often in category (3). In *diomedianus* 3 such variants out of 18 specimens examined fall partly or wholly in category (3). In *civitatium* 2 irregular variants were found among 38 specimens examined, and in *plagusia*, sensu stricto, 3 variants among 25 specimens. Four of the latter 5 variants belong to category (2) and one falls in category (1).

Except for the preceding moderate imperfections, the caudal fin is fairly regular. Of the many specimens examined, more than 600, the caudal count in only 3 fish could not be definitely determined. Two specimens were obviously injured in life and irregularly regenerated. The third is evidently an abnormal specimen and is described under its species, *minor*.

*Scale count.* The scale count here given refers to the number of oblique rows from the upper angle of the opercle to the caudal base. The scales run in fairly regular rows and when the scalation is complete a near accurate count is possible. However, in very many of the specimens examined the scales are missing on areas of variable extent. In such cases the count includes in part the rows of scale pockets which are sometimes indistinct. Consequently, the scale counts here given are only roughly approximate, but even so this character is of considerable value in separating the species. In Table 4 the counts of individual specimens are grouped by intervals of 3, the class headings representing their mid numbers.

*Dentition.* The dentition on the eyed side, especially that on the lower jaw, is of value in distinguishing some of the species. It is described under the accounts of the separate species and is also used in the key. This character is not easy to apply in practice. The teeth are small, partly hidden by the gums and lips, and may be discerned properly only with a strong magnifier and after the preserving fluid has been thoroughly evaporated. Also, the mucous membrane lining the jaws is usually covered with papillae which in superficial appearance simulate





TABLE 4.  
Frequency Distribution of the Number of Scales in Western Atlantic Species of *Symphurus*.

Species	Distribution																									
	55	58	61	64	67	70	73	76	79	82	85	88	91	94	97	100	103	106	109	112	115	118	121	124	127	
<i>minor</i>	2	1	6	1	1																					
<i>parrus</i>			3	4		1																				
<i>pelicanus</i>			1		1																					
<i>urospilus</i>						1	1																			
<i>pterospilolus</i>												1														
<i>diomedianus</i>											1	4	4	6	1											
<i>plagiusa</i>						1	22	72	89	28	3															
<i>piger</i>						2	4																			
<i>pusillus</i>									1	2																
<i>marginatus</i>													1	1												
<i>civitatum</i>						3	11	16	7	8	6	1	1													
<i>plagiusa</i>							1	5	2	8	6	1	1													
<i>tessellata</i>									1	8	12	8	2													
<i>jenyntsi</i>																	4	4	4	2	2	1				
<i>nebulosus</i>																								1		2

very small teeth, and particular care must be exercised not to mistake them for teeth.

Species living in deep water generally have the dentition on the eyed side better developed.

*Vertical distribution.* Judged by the fair number of available depth records for the specimens examined, it is evident that the species of *Symphurus* are markedly selective in their vertical distribution. Some species have the same vertical distribution, or nearly so, but in many instances they differ in this respect. Some species differ widely in their vertical distribution, and depth records become of value in separating them. Even where two given species overlap in their vertical distribution, the extreme depth records are of value. Consequently, in collecting specimens of *Symphurus* it is of particular importance to record the depths at which they are taken.

*Minor population differences.* Some of the characters that are used for distinguishing the species, also differ intraspecifically with the minor population. Such minor differences in the number of dorsal and anal rays are shown to a limited extent in Tables 5-6 for three species and are also discussed under the accounts of those species.

#### KEY TO THE WESTERN ATLANTIC SPECIES OF *Symphurus*.

- 1a. Dorsal rays 72-83; anal rays 56-67; when dorsal and anal rays up to 84 and 68, respectively (in *parvus*), caudal without a definite spot. Scales 55-74. Teeth on eyed side of lower jaw extending over its greater part to nearly its entire length.
- 2a. Caudal rays usually 10, sometimes 11. Caudal 12-16.
- 3a. Dorsal rays 72-75. Anal rays 56-61. Scales 55-66 . . . . . *minor* (p. 192).
- 3b. Dorsal rays 78-84. Anal rays 64-68. Scales 60-73 . . . . . *parvus* (p. 192).
- 2b. Caudal rays 12. Dorsal rays 80-81. Anal rays 63-67. Scales 61-74. Caudal 17.5. *pelicanus* (p. 193).
- 1b. Dorsal rays 85-101; anal rays 69-85; when dorsal and anal rays down to 84 and 68, respectively (in *urospilus*), caudal with a well marked black spot. Scales 69-98.
- 4a. Caudal with a large well marked spot. Caudal rays perhaps normally 11 (same count in 3 available specimens of both species). Teeth on eyed side of lower jaw absent or only a few present.
- 5a. Dorsal rays 84-86. Anal rays 68-71. Scales 73-77. No definite spots on dorsal and anal. *urospilus* (p. 193).
- 5b. Dorsal rays 93. Anal rays 75. Scales 88. Posterior part of dorsal and anal with definite spots  
*pterospilotes* (p. 194).

- 4b. Caudal without a well marked spot. Caudal rays normally 10 or 12 depending on the species, variants having 11 rays comparatively few, in 2-6 per cent. of the specimens in the samples examined.
- 6a. Caudal rays normally 10. Teeth on eyed side of lower jaw usually absent, sometimes a few present on side of jaw.
- 7a. Scales 86-98. Dorsal and anal with definite spots posteriorly, well marked in light colored or faded specimens, obscure or imperceptible in dark colored fish. No black spot on head. Offshore. Dorsal rays 89-93. Anal rays 73-78  
*diomedianus* (p. 194).
- 7b. Scales 71-86. Dorsal and anal without well marked spots. Many specimens having a black spot on opercle. Inshore to moderately offshore. Dorsal rays 85-92. Anal rays 69-78 . . . . . *plagiusa* (p. 195).
- 6b. Caudal rays normally 12.
- 8a. Teeth on eyed side of lower jaw extending over its anterior half or its greater part. Deep water species, available depth records ranging 40-324 fathoms.
- 9a. Dorsal rays 85-88. Anal rays 71-75.
- 10a. Scales 69-73. Depth 29.0-30.5 in specimens 50-86 mm. in standard length  
*piger* (p. 197).
- 10b. Scales 79-83. Depth 28.0-28.5 in specimens 53-59 mm. in standard length  
*pusillus* (p. 197).
- 9b. Dorsal rays 96-98. Anal rays 82-83. Scales 92-95. Notably slender, depth 21.0-22.5 in specimens 90-115 mm. in standard length  
*marginatus* (p. 198).
- 8b. Teeth on eyed side of lower jaw normally, or usually, absent, often a few teeth present on side of jaw in *plagiusia*. Species living in shallow water or moderately offshore, greatest available depth record 18 fathoms.
- 11a. Dorsal rays 87-92. Anal rays 70-77. Scales 69-80. Coast of the United States  
*civitatium* (p. 198).
- 11b. Dorsal rays 90-98. Anal rays 76-82 (72 in one specimen out of 25). Scales 74-90. West Indies and Panama  
*plagiusia plagiusia* (p. 199).
- 11c. Dorsal rays 95-101. Anal rays 78-85. Scales 80-92. Brazil  
*plagiusia tessellata* (p. 200).

