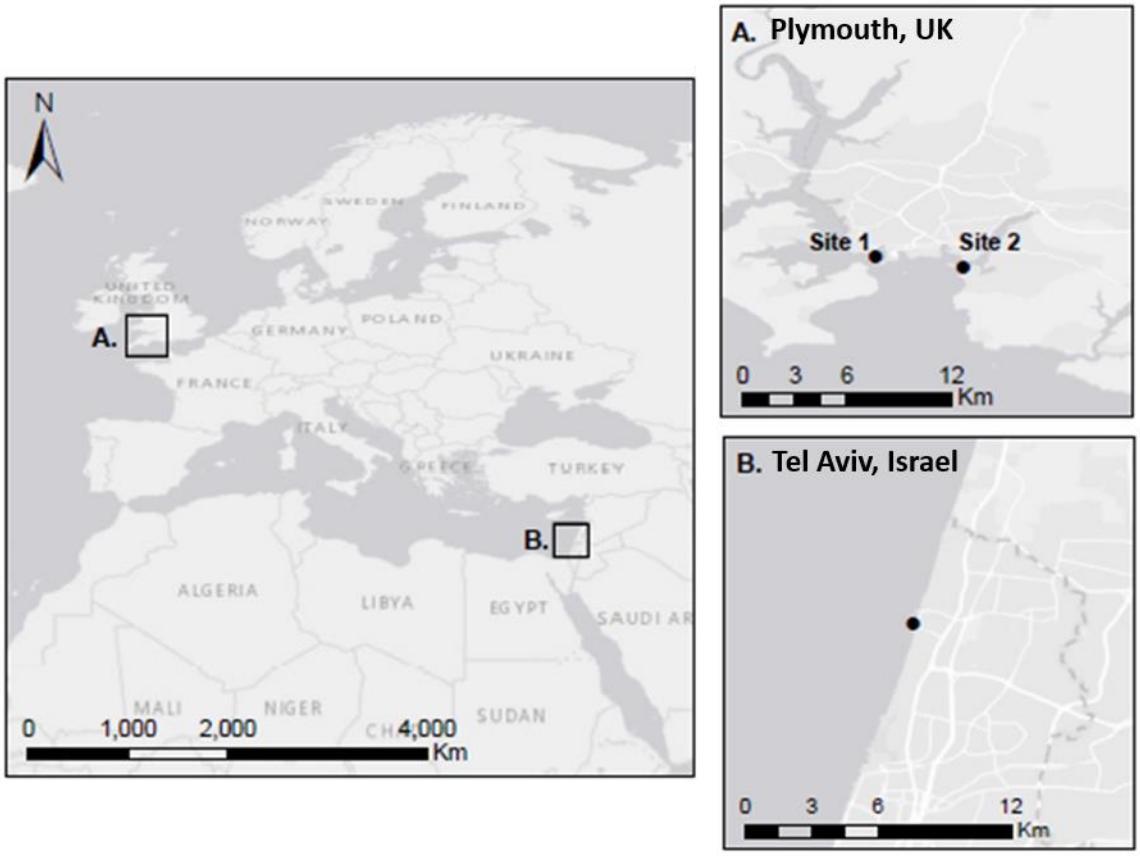

Figure 1. Study sites in (A.) Plymouth, UK, located along the English Channel in the North East Atlantic, and (B.) Tel Aviv, Israel located along the eastern Mediterranean coast. There were two study sites in Plymouth (50.364558, -4.172333; 50.359619, -4.120661), while in Tel Aviv, there was one site (32.162333, 34.794083). All study sites were within recreational marinas.

