

Interactions in the canopy among Caribbean reef octocorals

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Supplemental materials include a diagram of the nearest neighbour sampling scheme (Figure S1), octocoral species present in the study areas (Table S2), and tables showing the Partial Chi-square values for factors in the hierarchical log-linear analyses.

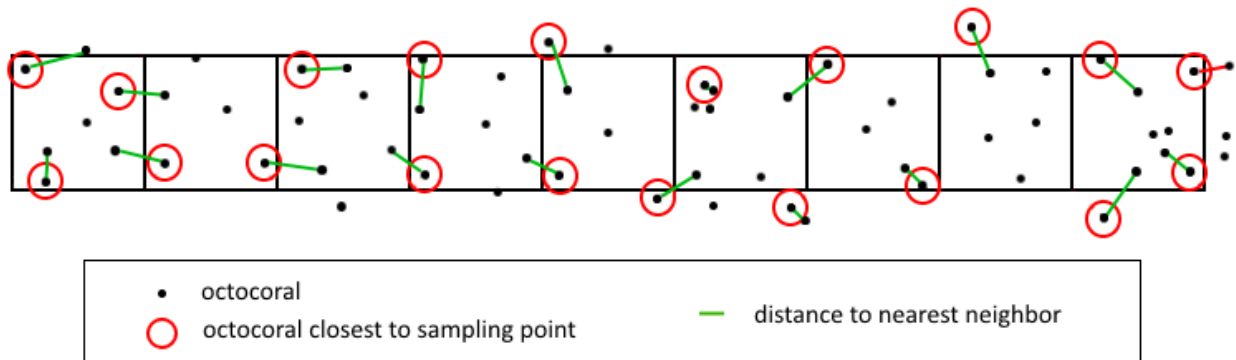


Fig. S1. The nearest neighbor analysis sampling design (see text for explanation)

Table S1. Hierarchical loglinear analysis for test of independence of numbers of octocoral colonies at sites on St. John, U.S. Virgin Is. as a function of colony proximity, height class, genus, and site. Estimates of individual parameters in the loglinear model and their significance identify those combinations of factors that contribute to the overall significant result. Significant effects ($p \leq 0.05$) are highlighted yellow.

Effect	df	Partial Chi-Square	Sig.
Colony Proximity by Height class by Genus	24	30.217	0.178
Colony Proximity by Height class by Site	3	9.723	0.021
Colony Proximity by Genus by Site	8	6.548	0.586
Height class by Genus by Site	24	170255	0.838
Colony Proximity by Height class	3	13.680	0.003
Colony Proximity by Genus	8	41.577	0.000
Height class by Genus	24	119.083	0.000
Colony Proximity by Site	1	41.860	0.000
Height class by Site	3	36.963	0.000
Genus by Site	8	194.208	0.000

Table S2. Octocoral species found in surveys for colony-colony interactions at East Cabritte and Europa Bay, St John, U.S.V.I.

<i>Species</i>	East Cabritte	Europa Bay
<i>Antillogorgia americana</i>	X	X
<i>Antillogorgia rigida</i>	X	X
<i>Briareum asbestinum</i> (upright)	X	X
<i>Eunicea calyculata</i>	X	X
<i>Eunicea clavigera</i>	X	
<i>Eunicea flexuosa</i>	X	X
<i>Eunicea fusca</i>	X	X
<i>Eunicea laciniata</i>	X	X
<i>Eunicea laxispica</i>	X	X
<i>Eunicea mammosa</i>	X	X
<i>Eunicea succinea</i>	X	X
<i>Eunicea tayrona</i>	X	X
<i>Eunicea tourneforti</i>	X	X
<i>Eunicea</i> sp	X	X
<i>Gorgonia ventalina</i>	X	X
<i>Muricea muricata</i>	X	X
<i>Muricea</i> sp.	X	
<i>Muriceopsis flavida</i>		X
<i>Plexaura homomalla</i>	X	X
<i>Plexaura homomalla</i> forma <i>kukenthali</i>	X	X
<i>Plexaura kuna</i>	X	X
<i>Plexaurella dichotoma</i>	X	X
<i>Plexaurella fusifera</i>	X	X
<i>Plexaurella grisea</i>	X	X
<i>Plexaurella nutans</i>	X	X
<i>Plexaurella</i> sp.	X	X
<i>Pseudoplexaura crucis</i>	X	X
<i>Pseudoplexaura porosa</i>	X	X
<i>Pseudoplexaura wagnaari</i>	X	X
<i>Pseudoplexaura</i> sp.	X	
<i>Pterogorgia citrina</i>	X	X
<i>Pterogorgia guadalupensis</i>	X	X