1c. Dorsal rays 109-114. Anal rays 92-98.

12a. Caudal rays usually 10, sometimes 9. Scales 102-118. No teeth on eyed side of lower jaw

*jenynsi* (p. 200).

12b. Caudal rays 14. Scales 123-128. Teeth on eyed side of lower jaw present

*nebulosus* (p. 200).

***Symphurus minor*, new species.**

*Description.* C 10 (11). D 72-75. A 56-61. Sc 55-66. Teeth on eyed side approximately extending over anterior half of upper jaw and anterior two-thirds of lower jaw. Measurements of 6 specimens 42-75 mm.: caudal 13.5-16.0, depth 28.5-30.5, head 22.5-23.0, preanal 28-31, postanal 73-78.

Rather faintly cross-banded, the bands diffuse, irregular, incomplete, often widely interrupted, in form of 2 short bars placed at dorsal and anal profile, on same vertical; one band at a moderate distance from caudal base often somewhat better developed than others; irregularly shaded with dusky and sometimes washed with whitish; fins rather light colored; no distinctive markings; color description based on only a few of the specimens examined, most specimens seemingly faded or turned dark by preservative.

*Caudal rays.* 14 and 1 specimens have fully developed 10 and 11 rays, respectively; one has 2 rays fused above their bases and 8 full rays or a total of 10. One specimen with a teratic caudal is described below.

*Holotype.* U.S.N.M. 131643; Albatross Station 2406; Lat. 28° 46' N., Long. 84° 49' W.; off St. George Island, Florida; 26 fathoms; March 15, 1885; 42 mm.

*Paratypes.* Two specimens obtained with the holotype (152734); off Cape San Blas, Florida (131590-91, Albatross Station 2374, 26 fathoms; 131593, Albatross Station 2372, 27 fathoms); off Savannah (155233, Pelican Station 195-9, 24 fathoms) and St. Catherine's Island (155230, Pelican Station 196-2, 12 fathoms), Georgia; off Charleston, South Carolina (155231, Pelican Station 182-22, 11 fathoms; and 155232, Pelican Station 194-11, 17 fathoms); off Cape Lookout, North Carolina (134272, Albatross Station 2609, 22 fathoms); off Halifax, Nova Scotia (92614, Albatross Station 2505, 93 fathoms). Total paratypes 15, 26-78 mm., taken in 11-27 fathoms, except off Nova Scotia in 93 fathoms.

The specimens from Albatross Station 2374 might be the same as were included in the original account of *piger* as noted below under that species.

One specimen, 37 mm. (153098), taken off Palm Beach, Florida, in 40 fathoms, has the caudal with 12 rays distally, and one of these rays represents a distal fusion of two rays which arise separately at the basal part of the fin. According to the method of counting here adopted, it should be recorded as having

13 caudal rays. However, the caudal of this specimen is obviously teratic. Some of the rays are sinuous instead of being straight. What is more striking, their bases are not in a clear-cut regular row, as they normally should be, but they overlap one another and are generally highly irregular. At one point, what appear to be a few basal ossicles are irregularly aggregated in a group. It is evident that this specimen is abnormal with respect to the development of the caudal, and this count was omitted from Table 1. It has D 73, A 57 and Sc 60, agreeing with *minor* in these counts which are included in Tables 2-4.

*Comparison.* This species differs from all other species here treated in its low dorsal and anal counts. Its scale count also averages lowest, but this character intergrades widely with *parvus* and *pelicanus*, and *minor* is also nearest to those two species in the dorsal and anal counts. It is closely related to *parvus*, agreeing with it in normally having 10 caudal rays, while *pelicanus* normally has 12 caudal rays. Judged by the small samples examined, its size averages smaller than *parvus*.

***Symphurus parvus*, new species.**

*Aphoristia pigra* Goode & Bean (in part), *Bull. Mus. Comp. Zool.*, 12: 154, 1886 (specimens from Albatross Station 2318 here forming in part basis of *S. parvus*).

*Aphoristia diomediana* Goode & Bean (in part), *Ocean. Ichthy.*, p. 460, 1895 (specimen from Blake Station XXV examined).

*Description.* C 10 (11). D 78-84. A 64-68. Sc 60-73. Teeth on eyed side very small; in upper jaw extending for half its anterior length or some distance farther backward; in lower jaw extending for its greater part or nearly its entire length. Measurements of 5 specimens 53-78 mm.; caudal 13.0-15.5, depth 27.0-31.5, head 22.5-24.5. Preanal 27-30, postanal 74-77.

Two recently preserved specimens 44-48 mm., rather irregularly shaded or diffusely spotted all over without distinctive markings; other specimens examined apparently partly or wholly faded; the holotype, in addition to the faint shadings all over, with a faint suggestion of a cross band on posterior part of body and a better marked transversely oblong spot at a moderate distance in front of caudal base; another specimen with an irregularly rounded, large brown spot at dorsal profile, not far from caudal base; fins light colored, irregularly flecked and shaded with dusky.

*Caudal rays.* 8 specimens have 10 and 1 has 11 rays, all fully developed.

*Holotype.* U.S.N.M. 84491; Albatross Station 2318; Lat. 24° 25' 45" N., Long. 81° 46' W.; off Boca Chica, Florida; 45 fathoms; January 15, 1885; 73 mm.

*Paratypes.* 4 specimens 53-78 mm., from the same Albatross Station as the holotype, as follows: 152733, one specimen originally



in same jar with holotype; 74330, originally labelled cotypes of *Aphoristia pigra*. Off Sombrero Light, Florida (153090, 50-60 fathoms, 63 mm.). Off Palm Beach, Florida (153088, 20-30 fathoms, 44 mm.; 153097, 40 fathoms, 48 mm.). Total paratypes 7, 44-78 mm., taken in approximately 20-60 fathoms.

The following two specimens evidently also belong to this species: Off Palm Beach, Florida (153087, 58 mm.). This specimen is injured and its fin ray counts are not accurately determinable. Blake Station XXV (47657, 66 mm., probably West Indies). The latter is apparently the specimen referred to by Goode & Bean in their 1895 account of *A. diomediana*. Its dorsal, anal and scale counts, included in Tables 2-4, fall at the extreme end on the right of the distribution of *parvus*.

*Comparison.* This species is structurally nearest *minor* and the differences between them are discussed under that species. It is also compared with *pelicanus* under the account of the latter.

#### *Symphurus pelicanus*, new species.

*Aphoristia diomediana* Goode & Bean (in part), Ocean. Ichth., p. 460, 1895 (specimen listed below from Albatross Station 2121-2122 evidently included in account cited).

*Description.* C 12. D 80-81. A 63-67. Sc 61-74. Teeth on eyed side very small, in lower jaw extending for nearly its entire length, in upper jaw ending at some distance before angle of mouth. Measurements of 3 specimens 60-71 mm.: caudal (in two specimens) 17.5, depth 27.5-28.5, head 22.0-23.5, preanal 26-30, postanal 75-78.