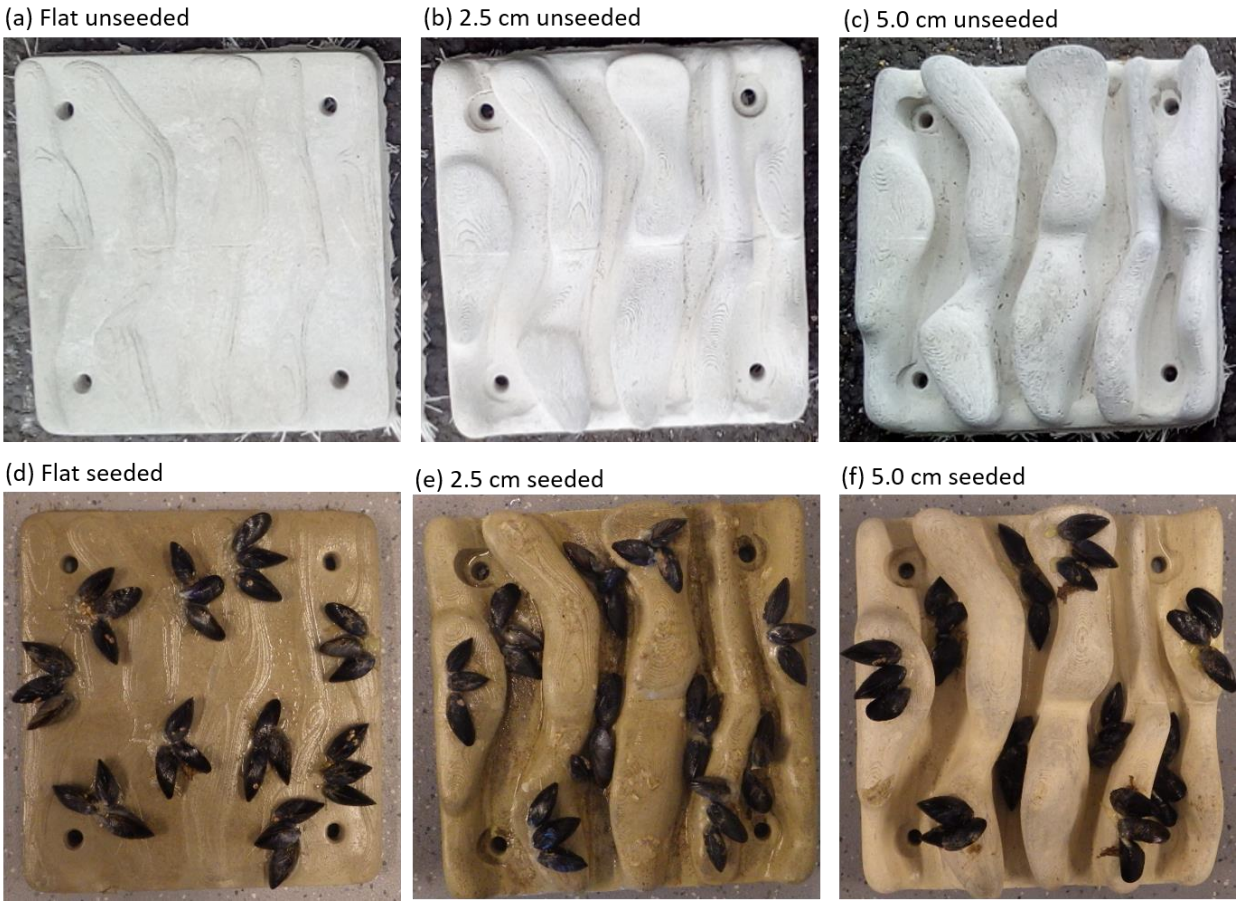

Figure 2. Experimental tiles used in Plymouth, UK (NE Atlantic) and Tel Aviv, Israel (eastern Mediterranean Sea). Top row from left to right: a) unseeded flat tile, b) unseeded 2.5 cm tile, c) unseeded 5.0 cm tile. Bottom row from left to right: d) seeded flat tile, e) seeded 2.5 cm tile, f) seeded 5.0 cm tile. All tiles were 25 cm x 25 cm. Seeded tiles were seeded with mussels (*Mytilus* spp.) of 30-35 mm shell length. Both Plymouth and Tel Aviv used unseeded tiles, but only experiments in Plymouth used seeded tiles. All experiments were in subtidal habitats. Photographs are from Plymouth.

