STUDIES ON THE FAUNA OF CURAÇAO AND OTHER CARIBBEAN ISLANDS: No. 147.

ON THE OCCURRENCE OF FISHES IN RELATION TO CORALS IN CURAÇAO

by

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Knowledge about the direct and indirect relationship between corals and fishes is rather restricted. Reliable descriptions of the co-occurrence of corals and fishes are generally fairly short.

In this study the author aimed at giving a preliminary and rather general description of relationships, by comparing the fish fauna occurring in two different types of coral fields in shallow water along the south coast of Curaçao.

The station numbers, the names of the corresponding localities and the dates of sampling are as follows (Fig. 105):

no.	*Millepora*-fields		*no.*	*Acropora palmata*-fields	
208	Boca Pos Spanó	10.IV.1969	209	Boca Pos Spañó	11.IV.1969
210	Jan Thielbaai	21.V.1969	212	Cornelisbaai	17.VI.1969
211	Piscaderabaai	10.VI.1969	213	Playa Kalki	11.VII.1969
214	Playa Kalki	14.VII.1969	216	Boca Hulu	23.VII.1969
215	Boca Hulu	17.VII.1969	217	Boca Pos Spañó	18.IX.1969
220	Boca Santa Marta	25.IX.1969	219	Boca Santa Marta	22.IX.1969
222	Fuikbaai	27.X.1969	221	Slangenbaai	21.X.1969
223	Portomaribaai	4.XI.1969	227	Fuikbaai	14.IV.1970
224	SE of Playa Hundu	5.XII.1969			

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Fig. 105. Sketch map of Curaçao showing locations and numbers of Stations.

CORALS

Material and Methods

On the southcoast of Curaçao, at a depth of ca. 0.5–3 m, large patches of the coral reefs consist almost exclusively of either *Millepora* (especially *Millepora complanata*) or *Acropora palmata*. To compare these two types of coral fields, an inventory was made of 9 *Millepora*-fields and 8 *Acropora palmata*-fields.

In all cases, representative sampling-areas of 4 × 4 m were chosen since, according to Scheer (1967), an inventory of such an area gives a reliable impression of the type of coral field as a whole. Every sampling-area was marked by 4 iron pins connected by a nylon-line (Fig. 106).

The cover percentage of the different species of coral in the various sampling-areas was estimated, and notes on the sociability were made. Moreover reference specimens and fragments were collected. SMITH (1948), BOSCHMA (1955), ROOS (1964 and 1971) were used for identification.

The cover percentage or "cover" is considered here to be the percentage of bottom surface covered by one species of coral. This was done in accordance with SCHEER (1967), who applied the Braun-Blanquet method (known from plant sociology) to describe coral reefs.

The following symbols for "cover" were used:

r = very few specimens (1–5), with a scanty cover.
x = few specimens (6–30), with a scanty cover.
1 = cover less than 5%.
2 = specimens very numerous ór cover at least 6–25%.
3 = cover 26–50%.
4 = cover 51–75%.
5 = cover 76–100%.

By sociability is meant the way in which coral colonies of the same species grow with respect to each other, viz.: separately; in small groups; forming extensive fields; solitary, but covering a large area.

For sociability the following symbols were used (also according to SCHEER):

1 = small colonies, growing separately.
2 = small colonies in groups covering less than 200 cm^2.
3 = small colonies, in groups covering 200–5000 cm^2.
4 = colonies in groups covering 0.5–4 m^2 and coral heads with a diameter of 0.7–2 m.
5 = colonies in groups covering more than 4 m^2 and coral heads with a diameter of more than 2 m.

For statistical purposes Wilcoxon's test was used. A significance-level of 10% was chosen.

Results

In the 9 *Millepora*-fields investigated, the cover of *Millepora* appeared to vary from 5–25% (Table 19). The cover of the other corals was much lower. Concerning sociability *Millepora* forms aggregations of more than 4 m^2.

In 6 of the *Acropora palmata*-fields studied *Acropora palmata* had a cover varying from 25–50%; in the 2 other stations the cover was 50–75%. Like *Millepora, Acropora palmata* forms aggregations of more than 4 m^2, which is a high degree of sociability compared to the values found for other species, although at 3 stations (no. 213, 216 and 221) a considerable sociability was established for *Porites porites*.

The very common species *Agaricia agaricites, Favia fragum, Porites astreoides, Porites porites* and *Tubastrea tenuilamellosa* show a striking similarity in their average sociability in the *Millepora* and *Acropora palmata*-fields, in other words: these corals do not show a clear preference for either *Millepora*-fields or *Acropora palmata*-fields.