Body and fins light yellowish, irregularly and very lightly shaded, almost immaculate. Blind side of Trinidad specimen thickly sprinkled with very small dark points, these points more sparsely distributed and finer in the two Texas specimens; all three specimens with a large dark area directly behind head at ventral profile on both sides of fish, evidently the black peritoneum showing externally.

*Caudal rays.* Two specimens have 12 complete rays; 1 has 2 rays fused above their bases and 10 complete rays or a total of 12.

*Holotype.* U.S.N.M. 155234; Pelican Station 115-5; Lat. 26° 43' N., Long. 96° 51' W.; off Padre Island, Texas; 25 fathoms; February 4, 1939; 60 mm.

*Paratypes.* U.S.N.M. 155235; Pelican Station 116-4; Lat. 26° 34' N., Long. 96° 32' W.; off Padre Island, Texas; 45 fathoms; February 5, 1939; 70 mm. U.S.N.M. 74331; Albatross Stations 2121-2; Station 2121, Lat. 10° 37' 40" N., Long. 61° 42' 40" W., off Trinidad, B. W. I., 31 fathoms; Station 2122 is a short distance away and in 34 fathoms; one specimen 60.9 mm. in standard length, about 71 mm. in total length.

*Comparison.* This species nearly agrees with *parvus* in the number of dorsal and anal rays and scales. It differs in having 12 caudal

rays. The two species also differ on the average in the caudal length and body depth, *pelicanus* having a longer caudal and slenderer body. There may be some minor color differences, but the small samples examined do not permit the evaluation of such probable differences. This species should also be compared with *piger*, the two agreeing in the number of caudal rays and the dentition on the eyed side. They differ in the number of dorsal and anal rays as shown in Tables 2-3. When adequate samples of *pelicanus* and *piger* become available, their frequency distributions in the number of those rays will likely be found to approach closely. This species differs from *piger* also in having a slenderer body and longer caudal.

This species is named after the U. S. Fish and Wildlife Service research boat *Pelican*, which brought together a very valuable collection of specimens from the southeast coast.

#### *Symphurus urosphilus*, new species.

*Description.* C 11. D 84-86. A 68-71. Sc 73-77. Eyed side of large specimen with a very few teeth at symphysis of upper jaw, none on lower; in small specimen teeth in upper jaw more numerous and 2 teeth on side of lower jaw. Measurements of 2 specimens 146 and 42 mm.: caudal 11.5 (13.5), depth 34 (32), head 19 (23.5), preanal 24 (30), postanal 82 (76).

A large black spot on caudal, nearer distal margin than base of fin, surrounded by a hyaline area; brownish with transverse, broad, brown bands deeper than ground color, 3 crowded bands on head, 9 on body, the last 3 faint and more approximated than others (scales largely missing on posterior part of body and bands very faint). The above color description is from the large, fairly recently preserved specimen. The small specimen, long in preservative, has the cross bands faint, but the caudal spot is sharply marked and ocellated with white.

*Caudal rays.* Both specimens have 11 complete rays.

*Holotype.* U.S.N.M. 155225; Pelican Station 181-8; Lat. 32° 01' N., Long. 80° 11' 30" W.; off Savannah, Georgia; 12 fathoms; February 3, 1940; 136 mm.

*Paratype.* U.S.N.M. 73262; Fish Hawk Station 7154; Lat. 29° 32' N., Long. 83° 58' 30" W.; off Pepperfish Key, Florida; 10.5 fathoms; November 7, 1901; 42 mm.

*Comparison.* Considering that in all species except *pterospilotus*, 11 caudal rays occur only in variants, in most species in rather infrequent variants, it is highly probable that the 11 caudal rays in both available specimens will prove to be the normal number in this species. It differs from all other species, again excepting *pterospilotus*, in having a caudal spot. It is compared with *pterospilotus* under the account of that species. The number of dorsal and anal rays and scales in this species is rather low, being at the borderline between the first two groups of species separated in the key.

**Symphurus pterospilotus**, new species.

*Description.* C 11. D 93. A 75. Sc 88. Eyed side of upper jaw with a few teeth near symphysis; that of lower jaw with very short, slender papillae, without teeth. Measurements of a specimen 127 mm.: caudal 11.5, depth 30, head 19, preanal 27, postanal 81.

Dusky shaded with darker, faint traces of diffuse, irregular and incomplete cross bands; caudal and posterior part of dorsal and anal dark; dorsal with 4 somewhat unevenly spaced black spots; the first near beginning of its posterior third, the last near its junction with caudal; 4 similar spots on anal opposite to those of dorsal; an elongate black spot nearly centered on caudal.

*Caudal rays.* 11 complete rays in the single specimen examined.

*Holotype.* U.S.N.M. 87770; Isla de Flores, Uruguay; W. L. Schmitt.

*Comparison.* This species has the unique combination of 11 caudal rays, a spot on the caudal, and spots on the dorsal and anal fins. It agrees with *urospilus* in the number of caudal rays and its spot, but differs in the number of dorsal and anal rays and scales. Unlike *urospilus* it has spots on the dorsal and anal and it is not as deep bodied. It agrees with *diomedianus* in having spots on the dorsal and anal, but differs in having a well defined spot also on the caudal, and it is very highly probable that it differs further from *diomedianus* in the number of caudal rays.

**Symphurus diomedianus** (Goode & Bean).

*Aphoristia diomediana* Goode & Bean, *Proc. U. S. Nat. Mus.*, 8:589, 1886 (off Tortugas, Florida; 26 fathoms)—Goode & Bean (in part), *Ocean. Ichthy.*, p. 460, pl. 90, fig. 378, 1895 (off Tortugas, Yucatan, Trinidad and Dominica; the specimen from Trinidad here referred to *pelicanus*, that from Dominica not examined).

*Symphurus diomedianus* Jordan & Evermann, *Bull. U. S. Nat. Mus.*, 47 (3): 2711, 1898 (after Goode & Bean).

*Symphurus sumptuosus* Chabanaud, *Bull. Museum Paris*, (2) 20:509, 1948 (Rio de Janeiro).

*Description.* C 10 (11). D 89-93. A 73-78. Sc 86-98. Teeth on eyed side absent or a few present at symphysis of upper jaw and on middle of lower jaw. Measurements of 7 specimens 133-207 mm.: caudal 10.0-12.5, depth 28.5-31.0, head 18-20, preanal 23-26, postanal 78-83.

Almost uniformly brownish, or with faint traces of cross bands, or irregularly mottled or blotched with dark shades; posterior part of dorsal and anal variably dusky, sometimes nearly black, with 1-4 rounded irregularly spaced spots on each fin, not far from caudal, on about posterior fifth of standard length, these spots moderately or sharply marked, sometimes faint or hardly perceptible, especially in specimens with very dark fins.