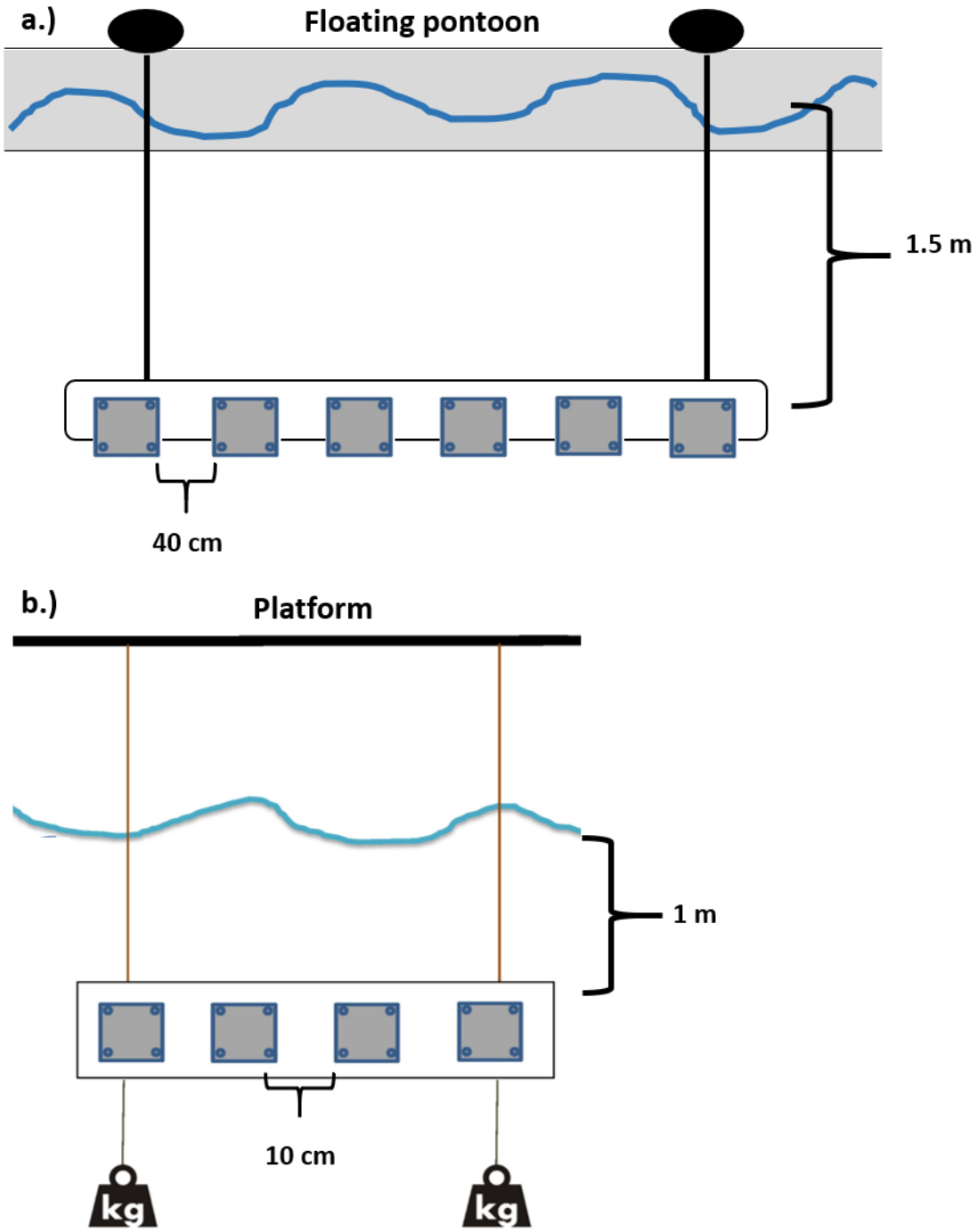

Figure 3. Experimental set-up of subtidal experiments in (a) Plymouth, UK (NE Atlantic) and (b) Tel Aviv, Israel (eastern Mediterranean Sea). In Plymouth, experimental tiles were affixed to plastic boards and hung off floating pontoons at 1.5 m below the surface of the water, while in Tel Aviv, tiles were affixed to a polypropylene board that was hung at approximately 1 m below the water's surface on the marina seawall.

