

Algal epibionts as co-engineers in mussel beds: effects on abiotic conditions and mobile interstitial invertebrates

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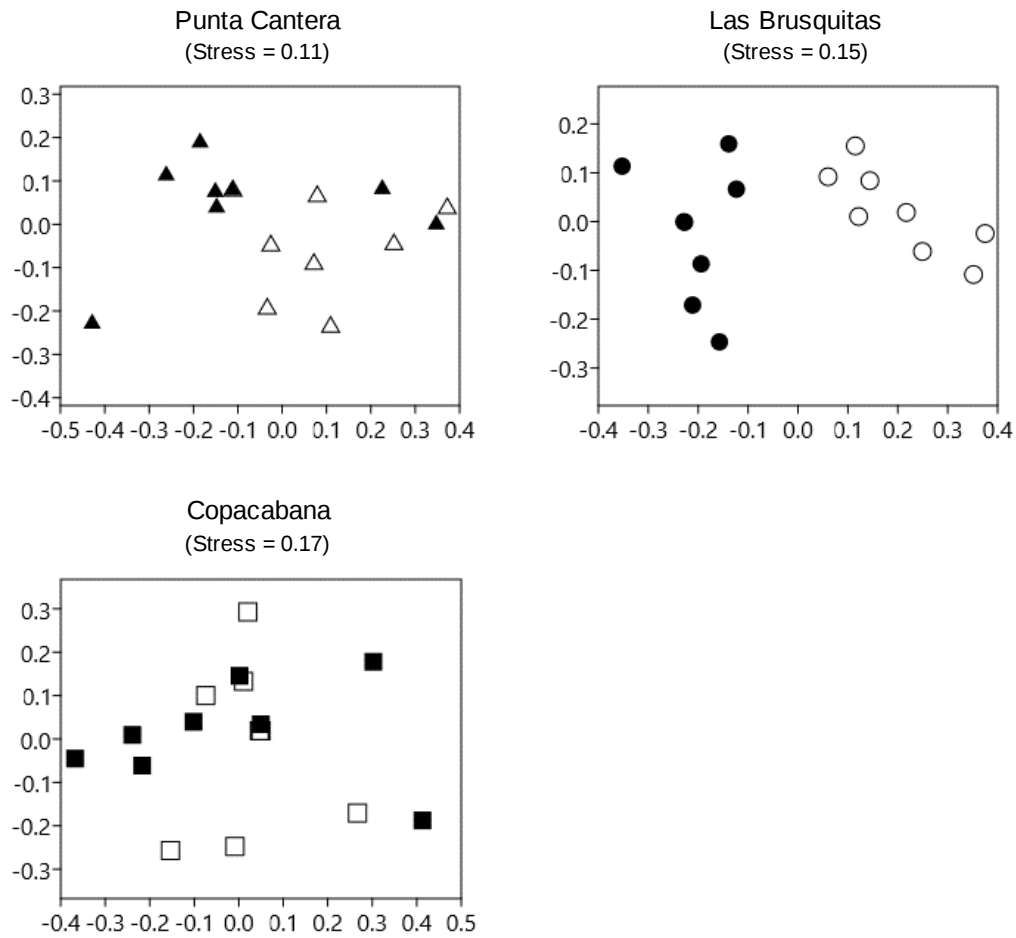


Figure S1. Effects of *Porphyra* cover on interstitial mussel bed invertebrates. Ordination of invertebrate assemblage composition between the *Porphyra*-removal treatment (filled symbols) and controls (empty symbols) at the three experimental sites. Sample ordination based on species abundance using non-metric multidimensional scaling and the Bray-Curtis index of dissimilarity.

