

Stress-Tolerant Coral Faces Bioerosion: Sponge Colonization Under Mass Bleaching

Mariany Oliveira *corresponding author

Instituto de Ciências do Mar (LABOMAR), Universidade Federal do Ceará (UFC), Av. da Abolição , 3207, Fortaleza, Brazil.

E-mail: marianyoliveira@alu.ufc.br;

<https://orcid.org/0000-0003-1664-4049>

Jessica Bleuel

Instituto de Ciências do Mar (LABOMAR), Universidade Federal do Ceará (UFC), Av. da Abolição , 3207, Fortaleza, Brazil.

<https://orcid.org/0000-0002-2943-9899>

Francisco das Chagas Silva Barbosa

Instituto de Ciências do Mar (LABOMAR), Universidade Federal do Ceará (UFC), Av. da Abolição , 3207, Fortaleza, Brazil.

<https://orcid.org/0009-0000-4180-7765>

Yasmin de Holanda

Laboratório de Invertebrados Marinhos do Ceará, Departamento de Biologia, Centro de Ciências, Universidade Federal do Ceará, Rua Campus do Pici, s/n, Bloco 909, Pici, CEP: 60440-900, Fortaleza, CE, Brazil.

<https://orcid.org/0009-0003-3192-6754>

Lucio Brabo

Instituto de Ciências do Mar (LABOMAR), Universidade Federal do Ceará (UFC), Av. da Abolição, 3207, Fortaleza, Brazil.

<https://orcid.org/0000-0001-9005-4798>

Anne Rebouças Gurgel

Instituto de Ciências do Mar (LABOMAR), Universidade Federal do Ceará (UFC), Av. da Abolição, 3207, Fortaleza, Brazil.

<https://orcid.org/0009-0002-6589-0094>

Eduardo Hajdu

Museu Nacional (MNRJ), Universidade Federal do Rio de Janeiro (UFRJ)

<https://orcid.org/0000-0002-8760-9403>

Juliano Moraes

Research Hub for Coral Reef Ecosystem Functions and College of Science and Engineering, James Cook University, Townsville, Queensland, Australia.

<https://orcid.org/0000-0001-8022-5389>

Sula Salani

Universidade do Distrito Federal Professor Jorge Amaury Maia Nunes (UnDF), SHIN CA 2 - Lago Norte, Brasília - Federal District, 71503-502

Laboratório de Bentos, Instituto de Ciências Biológicas, Universidade de Brasília, Campus Darcy Ribeiro s/n, Brasília - DF, 70910-900, Brazil.

<https://orcid.org/0000-0003-3850-1030>

Marcelo Oliveira Soares

Instituto de Ciências do Mar (LABOMAR), Universidade Federal do Ceará (UFC), Av. da Abolição , 3207, Fortaleza, Brazil.

<https://orcid.org/0000-0002-4696-3166>

Journal name; Coral Reefs Journal

Table S1. *Cliothisa delitrix* species, substrate and references

Substrate	References	Substrate	References	Substrate	References	Substrate	References
Algae		Coral		Coral		Coral	
<i>Coralineous algae</i>	4, 21	<i>Diploria spp.</i>	1	<i>Mycetophyllia aliciae</i>	1	<i>Siderastrea siderea</i>	1, 2, 3, 5, 6
Coral		<i>Diploria clivosa</i>	1	<i>Oculina diffusa</i>	1	<i>Siderastrea stellata</i> *	4, 15
<i>Acropora cervicornis</i>	1	<i>Diploria labyrinthiformis</i>	1, 3, 5, 6	<i>Orbicella faveolata</i>	1, 2, 5	<i>Solenastrea bournoni</i>	1
<i>Acropora palmata</i>	2	<i>Diploria strigosa</i>	1	<i>Porites</i> sp.	13	<i>Stephanocoenia intersepta</i>	1
<i>Agaricia agaricites</i>	1, 3, 4	<i>Eusmilia fastigiata</i>	1	<i>Porites astreoides</i>	1, 3, 4		
<i>Agaricia fragilis</i>	1, 4	<i>Isophyllia sinuosa</i>	1	<i>Porites porites</i>	1	Unspecified	
<i>Agaricia lamarcki</i>	1	<i>Madracis decactis</i>	1	<i>Pseudodiploria clivosa</i>	1	coral reef area	13, 16, 17, 18, 19
<i>Colpophyllia natans</i>	1, 3	<i>Meandrina meandrites</i>	1	<i>Pseudodiploria strigosa</i>	3	hard bottoms/ coral reefs	20
<i>Dendrogyra cylindrus</i>	3	<i>Montastraea annularis</i>	7	<i>Scolymia spp.</i>	1	<i>R. mangle</i> fringe contiguous to shallow reef	13
<i>Dichocoenia stokesii</i>	1	<i>Montastraea cavernosa</i>	1, 3, 4, 6, 8, 9, 10, 11,12	<i>Siderastrea</i> sp.	12	beachrocks	22, 23
<i>Favia gravida</i>	4	<i>Mussismilia hispida</i>	4	<i>Siderastrea radians</i>	14		