Table 1. Number and size of mussels that were seeded and survived over the 15-month experiments in Plymouth, UK (NE Atlantic) in subtidal habitats. Tiles seeded with mussels were used to test effects of biological complexity on diversity. 'No. seeded' and 'No. survived' represent mussels across all tiles (n = 30 seeded tiles). All means are shown with ± standard error. 'SL' = shell length, 'SW' = shell width.

	Count			Initial		Final	
	No. seeded	**No. survived**	**Mean no./tile**	**SL (mm)**	**SW (mm)**	**SL (mm)**	**SW (mm)**
Site 1	450	131 (29%)	10.1 ± 1.1	32.8 ± 0.1	14.6 ± 0.1	67.0 ± 0.5	24.1 ± 0.3
Site 2	450	157 (35%)	10.5 ± 1.2	32.4 ± 0.1	14.2 ± 0.1	71.7 ± 0.7	25.9 ± 0.2
Flat complexity	300	103 (34%)	11.4 ± 1.8	32.8 ± 0.1	14.4 ± 0.1	69.8 ± 0.4	25.2 ± 0.2
2.5 cm complexity	300	103 (34%)	10.3 ± 1.0	32.4 ± 0.1	14.4 ± 0.1	69.8 ± 0.6	25.0 ± 0.2
5.0 cm complexity	300	82 (27%)	9.1 ± 1.4	32.5 ± 0.1	14.4 ± 0.1	69.8 ± 0.6	24.8 ± 0.3
Total	**900**	**288 (32%)**	**10.3 ± 0.8**	**32.6 ± 0.1**	**14.4 ± 0.1**	**69.8 ± 0.6**	**25.0 ± 0.2**

Table 2. PERMANOVAs testing (a) the number of seeded mussels that survived and (b) the difference in size of seeded mussels that survived over the 15-month experiments at two sites in Plymouth, UK (NE Atlantic) in subtidal habitats. Significant p-values are in bold. Complexity treatment included flat, 2.5 cm and 5.0 cm tiles.

(a) Survival						
Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Site (Si)	1	193.15	193.15	0.60291	0.4812	9934
Complexity (Com)	2	2367.4	1183.7	3.0389	0.2805	360
Si x Com	2	779.03	389.51	1.2158	0.2920	9959
Residual	41	13135	320.37			
Total	46	16614				
Transform: sqrt						

(b) Size						
Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Site (Si)	1	57.992	57.992	52.887	**0.0001**	9862
Complexity (Com)	2	0.081156	0.040578	0.043652	0.9134	360
Si x Com	2	1.8591	0.92957	0.84774	0.4352	9952
Res	282	309.22	1.0965			
Total	287	367.54				
Transform: fourth root						

Table 3. Three-way PERMANOVAs comparing mean (a) taxon and (b) functional richness among subtidal tiles in Plymouth, UK (NE Atlantic) recorded at the conclusion of the 15-month experiments at two sites. Where unique permutations were < 100, Monte Carlo tests were run and P(MC) values were used to determine significance. Significant p-values are in bold. Experiments were run to test effects of topographic complexity (flat, 2.5 cm, 5.0 cm tiles) and biological complexity (seeding with mussels) on diversity.