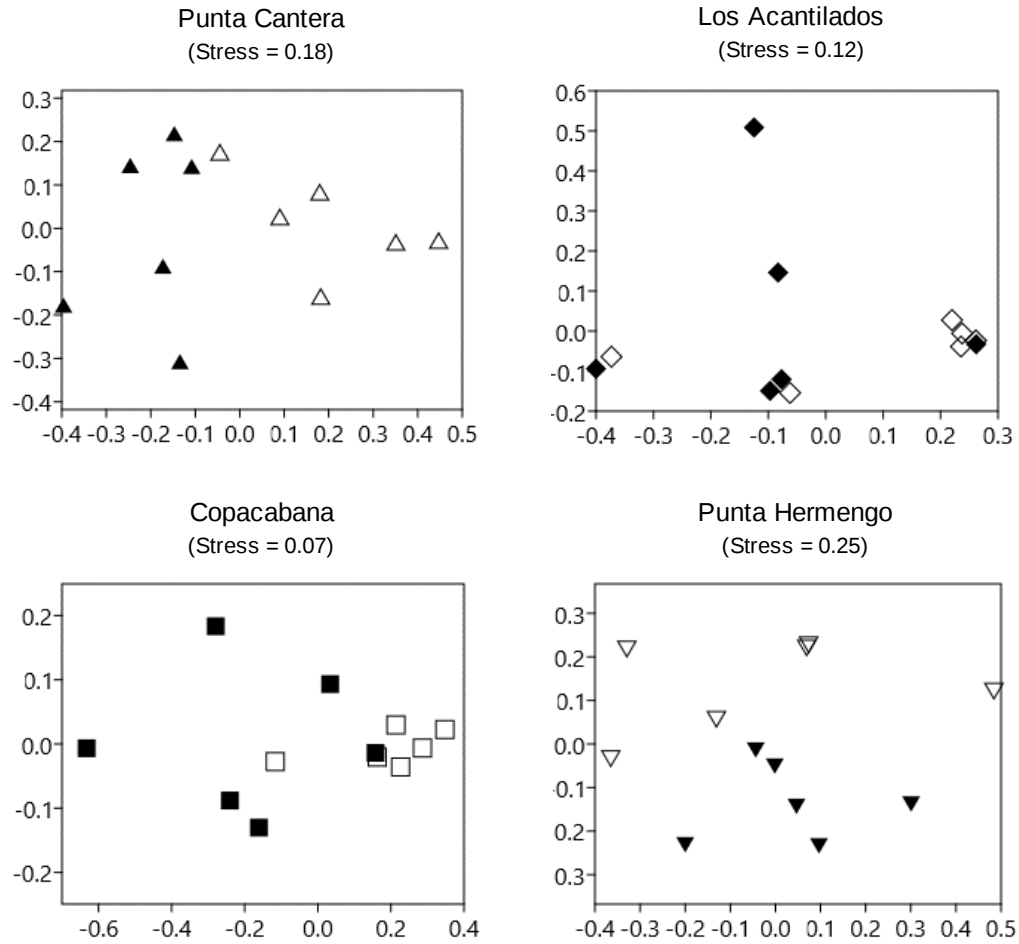


Figure S2. *Porphyra*-related patchiness in interstitial invertebrate distribution. Ordination of invertebrate assemblage composition between the *Porphyra*-covered patches (empty symbols) and exposed mussel bed areas (filled symbols) at the four sampling sites. Sample ordination based on species abundance using non-metric multidimensional scaling and the Bray-Curtis index of dissimilarity.

Table S1. Mean (SD) densities of invertebrate species found in the *Porphyra*-removal experiment that were not subject of univariate analyses due to low overall density (< 1 individual per sample) and/or scattered representation across sites/dates (n = 8).

Species	Taxa	Punta Cantera, 2011		Las Brusquitas, 2015		Copacabana, 2017	
		Removal	Control	Removal	Control	Removal	Control
<i>Sphaeroma serratum</i>	CI	0.25 (0.71)	0.13 (0.35)	- -	0.13 (0.35)	- -	- -
<i>Halicarcinus planatus</i>	CD	- -	- -	0.13 (0.35)	- -	- -	- -
Nemertea	N	- -	0.50 (1.07)	- -	1.00 (1.07)	0.14 (0.35)	0.13 (0.35)
<i>Boccardia polybranchia</i>	AP	2.25 (4.95)	2.50 (6.68)	- -	- -	- -	- -
<i>Syllis proluxa</i>	AP	- -	- -	- -	- -	0.29 (0.46)	0.38 (1.06)
<i>Protoariciella uncinata</i>	AP	- -	- -	- -	- -	- -	0.13 (0.35)
Chironomidae (larvae)	ID	0.75 (0.89)	2.50 (2.56)	- -	0.13 (0.35)	- -	0.13 (0.35)

Table S2. Mean (SD) densities of invertebrate species found in samples from *Porphyra*-covered patches and exposed mussel bed areas that were not subject of univariate analyses due to low overall density (< 1 individual per sample) and/or scattered representation across sites/dates (n = 6).

