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THE CHAENOPSINE BLENNIES OF THE SOUTHWESTERN CARIBBEAN (PISCES: CLINIDAE: CHAENOPSINAE) I. SYSTEMATIC ANALYSIS AND ZOOGEOGRAPHY

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ABSTRACT

The chaenopsine blennies are an homogeneous group which may be considered a subfamily of the Clinidae, since the existing evidence is not enough to give them familial status. The subfamily includes eight genera: **Mccoskerichthys, Coralliozetus, Acanthemblemaria, Ekemblemaria, Emblemaria, Hemiemblemaria, Lucayablennius,** and **Chaenopsis.** The nominal genera **Protemblemaria** and **Emblemariopsis** are herewith considered synonyms of **Coralliozetus,** since they share two derived characters: small size and sexual dimorphism in the color of the head, and are rather similar in several other characteristics. The división of the West Indian Zoogeographical Province made by Briggs (1974) is unnatural, since the fish fauna of Belize, Florida and the Bahamas is very similar. I proposed two subprovinces, the Northern Caribbean-Antillean from Isla de San Andrés (12.5°N) in the western Caribbean to Cabo Catoche (21.5°N, México), southern Florida, Bahamas, Bermuda, and the Antilles; and the Southern Caribbean from Costa Rica to the island of Trinidad. Eight of the thirteen chaenopsines endemic to the Southern Caribbean Subprovince belong to genera, subgenera, or species-groups of Chaenopsinae more widely distributed in the eastern Pacific than in the Caribbean, being therefore pacificophile species. There are 23 species of chaenopsine blennies in the southern Caribbean, which is 61% of the total West Indian fauna of the group, while in the Northern Caribbean-Antillean Subprovince the number of known species is 20.

RESUMEN

Los chaenopsinos son un grupo homogéneo de peces que puede ser considerado como una subfamilia de los Clinidae, debido a que la evidencia existente no es suficiente para darles estatus de familia. La subfamilia incluye ocho géneros: **Mccoskerichthys, Coralliozetus, Acanthemblemaria, Ekemblemaria, Emblemaria, Hemiemblemaria, Lucayablennius** y **Chaenopsis.** Los géneros nominales **Protemblemaria** y **Emblemariopsis** son considerados aquí sinónimos de **Coralliozetus** ya que comparten dos caracteres derivados: tamaño pequeño y coloración de la cabeza sexualmente dimórfica,

y son relativamente similares en varias otras características. Briggs (1974) dividió antinaturalmente la provincia zoogeográfica de las Indias Occidentales, pues la ictiofauna de Belice, Florida y las Bahamas es muy similar. Se proponen dos subprovincias, la Norte del Caribe-Antillas desde la Isla de San Andrés (12.5°N) en el Caribe occidental hasta Cabo Catoche (21.5°N, México), sur de Florida, Bahamas, Bermudas y las Antillas; y la del Sur del Caribe que va desde Costa Rica hasta la isla de Trinidad. Ocho de las trece especies de chaenopsinos endémicos de la Subprovincia del Sur del Caribe pertenecen a géneros, subgéneros, o grupos de especies de Chaenopsinae que están más ampliamente distribuidos en el Pacífico oriental que en el Caribe, siendo por ende especies pacificófilas. Hay 23 especies de chaenopsinos en el Caribe sur, lo cual es 61% de la fauna del grupo que existe en las Indias Occidentales, en tanto que en la Subprovincia Norte del Caribe-Antillas el número de especies conocidas es de 20.

The blennies (order Perciformes, infraorder Blennioidei) include more than 600 species, of which more than 80 percent belong to the tropical and temperate families Tripterygiidae, Clinidae and Blenniidae (Nelson, 1976). Gilbert (1973) discussed the fact that the members of the family Blenniidae are dominant Blennioidei in coral reefs of the tropical Indian and western Pacific Oceans, while the family Clinidae is the same in the coral reefs the Caribbean region. Böhlke and Chaplin (1968) reported 41 clinid species in the Bahamas, among 507 fish species in total, this being second only to the gobies (43 species); twelve of the clinid species were of the subfamily Chaenopsinae. Few comprehensive studies have been done on the systematics of the Caribbean chaenopsines (Stephens, 1963, 1970; Robins and Randall, 1965; Smith-Vaniz and Palacio, 1974). Except for short zoogeographical analysis appearing in the works cited above and in some other papers (e. g., Greenfield and Johnson, 1981), no studies have been made in this field. I have studied the chaenopsine blennies living in the southwestern Caribbean, and found 12 species, two of which were new to science. In this paper systematic analysis of this interesting group is made, and the zoogeography of chaenopsine species in the Caribbean is discussed.

