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The Intertwined Effects of Hydrographic Barriers, Palaeoclimate and Life History on Genetic Structure of Marine Populations: A Case Study of Two Marine Invertebrates

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Table S1. Parameters of genetic diversity for *M. galloprovincialis*. N (number of samples), Nh (number of haplotypes), Nps (number of polymorphic sites), h (haplotype diversity), Π (nucleotide diversity), D (Tajima's D), Fs (Fu's Fs), R2 (Ramos-Onsins & Rozas' R2). The significant ($P < 0.05$) D, Fs and R2 values are given in bold

Population (<i>M. galloprovincialis</i>)	N	Nh	Nps	h	Π	D	Fs	R ₂
Sevastopol (B1)	5	4	3	0.900 (0.161)	0.00209 (0.00056)	-104.849	-1.938	0.1633
Krasnodar Krai: Malyy Utrish (B2)	4	3	5	0.833 (0.222)	0.00465 (0.00195)	-0.21249	0.556	0.3528
Hopa: Kemalpaşa Harbor (B3)	7	4	5	0.810 (0.130)	0.00316 (0.00079)	-0.56143	-0.324	0.1741
Ordu: Perşembe (B4)	3	3	2	1.000 (0.272)	0.00233 (0.00078)	-	-1.216	0.2357
Sinop: Karakum (B5)	13	4	4	0.491 (0.175)	0.00127 (0.00056)	-171.166	-1.415	0.1928
Kastamonu: Gideros Cove (B6)	6	1	0	0	0	-	-	-
Düzce: Akçakoca (B7)	2	1	0	0	0	-	-	-
İstanbul: Şile (B8)	2	1	0	0	0	-	-	-
İstanbul: Riva (B9)	11	1	0	0	0	-	-	-
İstanbul: Kilyos (B10)	5	3	2	0.700 (0.218)	0.00140 (0.00053)	-0.97256	-0.829	0.2449
Varna (B11)	2	1	0	0	0	-	-	-
İstanbul: Anadolu Kavagi (TS3)	13	3	2	0.410 (0.154)	0.00076 (0.00031)	-0.90920	-0.790	0.1507
İstanbul: Rumeli Hisari (TS4)	11	2	1	0.182 (0.144)	0.00032 (0.00025)	-112.850	-0.410	0.2875
İstanbul: Kuzguncuk (TS5)	16	4	19	0.350 (0.148)	0.00714 (0.00362)	-11.432	3.837	0.0990
İstanbul: Kalamış (TS6)	17	3	2	0.228 (0.129)	0.00041 (0.00024)	-150.358	-1.680	0.1611
İstanbul: Burgaz Island (TS7)	14	2	1	0.143 (0.129)	0.00025 (0.00021)	-115.524	-0.595	0.2575
Kocaeli: Derince (TS8)	12	5	6	0.576 (0.163)	0.00175 (0.00065)	-189.423	-1.899	0.1273
Tekirdağ: Mürefte (TS9)	13	1	0	0	0	-	-	-
Balikesir: Erdek (TS10)	10	5	31	0.727 (0.144)	0.01336 (0.00588)	-139.143	1.857	0.1283
Canakkale (TS11)	16	7	10	0.625 (0.139)	0.00371 (0.00124)	-109.976	-1.531	0.0978
Edirne: Ibrice Harbor (A2)	21	7	35	0.5411 (0.125)	0.01523 (0.00373)	-0.45144	4.558	0.1257
Balikesir: Ayvalik (A4)	8	3	19	0.571 (0.119)	0.01895 (0.00396)	224.021	9.363	0.2857
Izmir: Foça (A5)	6	3	22	0.600 (0.215)	0.01315 (0.00685)	-136.789	4.020	0.2992
Izmir: Bayrakli (A6)	8	6	24	0.893 (0.111)	0.01957 (0.00431)	111.121	1.160	0.2096
Bodrum: Güllük (A8)	13	11	43	0.978 (0.035)	0.02528 (0.00229)	0.12468	-1.500	0.1494
Fethiye: Karagözler (L1)	4	2	20	0.500 (0.265)	0.01745 (0.00926)	-0.85430	5.652	0.4330
Total	242	57	65	0.638 (0.034)	0.01227 (0.00108)	-108.676	-13.421	0.0528

Table S2. The total number of individuals and number of samples belonging to each type (I, II, III) at each collection site for *M. galloprovincialis*.