Diploria strigosa was found 4 times in a *Millepora*-field and 3 times in a *Acropora palmata*-field. The cover of this species in both types of field was found to be low and about equal. The sociability in *Acropora palmata*-fields, however, was considerably higher, since

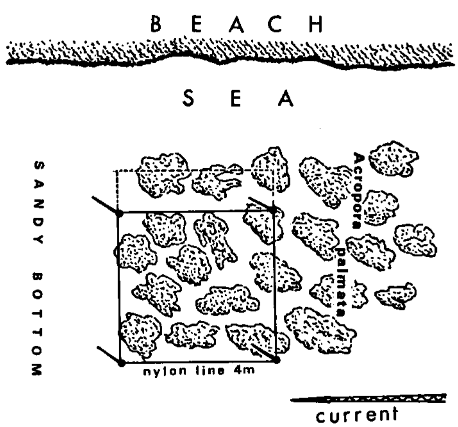

Fig. 106. Sketch of sampling-area: *Acropora palmata*-field in shallow water along the southcoast of Curaçao.

Diploria strigosa occurred in 2 *Acropora*-fields as large coral heads with a diameter of 0.7–2 m. The occurrence of such large coral heads, especially in *Acropora palmata*-fields, can be explained by the structure of the dominating *Acropora* itself, which leaves much more space for other coral growth than the tight-packed blades of *Millepora*.

The difference in cover and sociability between the species *Diploria clivosa, Eusmilia fastigiata, Meandrina meandrites, Montastrea cavernosa* and *Siderastrea siderea* are of little importance, since the data bear upon too few stations.

Stylaster roseus was not found in any of the *Acropora palmata*-fields studied, nor in any other formation. In 3 *Millepora*-fields, however, it was met with. It usually grows in holes in the substratum on which *Millepora* settles and it is therefore generally hidden from view.

The average number of species of coral for both the *Millepora* and the *Acropora palmata*-fields appeared to be about 9.

Conclusion

1. *Millepora* as the dominating genus in the *Millepora*-fields and *Acropora palmata* as the dominating species in the *Acropora palmata*-fields, show a significant difference ($p < 0.05$) in cover, 5–25% and 25–75% respectively.

2. No significant differences were found in cover and sociability of accompanying species of coral occurring in both the *Millepora* and *Acropora palmata*-fields.

3. The average number of accompanying species in both types of coral field is about 9.

4. No significant differences in the composition of the accompanying species were established for either type of coral field.

FISHES

Material and Methods

The populations of fishes in the various sampling-areas were killed with Rotenone (300 cc per sampling-area). This was introduced with a spoutbottle in such a way that the current would spread the poison through the whole sampling-area. Care was taken that the sampling-areas were bordered either by sand on two sides, or by a bottom without coral growth, to facilitate collecting. Only very small quantities of fish got lost in this manner.

Using this method, the fishes living in a strip of the adjacent coral formation about 1 m wide were also killed and collected. The size of the sampling-areas was therefore standardized at 20 m^2 for computation of the number of fishes and the fish biomass per m^2 (see Fig. 106, dotted line).

Every fish was weighed, measured and identified. Böhlke & Chaplin (1968), Böhlke & Robins (1968), Metzelaar (1919), Cervigón (1966) and Randall (1968) were used for identification.

The 17 stations were inventorised during the period from 10.IV. 1969 until 14.IV.1970, always from 15.00–18.00 h. Seasonal differences were not considered.

For statistical purposes Student's t-test and Wilcoxon's test were used. A significance-level of 10% was chosen.

Results

The results are given in Tables 20 and 21, and the most important have been summarized in Table 22.

With the aid of the data given by Randall (1967) a computation was made of the percentage of carnivores, omnivores, herbivores and zooplankton feeders in *Millepora* and *Acropora palmata*-fields (Tables 23 and 24).

Conclusions and discussions

1. The number of fishes in *Millepora*-fields is significantly larger than in *Acropora palmata*-fields ($p < 0.05$). The fish biomass per m^2, however, is about equal for both types of coral field.

The larger number of fishes in *Millepora*-fields can at least partly be explained by the occurrence of many juvenile fishes in this type of field. *Millepora*-fields are built up of vertical blades, often with junctions, the distances between them varying from 0–10 cm or more. These blades vary in height from a few centimetres to a few decimetres, and in thickness from about 0.2–2 cm or more. As a result of this arrangement there is less free flow and swell, and more shelter in this type of field than in *Acropora palmata*-fields. Therefore, *Millepora*-fields are very suitable as a hatchery and hiding place. In *Acropora palmata*-fields on the other hand, there is much open space. Here, large solitary fishes and schools can move about. This type of field is built up of large coral trunks, which spread like elkhorn, either sloping, or more or less horizontal. The coral trunks, varying from ca. $\frac{1}{2}$–$1\frac{1}{2}$ m in height, cover a large proportion of the underlying bottom and therefore it is usually rather dark in *Acropora palmata*-fields.