SYSTEMATIC ANALYSIS OF THE CHAENOPSINE BLENNIES

The chaenopsine blennies have been classified recently in different ways. They have been included in the family Blenniidae (Hubbs, 1952), in the family Clinidae (Springer, 1955), or as a separate family (Stephens, 1963). The last two trends are the most accepted today, and they will be discussed below. Stephens (1963) separated the group from the family Clinidae principally because its members have two circumorbital bones, scaleless bodies, and no lateral line. This point of view is shared by several authors as Greenwood *et al.* (1966), Randall (1968) and Gosline (1971). On the other hand, several researchers have kept the group within the family Clinidae, considering that their characteristics do not deserve

familial status (e. g., Robins and Randall, 1965; Böhlke and Chaplin, 1968; Böhlke and Robins, 1974; Smith-Vaniz and Palacio, 1974). Nelson (1976) separated the chaenopsines from the clinines as different subfamilies, but considered the genera *Neoclinus* and *Stathmonotus* to be chaenopsines. *Neoclinus* was excluded from this group by Stephens (1963) and this seems to be backed by the presence of scales, a lateral line and four circumorbital bones in this genus. *Stathmonotus* was considered to be a member of the subfamily Clininae by Springer (1955) and subsequent authors. This genus has four circumorbital bones, scales present or not, and a lateral line composed of rudimentary pores.

Böhlke and Robins (1974) described a new genus and species of blenny, *Haptoclinus apectolophus,* from the Caribbean, and noted that its characteristics break down the separation between chaenopsids, clinids, and tripterygiids. Rosenblatt and Stephens (1978) considered *Haptoclinus* a typical clinid since it has scales, four circumorbital bones, and lateral-line pores. These authors described a new genus of chaenopsine blennies, *Mccoskerichthys,* which has four circumorbital bones, and bushlike supraorbital cirrus (a character of *Neoclinus*). They said that *Neoclinus* can be additionally separated from *Mccoskerichthys* and other chaenopsines because it has a dermosphenotic bone. Fukao (1980: 204) reported : "It (the dermosphenotic bone) was not found, however, in the three Japanese species of *Neoclinus* in this study". This causes the separation of the chaenopsines and clinines to be more difficult. George and Springer (1980) have restricted further the limits of the family Clinidae, which would include only *Clinus* and related genera. This a typical "splitters" classification, which emphasizes the characters that distinguish the groups.

I consider that the existing evidence is insufficient to give familial status to the Chaenopsinae because in the family Clinidae (*sensu* Springer, 1955) there are several evolutionary tendencies that have resulted in repeated losses of scales and other characters at different times. It must be noted that the chaenopsine blennies are a homogeneous group with similar habits and a restricted geographical distribution. Therefore, I support the inclusion of the group within the family Clinidae, as it has been done by Robins *et al.* (1980), giving it subfamilial status following Smith-Vaniz and Palacio (1974).

Stephens (1963) divided the subfamily in two lineages, one with the nasals united medially and the other with them separated. The first subgroup included the genera *Protemblemaria, Coralliozetus, Ekemblemaria,* and *Acanthemblemaria,* which also have experimented a tendency to the sculpturing of the frontals. This subgroup must include also the recently described genus *Mccoskerichthys* (Rosenblatt and Stephens,

1978). The other lineage included *Pseudemblemaria, Emblemaria, Emblemariopsis, Hemiemblemaria, Lucayablennius,* and *Chaenopsis.* Stephens (1970) synonymyzed *Pseudemblemaria* with *Emblemariopsis,* reducing the number of genera accepted by him to nine.

Table 1 analizes the different characteristics which may be considered either advance or generalized in the Chaenopsinae. The criteria for cataloguing a characteristic was based principally on its presence or absence in the clinine genus *Neoclinus.* This genus is considered near the branch from which the chaenopsines originated (Stephens, 1963). If one characteristic is present in *Neoclinus* it is considered generalized. The divergence of it from that genus is considered advanced.

The characteristics considered are:

1. Cranial bones rugose and in some cases spiny. This characteristic is relatively to very well developed in *Ekemblemaria* and *Acanthemblemaria,* poorly developed in *Mccoskerichthys, Protemblemaria* and *Coralliozetus,* and apparently absent in the rest of the genera.
2. Snout elongate. The genera with this specialized characteristic are *Lucayablennius* and *Chaenopsis. Hemiemblemaria* has a moderately long snout and may be considered intermediate between *Lucayablennius* and *Chaenopsis* and the remaining genera in this character.
3. Supraorbital cirrus absent. The generalized characteristic, the existence of two or more pairs of multifid supraorbital cirri, is present in *Mccoskerichthys* and *Protemblemaria.* The intermediate trait includes from mediumly developed, as in *Coralliozetus, Ekemblemaria*, and *Acanthemblemaria* and *Emblemaria*, to poorly developed to absent in *Emblemariopsis.* It is absent in *Hemiemblemaria, Lucayablennius* and *Chaenopsis.*
4. Dorsal fin high and sexually dimorphic. The generalized characteristic of a low dorsal fin exists in *Mccoskerichthys, Ekemblemaria, Acanthemblemaria,* and *Lucayablennius.* The intermediate characteristic appears in *Protemblemaria, Coralliozetus, Emblemariopsis* and *Chaenopsis.* Only *Emblemaria* has the advanced character.
5. Dorsal and anal ray counts extreme; many more dorsal rays than spines. Only *Mccoskerichthys* and *Chaenopsis* have this advanced characteristic. *Ekemblemaria* and *Lucayablennius* may have equal number of dorsal-fin rays and spines. All other genera have more dorsalfin spines than rays.
6. Pelvics longer than pectorals. The generalized characteristic, pectorals longer than pelvics, is present in *Mccoskerichthys, Protemblemaria, Ekemblemaria, Hemiemblemaria,* and *Lucayablennius,* the intermedium condition is present in *Emblemariopsis, Chaenopsis, Coral-*

Table 1. Characteristics considered advanced in the chaenopsine blennies and their presence or absence in the 10 genera accepted by Stephens (1970) and Rosenblatt and Stephens (1978). For detailed explanations see the text. +, present, ±, relatively developed; −, absent.

	Acanthemblemaria	Ekemblemaria	Lucayablennius	Chaenopsis	Hemiemblemaria	Mccoskerichthys	Protemblemaria	Coralliozetus	Emblemariopsis	Emblemaria
1. Cranial bones rugose or spiny	+	+	−	−	−	±	±	±	−	−
2. Snout elongated	−	−	+	+	±	−	−	−	−	−
3. Supraorbital cirrus absent	±	±	+	+	+	−	−	±	±	±
4. Dorsal fin high, sexually dimorphic	−	−	−	±	−	−	±	±	±	+
5. Many more dorsal rays than spines	−	±	±	+	−	+	−	−	−	−
6. Pelvics longer than pectorals	±	−	−	±	−	−	−	±	±	+
7. Small size	−	−	+	*	*	−	+	+	+	−
8. Color of head sexually dimorphic	±	−	−	−	−	±	+	+	+	±
9. Two rows of teeth on palatines	+	−	−	−	−	−	−	±	−	±
10. Two circumorbital bones	+	+	+	+	+	−	+	+	+	+

*Genera with another advanced character: Large size

liozetus, and *Acanthemblemaria*. The advanced characteristic appears only in *Emblemaria*.

7. Small size (standard length always less than 50 mm, sometimes less than 40 mm). The generalized characteristic (length between 50 and 80 mm) is the normal condition in *Mccoskerichthys, Emblemaria, Ekemblemaria,* and *Acanthemblemaria. Hemiemblemaria* and *Chaenopsis* —except the so called "short-bodied species" (Hastings and Shipp, 1981)— show another advanced character, large size (length greater than 80 mm). The small size chaenopsines are *Protemblemaria, Coralliozetus, Emblemariopsis,* and *Lucayablennius.*
8. Sexual dimorphism present in the color of the head; males black headed or with bands. This characteristic is absent from species of *Ekemblemaria, Hemiemblemaria, Lucayablennius,* and *Chaenopsis.* It is not well developed in *Mccoskerichthys, Acanthemblemaria* and *Emblemaria,* The character is well extended in *Protemblemaria, Coralliozetus* and *Emblemariopsis.*
9. Always two rows of teeth on the palatine bones. Only one species of both *Coralliozetus* and *Emblemaria* exhibit this condition, which is an advanced character of *Acanthemblemaria.*

10. Two circumorbital bones. The primitive characteristic, four circumorbital bones, is present only in *Mccoskerichthys*. The other genera show the advanced character.

Other characters considered important by Stephens (1963) are not so considered in this work. As noted above, Stephens separated the chaenopsine blennies into two lineages based on the separation or union of the nasal bones. The separation of the nasals is a neotenic character, of which existence or absence cannot be considered a demostration of phylogenetic relations.

From Table 1 several considerations may be inferred. First, the sharing of characteristics 2 (in part) and 3 by *Hemiemblemaria, Lucayablennius* and *Chaenopsis* (the *Chaenopsis*-group) indicate the close relationships existing between these three genera. *Chaenopsis* is the most specialized of them, as it is demostrated by characteristic 5.