(a) Taxon richness							
Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms	P(MC)
Site (Si)	1	91.946	91.946	0.97311	0.3296	9921	0.3214
Complexity (Com)	2	22.463	11.232	0.96147	0.5535	180	0.5032
Seeding (Seed)	1	288.21	288.21	58.186	0.3345	6	**0.0454**
Si x Com	2	23.364	11.682	0.12363	0.9023	9955	0.8995
Si x Seed	1	4.9532	4.9532	0.052422	0.8748	9929	0.874
Com x Seed	2	27.82	13.91	0.20775	0.8456	9958	0.8417
Si x Com x Seed	2	133.91	66.956	0.70862	0.5048	9948	0.4986
Residual	46	4346.4	94.487				
Total	57	4944.5					
Transform: no transformation							

(b) Functional richness							
Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms	P(MC)
Site (Si)	1	186.29	186.29	0.71102	0.4254	9938	0.434
Complexity (Com)	2	1195.1	597.55	2.0416	0.3288	180	0.2961
Seeding (Seed)	1	1312.1	1312.1	4.8132	0.5075	6	0.2076
Si x Com	2	585.38	292.69	1.1171	0.3343	9948	0.3365
Si x Seed	1	272.6	272.6	1.0405	0.3238	9939	0.3152
Com x Seed	2	728.53	364.26	6.8206	0.0804	9962	0.0725
Si x Com x Seed	2	106.81	53.407	0.20384	0.9013	9947	0.894
Residual	46	12052	262				
Total	57	16263					
Transform: no transformation							

Table 4. Three-way PERMANOVA comparing community composition among subtidal tiles in Plymouth, UK (NE Atlantic) recorded at the conclusion of the 15-month experiments. Significant p-values are in bold. Experiments were run to test effects of topographic complexity (flat, 2.5 cm, 5.0 cm tiles) and biological complexity (seeding with mussels) on diversity.

Community composition						
Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Site (Si)	1	11047	11047	12.326	**0.0001**	9917
Complexity (Com)	2	2330.6	1165.3	1.3002	0.1208	9880
Seeding (Seed)	1	1931	1931	2.1544	**0.0033**	9904
Si x Com	2	2557.4	1278.7	1.4267	0.0513	9876
Si x Seed	1	515.88	515.88	0.57558	0.9082	9909
Com x Seed	2	1065.4	532.68	0.59432	0.9668	9894
Si x Com x Seed	2	1835	917.52	1.0237	0.4406	9889
Residual	46	41229	896.28			
Total	57	62477				
Transform: fourth root						

Table 5. SIMPER analyses showing differences in mean abundances (fourth root transformed; indicated by >/<) and contributions of individual species to community composition between seeded and unseeded subtidal tiles in Plymouth, UK (NE Atlantic) over the 15-month experiments. Consistency of contribution is shown by 'Diss/SD', which is the dissimilarity divided by standard deviation of contributions across all pairs of samples. Diss/SD values > 1 indicate that the contribution of a species to the average dissimilarity was consistent across samples and thus an important contributing species to differences between seeded and unseeded tiles.

Ave dissimilarity = 46.22%	**Seeded**	**>/<**	**Unseeded**	**Ave Diss**	**Diss/SD**	**Contrib%**	**Cum.%**
Ascidiella aspersa	1.68	>	1.54	1.97	1.23	4.27	4.27
Styela clava	1.02	<	1.50	1.77	1.29	3.83	8.10
Corella eumyota	1.17	>	1.10	1.69	1.31	3.65	11.74
Cryptosula pallasiana	0.71	<	0.98	1.63	1.26	3.52	15.27
Aplidium cf. *glabrum*	1.02	=	1.02	1.60	1.25	3.47	18.74
Mytilus spp.	1.78	>	1.37	1.55	1.09	3.36	22.10
Bugulina fulva	0.52	<	0.69	1.47	1.07	3.17	25.27
Tricellaria inopinata	1.11	>	1.08	1.42	1.16	3.08	28.34
Asterocarpa humilis	0.68	>	0.62	1.36	1.20	2.95	31.29
Amphipod spp.	1.55	<	1.71	1.33	1.12	2.87	34.17
Bugula neritina	0.19	<	0.61	1.22	0.88	2.63	36.80
Pomatocerous sp.	1.17	<	1.50	1.21	1.43	2.62	39.42
Caprella spp.	0.48	<	0.64	1.19	1.15	2.57	41.99
Botrylloides violaceus	0.37	<	0.45	1.18	0.78	2.55	44.54
Conopeum reticulum	0.42	>	0.35	1.15	0.72	2.49	47.03
Molgula sp.	0.48	>	0.43	1.13	1.03	2.45	49.48
Ciona intestinalis	1.96	<	1.97	1.13	0.92	2.44	51.92

Table 6. Number and size of mussels that recruited to subtidal tiles over 15-month experiments in Plymouth, UK (NE Atlantic). Table takes into account mussels that recruited to all tiles over the course of the experiments (n = 60 tiles). All means are shown with ± standard error. 'SL' = shell length, 'SW' = shell width.