*Caudal rays.* Three specimens out of 18 have the structure of the caudal irregular, in all three 2 of the rays being fused at a

TABLE 5.

Frequency Distribution of the Number of Dorsal Rays in Three Western Atlantic Species of *Symphurus*, Segregated by Minor Populations.

Species and Populations	Distribution														
	85	86	87	88	89	90	91	92	93	94	95	96	97	98	
<i>diomedianus</i>															
United States and Yucatan					1	3	3	1	2						
Brazil							3	2	2						
<i>plagiusa</i>															
Long Island Sound to Cape Canaveral	3	2	18	29	18	13	8	1							
Key West to Tampa	2	4	8	10	7	1									
Apalachicola to Corpus Christi		1	2	15	17	6	3								
Cuba			1					1							
<i>plagusia</i>															
Cuba									1	2			1	1	
Hispaniola							1			2	1	1			
Puerto Rico						2		1		1		1			
Panama									1		4	2	1		

variable distance above their bases to form a single ray distally, as follows. One variant has 1 ray incomplete, 2 rays fused and 7 complete rays or a total count of 10. Another variant has 2 rays fused and 8 complete rays. The third variant has 2 rays fused and 9 complete rays or a total count of 11. The other 15 specimens have 10 complete rays.

*Specimens examined.* From off the following localities: North Carolina (152029); Key West (107322, 129945) and Tortugas (37347, the type), Florida; Isle Derniere (154978, collected by the Pelican) and Atchafalaya Bay (154977, 154979; Pelican), Louisiana; Cabo Catoche, Yucatan (133935); Rio de Janeiro (M. C. Z. 889 and 4665) and Victoria (M. C. Z. 11377), Brazil. Total examined 18 specimens 68-207 mm. The largest specimen is from the coast of North Carolina.

*Comparison.* This species normally has 10 caudal rays like *plagiusa*, and differs from that species in the higher scale count. The numbers of dorsal and anal rays average considerably higher. The black spots on the dorsal and anal, when present, distinguish this species from *plagiusa* and all other species examined from the western Atlantic, except *pterospilotus*; but the spots are hardly perceptible in some specimens. The vertical distribution also separates it incompletely from *plagiusa*. Seven available depth records for *diomedianus* range from 17 to 50 fathoms, and one specimen was taken at 8 fathoms; while *plagiusa* is most common inshore and ranges only to 14 fathoms off-

shore. It is compared with *pterospilotus* under the account of that species.

*Synonymy.* According to Chabanaud's description, the type specimen of his *sumptuosus* agrees with *diomedianus* in the number of caudal, dorsal and anal rays and scales, in the presence of spots on the dorsal and anal and the absence of a spot on the caudal. That *diomedianus* does occur on the coast of Brazil is proved by the 7 specimens examined in the Museum of Comparative Zoology from that coast as listed above. It is, therefore, concluded that *sumptuosus* is a synonym of *diomedianus*.

*Populations.* The composite sample examined from Brazil averages a little higher dorsal and anal counts than that from the coasts of the United States and Yucatan, as shown in Tables 5-6.

#### *Symphurus plagiusa* (Linnaeus).

*Pleuronectes plagiusa* Linnaeus, Syst. Nat., ed. 12, p. 455, 1766 (no locality, received from Dr. Garden and probably came from Charleston)—Goode & Bean, *Proc. U. S. Nat. Mus.*, 8:196, 1886 (description of type, see below).

*Plagusia fasciata* De Kay, *Zool.*, New York, pt. 4, Fishes, p. 304, 1842 (South Carolina, based on an unpublished illustration by Holbrook).

*Symphurus plagiusa* Jordan & Goss, Rep. U. S. Comm. Fish. 1886:325, 1889 (Beaufort, Charleston, Pensacola and Key West)—Jordan & Evermann, *Bull. U. S. Nat. Mus.*,

TABLE 6.

Frequency Distribution of the Number of Anal Rays in Three Western Atlantic Species of *Symphurus*, Segregated by Minor Populations.

Species and Population	Distribution													
	69	70	71	72	73	74	75	76	77	78	79	80	81	82
<i>diomedianus</i>														
United States and Yucatan					1	3	6		1					
Brazil					1		1	1	3	1				
<i>plagiusa</i>														
Long Island Sound to Cape Canaveral	2	6	13	30	22	13	6							
Key West to Tampa	1	6	7	11	4	2	1							
Apalachicola to Corpus Christi			3	5	9	14	7	5	1					
Cuba				1							1			
<i>plagiusa</i>														
Cuba										1	1		1	1
Hispaniola				1					1	1	1	1		
Puerto Rico								3		1		1		
Panama										3	2	1	2	

47 (3): 2710, 1898 (same localities as preceding).

*Description.* C (9) 10 (11). D 85-92. A 69-76 (78). Sc 71-86. Eyed side with teeth on anterior half of upper jaw or for a shorter distance; usually no teeth on eyed side of lower jaw, sometimes a very few teeth at its side. Measurements of 5 specimens 124-147 mm. and 6 specimens 54-77 mm.: caudal 11.0-11.5 (11.5-13.0), depth 29.5-31.5 (27-31), head 18.5-20.5 (21.0-22.5), preanal 24-26 (24-30), postanal 79-83 (77-81).

Color very variable; cross bands darker than ground color, present or absent, when present in various stages of development from almost solidly continuous to interrupted, incomplete or irregular in various degrees, or only faintly indicated; sometimes with few or many intensely dark, very small specks; a large black spot on opercle, centered on its upper lobe, present in the majority of the larger specimens, especially those recently preserved, usually faint or absent in the smaller specimens and often also in the larger; sometimes a smaller solid or interrupted black spot also on lower posterior part of head; dorsal, anal and caudal fins faintly or moderately dusky, usually with a darker pigment along the rays.

*Caudal rays.* Of 345 specimens of which the caudal was examined as recorded in Table 1, 25 specimens or 7.2 per cent. have an irregular or imperfect structure, as follows:

The 3 variants with 9 caudal rays have them fully developed, without irregularities in structure.

Among the 334 specimens recorded as having 10 rays, 22 have an imperfect structure, as follows: 9 have one of the 10 rays in the form of a very small basal ossicle; 2 have 2 such ossicles representing 2 rays; 1 has 3 ossicles and only 7 fully developed rays; 7 have 1 ray in various degrees of incompleteness, in some of them in the form of a very short stump; 2 have 2 of the rays fused at some distance above their bases; 1 specimen has 2 rays in the form of stumps, 2 rays fused above their base and 6 complete rays.

Among the 8 variants recorded in Table 1 as having 11 rays, 5 specimens have them fully developed, while 3 have 1 ray in the form of a basal fragment and 10 complete rays. These 8 variants are important from the practical standpoint of identification in distinguishing *plagiusa* from *civitatium*. Seven of these 8 variants are identified as being specimens of *plagiusa* on the following grounds: 5 have a black spot on the opercle which is a unique color mark of *plagiusa*; 2 which lack a definite opercular spot, were taken in shallow water situations where only *plagiusa* lives, one by seining the beach on Cat Island, Mississippi, the other by trawling in Barataria Bay, Louisiana. The eighth specimen, small and faded, was taken off Anclote Key, Florida, in 6¼ fathoms (133980). As it differs from normal specimens of *plagiusa* in having, in addition to

10 fully developed caudal rays, only an extra very small basal ossicle, the probabilities are that it is a variant of *plagiusa*, but this is not altogether certain. By an outside chance, it might possibly be a variant of *civitatium*.