Ekemblemaria and *Acanthemblemaria* (the *Acanthemblemaria*-group) share characteristic 1, which indicate their close relationship, although *Acanthemblemaria* differs in its two rows of palatine teeth. *Emblemaria* diverges from the rest of known chaenopsid genera in characters 4 and 6. I agree with Stephens (1963, 1970) in the inference of a close relationship between *Emblemaria* and the *Chaenopsis*-group.

Mccoskerichthys is the only genus with characteristic 10. For this reason it is considered the most primitive form in the group and thus the closest one to *Neoclinus*. *Mccoskerichthys* shares with *Chaenopsis* an elongated body, as indicated by the increase of soft dorsal fin rays. However, this may be considered a case of convergence, since the two share no other derived characters. *Protemblemaria, Coralliozetus* and *Emblemariopsis* share characteristics 7 and 8 (*Lucayablennius* also exhibits characteristic 7, but it has been shown that this genus belongs to the *Chaenopsis*-group), and are rather similar in characteristics 1, 2, 3, 4, 5, 6 and 9. I consider these genera very similar in several respects, and emphasizing their similarities better than their differences, I synonymize them with *Coralliozetus* being the oldest name of the group.

In Figure 1, I present my point of view of the interrelationships of the genera, comparing it to Stephens' (1970). The principal divergences are in the supposed separations between *Protemblemaria, Coralliozetus* and *Emblemariopsis,* which Stephens (1963, 1970) included in two different lineages.

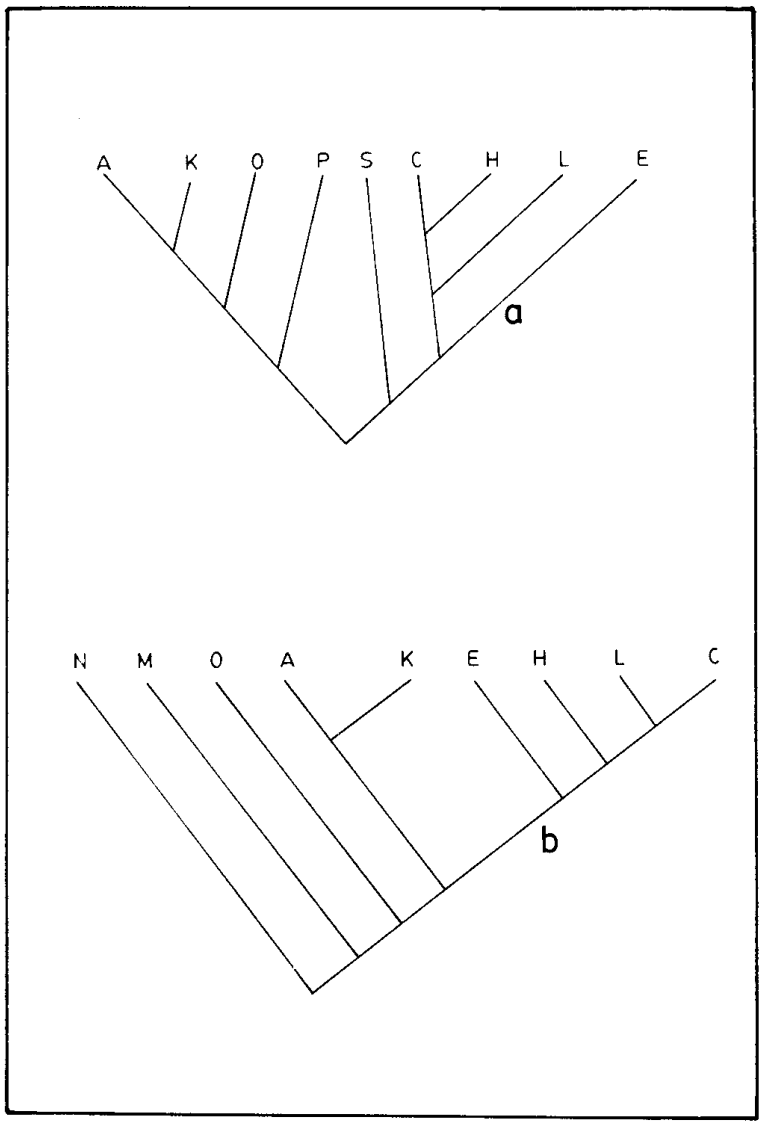

Figure 1. The phylogenetic relationships between the genera of the subfamily Chaenopsinae: **a**, scheme proposed by Stephens (1970); b, scheme proposed in this work. A, *Acanthemblemaria;* C, *Chaenopsis;* E, *Emblemaria;* H. *Hemiemblemaria;* K, *Ekemblemaria;* L, *Lucayablennius;* M, *Mccoskerichthys;* N, *Neoclinus;* O, *Coralliozetus;* P, *Protemblemaria;* S, *Emblemariopsis.*