Species	Taxa	Punta Cantera, 2016		Los Acantilados, 2018		Copacabana, 2018		Punta Hermengo, 2016	
		Exposed	<i>Porphyra</i>	Exposed	<i>Porphyra</i>	Exposed	<i>Porphyra</i>	Exposed	<i>Porphyra</i>
<i>Sphaeroma serratum</i>	CI	1.50 (2.51)	0.67 (1.21)	-	-	-	-	-	-
<i>Idotea balthica</i>	CI	-	-	0.17 (0.41)	0.17 (0.41)	-	-	-	-
<i>Caprella dilatata</i>	CA	-	-	0.17 (0.41)	-	-	-	-	-
Nemertea	N	2.00 (2.90)	0.50 (0.55)	-	0.17 (0.41)	-	-	0.67 (0.82)	0.17 (0.41)
<i>Boccardia polybranchia</i>	AP	-	-	3.33 (4.89)	1.00 (2.00)	-	0.17 (0.41)	-	-
<i>Syllis prolixa</i>	AP	0.17 (0.41)	2.00 (4.43)	1.83 (4.49)	1.17 (2.40)	-	0.50 (1.22)	-	-
<i>Syllis gracilis</i>	AP	8.33 (8.87)	4.83 (6.21)	0.67 (1.03)	1.83 (3.54)	-	-	0.17 (0.41)	1.83 (2.23)
<i>Protoariciella uncinata</i>	AP	0.50 (0.84)	0.67 (0.82)	-	-	-	-	-	-
<i>Hallosydnella australis</i>	AP	0.17 (0.41)	-	-	-	-	-	-	-
<i>Lumbrineris tetraura</i>	AP	-	-	0.17 (0.41)	-	-	-	-	-
Chironomidae (larvae)	ID	0.17 (0.41)	0.83 (0.04)	-	-	-	-	-	-

Table S3. Mean (SD) densities of invertebrate species other than the grazing amphipod *Hyale grandicornis* in the experiment comparing natural *Porphyra*-covered areas (i.e., Control), and *Porphyra* removal plots with and without *Porphyra* mimics (i.e., Mimics and Removal, respectively (n = 7).

Species	Taxa	Mimics	Removal	Control
<i>Siphonaria lessonii</i>	MG	1.14 (0.90)	0.86 (0.69)	0.71 (1.11)
Nemertea	N	0.29 (0.49)	0.29 (0.76)	1.57 (1.62)
<i>Perinereis anderssoni</i>	AP	0.43 (0.53)	0.57 (0.53)	0.71 (0.76)
<i>Syllis prolixa</i>	AP	0.14 (0.38)	0.29 (0.49)	0.57 (1.51)
<i>Hallosydnella australis</i>	AP	-	0.14 (0.38)	-
Chironomidae (larvae)	ID	0.14 (0.38)	-	-

Table S4. Two-way PERMANOVA comparing the composition of interstitial invertebrate assemblages across Treatments (*Porphyra* removal vs. Control plots) and experimental Sites/Dates (Punta Cantera/2011, Las Brusquitas/2015, and Copacabana/2017) when excluding the amphipod *Hyale grandicornis* from the analysis. Asterisks indicate significant effects.

Source	MS	df	F	p
Treatment	0.25	1	1.83	0.128
Site/Date	2.97	2	21.73	<0.001*
Treatment X Site/Date	0.21	2	1.54	0.164
Residual	0.14	42		

Table S5. Two-way PERMANOVA comparing the composition of interstitial invertebrate assemblages across Patch Types (*Porphyra* covered vs. Exposed mussel bed areas) and experimental Sites/Dates (Punta Cantera/2011, Las Brusquitas/2015, and Copacabana/2017) when excluding the amphipod *Hyale grandicornis* from the analysis. Asterisks indicate significant effects.

Source	MS	df	F	p
Treatment	0.14	1	0.86	0.494
Site/Date	2.08	3	13.09	<0.001*
Treatment X Site/Date	0.28	3	1.74	0.056
Residual	0.16	40		

Table S6. Names and taxonomic authorities of the taxa analyzed in this study, listed in the order they appear in the text and Tables S1-S3.

Taxa
<i>Porphyra</i> C.Agardh, 1824
<i>Brachidontes rodriguezii</i> (d'Orbigny, 1842)
<i>Hyale grandicornis</i> (Krøyer, 1845)
<i>Siphonaria lessonii</i> Blainville, 1827
<i>Perinereis anderssoni</i> Kinberg, 1866
<i>Sphaeroma serratum</i> (Fabricius, 1787)
<i>Halicarcinus planatus</i> (Fabricius, 1775)
<i>Boccardia polybranchia</i> (Haswell, 1885)
<i>Syllis proluxa</i> Ehlers, 1901
<i>Protoariciella uncinata</i> Hartmann-Schröder, 1962
<i>Idotea balthica</i> (Pallas, 1772)
<i>Caprella dilatata</i> Krøyer, 1843
<i>Syllis gracilis</i> Grube, 1840
<i>Hallosydnella australis</i> (Kinberg, 1856)
<i>Lumbrineris tetraura</i> (Schmarda, 1861)