The values computed for the fish biomass in *Millepora* (167 gr/m^2) and in *Acropora palmata*-fields (157 gr/m^2) show a striking correspondence with those found by Randall (1963) for 2 "natural reefs" in Puerto Rico (160 and 158 gr/m^2).

2. A number of fishes shows a striking preference for either *Millepora* or *Acropora palmata*-fields.

As a result of the difference in structure, one type of coral field is better suited to the requirements of certain fishes than the other type.

Fishes with a conspicuous preference for *Millepora*-fields are: *Enchelycore nigricans*, *Enchelycore* sp., *Adioryx vexillarius*, *Myripristis jacobus*, *Apogon maculatus*, *Apogon conklini*, *Rypticus saponaceus*, *Rypticus subbifrenatus*, *Pseudogramma bermudensis*, *Eupomacentrus partitus*, *Eupomacentrus* sp., *Chromis multilineata*.

The mean weight of *Enchelycore nigricans* and *Enchelycore* sp. in

Acropora palmata-fields is significantly higher than in *Millepora*-fields. However, because adults of both species have not as yet been systematically separated (BÖHLKE, 1968), the results cannot be regarded as complete. In the present study the two have been taken together as one species, viz. *Enchelycore nigricans.*

Pempheris schomburgki, Aulostomus maculatus and *Acanthurus bahianus,* show a strong preference for *Acropora palmata*-fields.

Pempheris schomburgki was only met in one *Millepora*-station (215). This station, however, contained also an *Acropora palmata*-trunk.

3. A number of species, occurring in both types of coral field, reach a significantly higher mean weight in either *Millepora* or *Acropora palmata*-fields: *Apogon maculatus* and *Ophioblennius atlanticus* in *Millepora*-fields, and *Enchelycore nigricans, Adioryx vexillarius, Myripristis jacobus, Rypticus subbifrenatus, Eupomacentrus dorsopunicans* and *Chromis multilineata* in *Acropora palmata*-fields.

4. There is no significant difference in the ratio of carnivores, omnivores, herbivores and zooplankton feeders in *Millepora* and *Acropora palmata*-fields (see Table 23).
The total weight of carnivores is significantly higher in *Millepora*-fields, whereas the total weight and total number of herbivores and the total weight of zooplankton feeders is significantly higher in *Acropora palmata*-fields (see Table 24).

The significantly higher total weight of carnivores in *Millepora*-fields may correlate with the large numbers of juvenile fishes and crustaceae found in these fields. The higher total weight of zooplankton feeders like *Pempheris schomburgki* in *Acropora palmata*-fields might be explained by the stronger free flow and consequently larger supply of plankton in this type of coral field.

Compared with the results of ODUM & ODUM (1955), RANDALL (1963: 24,3%) and TALBOT (1965: 36%), the low percentage of herbivorous fishes (Acanthuridae, Scaridae and Blenniidae) in both types of coral field (8.3% in *Millepora*- and 15.2% in *Acropora*-fields) is remarkable. Probably this is caused by the poor algal growth in and around these types of coral field. In the zone from ca.

0–5 to 7 m depth along the southcoast of Curaçao VAN DEN HOEK (1969) found an algal vegetation, which was quantitatively very poor, except for rich encrustations of *Porolithon pachydermum*. VAN DEN HOEK says that this poor algal vegetation could be ascribed to heavy grazing by herbivores, of which herbivorous fishes and the sea-urchin *Diadema* are probably the most important. However, in my study the percentage of herbivorous fishes is low. Assuming, that VAN DEN HOEK's theory is correct, it follows that the poor algal vegetation is due to grazing by *Diadema*, which is present in great numbers in and around *Millepora* and *Acropora palmata*-fields. However, my fields (0.5–3 m depth) are only a part of the zone studied by VAN DEN HOEK (0–±7 m).

SUMMARY

During the period from 10.IV.1969 until 14.IV.1970 an inventory was taken of 9 *Millepora*-fields and 8 *Acropora palmata*-fields in shallow water along the southcoast of Curaçao. From these fields all fishes were collected and one specimen of every species of coral. With the aid of a method used in the sociology of plants, the corals of both types of field were compared with each other as regards rate of cover and sociability. The fishes were identified, weighed and measured and the data obtained were then statistically evaluated.

A significant difference in cover was found between *Millepora* in *Millepora*-fields and *Acropora palmata* in *Acropora palmata*-fields. No significant differences were found in cover and sociability of accompanying species of coral occurring in both the *Millepora* and *Acropora palmata*-fields. The average number of accompanying species of coral in both types of coral field is equal. No significant differences in composition of species were established for either type of coral field.