KEY TO THE WESTERN ATLANTIC GENERA
OF THE SUBFAMILY CHAENOPSINAE

1a. Total dorsal-fin elements 44-56. At least 10 more soft rays than spines in dorsal fin ..... *Chaenopsis*

1b. Total dorsal-fin elements 28-44. At most 3 more soft rays than spines in dorsal fin (usually an equal number or more spines than soft rays) 2

2a. Tip of lower jaw projecting beyond tip of upper jaw; supraorbital cirrus absent 3

2b. Tip of lower jaw not projecting beyond tip of upper jaw; supraorbital cirrus present or lacking . 4

3a. Snout very long and pointed, snout length 1.2 to 1.4 in upper jaw length; lower jaw produced into a long fleshy tip; pectoral-fin rays 13 ..... *Lucayablennius*

3b. Snout moderately long, not pointed, snout length 2.0 to 2.3 in upper jaw length; lower jaw not produced into a fleshy tip; pectoral fin rays 14 ..... *Hemiemblemaria*

4a. Two or more rows of teeth on each palatine bone; top of head often spiny ..... *Acanthemblemaria*

4b. One row of teeth on each palatine bone (except two rows in one species of *Emblemaria,* which has a simple cirrus on each eye and 14-16 soft rays in dorsal fin, and in one species of *Coralliozetus*, which has one or two pairs of supraorbital cirri and 11-13 soft rays in dorsal fin); top of head never spiny 5

5a. Supraorbital cirrus present or lacking, if present equal or smaller than the orbit diameter; 10-17 soft rays in dorsal-fin (only one species with 15 rays or more, but it has two pairs of bifid to multifid supraorbital cirri) ..... *Coralliozetus*

5b. One pair of supraorbital cirrus, longer than the orbit diameter in males; 13-22 soft rays in dorsal fin 6

6a. Head rugose anteriorly; 37-39 total dorsal-fin elements; pectoral fins longer or equal to pelvic fins ..... *Ekemblemaria*

6b. Head smooth anteriorly; 30-38 total dorsal-fin elements; pelvic fins longer than pectoral fins ... *Emblemaria*

ZOOGEOGRAPHY

Zoogeographically, the world tropical oceans have been divided into two well defined regions: the Indo-West Pacific and the Atlanto-Eastern Pacific (Ekman, 1953). The nature of this scheme may be seen by the distribution of several fish groups endemic to either region, e.g., the subfamily Sparisomatinae (Scaridae) and the tribe Blenniini (Blenniidae) are both endemic to the Atlanto-Eastern Pacific Region.

The relationships between both coasts of the Americas are closer than between the Atlantic American and African coasts. There is no endemic family of fishes in the tropical Atlantic, but there are several of these groups restricted to the Eastern Pacific and to the western Atlantic. The subfamily Chaenopsinae, together with the Dactyloscopidae, the Gobiesocinae (Gobiesocidae), Gobiosomini (Gobiidae), and the Lepophidiinae (Ophidiidae) are a good example of these.

The chaenopsine blennies are represented in the tropical western Atlantic by 38 species (Table 2). Nine of these species (or species pairs) are relatively widely distributed in the Caribbean and adjacent waters (Table 3). Eleven of the chaenopsine species are restricted to the north-western Caribbean (Bahamas, southern Florida, Greater Antilles, Belize, and Honduras) (Table 4). Thirteen of the chaenopsine species are restricted to the south-western Caribbean and adjacent waters (Table 5): Costa Rica, Panamá, Colombia, Venezuela and Guianas. Three of the remaining species are known from Bermuda or the Carolinian Province (temperate waters) (Table 6). The last species, *Coralliozetus signifer,* is a Brasilian endemic.

The habitat or ecological preference of the north-western Caribbean group of chaenopsine blennies is usually heavily dependant on the presence of well developed coral reefs (Böhlke and Chaplin, 1968; Smith-Vaniz and Palacio, 1974; Greenfield and Johnson, 1981). These blennies are not closely related to the eastern Pacific chaenopsines (Table 7). The habitat of the south-western group of chaenopsine blennies is usually not dependant on the presence of well developed coral reefs (Cervigón, 1966; Acero. 1984a). These blennies are usually closely related to the Eastern Pacific chaenopsines (Table 8).

There are two important zoogeographical implications that may be extracted from the distributions and relationships of the Caribbean members of the subfamily Chaenopsinae.