*Specimens examined.* Long Island Sound (59056, 5 specimens 41-55 mm.). Chesapeake Bay (Cape Charles City, Cape Charles, Thimble Shoal, Ocean View; altogether 13 specimens 52-176 mm.). Many lots ranging from Cape Hatteras, North Carolina, to Key West, Florida, on the Atlantic coast and from Cape Sable, Florida, to Laguna Madre, Texas, on the Gulf coast. Also, 2 specimens from Cuba (37750, 107365). The largest specimens are 189 mm. (one from St. Augustine, Florida, B.O.C. 3708; another from "Florida Keys," M.C.Z. 11060).

This is the most common species of *Symphurus* on the Atlantic and Gulf coasts of the United States. Altogether 130 constituent samples comprising 347 specimens were examined. It is an inshore species and ranges offshore to a depth of 14 fathoms. Depth records are available for 32 of the lots. They were mostly taken in open water offshore in 2-14 fathoms. Many of the other lots, perhaps all of them, were taken by shore seining or by trawling in the inner shallow water bays and estuaries. The latter situations evidently constitute the center of abundance of *plagiusa* with respect to the vertical distribution of the species of *Symphurus*, and of all those examined no specimens of any other species were taken in such locations.

*Comparison.* This species is usually distinguishable by the combination of normally having 10 caudal rays, the presence of a black spot on the posterior part of the head in many specimens, its dorsal, anal and scale counts and its usual shallow water habitat. In the number of caudal rays it agrees with *diomedianus* and is further compared with it and with *civitatium* under the accounts of those species.

*Nomenclature.* Goode & Bean (cited above) present some measurements of Linnaeus' type specimen of *plagiusa* which, converted to percentages of the standard length, give depth 23 and head 17. These measurements do not apply to the common American species here treated, and this species seemingly should be designated *fasciata* De Kay. However, I hesitate to alter well established usage without confirmation of the measurements and further study of the questions involved. Therefore, current usage is here continued.

*Populations.* This species is comparatively homogeneous in its structure, with the possible exception of the Cuban population. Tables 5-6 in which the dorsal and anal counts are segregated into three major geographic regions, show only slight differences. The population of the northern part of the Gulf averages the highest count, that from Key West to Tampa, inclusive, the lowest, and the population on the Atlantic coast is intermediate, but the differences are slight.

The 2 Cuban specimens examined have 10 caudal rays and 73-77 scales, agreeing with *plagiusa* in these counts. One of them (107365) has D 87, A 71, which counts fall within the range of variation of *plagiusa*, somewhat to the left of a median. The other specimen (37750) has D 92, A 78. The dorsal count of this specimen falls in the last column, on the right of the distribution of the species as a whole, while the anal count falls altogether out of the range of the species. Either the latter specimen is an unusually extreme variant, or the Cuban population of *plagiusa* is markedly variable. Another possibility is that the Cuban population averages higher dorsal and anal counts than the populations on the coast of the United States.

***Symphurus piger* (Goode & Bean).**

*Aphoristia pigra* Goode & Bean (in part), *Bull. Mus. Comp. Zool.*, 12:154, 1888 (specimens of more than one species included in original account, see below)—Goode & Bean (in part), *Ocean. Ichthy.*, p. 460, pl. 110, fig. 377, 1895 (same specimens listed as in preceding citation).

*Symphurus piger* Jordan & Goss, Rep. U. S. Comm. Fish., 1886:326, 1889 (after Goode & Bean)—Jordan & Evermann, *Bull. U. S. Nat. Mus.*, 47 (3): 2705, 1898 (after Goode & Bean).

*Symphurus pusillus* Hildebrand (not Goode & Bean), *Carnegie Inst. Washington Publ.* 535:50, 1941 (Tortugas, Florida).

*Description.* C 12. D 85-88. A 72-73. Sc 79-74. Teeth on eyed side extending approximately over anterior three-quarters of both jaws. Measurements of 2 specimens 116-133 mm. and 3 specimens 57-98 mm.: caudal 14 (12.5-15.0), depth 33-34 (29.0-30.5), head 22.5-23.0 (23.0-24.5), preanal 28-30 (in all 5), postanal 75-77 (73-74).

Color of the three large Tortugas specimens pale with sharply contrasting, somewhat irregular, rather narrow cross bands. The other three specimens probably more or less faded; the one specimen from off Sombrero Light with one cross band and a small part of another; the lectotype brownish, irregularly shaded with faint traces of darker cross bands. Fins light colored or moderately dusky, moderately marked with darker dots and small elongate or irregular spots.

*Caudal rays.* The five specimens in which the caudal rays were counted have 12 complete rays.

*Specimens examined.* Off St. Kitts, W. I. (M.C.Z. 27965, 250 fathoms, the lectotype, 98 mm.). Tortugas (117287, 140-197 fathoms, 2 specimens 115-133 mm., the smaller specimen badly damaged; 117176, no depth record, about 116 mm.), off Sombrero Light (153099, 50-60 fathoms, 62 mm., a teratic specimen having only one eye) and off Palm Beach (153089, 40 fathoms, 57 mm.), Florida.

*Comparison.* The number of dorsal rays and scales of *piger* falls near the lower end

of the distribution of *plagiusa* and *civittatum*, while the anal count falls at or near the middle of their ranges. It differs from those two species in having the dentition on the eyed side better developed, and it differs further from *plagiusa* in having 12 caudal rays. In its structural characters it is nearest *pusillus*. Judged by the specimens examined, *piger* differs from *pusillus* in having fewer scales, a deeper body, longer head and shorter postanal. More extensive samples are needed to elaborate adequately the differences between *piger* and *pusillus*.

*Lectotype.* Specimens of at least two species were included for certain in the original account of *Aphoristia pigra*, and probably more than two. Specimens are listed from Blake Station XXIII, and Albatross Stations 2318, 2374, 2425 and 2405. As the phraseology used in the original description for type designation is not in consonance with present day taxonomic practice, and a question might be raised as to which species the name *piger* is to be applied, the specimen from Blake Station XXIII, M. C. Z. 27965, is hereby designated as the lectotype. The specimens from Albatross Station 2318, U. S. N. M. 74330, now labeled as cotypes of *A. pigra*, are included above in the account of *parvus*. Also, specimens from Albatross Station 2374 are included above under the account of *minor*, but it is not altogether certain whether they are the same specimens referred to by Goode & Bean. Specimens from the other two stations listed in the original description could not be located now.