Population (<i>M. galloprovincialis</i>)	N	Type I	Type II	Type III
Sevastopol (B1)	5	-	-	5
Krasnodar Krai: Malyy Utrish (B2)	4	-	-	4
Hopa: Kemalpaşa Harbor (B3)	7	-	-	7
Ordu: Perşembe (B4)	3	-	-	3
Sinop: Karakum (B5)	13	-	-	13
Kastamonu: Gideros Cove (B6)	6	-	-	6
Düzce: Akçakoca (B7)	2	-	-	2
İstanbul: Şile (B8)	2	-	-	2
İstanbul: Riva (B9)	11	-	-	11
İstanbul: Kilyos (B10)	5	-	-	5
Varna (B11)	2	-	-	2
Istanbul: Anadolu Kavagi (TS3)	13	-	-	13
Istanbul: Rumeli Hisari (TS4)	11	-	-	11
Istanbul: Kuzguncuk (TS5)	16	-	2	14
Istanbul: Kalamış (TS6)	17	-	-	17
Istanbul: Burgaz Island (TS7)	14	-	-	14
Kocaeli: Derince (TS8)	12	-	-	12
Tekirdağ: Mürefte (TS9)	13	-	-	13
Balikesir: Erdek (TS10)	10	1	-	9
Canakkale (TS11)	16	-	-	16
Edirne: Ibrice Harbor (A2)	21	1	16	4
Balikesir: Ayvalik (A4)	8	-	4	4
Izmir: Foça (A5)	6	1	5	-
Izmir: Bayrakli (A6)	8	-	6	2
Bodrum: Güllük (A8)	13	1	6	6
Fethiye: Karagözler (L1)	4	-	3	1
Total	242	4	42	196

Table S3. Parameters of genetic diversity for *P. elegans*. N (number of samples), Nh (number of haplotypes), Nps (number of polymorphic sites), h (haplotype diversity), Π (nucleotide diversity), D (Tajima's D), Fs (Fu's Fs), R2 (Ramos-Onsins & Rozas' R2). The significant ($P < 0.05$) D, Fs and R2 values are given in bold.

Population (<i>P. elegans</i>)	N	Nh	Nps	h	Π	D	Fs	R ₂
Hopa: Kemalpaşa Harbor (B3)	6	4	4	0,867 + 0,129	0,00600 + 0,00145	-0,05722	-0,761	0,178
Ordu: Perşembe (B4)	3	2	1	0,667 + 0,314	0,00231 + 0,00109	-	0,201	0,4714
Sinop: Karakum (B5)	6	5	5	0,933 + 0,122	0,00784 + 0,00143	0,19651	-1,846	0,1857
Kastamonu: Gideros Cove (B6)	17	7	23	0,721 + 0,01239	0,01415 + 0,00715	-1,59697	0,525	0,1797
Düzce: Akçakoca (B7)	16	9		0,883 + 0,061	0,00603 + 0,00101	-1,31432	-4,818	0,0864
Istanbul: Hamsi Limani (TS1)	7	4	6	0,714 + 0,181	0,00593 + 0,00222	-1,52412	-0,428	0,1875
Istanbul: Büyük Liman (TS2)	11	5	5	0,618 + 0,164	0,00315 + 0,00114	-1,79107	-2,31	0,1311
Istanbul: Burgaz Island (TS7)	17	5	7	0,476 + 0,155	0,00323 + 0,00138	-2,03996	-1,701	0,1263
Canakkale (TS11)	5	4	4	0,9 + 0,161	0,00554 + 0,00166	-1,0938	-1,405	0,1871
Edirne: Enez (A1)	25	5	7	0,513 + 0,104	0,00281 + 0,00091	-1,73553	-1,376	0,0961
Gökçeada: Kaleköy Harbor (A3)	24	11	28	0,902+0,00131	0,03927 + 0,00528	1,73496	2,079	0,1971
Balikesir: Ayvalik (A4)	5	2	23	0,6 + 0,175	0,04775 + 0,01395	1,8563	7,977	0,3
Izmir: Çeşme (A7)	1	-	-	-	-	-	-	-
Bodrum: Turgutreis (A9)	1	-	-	-	-	-	-	-
Datça: Palamutbükü (A10)	5	4	3	0,9 + 0,900	0,00415 + 0,00111	-1,04849	-1,938	0,1633
Fethiye: Karagözler (L1)	8	2	1	0,25 + 0,180	0,00087 + 0,00062	-1,05482	-0,182	0,3307
Antalya: Kaş (L2)	13	5	4	0,692 + 0,119	0,00293 + 0,00071	-1,16688	-2,19	0,1158
Antalya: Demre (L3)	2	2	1	1+ 0,500	0,00346 + 0,00173	-	0	0,5
Mersin: Taşucu (L4)	11	2	1	0,182 + 0,144	0,00063 + 0,00050	-1,1285	-0,41	0,2875
Total	183	40	40	0,827 + 0,021	0,0393 + 0,00137	1,59211	-2,256	0,1403

Table S4. The total number of individuals and number of samples belonging to each type (II, III) at each collection site for *P.elegans*.