The number of fishes in *Millepora*-fields is significantly larger than in *Acropora palmata*-fields. This can at least partly be explained by the occurrence of many juvenile fishes in *Millepora*-fields, because there is more shelter and less free flow and swell. The fish biomass per m^2, however, is about equal for both types of fields, viz. 167 g in *Millepora* and 157 g in *Acropora palmata*-fields, and corresponds with the figures given by RANDALL (1963) for two "natural reefs" in Puerto Rico (160 and 158 g/m^2).

A number of fishes show a striking preference for either *Millepora* or *Acropora palmata*-fields. Some species, occurring in both types of coral field, reach a significantly higher mean weight in either *Millepora* or *Acropora palmata*-fields.

The significantly higher total weight of carnivores in *Millepora*-fields may correlate with the large numbers of juvenile fishes and crustaceae found in these fields. The higher total weight of zoo-plankton feeders in *Acropora palmata*-fields might be

explained by the stronger free flow and, consequently, the larger supply of plankton in this type of coral field.

The low biomass of herbivorous fishes, compared with the results of ODUM & ODUM (1955), RANDALL (1963) and TALBOT (1965), may be caused by the poor algal growth in and around these types of coral field.

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Table 19

Cover and sociability of the species of coral.

station numbers	*Millepora*-field									*Acropora palmata*-field							
species	208	210	211	214	215	220	222	223	224	209	212	213	216	217	219	221	227
Acropora cervicornis									x–1		x–2						1–3
Acropora palmata			r–1		x–4	x–4				3–5	4–5	4–5	3–5	3–5	3–5	3–5	3–5
Agaricia agaricites	1–1	x–1	1–1	1–2	1–3	x–1	1–1	1–1	1–1	x–1	1–2	x–1	1–2	1–1	x–1	1–2	x–1
Colpophyllia natans						x–1											
Dendrogyra cylindrus																r–1	
Dichocoenia stokesii											r–1						
Diploria clivosa			r–1					r–1						r–1			1–1
Diploria labyrinthiformis										r–1							
Diploria strigosa	r–1		x–1		r–4	r–1					1–4				1–4	r–1	
Eusmilia fastigiata											r–1					r–1	
Favia fragum	r–1	x–1	x–1	x–1	x–1	x–1	x–1	x–1	x–1	x–1	1–1	r–1	x–1	x–1	x–1	1–1	x–1
Isophyllastrea rigida				r–1							r–1						
Madracis asperula		1–3			x–2				r–2				r–2				
Meandrina meandrites		r–1				r–1											
Millepora sp.	2–5	2–5	2–4	2–5	2–5	2–5	2–5	2–5	2–5	1–3	x–2	x–3	x–2	x–2	x–2	1–4	x–2
Montastrea annularis	r–1	x–1	r–1		1–1	x–2		x–2	x–1				r–1		x–1	1–3	r–1
Montastrea cavernosa	r–1			r–1													
Mycetophyllia lamarckana						r–1											
Porites astreoides	1–2	x–1	x–1	1–4	1–2	1–2	x–1	1–1	1–1	x–2	1–2	1–2	x–1	x–2	x–2	x–2	x–1
Porites porites	1–3	1–3		1–4	1–3	1–2	r–2	r–1	1–3	x–2	1–2	2–4	1–3		x–2	1–4	x–2
Siderastrea radians							r–1										
Siderastrea siderea										r–1	x–2						
Stylaster roseus	x–1	1–1							1–1								
Tubastrea tenuilamellosa	1–2	1–1	1–1	1–2	1–2	1–1	x–1	1–1	1–1	x–1	x–1	1–2	x–2	1–1	r–1	1–2	

Table 20

List of fish species collected in the sampling areas and number of specimens per station.

station numbers / species	*Millepora*-field 208	210	211	214	215	220	222	223	224	*Acropora palmata*-field 209	212	213	216	217	219	221	227
Pomacentridae																	
Eupomacentrus dorsopunicans	2	2	7	34	36	3	48	41	14	36	1	18	14		17	4	13
Eupomacentrus partitus	19	18	17	49	10	13	11	12	10	10	8	7	26		8		3
Eupomacentrus sp.	2	1		2	1	1	10	12	3	1					3	1	2
Eupomacentrus planifrons	4			8	1				1	6	5	3	1	1			
Chromis multilineata	38	83	13	67			44	27	25		45	25	1		2		
Microspathodon chrysurus	18	8	1	23	19	3	4	9	8	20	2	9	13	4	13	18	12
Abudefduf saxatilis			1														
Blenniidae																	
Ophioblennius atlanticus	6	4	16	6	37	14	58	17	11	7	21	7	8	9	41	49	41
Entomacrodus nigricans	1				1		2	3			7	1		1	7	1	
Hypleurochilus sp.														6			
Hypleurochilus springeri													3				
Labridae																	
Thalassoma bifasciatum	2	2	3	3	7	10	28	55	2	7	22	32	12	6	39	9	6
Halichoeres maculipinna		3		1	5	5	7	26		1		1	4		6	1	1
Halichoeres radiatus	1				2		1	6	1			1	1			1	
Halichoeres garnoti		3						1	1		2						
Halichoeres bivittatus			1				1			1					5	1	
Halichoeres poeyi								1									
Bodianus pulchellus													1				