	Count		**Size**	
	Total	**Mean /tile (± SE)**	**SL (mm)**	**SW (mm)**
Site 1	1837	63.3 ± 10.0	26.3 ± 0.4	8.9 ± 0.1
Site 2	865	33.1 ± 11.7	17.5 ± 0.4	5.8 ± 0.2
Flat complexity	1185	62.4 ± 17.3	22.3 ± 0.5	7.4 ± 0.2
2.5 cm complexity	931	49.0 ± 11.3	25.7 ± 0.6	8.9 ± 0.3
5.0 cm complexity	586	32.6 ± 10.1	22.4 ± 0.6	7.6 ± 0.2
Seeded	1412	50.3 ± 10.1	26.1 ± 0.5	9.0 ± 0.2
Unseeded	1290	47.8 ± 12.2	20.7 ± 0.4	6.8 ± 0.1
Total	**2702**	**49.0 ± 7.8**	**23.5 ± 0.3**	**7.9 ± 0.1**

Table 7. PERMANOVAs testing (a) count and (b) size (shell length) of recruited mussels to subtidal tiles at two sites in Plymouth, UK (NE Atlantic) from experiments investigating effects of topographic and biological complexity over 15 months. When unique permutations were < 100, Monte Carlo analyses were run, and the resulting p-values were used. Significant p-values are in bold.

(a) Count

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms	P(MC)
Site (Si)	1	5112.2	5112.2	11.487	**0.0002**	9949	0.001
Complexity (Com)	3	5360.9	1787	5.7866	0.0698	7836	0.0482
Seeding (Seed)	1	448.89	448.89	1.7399	0.3299	6	0.3795
Si x Com	3	926.43	308.81	0.69389	0.587	9954	0.5961
Si x Seed	1	258	258	0.57972	0.4903	9935	0.4962
Com x Seed	2	948.95	474.47	5.3973	0.1503	9964	0.0957
Si x Com x Seed	2	175.82	87.91	0.19753	0.9038	9955	0.9055
Residual	89	39609	445.04				
Total	102	54636					
Transform: log							

(b) Size

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms	P(MC)
Site (Si)	1	4896.9	4896.9	61.161	**0.0001**	9906	0.0001
Complexity (Com)	2	902.46	451.23	2.23	0.3791	360	0.3085
Seeding (Seed)	1	3554.2	3554.2	10.502	0.331	6	0.1701
Si x Com	2	404.69	202.34	2.5272	0.0817	9942	0.0827
Si x Seed	1	338.44	338.44	4.2271	**0.0386**	9908	0.0402
Com x Seed	2	1990.3	995.13	0.95446	0.5075	9957	0.5104
Si x Com x Seed	2	2085.2	1042.6	13.022	**0.0002**	9943	0.0001
Residual	2688	215220	80.066				
Total	2699	239650					
Transform: log							

Table 8. Post-hoc pairwise comparisons of significant interactions from PERMANOVA tests comparing size of mussels that recruited to subtidal tiles at two sites in Plymouth, UK (NE Atlantic) at the end of 15-month experiments. Experiments investigated the effects of topographic and biological complexity in subtidal habitats. 'Complexity' represents three levels of topographic complexity: Flat, 2.5 cm and 5.0 cm tiles. 'Seeding' represents two levels of biological complexity: tiles seeded with mussels and tiles left unseeded. Associated *F*- and *P*-values for each interaction are shown. *Pairwise tests for pairs of levels of factor 'complexity'. ** Pairwise tests for pairs of levels of factor 'seeding'.