Table S3. Hierarchical loglinear analysis for test of independence of numbers of octocoral colonies at sites on St. John, U.S. Virgin Is. as a function of site, genus, and height class. Estimates of individual parameters in the loglinear model and their significance identify those combinations of factors that contribute to the overall significant result. The 3-way interaction was not significant and is not shown. Significant effects ($p \leq 0.05$) are highlighted yellow.

Interaction			Parameter Estimate	Std. Error	Z	Sig.
Site by Genus	East Cabritte	<i>Antillogorgia</i>	0.256	0.128	1.999	0.046
		<i>Eunicea</i>	0.412	0.117	3.539	0.000
		<i>Gorgonia</i>	-0.005	0.153	-0.034	0.973
		<i>Muricea</i>	-0.498	0.350	-1.423	0.155
		<i>Muriceopsis</i>	-1.065	0.363	-2.934	0.003
		<i>Plexaura</i>	1.141	0.272	4.197	0.000
		<i>Plexaurella</i>	-0.477	0.165	-2.885	0.004
		<i>Pseudoplexaura</i>	0.747	0.143	5.222	0.000
		<i>Pterogorgia</i>	-0.512	0.373	-1.373	0.170
	Europa	<i>Antillogorgia</i>	-0.256	0.128	-1.999	0.046
		<i>Eunicea</i>	-0.412	0.117	-3.539	0.000
		<i>Gorgonia</i>	0.005	0.153	0.034	0.973
		<i>Muricea</i>	0.498	0.350	1.423	0.155
		<i>Muriceopsis</i>	1.065	0.363	2.934	0.003
		<i>Plexaura</i>	-1.141	0.272	-4.197	0.000
		<i>Plexaurella</i>	0.477	0.165	2.885	0.004
		<i>Pseudoplexaura</i>	-0.747	0.143	-5.222	0.000
		<i>Pterogorgia</i>	0.512	0.373	1.373	0.170
Site by Height class	East Cabritte	5-19 cm	-0.551	0.137	-4.024	0.000
		20-29 cm	-0.054	0.128	-0.425	0.671
		30-39 cm	0.147	0.164	0.898	0.369
		>40 cm	0.458	0.180	2.538	0.011
	Europa	5-19 cm	0.551	0.137	4.024	0.000
		20-29 cm	0.054	0.128	0.425	0.671
		30-39 cm	-0.147	0.164	-0.898	0.369
		>40 cm	-0.458	0.180	-2.538	0.011
Genus by Height class	<i>Antillogorgia</i>	5-19 cm	-0.548	0.204	-2.692	0.007
		20-29 cm	-0.399	0.211	-1.892	0.058
		30-39 cm	0.112	0.239	0.467	0.640
		>40 cm	0.835	0.231	3.617	0.000
	<i>Eunicea</i>	5-19 cm	0.182	0.167	1.089	0.276
		20-29 cm	-0.319	0.179	-1.784	0.074
		30-39 cm	-0.442	0.237	-1.864	0.062
		>40 cm	0.578	0.216	2.671	0.008