Table 20 (*continued*)

species / station numbers	*Millepora*-field 208	210	211	214	215	220	222	223	224	*Acropora palmata*-field 209	212	213	216	217	219	221	227
MURAENIDAE																	
Enchelycore nigricans	10	1	4	17	2	7	22	21	15		4	5		1	5	4	2
Enchelycore sp.	1	6	6	7	2	1	5	20	4		3	1	4	1	3	2	1
Gymnothorax moringa		4		4	1	1	9	14	4	2		4	4		1	2	2
Muraena miliaris	4	2	1	1		2	1	6	3		1	1			4	1	3
Echidna catenata			1														
HOLOCENTRIDAE																	
Adioryx vexillarius	9	10	6	13	19	3	30	13	18	2	2		2	2		13	
Adioryx coruscus		1					2		2							1	
Myripristis jacobus		8		7	8			25	5	3	16	2	4	1	2	6	
Holocentrus ascensionis			1					2	1								
Plectrypops retrospinis											1						
PEMPHERIDAE																	
Pempheris schomburgki	15									51	5	52	22	40	27	21	
CLINIDAE																	
Labrisomus guppyi	3	5	4	1	7	1	29	4	4	1		2	1		5	14	7
Labrisomus nigricinctus			1				2		1	1						3	
Labrisomus nuchipinnis					1		1	1									
Malacoctenus triangulatus		1	5		4	1	7	1	1		1	4	3	1	3	4	3
Malacoctenus gilli							4	3	3								2
Starksia ocellata			2	1		1	1	7				2		5	1	3	1
Starksia atlantica	1				6		2	1	2			1	1				
Acanthemblemaria spinosa							1	9				3	1	8			

Table 20 (*continued*)

species / station numbers	*Millepora*-field 208	210	211	214	215	220	222	223	224	*Acropora palmata*-field 209	212	213	216	217	219	221	227
Emblemariopsis bahamensis												2	4	10	1		
Pseudemblemaria signifera		1															
Coralliozetus cardonae							1				1						
GRAMMISTIDAE																	
Rypticus subbifrenatus	6	8	3	5	2	2	4	7	9	1	2			2	3	3	
Rypticus saponaceus	2	1	1	9	6	3	7	12	3	2		3			2	2	1
Rypticus bistrispinus																	
Pseudogramma bermudensis																	
TRIPTERYGIIDAE																	
Enneanectes sp.		1	1		4		8	24	1	1	3	1	12	44	4	6	6
GOBIIDAE																	
Gobiosoma dilepis													1				
Gobiosoma evelynae													1	2			
Gobiosoma gemmatum								4							1		
Gobiosoma genie	1	2				1		1		2	1		2	1	3	1	1
Gnatholepis thompsoni								5	1								
Lythrypnus mowbrayi																	
Quisquilius hipoliti			6	1		2	1	6				2		1	2		
SCORPAENIDAE																	
Scorpaena plumieri		1	1					2								1	1
Scorpaenodes caribbaeus	4	2	6	8	6	2	2	20	5	4	1	12	7	1	1	4	

Table 20 (*continued*)

species / station numbers	*Millepora*-field 208	210	211	214	215	220	222	223	224	*Acropora palmata*-field 209	212	213	216	217	219	221	227
POMADASYIDAE																	
Haemulon chrysargyreum				2					3					1			
Haemulon flavolineatum				3			21	2		4		25	1	1			
CIRRHITIDAE																	
Amblycirrhitus pinos	5	1	8	3	1	3	6	6	3	2	2	6	4	2	4		
DACTYLOSCOPIDAE																	
Gillellus greyae			1														
Gillellus rubrocinctus		1					2	5	1			2	5	14	3	1	
Leurochilus acon													1				
SCARIDAE																	
Scarus taeniopterus				1				1									
Scarus vetula												7	3				
Sparisoma radians					3												
Sparisoma viride	2	2		1	2			1			1	2	2	1			
APOGONIDAE																	
Apogon conklini				1	4	3		9	7						2		
Apogon maculatus		3	12	29	27	5	16	45	47	12	1	6	6	8	9	17	1
SERRANIDAE																	
Epinephelus adscensionis	1				1			2		2		1	1				
Cephalopholis fulva		3	3	3	2		1						2				
Petrometopon cruentatum																	1