First, Briggs (1974) divided the tropical western Atlantic into three zoogeographical provinces: Caribbean, Brasilian, and West Indian. He considered the West Indian Province to be entirely insular, including Bermuda, Bahamas, Greater and Lesser Antilles. Briggs' Caribbean

Table 2. List of species of Chaenopsinae known to the western Atlantic with their common names. Those common names marked by a + are being proposed here for the first time.

Acanthemblemaria aspera (Longley)	roughead blenny
A. betinensis Smith-Vaniz and Palacio	speckled blenny
A. chaplini Böhlke	papillose blenny
A. greenfieldi Smith-Vaniz and Palacio	false papillose blenny
A. maria Böhlke	secretary blenny
A. medusa Smith-Vaniz and Palacio	medusa blenny
A. rivasi Stephens	spotjaw blenny
A. spinosa Metzelaar	spinyhead blenny
Chaenopsis limbaughi Robins and Randall	yellowface pikeblenny
C. ocellata Poey	bluethroat pikeblenny
C. resh Robins and Randall	resh pikeblenny +
C. roseolla Hastings and Shipp	pinkflecked blenny
C. stephensi Robins and Randall	stout pikeblenny +
Chaenopsis n. sp. Smith-Vaniz	
Coralliozetus bahamensis (Stephens)	blackhead blenny
C. cardonae Evermann and Marsh	twinhorn blenny
C. diaphanus (Longley)	glass blenny
C. leptocirrus (Stephens)	samllhorn blenny +
C. occidentalis (Stephens)	flagfin blenny
C. pricei (Greenfield)	midnight blenny +
C. punctatus (Cervigón)	estuarine blenny +
C. randalli (Cervigón)	hornless blenny +
C. signifer (Ginsburg)	Brasilian blenny +
Coralliozetus n. sp.	pigmy blenny +
Coralliozetus n. sp. Williams	
Ekemblemaria nigra (Meek and Hildebrand)	moth blenny +
Emblemaria atlantica Jordan and Evermann	banner blenny
E. biocellata Stephens	twospot blenny +
E. caldwelli Stephens	Caribbean blenny +
E. caycedoi Acero	Colombian blenny +
E. culmenis Stephens	ridge blenny +
E. diphyodontis Stephens and Cervigón	Venezuelan blenny +
E. hyltoni Johnson and Greenfield	Roatán blenny +
E. pandionis Evermann and Marsh	sailfin blenny
E. piratula Ginsburg and Reid	pirate blenny +
Emblemaria n. sp. Emery	
Hemiemblemaria simulus Longley and Hildebrand	wrasse blenny
Lucayablennius zingaro (Böhlke)	arrow blenny

Table 3. Species (or species pairs) of chaenopsine blennies widely distributed in the Caribbean and adjacent waters, and their distribution.

Acanthemblemaria aspera +	Southern Florida, Bahamas, Hispaniola, Jamaica, Grand Cayman, St. Barthelemy, Dominica, Yucatán to Colombia.
A. medusa +	Lesser Antilles, Los Roques
A. maria	Bahamas, Puerto Rico, St. Barthelemy, Dominica, St. Lucia, Tobago, Grand Cayman, Belize, Providencia.
A. spinosa	Bahamas, Hispaniola, Puerto Rico, Lesser Antilles, Grand Cayman, Belize to San Andrés, Curaçao, Los Roques.
Chaenopsis limbaughi	Southern Florida, Bahamas, Puerto Rico, Virgin Islands, Grand Cayman, Colombia, Venezuela.
C. ocellata	Southern Florida, Bahamas, Greater Antilles, Belize, Colombia.
Coralliozetus bahamensis	Southern Florida, Bahamas, Lesser Antilles, Providencia, Curaçao, Los Roques.
C. cardonae	Bahamas, Antilles, Belize, Colombia, Curaçao.
Emblemaria pandionis	Southern Florida, Texas, Bahamas, Antilles, Belize, Venezuela, Curaçao.
Lucayablennius zingaro	Bahamas, Antilles, Grand Cayman, Belize, Honduras, Panamá, Colombia, Bonaire, Barbados.

+ These two species conform a species pair.

Tabla 4. Species of chaenopsine blennies endemic to the northern Caribbean or more northern tropical waters, and their distribution.

Acanthemblemaria chaplini	Southern Florida, Bahamas
A. greenfieldi	Jamaica, Yucatán, Belize, Providencia.
Coralliozetus diaphanus	Southern Florida, Grand Cayman
C. leptocirris	Bahamas, Antilles, Belize, Honduras, Providencia.
C. occidentalis	Bahamas, Lesser Antilles
C. pricei	Belize, Honduras
Coralliozetus n. sp. Williams	Bahamas
Emblemaria caldwelli	Bahamas, Jamaica, Belize, Providencia.
E. hyltoni	Honduras
Emblemaria n. sp. Emery	Belize, Barbados
Hemiemblemaria simulus	Southern Florida, Bahamas, Belize, Providencia.