Interaction			Parameter Estimate	Std. Error	Z	Sig.
<i>Gorgonia</i>	5-19 cm	-0.140	.234	-0.599	0.549	
	20-29 cm	-0.286	0.247	-1.160	0.246	
	30-39 cm	-0.214	0.303	-0.708	0.479	
	>40 cm	0.641	0.269	2.386	0.017	
<i>Muricea</i>	5-19 cm	-0.014	0.578	-0.025	0.980	
	20-29 cm	0.300	0.473	0.634	0.526	
	30-39 cm	0.198	0.612	0.324	0.746	
	>40 cm	-0.484	0.732	-0.661	0.509	
<i>Muriceopsis</i>	5-19 cm	-0.167	0.585	-0.286	0.775	
	20-29 cm	0.094	0.585	0.161	0.872	
	30-39 cm	0.849	0.592	1.433	0.152	
	>40 cm	-0.776	0.738	-1.051	0.293	
<i>Plexaura</i>	5-19 cm	0.542	0.322	1.681	0.093	
	20-29 cm	0.396	0.357	1.111	0.267	
	30-39 cm	-0.069	0.545	-0.126	0.900	
	>40 cm	-0.869	0.598	-1.453	0.146	
<i>Plexaurella</i>	5-19 cm	0.124	0.235	0.525	0.600	
	20-29 cm	-0.006	0.261	-0.022	0.983	
	30-39 cm	-0.085	0.313	-0.270	0.787	
	>40 cm	-0.033	0.325	-0.103	0.918	
<i>Pseudoplexaura</i>	5-19 cm	-0.135	0.205	-0.660	0.509	
	20-29 cm	-0.742	0.257	-2.885	0.004	
	30-39 cm	0.271	0.249	1.086	0.277	
	>40 cm	0.606	0.275	2.202	0.028	
<i>Pterogorgia</i>	5-19 cm	0.158	0.590	0.267	0.789	
	20-29 cm	0.961	0.469	2.050	0.040	
	30-39 cm	-0.621	0.739	-0.839	0.401	
	>40 cm	-0.498	0.743	-0.670	0.503	

Table S4. Hierarchical loglinear analysis for test of independence of numbers of octocoral colonies at sites on St. John, U.S. Virgin Is. as a function of colony proximity, site, and genus. Estimates of individual parameters in the loglinear model and their significance identify those combinations of factors that contribute to the overall significant result. The 3-way interaction was not significant and is not shown. Significant effects ($p \leq 0.05$) are highlighted yellow.