Table 20 (*continued*)

station numbers	*Millepora*-field									*Acropora palmata*-field							
species	208	210	211	214	215	220	222	223	224	209	212	213	216	217	219	221	227
Serranus tigrinus					1												
ACANTHURIDAE																	
Acanthurus bahianus											1	1	1		1		5
Acanthurus coeruleus			2		1		1	2		1	2		2			1	2
TETRAODONTIDAE																	
Canthigaster rostrata	3		1	2	2			5	3				4	1			1
MORINGUIDAE																	
Moringua edwardsi	1		1				6	4	2	2	1	1					1
BROTULIDAE																	
Ogilbia sp.	1		3				2	2	2				1			1	
Stygnobrotula latebricola			1							1							
GOBIESOCIDAE																	
Arcos artius							1	3					6	1			
Tomicodon fasciatus								1						2			
LUTJANIDAE																	
Lutjanus apodus																	1
Lutjanus griseus												1					
Lutjanus mahogoni							1		6			2		1	1		

Table 20 (*continued*)

station numbers species	*Millepora*-field 208	210	211	214	215	220	222	223	224	*Acropora palmata*-field 209	212	213	216	217	219	221	227
SYNODONTIDAE																	
Synodus synodus			2	2				2					4		1		
AULOSTOMIDAE																	
Aulostomus maculatus				1						2	2			1	1	1	2
ANTENNARIIDAE																	
Antennarius multiocellatus			2		1		1	2				2					
BOTHIDAE																	
Bothus ocellatus												5	2				
MULLIDAE																	
Mulloidichthys martinicus				1						3							
CHAETODONTIDAE																	
Holacanthus tricolor	1								1								1
Pomacanthus paru										1							
OSTRACIIDAE																	
Lactophrys triqueter	1		1		1										1		
DIODONTIDAE																	
Diodon hystrix			1														1

Table 20 (*continued*)

station numbers	*Millepora*-field									*Acropora palmata*-field							
species	208	210	211	214	215	220	222	223	224	209	212	213	216	217	219	221	227
GERREIDAE																	
Ulaema lefroyi			2														
XENOCONGRIDAE																	
Kaupichthys hyoproroides															2		
SCIAENIDAE																	
Equetus lanceolatus				2													
OPHICHTHYIDAE																	
Sphagebranchus ophioneus														1			
CLUPEIDAE																	
Jenkinsia lamprotaenia														1			
OPHIDIIDAE																	
cf. *Raneya fluminensis*													1				

TABLE 21

TOTAL NUMBER OF STATIONS IN WHICH THE FISH SPECIES OCCUR, TOTAL NUMBER OF SPECIMENS, AND MEAN WEIGHT WITH STANDARD DEVIATION.

A statistical test was applied only on those species found in at least 4 stations in one type of coral field. The values marked with an asterisk are significantly higher than the corresponding figures in the column representing the other type of coral field. — Instead of 10,6 ± 8,3 read 10.6 ± 8.3 etc.
[Total number of specimens in fields of *Millepora* 2363, of *Acropora* 1586.]

species	*Millepora*-field			*Acropora palmata*-field		
	nrs. of stations	nrs. of fish	mean weight (g)	nrs. of stations	nrs. of fish	mean weight (g)
POMACENTRIDAE						
Eupomacentrus dorsopunicans	9	187	10,6 ± 8,3	7	103	16,2* ± 14,3
Eupomacentrus partitus	9	159*	4,0 ± 2,1	6	62	3,5 ± 2,9
Eupomacentrus sp.	8	32*	1,0 ± 0,9	4	7	1,4 ± 1,3
Eupomacentrus planifrons	4	14	16,4 ± 18,2	5	16	18,0 ± 15,0
Chromis multilineata	7	297*	3,9 ± 4,5	4	73	7,0* ± 2,2
Microspathodon chrysurus	9	93	30,8 ± 35,5	8	91	25,1 ± 38,6
Abudefduf saxatilis	1	1	74,0	0	0	0,0
BLENNIIDAE						
Ophioblennius atlanticus	9	169	5,3* ± 2,3	8	183	4,1 ± 2,3
Entomacrodus nigricans	4	7	0,2 ± 0,1	5	17	0,5 ± 0,6
Hypleurochilus sp.	0	0	0,0	1	6	0,1
Hypleurochilus springeri	0	0	0,0	1	3	0,7
LABRIDAE						
Thalassoma bifasciatum	9	112	0,9 ± 1,9	8	133	0,9 ± 1,4
Halichoeres maculipinna	6	47	2,5 ± 3,0	6	14	1,4 ± 2,7
Halichoeres radiatus	5	11	2,7 ± 2,8	3	3	3,4 ± 5,7
Halichoeres garnoti	3	5	5,6	1	2	4,5
Halichoeres bivittatus	2	2	9,0	3	7	0,9
Halichoeres poeyi	1	1	9,0	0	0	0,0
Bodianus pulchellus	0	0	0,0	1	1	22,0
MURAENIDAE						
Enchelycore nigricans	9	99*	26,4 ± 64,4	6	21	52,9* ± 86,4
Enchelycore sp.	9	52*	3,7 ± 5,6	7	15	4,0 ± 4,5
Gymnothorax moringa	7	37	114,8 ± 227,0	6	15	100,8 ± 162,5
Muraena miliaris	8	20	62,5 ± 45,6	5	10	79,7 ± 80,0
Echidna catenata	1	1	96,0	0	0	0,0