***Symphurus pusillus* (Goode & Bean).**

*Aphoristia pusilla* Goode & Bean, *Proc. U. S. Nat. Mus.*, 8:590, 1885 (off Long Island)—Goode & Bean, *Ocean. Ichthy.*, p. 461, pl. 110, fig. 379, 1895 (based on preceding specimens).

*Symphurus pusillus* Jordan & Evermann, *Bull. U. S. Nat. Mus.*, 47(3): 2710, 1898 (after Goode & Bean).

*Description.* C 12. D 85-88. A 71-75. Sc 79-83. Teeth on eyed side rather well developed in both jaws, continuously extending over their anterior half or farther backward. Measurements of 3 specimens 53-59 mm. in standard length, the caudal damaged: depth 28.0-28.5, head 20.5-22, preanal 27-28, postanal 77-81.

The three small specimens examined apparently faded, rather light brownish, with traces of cross bands in two specimens, fins yellowish.

*Caudal rays.* All 3 specimens have 12 complete caudal rays.

*Specimens examined.* Off Long Island, New York (28730, Fish Hawk Station 921, Lat. 40° 07' 48" N., Long. 70° 43' 54" W., 67 fathoms; 28778, F. H. Station 941, Lat. 40° 01' N., Long. 69° 56' W., 79 fathoms); the three cotypes, their measurements given above.

*Comparison.* This species is nearest *piger*

as discussed under the account of that species.

***Symphurus marginatus*** (Goode & Bean).

*Aphoristia marginata* Goode & Bean (in part), *Bull. Mus. Comp. Zool.*, 12:154, 1886 (specimens from Blake Station CLXXXI and Albatross Station 2376 included in account below; specimen from Fish Hawk Station 1154 included below in account of *nebulosus*; specimens from off St. Vincent not examined)—Goode & Bean (in part), *Ocean. Ichthy.*, p. 459, pl. 110, fig. 376, 1895 (preceding specimens listed).

*Symphurus marginatus* Jordan & Goss, Rep. U. S. Comm. Fish. 1886:323, 1889 (after Goode & Bean)—Jordan & Evermann, *Bull. U. S. Nat. Mus.*, 47(3): 2706, pl. 387, fig. 949, 1900 (after Goode & Bean).

*Symphurus diomedianus* Hildebrand (not Goode & Bean), *Carnegie Inst. Washington Publ.* 535:49, 1941 (Tortugas, Florida).

*Description.* C 12. D 96-98. A 82-83. Sc 92-95. Teeth on eyed side extending over greater part of both jaws. Measurements of 2 specimens 102-127 mm.: caudal 11-13, depth 21.0-22.5, head 17-19, preanal 24-25, postanal 78-80.

Specimens examined probably faded, brownish, traces of rather small, diffuse dusky spots, giving impression of rough arrangement along longitudinal lines; a dark, very fine streak at dorsal and anal base; fins at posterior end of fish dark.

*Caudal rays.* All 12 rays in the four caudals counted, fully developed.

*Specimens examined.* Off Mississippi Delta (M. C. Z. 27967, Lat. 28° 42' N., Long. 88° 40' W., 321 fathoms, Blake). Off Dauphin Island, Alabama (131634, Lat. 29° 03' 15" N., Long. 88° 16' W., 324 fathoms, Albatross). Besides the above 2 type specimens, their measurements given above, 3 specimens examined from Tortugas, Florida (117174, taken in "197 plus fathoms;" 117288, no depth data); in very bad condition, but body rather slender, fin ray counts about agree with the 2 type specimens, and apparently of the same species. The determinable fin ray counts of the Tortugas specimens included in Tables 1-3 and the account of the species.

*Comparison.* This is a deep water species. It has the dentition on the eyed side fairly developed as in *piger* and *pustillus* with which it also agrees in having 12 caudal rays. It differs rather widely from those two species in the dorsal, anal and scale counts. The body is slenderer than in any species here treated, except *nebulosus*.

***Symphurus civitatum***, new species.

*Description.* C (11)12. D 87-92. A 70-77. Sc 69-80. Teeth on eyed side of upper jaw extending over anterior half of jaw or less, none on lower jaw. Angle of mouth approximately under posterior margin of lower pupil or middle of eye. Measurements of 10 Gulf

specimens 91-147 mm. and 2 Atlantic specimens 121-153 mm., the latter in parenthesis: caudal 10.5-13.5 (10.5-11.5), depth 30-34 (31-32), head 19.5-21.0 (18.0-18.5), preanal 24-26 (22-24), postanal 78-82 (81-82).

Cross bands usually absent or faint, sometimes rather fairly marked; opercle without a black spot, occasionally with a dusky area; caudal and posterior part of dorsal and anal variably dusky, sometimes nearly black.

*Caudal rays.* Of 36 specimens with 12 caudal rays, 2 have one of the rays represented by a basal ossicle only, the other 34 having 12 complete rays. Two specimens have only 11 complete rays. The latter were taken in 8 and 10 fathoms in company with other specimens of *civitatum* having the normal number of 12 rays. The probabilities favor the conclusion that they are specimens of *civitatum*, but there is some shade of doubt. By long odds they might possibly be examples of *plagiusa*.

*Holotype.* U.S.N.M. 155227; Pelican Station 77-4; Lat. 29° 06' 30" N., Long. 89° 40' W.; off Mississippi Delta; 9½ fathoms; July 8, 1938; 125 mm.

*Paratypes.* Other 36 Gulf specimens 91-147 mm., in 19 constituent samples taken off the following localities: Aransas Pass and Galveston, Texas; Calcasieu Pass, Marsh Island, Atchafalaya Bay, Isle Derniere, Grand Isle and Grande Terre, Louisiana; Mobile, Alabama; St. Joseph Bay, Florida. Depth records are available for 16 of these constituent samples and range 4-12 fathoms. Also, 2 specimens 121-153 mm. from the Atlantic, taken at Cape Hatteras, North Carolina, and Cape Canaveral, Florida, in 14 and 10 fathoms, respectively.

Six of the 22 constituent samples examined were separated from a mixture of *civitatum* and *plagiusa*. Of the above specimens the *Pelican* took 23 in 11 constituent samples in the Gulf, all on the coast of Louisiana, and one specimen off Cape Canaveral. Based on the samples examined, this is evidently a moderately offshore species which is fairly common on the northern Gulf coast and not so common on the Atlantic coast.

*Comparison.* This species is very close to *plagiusa*. These two represent allopatric, composite, somewhat intergrading populations, as discussed further under the account of *plagiusa*, and it would not be altogether out of place to treat them as two coordinate subspecies. However, the degree of divergence between the two composite populations is high, being at least at the borderline between species and subspecies. The index of divergence, according to the composite samples examined, is 8 when the number of dorsal rays is used as the basis for comparison and 7 when the number of anal rays is used. This degree of divergence seems nearer that of species. At any rate, *civitatum* is here treated as a full species until it and *plagiusa*, especially the latter, are more adequately sampled.