Interaction			Parameter Estimate	Std. Error	Z	Sig.
Site by Colony Proximity	East Cabritte	> 5 cm apart	-0.313	0.095	-3.291	0.001
		< 5 cm apart	0.313	0.095	3.291	0.001
	Europa	> 5 cm apart	0.313	0.095	3.291	0.001
		< 5 cm apart	-0.313	0.095	-3.291	0.001
Site by Genus	East Cabritte	<i>Antillogorgia</i>	0.480	0.132	3.632	0.000
		<i>Eunicea</i>	0.504	0.113	4.449	0.000
		<i>Gorgonia</i>	0.057	0.153	.375	0.708
		<i>Muricea</i>	-0.560	0.401	-1.396	0.163
		<i>Muriceopsis</i>	-1.464	0.456	-3.214	0.001
		<i>Plexaura</i>	1.338	0.189	7.083	0.000
		<i>Plexaurella</i>	-0.224	0.174	-1.284	0.199
		<i>Pseudoplexaura</i>	0.889	0.138	6.450	0.000
	<i>Pterogorgia</i>	-1.022	0.380	-2.686	0.007	
	Europa	<i>Antillogorgia</i>	-0.480	0.132	-3.632	0.000
		<i>Eunicea</i>	-0.504	0.113	-4.449	0.000
		<i>Gorgonia</i>	-0.057	0.153	-0.375	0.708
		<i>Muricea</i>	0.560	0.401	1.396	0.163
		<i>Muriceopsis</i>	1.464	0.456	3.214	0.001
		<i>Plexaura</i>	-1.338	0.189	-7.083	0.000
		<i>Plexaurella</i>	0.224	0.174	1.284	0.199
<i>Pseudoplexaura</i>		-0.889	0.138	-6.450	0.000	
<i>Pterogorgia</i>	1.022	0.380	2.686	0.007		
Colony Proximity by Genus	>5 cm apart	<i>Antillogorgia</i>	-0.093	.132	-0.707	0.480
		<i>Eunicea</i>	-0.053	.113	-0.469	0.639
		<i>Gorgonia</i>	-0.192	0.153	-1.255	0.210
		<i>Muricea</i>	0.170	0.401	.423	0.672
		<i>Muriceopsis</i>	-0.160	0.456	-0.350	0.726
		<i>Plexaura</i>	0.007	0.189	.035	0.972
		<i>Plexaurella</i>	.588	0.174	3.377	0.001
		<i>Pseudoplexaura</i>	-0.094	0.138	-0.678	0.498
		<i>Pterogorgia</i>	-0.173	0.380	-0.455	0.649
	<5 cm apart	<i>Antillogorgia</i>	0.093	0.132	0.707	0.480
		<i>Eunicea</i>	0.053	0.113	0.469	0.639
		<i>Gorgonia</i>	0.192	0.153	1.255	0.210
		<i>Muricea</i>	-0.170	0.401	-0.423	0.672
		<i>Muriceopsis</i>	0.160	0.456	0.350	0.726
		<i>Plexaura</i>	-0.007	0.189	-0.035	0.972
		<i>Plexaurella</i>	-0.588	0.174	-3.377	0.001
		<i>Pseudoplexaura</i>	0.094	0.138	0.678	0.498
		<i>Pterogorgia</i>	.173	0.380	0.455	0.649

Table S5. Hierarchical loglinear analysis for test of independence of numbers of octocoral colonies at sites on St. John, U.S. Virgin Is. as a function of colony proximity, genus, and height class. Estimates of individual parameters in the loglinear model and their significance identify those combinations of factors that contribute to the overall significant result. The 3-way interaction was not significant and is not shown. Significant effects ($p \leq 0.05$) are highlighted yellow.

Interaction			Parameter Estimate	Std. Error	Z	Sig.
Colony Proximity by Genus	>5 cm apart	<i>Antillogorgia</i>	-0.125	0.120	-1.039	0.299
		<i>Eunicea</i>	-0.159	0.106	-1.499	0.134
		<i>Gorgonia</i>	-0.177	0.149	-1.190	0.234
		<i>Muricea</i>	0.433	0.318	1.362	0.173
		<i>Muriceopsis</i>	-0.240	0.253	-0.947	0.343
		<i>Plexaura</i>	-0.139	0.228	-0.610	0.542
		<i>Plexaurella</i>	0.686	0.206	3.329	0.001
		<i>Pseudoplexaura</i>	-0.329	0.125	-2.625	0.009
		<i>Pterogorgia</i>	0.050	0.330	0.152	0.879
	<5 cm apart	<i>Antillogorgia</i>	0.125	0.120	1.039	0.299
		<i>Eunicea</i>	0.159	0.106	1.499	0.134
		<i>Gorgonia</i>	0.177	0.149	1.190	0.234
		<i>Muricea</i>	-0.433	0.318	-1.362	0.173
		<i>Muriceopsis</i>	0.240	0.253	0.947	0.343
		<i>Plexaura</i>	0.139	0.228	0.610	0.542
		<i>Plexaurella</i>	-0.686	0.206	-3.329	0.001
		<i>Pseudoplexaura</i>	0.329	0.125	2.625	0.009
		<i>Pterogorgia</i>	-0.050	0.330	-0.152	0.879
Colony Proximity by Height class	>5 cm apart	5-19 cm	0.212	0.092	2.297	0.022
		20-29 cm	0.020	0.103	0.193	0.847
		30-39 cm	-0.293	0.142	-2.067	0.039
		>40 cm	0.061	0.181	0.338	0.735
	<5 cm apart	5-19 cm	-0.212	0.092	-2.297	0.022
		20-29 cm	-0.020	0.103	-0.193	0.847
		30-39 cm	0.293	0.142	2.067	0.039
		>40 cm	-0.061	0.181	-0.338	0.735
Genus by Height class	<i>Antillogorgia</i>	5-19 cm	-0.723	0.174	-4.161	0.000
		20-29 cm	-0.436	0.196	-2.225	0.026
		30-39 cm	0.102	0.225	0.453	0.651
		>40 cm	1.058	0.231	4.586	0.000
	<i>Eunicea</i>	5-19 cm	-0.018	0.132	-0.138	0.890
		20-29 cm	-0.398	0.162	-2.449	0.014
		30-39 cm	-0.353	0.212	-1.665	0.096
		>40 cm	0.769	0.217	3.552	0.000