Table 21 (*continued*)

species	*Millepora*-field nrs. of stations	nrs. of fish	mean weight (g)	*Acropora palmata*-field nrs. of stations	nrs. of fish	mean weight (g)
HOLOCENTRIDAE						
Adioryx vexillarius	9	121*	17,6 ± 12,1	5	21	28,9* ± 12,4
Adioryx coruscus	3	5	5,4	1	1	11,0
Myripristis jacobus	5	53*	31,1 ± 20,1	7	34	56,5* ± 31,8
Holocentrus ascensionis	3	4	40,3	0	0	0,0
Plectrypops retrospinis	0	0	0,0	1	1	43,0
PEMPHERIDAE						
Pempheris schomburgki	1	15	27,8 ± 7,0	7	218*	28,6 ± 8,4
CLINIDAE						
Labrisomus guppyi	9	58	3,9 ± 2,5	6	30	4,6 ± 2,3
Labrisomus nigricinctus	3	4	1,5	2	4	3,8
Labrisomus nuchipinnis	3	3	12,3	0	0	0,0
Malacoctenus triangulatus	7	20	0,7 ± 0,5	7	19	0,8 ± 0,3
Malacoctenus gilli	3	10	0,4	1	2	0,1
Starksia ocellata	5	12	0,1 ± 0,0	5	12	0,1 ± 0,0
Starksia atlantica	5	12	0,1 ± 0,0	2	2	0,1
Acanthemblemaria spinosa	2	10	0,1	3	12	0,1
Emblemariopsis bahamensis	0	0	0,0	4	17	0,1 ± 0,0
Pseudemblemaria signifera	1	1	0,1	0	0	0,0
Coralliozetus cardonae	1	1	0,1	1	1	0,1
GRAMMISTIDAE						
Rypticus subbifrenatus	9	46*	6,8 ± 6,3	5	11	12,1* ± 10,2
Rypticus saponaceus	9	44*	62,2 ± 67,4	5	10	35,1 ± 60,2
Rypticus bistrispinus	1	1	0,1	1	1	0,1
Pseudogramma bermudensis	7	49*	1,3 ± 1,0	3	5	0,6 ± 1,0
TRIPTERYGIIDAE						
Enneanectes sp.	6	39	0,1 ± 0,1	8	76	0,1 ± 0,2
GOBIIDAE						
Gobiosoma dilepis	0	0	0,0	1	1	0,1
Gobiosoma evelynae	0	0	0,0	2	3	0,1
Gobiosoma gemmatum	1	4	0,1	1	1	0,1
Gobiosoma genie	4	5	0,1 ± 0,1	7	11	0,1 ± 0,1
Gnatholepis thompsoni	6	21	0,4 ± 0,3	4	30	0,5 ± 0,4
Lythrypnus mowbrayi	2	6	0,1	0	0	0,0
Quisquilius hipoliti	5	16	0,1 ± 0,0	3	5	0,1 ± 0,0

Table 21 (*continued*)