For the practical purpose of identification,

*civitatum* needs to be compared with *plagiusa*; as it occurs through the greater part of the geographic range of that species, the two are sometimes taken together, and the dorsal, anal and scale counts are nearly the same in both. The chief character that distinguishes them is the number of caudal rays, normally 10 in *plagiusa* and 12 in *civitatum*, but this difference is not absolute, as out of 383 specimens examined of both species 10 have 11 rays. Most specimens of these two species are further distinguished by their habitat and by color. *S. civitatum* does not live in shallow water and is not taken in the inner bays or by shore seining in open water. Also, most of the larger, well preserved specimens of *plagiusa* have a black spot on the head, while *civitatum* lacks such a spot. Often these two differences are not applicable. Many specimens of *plagiusa* lack the black spot. Also, while *plagiusa* is the only species of *Symphurus* on the east coast of the United States that inhabits shallow water, it also extends offshore over the range of *civitatum*, and of 82 lots of both species examined, that comprise 2 or more specimens, 6 contained a mixture of both, apparently taken together in the same trawl. Nevertheless, by these two differences, 7 out of the 10 specimens which have 11 caudal rays are confidently referable to *plagiusa* as discussed under that species. That leaves only 3 specimens out of 383, or less than one per cent., about which there is a shade of doubt regarding their proper placement by species. The grounds for placing these 3 specimens by species, one in *plagiusa* and two in *civitatum*, are stated above.

A minor difference between the two species is that in *civitatum* the posterior angle of the mouth is usually slightly more backward with relation to the position of the eye, than in *plagiusa*. This criterion furnishes some slight additional evidence that the 10 variants with 11 caudal rays have been properly placed, 8 and 2 in *plagiusa* and *civitatum*, respectively. However, this character is not decisive, and often specimens cannot be referred to their proper species when it alone is used as a criterion.

*Populations.* The two Atlantic specimens examined have a shorter head than 10 specimens measured from the Gulf, as indicated above.

#### *Symphurus plagiusa*

(Bloch & Schneider), *sensu lato*.

*Aphoristia ornata* Gunther, Cat. Fish. Brit. Mus., 4:490, 1862 (Atlantic coasts of tropical America).

*Symphurus plagiusa* Jordan & Goss, Rep. U. S. Comm. Fish. 1886:324, 1889 (Havana; Brazil)—Jordan & Evermann, *Bull. U. S. Nat. Mus.*, 47(3): 2709, 1898 (Havana; Brazil).

*Description.* C (11) 12 (13). D 90-101. A (72) 76-85. Sc 74-92. Teeth on eyed side of lower jaw absent, or a few present in individual variants. Angle of mouth under

middle of lower eye or posterior margin of its pupil. Cross bands present or absent; caudal and posterior part of dorsal and anal black or dusky; no definite, well marked spots on caudal, dorsal, anal and opercle.

*Distinctive characters and relationship.* This species is characterized by the combination of normally having 12 caudal rays, its dorsal, anal and scale counts, the poorly developed dentition on the eyed side and the lack of definite spots on the caudal, dorsal and anal. As here treated, it is divisible into two subspecies, *plagiusa* in the West Indies and Central America, and *tessellata* on the coast of Brazil and Uruguay. The index of divergence between the two in the frequency distribution of the dorsal and anal rays (Tables 2-3), amounts to 15, which is of subspecies magnitude.

From one viewpoint *plagiusa* might be regarded as a species that extends from the coast of the United States to South America; that is, including *civitatum*; and is composed of a number of diverging populations the degrees of divergence of which differ widely. From this viewpoint the populations of *plagiusa*, *sensu lato*, might be divided into three major groups which might be treated as subspecies, *civitatum* on the coast of the United States, *plagiusa*, *sensu stricto*, in the West Indies and Central America, and *tessellata* on the coast of Brazil and Uruguay. However, the divergence of the population on the coast of the United States is rather abrupt. *S. civitatum* diverges to a greater extent from the subspecies *plagiusa* than *tessellata* does from the latter. The degree of divergence of *civitatum* is about that of species magnitude and it is here treated as a full species, as discussed under its account.

#### *Symphurus plagiusa plagiusa*

(Bloch & Schneider).

*Plagiusa subcinerea*, cauda attenuata . . . Browne, The civil and natural history of Jamaica, p. 445, 1789 (Jamaica; non-binomial).

*Pleuronectes plagiusa* Bloch & Schneider, Syst. Ichthy., p. 162, 1801 (based on Browne).

*Aphoristia fasciata* Goode & Bean (not De Kay), Ocean. Ichthy., p. 458, pl. 110, fig. 374, 1895 (Jamaica).

*Description.* C (11) 12 (13). D 90-98. A (72) 76-82. Sc 74-90. Dentition on eyed side rather weak; teeth in upper jaw extending over its anterior two-fifths or less; usually no teeth on eyed side of lower jaw, often a few teeth present on side, near its middle or on its anterior third. Measurements of 12 specimens 85-195 mm. and 6 specimens 49-76 mm.: caudal 9-12 (9.5-12.0), depth 27.0-30.5 (25-28), head 19-21 (20.5-22.0), preanal 23-27 (26-28), postanal 77-83 (76-81).

Cross bands usually present, variable, often interrupted or irregular, sometimes faint or imperceptible; caudal and posterior part of dorsal and anal usually black, often

moderately dusky; posterior part of head often with a large dusky area, but no well defined black spot; no distinctive color marks.

*Caudal rays.* Of the 23 specimens recorded in Table 1 as having 12 rays, one of the rays is incomplete in 3, being in the form of a small basal ossicle in 2 specimens, and as a short stump in one. All 3 imperfect specimens are from Panama. One specimen has 11 and another 13 caudal rays, all complete.

*Specimens examined.* Taken at or off the following localities: Cuba (35108; M. C. Z. 11200, 11269 and 25982); Jamaica (37348); Haiti (133671); Dominican Republic (108369, 108372); Puerto Rico (50178, M. C. Z. 28843); Porto Bello (81652), Fox Bay (81653-5) and Fort Randolph (144792), Panama; Trinidad (123112). Total examined, 25 specimens, 44-195 mm. Only 2 depth records are available, 17-18 fathoms, for the two specimens taken off the Dominican Republic by the *Caroline*. Some of the others at least apparently were taken by shore seining.

*Comparison.* The relationship of the subspecies is discussed above under the account of its species.

*Populations.* This subspecies has a comparatively wide geographic range, and judged by the small samples examined it appears to be markedly heterogeneous. The dorsal and anal counts are segregated by local populations in Tables 5-6. The Cuba and Panama populations average higher counts than those from Hispaniola and Puerto Rico.

***Symphurus plagusia tessellata***  
(Quoy & Gaimard).

*Plagusia tessellata* Quoy & Gaimard, Voy. Uranie, Zool., p. 240, 1824 (Rio de Janeiro).

*Plagusia brasiliensis* Agassiz, in Spix, Selecta Genera et Species Piscium . . . Brasiliam, p. 89, pl. 50, 1829 (Brazil).