Table 5. Species of chaenopsine blennies endemic to the southern Caribbean and adjacent waters, and their distribution.

Acanthemblemaria betinensis	Costa Rica to Colombia
A. rivasi	Costa Rica to Venezuela
Chaenopsis n. sp. Smith-Vaniz	Colombia
C. resh	Venezuela
C. stephensi	Venezuela
Coralliozetus punctatus	Venezuela
C. randalli	Venezuela
Coralliozetus n. sp. Acero	Colombia
Ekemblemaria nigra	Panamá, Colombia
Emblemaria biocellata	Colombia, Venezuela, Suriname
E. caycedoi	Providencia, Colombia
E. culmenis	Venezuela
E. diphyodontis	Venezuela

Table 6. Species of chaenopsine blennies endemic to northern subtropical waters, and their distribution.

Chaenopsis roseolla	Gulf of México
Emblemaria atlantica	Bermuda, Georgia, west Florida
E. piratula	Gulf of México

Table 7. Subgenus or species group of chaenopsine blennies principally Atlantic in their distribution, with the list of their species in each ocean.

Genus	Subgenus or species group	Atlantic species	Pacific species
Acanthemblemaria	**Acanthemblemaria**	**A. spinosa**	
		A. maria	
	Paremblemaria	**A. aspera**	
		A. medusa	
		A. chaplini	
		A. greenfieldi	
Chaenopsis	**ocellata**	**C. limbaughi**	**C. alepidota**
	species group	**C. ocellata**	**C. schmitti**
		C. resh	
		C. n. sp.	
Emblemaria	**Emblemaria**	**E. atlantica**	**E. nivipes**
		E. pandionis	
		E. biocellata	
		E. culmenis	
	caldwelli	**E. caldwelli**	
	species group	**E. hyltoni**	
		E. piratula	
Hemiemblemaria		**H. simulus**	
Lucayablennius		**L. zingaro**	

Table 8. Subgenus or species group of chaenopsine blennies principally Pacific in their distribution, with the list of their species in each ocean.

Genus	Subgenus or species group	Atlantic species	Pacific species
Acanthemblemaria	**hancocki**	**A. rivasi**	**A. hancocki**
	species group		**A. macrospilus**
			A. balanorum
			A. castroi
	exilispinus	**A. betinensis**	**A. exilispinus**
	species group		**A. crockeri**
Chaenopsis	**coheni**	**C. roseolla**	**C. coheni**
	species group	**C. stephensi**	**C. deltarrhis**
Ekemblemaria		**E. nigra**	**E. myersi**
Emblemaria	**Psednoblennius**	**E. diphyodontis**	**E. piratica**
		E. caycedoi	**E. hudsoni**
			E. walkeri
			E. hypacanthus

Province is disjunct, being composed by southern Florida (east and west coasts), the Mexican coast bordering the Bahía de Campeche, and the Caribbean coasts of Central and South America. The separation made by Briggs (1974) between the Bahamas and the Greater Antilles on one side, and Florida, Belize and Honduras on the other is unnatural. All of these regions have very similar reef ichthyofaunas, as shown by the chaenopsines, and so they constitute the West Indian Province (*sensu* Ekman, 1953), which cannot be separated into different provinces. It may be possible to divide the West Indian region in two or more suprovinces, as already done by Bayer *et al.* (1970). I propose two subprovinces: one from Isla de San Andrés (12.5°N) in the western Caribbean to Cabo Catoche (21.5°N, México), southern Florida, Bahamas, and the Antilles. This subprovince would also include the coral reefs of the Gulf of México (Smith, 1976) and Bermuda. Bermuda has only one species of chaenopsine blenny, *Emblemaria atlantica,* which is not a true tropical form, but this island has several species of corals and other characteristics that make it an outpost of the West Indian Province. The presence of *Emblemaria caycedoi* (Acero, 1984b), a typical member of the southern fauna of chaenopsines, on Isla de Providencia (13.3°N, 81.4°W), shows the possibility of intergradation between the two faunas. I propose the name Northern Caribbean-Antillean for this subprovince. The other subprovince of the West Indian Province herewith presented includes from Costa Rica to the island of Trinidad, and it is named the Southern Caribbean Subprovince.