species	*Millepora*-field			*Acropora palmata*-field		
	nrs. of sta-tions	nrs. of fish	mean weight (g)	nrs. of sta-tions	nrs. of fish	mean weight (g)
SCORPAENIDAE						
Scorpaena plumieri	3	4	106,3	2	2	9,0
Scorpaenodes caribbaeus	9	55	7,1 ± 4,9	7	30	6,4 ± 6,0
POMADASYIDAE						
Haemulon chrysargyreum	2	5	52,2	1	1	74,0
Haemulon flavolineatum	3	26	15,8 ± 13,3	4	31	15,3 ± 12,4
CIRRHITIDAE						
Amblycirrhitus pinos	9	36	4,3 ± 2,5	6	20	3,7 ± 3,1
DACTYLOSCOPIDAE						
Gillellus greyae	1	1	0,1	0	0	0,0
Gillellus rubrocinctus	4	9	0,6 ± 0,3	5	25	0,8 ± 0,4
Leurochilus acon	0	0	0,0	1	1	0,1
SCARIDAE						
Scarus taeniopterus	2	2	1,6	0	0	0,0
Scarus vetula	0	0	0,0	2	10	58,0
Sparisoma radians	1	3	0,3	0	0	0,0
Sparisoma viride	5	8	5,4 ± 4,5	4	6	4,2 ± 3,9
APOGONIDAE						
Apogon conklini	5	24*	0,8 ± 0,7	1	2	1,5
Apogon maculatus	8	184*	5,2* ± 3,2	8	60	4,3 ± 3,6
SERRANIDAE						
Epinephelus adscensionis	3	4	85,0	3	4	262,0
Cephalopholis fulva	5	12	51,8 ± 82,2	1	2	16,5
Petrometopon cruentatum	0	0	0,0	1	1	300,0
Serranus tigrinus	1	1	12,0	0	0	0,0
ACANTHURIDAE						
Acanthurus bahianus	0	0	0,0	5	9	26,8 ± 71,1
Acanthurus coeruleus	4	6	1,2 ± 0,6	5	8	104,8 ± 192,1
TETRAODONTIDAE						
Canthigaster rostrata	6	16	4,1 ± 2,7	3	6	3,2 ± 1,1
MORINGUIDAE						
Moringua edwardsi	5	14	1,2 ± 0,8	4	5	2,0 ± 1,1

Table 21 (*continued*)

species	*Millepora*-field nrs. of stations	nrs. of fish	mean weight (g)	*Acropora palmata*-field nrs. of stations	nrs. of fish	mean weight (g)
BROTULIDAE						
Ogilbia sp.	5	10	1,0 ± 1,1	2	2	0,1
Stygnobrotula latebricola	1	1	4,0	1	1	4,0
GOBIESOCIDAE						
Arcos artius	2	4	0,1	2	7	0,2
Tomicodon fasciatus	1	1	0,1	1	2	0,1
LUTJANIDAE						
Lutjanus apodus	0	0	0,0	1	1	40,0
Lutjanus griseus	0	0	0,0	1	1	5,0
Lutjanus mahogoni	2	7	31,6	3	4	20,8
SYNODONTIDAE						
Synodus synodus	3	6	4,5	2	5	2,0
AULOSTOMIDAE						
Aulostomus maculatus	1	1	76,0	6	9*	88,2 ± 18,8
ANTENNARIIDAE						
Antennarius multiocellatus	4	6	29,0	1	2	2,5
BOTHIDAE						
Bothus ocellatus	0	0	0,0	2	7	0,5
MULLIDAE						
Mulloidichthys martinicus	1	1	114,0	1	3	28,3
CHAETODONTIDAE						
Holacanthus tricolor	2	2	5,5	1	1	40,0
Pomacanthus paru	0	0	0,0	1	1	1,0
OSTRACIIDAE						
Lactophrys triqueter	3	3	0,7	1	1	0,1
DIODONTIDAE						
Diodon hystrix	1	1	1207,0	1	1	918,0
GERREIDAE						
Ulaema lefroyi	1	2	7,5	0	0	0,0

Table 21 (*continued*)

Species	*Millepora*-field nrs. of stations	nrs. of fish	mean weight (g)	*Acropora palmata*-field nrs. of stations	nrs. of fish	mean weight (g)
XENOCONGRIDAE						
Kaupichthys hyoproroides	0	0	0,0	1	2	3,5
SCIAENIDAE						
Equetus lanceolatus	1	2	1,0	0	0	0,0
OPHICHTHYIDAE						
Sphagebranchus ophioneus	0	0	0,0	1	1	4,0
CLUPEIDAE						
Jenkinsia lamprotaenia	0	0	0,0	1	1	0,1
OPHIDIIDAE						
cf. *Raneya fluminensis*	0	0	0,0	1	1	0,1

TABLE 22

IMPORTANT RESULTS OBTAINED FROM TABLES 20 AND 21.

	Millepora-fields	*Acropora palmata*-fields
average number of specimens/m²	13.1	9.9
mean weight/m² in g	167.0	157.0
number of species occurring in significantly larger numbers	12	2
number of species with significantly higher mean weight	2	6

Table 23

PERCENTAGES OF CARNIVORES, ZOOPLANKTON FEEDERS, OMNIVORES, AND HERBIVORES.

	Millepora-fields	*Acropora palmata*-fields
Carnivores	38.0	30.2
Zooplankton feeders	31.1	34.5
Omnivores	22.6	20.1
Herbivores	8.3	15.2

Table 24

PERCENTAGES OF WEIGHT OF CARNIVORES, ZOOPLANKTON FEEDERS, OMNIVORES, AND HERBIVORES.

	Millepora-fields	*Acropora palmata*-fields
Carnivores	62.1	36.0
Zooplankton feeders	15.0	36.4
Omnivores	19.7	17.9
Herbivores	3.2	9.7