*Description.* C (11) 12 (13). D 95-101. A 78-85. Sc 80-92. Teeth on eyed side of upper jaw extending approximately over its anterior third; no teeth on eyed side of lower jaw. Measurements of 10 specimens 124-221 mm.: caudal 8.5-9.5, depth 26.0-29.5, head 18.0-19.5, preanal 24-26, postanal 77-84.

Most specimens examined apparently faded, a few specimens perhaps showing about normal color in preservative, or not so faded, having a nearly uniform brownish color, without definite cross bands, and caudal and posterior part of dorsal and anal black or dusky; no distinctive markings.

*Caudal rays.* Of the 31 specimens entered in Table 1 as having 12 caudal rays, 2 have one of these rays incomplete, represented by a small basal ossicle. One specimen has 2 rays fused at some distance above their bases and 11 complete rays, or a total count of 13. Two specimens have only 11 rays, all of them complete.

*Specimens examined.* Rio de Janeiro, Santos, Pernambuco and Rio Sao Francisco,

Brazil; Uruguay. Total examined, 34 specimens, 76-221 mm., all except one from Brazil.

*Comparison.* The relationship of this subspecies is discussed under the account of its species.

*Nomenclature.* The name *ornatus* Lacépède (Hist. Nat. Poiss., 4:659 and 664, 1802), is sometimes used by authors to designate this subspecies, or that name is placed in the synonymy of *plagusia*, sensu lato. Lacépède's *ornatus* was based on a specimen the locality of which was unknown. It is described as having a lateral line and 8 or 9 deeply dark bands. It is much more likely that this specimen came from the Indo-Pacific region than from the western Atlantic.

***Symphurus jenynsi*** Evermann & Kendall.

*Symphurus jenynsi* Evermann & Kendall, Proc. U. S. Nat. Mus., 31:108, fig. 4, 1907 ("probably from the market at Buenos Aires").

*Symphurus bergi* Thompson, *ibid.* 50:414, pl. 2, fig. 2, 1916 (Montevideo).

*Description.* C 9-10. D 109-114. A 92-97. Sc 102-118. Beginning to taper posteriorly at about middle of standard length, varying a little both ways (some evidence to show shape changing with growth, beginning to taper more posteriorly in the largest specimen). Teeth on eyed side of upper jaw in a small group at a short distance behind symphysis; no teeth on eyed side of lower jaw. Measurements of 3 specimens 233-346 mm., 9 specimens 165-195 mm. and 5 specimens 128-159 mm., the following proportional measurements given in three groups in same order, beginning with largest: caudal 6.5-8.0, 7.0-8.5, 8-9; depth 27.5-32.5, 26-30, 26.5-29.0; head 15.5-16.5, 16-18, 17.5-19.0; preanal 21-24, 21-24, 23-28, postanal 83-87, 80-86, 78-83.

Nearly uniformly colored or irregularly shaded or spotted, the shadings sometimes aggregated to form rather diffuse cross bands; fins moderately dusky; no distinctive markings.

*Caudal rays.* In the 21 specimens counted, all the caudal rays are fully developed, including the two variants having 9 such rays.

*Specimens examined.* Buenos Aires, Argentina (55573, type of *jenynsi*, 181 mm.). Other 21 specimens 117-346 mm., in 10 constituent samples, including the type of *bergi* (76852), all taken on the coast of Uruguay, at or off Montevideo and Isla de Flores, definite depth records not available, probably taken both inshore and offshore. This is evidently a common species on the coast of South America.

*Comparison.* This species is readily distinguished from the others here treated by its high dorsal, anal and scale counts in combination with the presence of 9-10 caudal rays.

***Symphurus nebulosus*** (Goode & Bean).

*Aphoristia nebulosa* Goode & Bean, Bull. Mus. Comp. Zool., 10:192, 1883 (off Charles-



ton, South Carolina)—Goode & Bean, Ocean. Ichthy., p. 458, pl. 110, fig. 375, 1895 (based on type specimen).

*Aphoristia marginata* Goode & Bean (in part), *Bull. Mus. Comp. Zool.*, 12:154, 1886 (specimen from Fish Hawk Station 1154 belongs to *nebulosus*).

*Description.* C 14. D 109-113. A 94-98. Sc 123-128. Teeth on eyed side extending over anterior half or greater part of both jaws. Body notably elongate. Upper lobe of head notably small, lower lobe large and notably projecting beyond lower. Measurements of 3 specimens 45.5-77.5 mm. in standard length, the caudals damaged: depth 21.5-23.5, head to apex of upper lobe 19.0-20.5, to apex of lower lobe 21.0-23.5, preanal 27-30, postanal 73-75.

Almost uniformly colored, reddish or yellowish brown, the three available specimens perhaps faded, side of abdomen black, apparently the black peritoneum showing on the outside; no distinctive markings.

*Caudal rays.* The 3 specimens examined have 14 complete rays.

*Specimens examined.* Fish Hawk Station 1154; Lat. 39° 55' 31" N., Long. 70° 39' W.; off Long Island, New York; 193 fathoms (152842). Blake Station 316; Lat. 32° 7' N., Long. 78° 37' 30" W.; off Charleston, South Carolina; 229 fathoms (M. C. Z. 27966, the holotype). Albatross Station 2664; Lat. 29° 41' N., Long. 79° 55' W.; off Matanzas Inlet, Florida; 373 fathoms (84490). Measurements of these 3 specimens given above.

*Comparison.* This species differs from all others here treated in having 14 caudal rays. The scales are more numerous than in all other species, approaching *jenynsi* in this character. In the number of dorsal and anal rays it about agrees with *jenynsi* and differs from all other species. In its notably slender body, it about agrees with *marginatus* and differs from the others. Altogether, it is a very distinctive, readily recognizable species.

## EXPLANATION OF THE PLATES.

### PLATE I.

Fig. A. *Symphurus minor*; from the holotype; U. S. N. M. 131643; off St. George Island, Florida; 42 mm.

Fig. B. *Symphurus parvus*; from the holotype; U. S. N. M. 84491; off Boca Chica, Florida; 73 mm.

Fig. C. *Symphurus pelicanus*; from a paratype; U. S. N. M. 155235; off Padre Island, Texas; 70 mm.

### PLATE II.

Fig. D. *Symphurus urospilus*; from the holotype; U. S. N. M. 155225; off Savannah, Georgia; 136 mm.

Fig. E. *Symphurus pterospilotus*; from the

holotype; U. S. N. M. 87770; Isla de Flores, Uruguay; 127 mm.

Fig. F. *Symphurus diomedianus*; from the holotype; U. S. N. M. 37347; off Tortugas, Florida; 152 mm.

### PLATE III.

Fig. G. *Symphurus plagiusa*; U. S. N. M. 154962; off Cumberland Island, Georgia; 123 mm.; many specimens lack black opercular spot.

Fig. H. *Symphurus civitatum*; from the holotype; U. S. N. M. 155227; off Mississippi Delta; 125 mm.

Fig. I. *Symphurus civitatum*; a well marked banded variant; U. S. N. M. 120081; Galveston, Texas; 125 mm.