Interaction			Parameter Estimate	Std. Error	Z	Sig.
	<i>Gorgonia</i>	5-19 cm	-0.042	0.188	-0.224	0.823
		20-29 cm	-0.389	0.242	-1.610	0.107
		30-39 cm	-0.300	0.305	-0.985	0.324
		>40 cm	0.732	0.280	2.614	0.009
	<i>Muricea</i>	5-19 cm	0.338	0.387	0.874	0.382
		20-29 cm	0.087	0.445	0.196	0.845
		30-39 cm	0.026	0.590	0.044	0.965
		>40 cm	-0.451	0.719	-0.628	0.530
	<i>Muriceopsis</i>	5-19 cm	0.030	0.292	0.104	0.917
		20-29 cm	0.223	0.315	0.708	0.479
		30-39 cm	1.093	0.323	3.385	0.001
		>40 cm	-1.346	0.693	-1.944	0.052
	<i>Plexaura</i>	5-19 cm	0.262	0.260	1.009	0.313
		20-29 cm	0.490	0.278	1.765	0.078
		30-39 cm	0.168	0.377	0.446	0.656
		>40 cm	-0.921	0.582	-1.584	0.113
	<i>Plexaurella</i>	5-19 cm	-0.107	0.262	-0.409	0.683
		20-29 cm	0.271	0.264	1.028	0.304
		30-39 cm	0.195	0.310	0.629	0.529
		>40 cm	-0.359	0.525	-0.684	0.494
	<i>Pseudoplexaura</i>	5-19 cm	-0.478	0.170	-2.816	0.005
		20-29 cm	-0.837	0.228	-3.665	0.000
		30-39 cm	0.096	0.234	0.410	0.682
		>40 cm	1.218	0.230	5.293	0.000
	<i>Pterogorgia</i>	5-19 cm	0.738	0.360	2.049	0.040
		20-29 cm	0.988	0.376	2.627	0.009
		30-39 cm	-1.027	0.716	-1.435	0.151
		>40 cm	-0.699	0.724	-0.965	0.334

Table S6. Hierarchical loglinear analysis for test of independence of numbers of octocoral colonies at East Cabritte on St. John, U.S. Virgin Is. as a function of colony proximity and genus. Estimates of individual parameters in the loglinear model and their significance identify those combinations of factors that contribute to the overall significant result. Significant effects ($p \leq 0.05$) are highlighted yellow.