*Present work, 1 – Halperin 2016; 2 – Bakker et al. 2024; 3 – Chaves-Fonnegra 2011; 4 – Moraes et al. 2019; 5 – Chaves-Fonnegra 2007; 6 – Pang 1973; 7 – Highsmith et al 1983; 8 – Aguilera-Pérez et. al 2024; 9 – Mueller 2017; 10 – Rose, 1985; 11 – Buznego 1987; 12 – Pulitzer-Finali 1986; 13 – Diaz 2005; 14 – Buznego 1987; 15 – Amaral et al. 2010; 16 – Alcolado 2012; 17 – Kobluk 1989; 18 – Lehnert 1998; 19 – Vasha 2020; 20 – Pérez 2017; 21 – Muricy et al. 2008; 22 – Praxedes et al. 2024; 23 – Bettcher et al.2023

Table S2. *Cliothisa delitrix* distribution, depth and references.

Sponge species	Region	Depth	References
<i>Cliothisa delitrix</i> (Pang 1973)	Off Fortaleza, Ceará (Pemprim)	15-30m	This paper*
	Caribbean	Not informed	Aguillera-Pérez et al. 2024
	Rio Grande do Norte - Brazil	13-33m; intertidal zone	Muricy et al. 2008; Praxedes et al. 2024
	Mexican Caribbean	3-12m	Bakker et al. 2024
	Bahia, Brazil: Madre de Deus, Salvador, Maraú, Abrolhos; Coroa Vermelha, Coroa Alta, Marine Park; Abrolhos;	Not informed; not informed; 8-23m	Hajdu et al. 2011; Bettcher et al. 2023; Moraes et al. 2019
	Eastern Caribbean (French Antilles)	30m	Pérez 2017
	Curaçao	8m	Mueller 2017
	Southeast Florida - USA	3-21m	Halperin 2016

Greater Caribbean: Bahamas; Florida; Belize; Panama; Curaçao	4-18m; 8-22m; 8-25m; 6-10m; 5-15m	Chaves-Fonnegra 2015
Guadalupe, Caribbean - France (Ultramarine)	5-26m	Alcolado 2012
SWCaribbean - Colombia	Not informed	Chaves-Fonnegra 2007; Chaves-Fonnegra 2011
Pernambuco- Brazil	23m	Amaral et al. 2010
Bocas del Toro - Panama	1-18m	Diaz 2005
Mexico	5m-27m	Lehnert 1998
Venezuela	Not informed	Diaz et al. 1990
Southern Caribbean - Netherlands Antilles (Bonaire)	18-30m	Kobluk 1989
Cuba	6-30m	Buznego 1987
Bimini (Bahamas) and Jamaica	2-3m; 10-25m	Pulitzer-Finali 1986

Grand Cayman Island - (UK, Caribbean)	9-11m	Rose and Risk 1985
Belize	Not informed	Highsmith et al. 1983
Netherlands Antilles	5-30m	Van Soest 1981
Discovery Bay (Jamaica)	22-34m	Pang 1973