Site x Seeding		**Site x Complexity x Seeding**		**Site x Complexity x Seeding**	
$F_{1,2688}$ = 4.2271, *P* = 0.0386		$F_{2,2688}$ = 13.022, *P* = 0.0002		$F_{2,2688}$ = 13.022, *P* = 0.0002	
		*Factor: Complexity**		*Factor: Seeding***	
Site 1	Seeded > Unseeded	**Site 1**		**Site 1**	
Site 2	Seeded > Unseeded	**Seeded**	Flat < 2.5 cm	**2.5 cm**	Seeded > Unseeded
			Flat < 5.0 cm	**5.0 cm**	Seeded > Unseeded
		Unseeded	Flat > 5.0 cm	**Site 2**	
			2.5 cm > 5.0 cm	**Flat**	Seeded > Unseeded
		Site 2		**2.5 cm**	Seeded > Unseeded
		Seeded	Flat < 2.5 cm		
			2.5 cm > 5.0 cm		
		Unseeded	Flat > 2.5 cm		
			Flat < 5.0 cm		
			2.5 cm < 5.0 cm		

Table 9. Summary table for taxa recorded on subtidal tiles from Tel Aviv, Israel in the eastern Mediterranean Sea at the end of the 12-month experiment (August 2016-August 2017). Experiments tested effects of physical complexity in a marina using three tile treatments: Flat, 2.5 cm and 5.0 cm tiles. 'x' represents where taxa were present for each treatment. The superscript 'NNS' denotes non-native species.

	Tile complexity treatment		
	Flat	**2.5 cm**	**5.0 cm**
Filter feeder			
Alectryonella plicatula^{NNS}		x	x
Amphibalanus amphitrite	x	x	x
Bryozoan, encrusting	x	x	x
Crambe crambe	x	x	x
Ostrea edulis	x	x	x

Schizoporella sp.	x	x	x
Serpulidae sp.	x		x
Spirorbis spp.	x	x	x
Primary producer			
Crustose coralline algae			x
Turf algae	x	x	x
Other			
Unidentified fouling organism	x	x	
Total taxon richness	**9**	**9**	**10**

Table 10. One-way PERMANOVAs comparing effects of subtidal topographic complexity for (a) taxon richness and (b) community composition for experiments in Tel Aviv, Israel in the eastern Mediterranean Sea at the end of the 12-month experiment (August 2016-August 2017). Significant p-values are in bold. Experiments tested effects of topographic complexity in a marina using three tile treatments: Flat, 2.5 cm and 5.0 cm tiles.

(a) Taxon richness						
Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Complexity	2	2510.2	1255.1	1.9536	0.1644	2848
Residual	12	7709.6	642.47			
Total	14	10220				
Transform: no transformation						

(b) Community composition						
Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Complexity	2	9006.4	4503.2	3.1239	**0.0300**	9566
Residual	12	17298	1441.5			
Total	14	26305				
Transform: sqrt						

Table 11. SIMPER analyses comparing mean abundances (square root transformed; indicated by >/<) and contributions of individual taxa to community composition differences between flat and 2.5 cm tiles in Tel Aviv, Israel in the eastern Mediterranean Sea. SIMPER analyses between other treatments were not done because differences were not detected between other treatments. Consistency of contribution is shown by 'Diss/SD', which is the dissimilarity divided by standard deviation of contributions across all pairs of samples. Diss/SD values > 1 indicate that

the contribution of a species to the average dissimilarity was consistent across samples and thus an important contributing species to differences between flat and 2.5 cm tiles.

Average dissimilarity = 68.6%	Flat	</>	2.5 cm	Av. Diss	Diss/SD	Contrib%	Cum.%
Turf	8.94	>	2.26	31.22	1.63	45.96	45.96
Spirorbid spp.	2.78	>	1.02	7.52	1.43	11.07	57.03
Ostrea edulis	1.33	<	1.58	6.78	2.00	9.98	67.01
Bryozoan sp., encrusting	1.85	>	1.05	6.67	1.23	9.82	76.83