Robins (1972) divided the Caribbean shore fish fauna in two segments, insular and continental. The insular segment includes the Bahama Islands, the Antilles, and the islands off South America; the continental is from Cape Cañaveral (Florida) to Yucatán, and from Venezuela to Brasil's north coast, with mixing areas in the Florida Keys, Cuba, Hispaniola, Jamaica, and from Nicaragua to Colombia. This division seems to be basically right considering the conclusions of my work. The insular fauna constitutes the coral reef part of the Northern Caribbean Antillean Subprovince, which is descendant of the Caloosahatchian Province of Petuch (1980). Robins (1972) considered that the insular fauna is best developed in the Bahamas, and I propose that the coral islands and atolls of Belize and Honduras must be included with the Bahamas as the areas where the coral reef ichthyofauna is best developed in the Caribbean. The islands off South America with well developed coral reefs (Los Roques, Bonaire, Curaçao, Islas del Rosario) have not developed an endemic coral reef ichthyofauna, but they are inhabited by typical members of the rocky reef ichthyofauna of the Southern Caribbean Subprovince and by widely distributed West Indian coral reef fishes. The

explanation for this may rest in the recent origin of those islands, e.g., Islas del Rosario originated 10.000 y.b.p. (Pfaff, 1969), and their proximity to squrces of continental input to the surrouding water.

The tropical continental fauna of the Caribbean is undoubtedly very well developed from the Golfo de Urabá (Colombia) to northern Brasil. The brackish water and muddy bottom component of this fauna (families Ariidae, Sciaenidae, etc) is more diversified in the southern Caribbean than in the Gulf of México and adjacent waters (Fischer, 1978). The rocky reef component has not succeeded in invading the dominating coralline reefs of the northern Caribbean. Only one species has been established in the Northern Caribbean-Antillean Subprovince, *Chaenopsis roseolla,* which has only been collected in deep water in the Gulf of México.

The second zoogeographical implication is that the typical southern Caribbean chaenopsine blennies are more closely related to the Eastern Pacific species than to the Northern Caribbean-Antillean ones. Eight of the thirteen chaenopsines endemic to the Southern Caribbean Subprovince belong to genera, subgenera, or species groups of Chaenopsinae more widely distributed in the Eastern Pacific than in the Caribbean, or better representated in that ocean (Table 8). Petuch (1980) discussed the evolution of the Upper Cenozoic Caribbean faunal provinces, with emphasis on the mollusks. He considered the existence of two Neogene Caribbean provinces: the Caloosahatchian Province and the Gatunian Province. The Caloosahatchian was located in the northern Caribbean and was a typical carbonate environment. The Gatunian was located in the southern Caribbean and in the tropical Eastern Pacific and was a typical silicoclastic environment. In the Upper Pliocene two biologically catastrophic events took place (Emiliani, 1971; Vermeij, 1979): the closing of the Central American Isthmus, and glacially induced sealevel fluctuations with the associated drop in water temperature. In the case of mollusks these two events brought as results that the Caribbean region was a composite of survivors of communities from the two original provinces, and that the Atlantic component of the Gatunian Province was destroyed, except a reclict Gatunian gastropod assemblage which remained in Colombia and Venezuela (Petuch, 1980). In the case of fishes, and particularly of small coastal fishes as the chaenopsine blennies, the descendants of the Neogene Gatunian Province or pacificophile species (Vermeij, 1979; Petuch, 1980) are still widely distributed in the southern Caribbean from Costa Rica to Venezuela.

Most large Caribbean reef fishes have long living planctonic stages, and therefore they are usually widely distributed in the Caribbean. Anyhow, there are very important exceptions to this as the white grouper *Mycteroperca cidi,* the bronzestriped grunt *Haemulon boschmai,* and the

brownstriped grunt *Anisotremus moricandi,* which are not known north of the southern Caribbean (Randall, 1968; Acero and Garzón, 1982). Interesting also are the cases of the chere-chere grunt *Haemulon steindachneri,* which is known from the southern Caribbean, Brasil and the Eastern Pacific (Randall, 1968), and that of the vieja *Paralabrax dewegeri,* endemic to the southeastern Caribbean and Guianas, and the only Atlantic representative of the otherwise solely eastern Pacific genus *Paralabrax* (Robins and Starck, 1961).

Finally, it is clear that the existence in the southern Caribbean of an endemic rocky reef fauna, and at the same time of a relatively impoverished coral reef fauna, has caused the number of species to be higher than in other regions of the West Indian Province. This is shown when groups of animals are thoroughly studied: Werding (1982) has found 30 species of porcelain crabs in the Atlantic coastal waters of Colombia, which is 86% of the total West Indian fauna of the group; in this work, I report the existence of 23 species of chaenopsine blennies in the southern Caribbean, which is 61% of the total West Indian fauna of the group, while in the Northern Caribbean-Antillean Subprovince the number of known species is 20.

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