Interaction			Parameter Estimate	Std. Error	Z	Sig.
Colony Proximity by Genus	>5 cm apart	<i>Antillogorgia</i>	-0.068	0.220	-0.308	0.758
		<i>Eunicea</i>	0.023	0.196	0.115	0.908
		<i>Gorgonia</i>	-0.238	0.269	-0.886	0.376
		<i>Muricea</i>	-0.292	0.741	-0.394	0.693
		<i>Muriceopsis</i>	0.257	0.899	0.286	0.775
		<i>Plexaura</i>	0.157	0.217	0.722	0.470
		<i>Plexaurella</i>	0.631	0.308	2.046	0.041
		<i>Pseudoplexaura</i>	-0.176	0.209	-0.844	0.399
		<i>Pterogorgia</i>	-0.292	0.741	-0.394	0.693
	<5 cm apart	<i>Antillogorgia</i>	0.068	0.220	0.308	0.758
		<i>Eunicea</i>	-0.023	0.196	-0.115	0.908
		<i>Gorgonia</i>	0.238	0.269	0.886	0.376
		<i>Muricea</i>	0.292	0.741	0.394	0.693
		<i>Muriceopsis</i>	-0.257	0.899	-0.286	0.775
		<i>Plexaura</i>	-0.157	0.217	-0.722	0.470
		<i>Plexaurella</i>	-0.631	0.308	-2.046	0.041
		<i>Pseudoplexaura</i>	0.176	0.209	0.844	0.399
		<i>Pterogorgia</i>	0.292	0.741	0.394	0.693

Table S7. Hierarchical loglinear analysis for test of independence of numbers of octocoral colonies at Europa Bay on St. John, U.S. Virgin Is. as a function of colony proximity and genus. Estimates of individual parameters in the loglinear model and their significance identify those combinations of factors that contribute to the overall significant result. Significant effects ($P \leq 0.05$) are highlighted yellow.

Interaction			Parameter Estimate	Std. Error	Z	Sig.
Colony Proximity by Genus	>5 cm apart	<i>Antillogorgia</i>	-0.119	0.148	-0.808	0.419
		<i>Eunicea</i>	-0.129	0.113	-10.144	0.253
		<i>Gorgonia</i>	-0.146	0.146	-0.998	0.318
		<i>Muricea</i>	0.632	0.305	20.069	0.039
		<i>Muriceopsis</i>	-0.576	0.147	-30.932	0.000
		<i>Plexaura</i>	-0.143	0.310	-0.463	0.644
		<i>Plexaurella</i>	0.546	0.162	30.361	0.001
		<i>Pseudoplexaura</i>	-0.011	0.180	-0.060	0.952
		<i>Pterogorgia</i>	-0.054	0.170	-0.316	0.752
	<5 cm apart	<i>Antillogorgia</i>	0.119	0.148	0.808	0.419
		<i>Eunicea</i>	0.129	0.113	10.144	0.253
		<i>Gorgonia</i>	0.146	0.146	0.998	0.318
		<i>Muricea</i>	-0.632	0.305	-20.069	0.039
		<i>Muriceopsis</i>	0.576	0.147	30.932	0.000
		<i>Plexaura</i>	0.143	0.310	0.463	0.644
		<i>Plexaurella</i>	-0.546	0.162	-30.361	0.001
<i>Pseudoplexaura</i>	0.011	0.180	0.060	0.952		
<i>Pterogorgia</i>	0.054	0.170	0.316	0.752		

Table S8. Hierarchical loglinear analysis for test of independence of numbers of octocoral colonies at East Cabritte on St. John, U.S. Virgin Is. as a function of branch proximity and distance between octocoral bases. Estimates of individual parameters in the loglinear model and their significance identify those combinations of factors that contribute to the overall significant result. Significant effects ($p \leq 0.05$) are highlighted yellow.

Interaction			Parameter Estimate	Std. Error	Z	Sig.
Branch Proximity by Basal Distance Group	>5 cm apart	5-14 cm	-0.337	0.131	-20.577	0.010
		15-24 cm	-0.095	0.137	-0.695	0.487
		25-34 cm	0.433	0.178	20.426	0.015
	<5 cm apart	5-14 cm	0.337	0.131	20.577	0.010
		15-24 cm	0.095	0.137	0.695	0.487
		25-34 cm	-0.433	0.178	-20.426	0.015