Population (<i>P. elegans</i>)	N	Type II	Type III
Hopa: Kemalpaşa Harbor (B3)	6	-	6
Ordu: Perşembe (B4)	3	-	3
Sinop: Karakum (B5)	6	-	6
Kastamonu: Gideros Cove (B6)	17	1	16
Düzce: Akçakoca (B7)	16	-	16
Istanbul: Hamsi Limani (TS1)	7	-	7
Istanbul: Büyük Liman (TS2)	11	-	11
Istanbul: Burgaz Island (TS7)	17	1	16
Canakkale (TS11)	5	5	
Edirne: Enez (A1)	25	-	25
Gökçeada: Kaleköy Harbor (A3)	24	16	8
Balikesir: Ayvalik (A4)	5	2	3
Izmir: Çeşme (A7)	1	1	-
Bodrum: Turgutreis (A9)	1	1	-
Datça: Palamutbükü (A10)	5	5	-
Fethiye: Karagözler (L1)	8	8	-
Antalya: Kaş (L2)	13	13	-
Antalya: Demre (L3)	2	2	-
Mersin: Taşucu (L4)	11	11	-
Total	183	66	117

Table S5. Neutrality tests for different populations and types of *Mytilus galloprovincialis* and *Palaemon elegans* based on COIII and CO1 sequences, respectively. D, Tajima's D; Fs, Fu's Fs; R₂, Ramos- Onsins and Rozas's R₂. The significant ($P < 0.05$) D, Fs and R₂ values are given in bold.

Region	<i>M. galloprovincialis</i>			<i>P. elegans</i>		
	D	Fs	R ₂	D	Fs	R ₂
Total	-1.08676	-13.421	0.0528	1,62587	-2,978	0,1413
Total_with Type III haplotypes	-2.46765	-32.990	0.0175	-2,21607	-17,119	0,0294
Black Sea	-2.42937	-15.227	0.0324	-1,79257	-5,041	0,0914
Turkish Strait System	-2.34649	-10.697	0.0292	-1,41697	-0,171	0,0739
TSS_with Type III haplotypes	-2.55255	-11.871	0.0272	-2,08057	-5,456	0,0508
Mediterranean Sea (Aegean & Levantine seas)	-0.34782	-1.607	0.0932	1,31368	2,511	0,1441
Mediterranean Sea with Type II haplotypes	-2,27650	-6,327	0.0637	-2,06109	-10,178	0,0388

Table S6. Above diagonal: Pairwise FST values between populations of *Mytilus galloprovincialis* for five microsatellite loci. Below diagonal: Pairwise RST values between populations of *Mytilus galloprovincialis* for five microsatellite loci. FSTs with significant P values (P<0.05) are indicated in bold.

		Black Sea										Turkish Straits System										Eastern Mediterranean Sea					
		B1	B2	B3	B4	B5	B6	B7	B9	B10	B11	TS3	TS4	TS5	TS6	TS7	TS8	TS9	TS10	TS11	A2	A4	A5	A6	A8	L1	
B1			0.19	0.62	0.40	0.44	0.57	0.72	0.36	0.19	0.47	0.25	0.35	0.39	0.46	0.59	0.07	0.37	0.23	0.10	0.13	0.15	0.62	0.18	0.26	0.15	
B2	0.33		0.39	0.07	0.28	0.39	0.50	0.27	0.14	0.29	0.23	0.24	0.30	0.37	0.42	0.11	0.26	0.10	0.08	0.09	0.23	0.46	0.24	0.15	0.08		
B3	0.51	-0.07		0.12	-0.11	-0.15	0.39	0.16	0.07	-0.08	0.60	-0.05	-0.11	-0.02	0.13	0.23	0	0.02	0.21	0.21	0.48	-0.04	0.50	0.18	0.16		
B4	0.75	0.24	0.01		0.12	0.23	0.41	0.22	0.14	0.17	0.36	0.17	0.19	0.28	0.28	0.21	0.16	0.05	0.17	0.19	0.38	0.30	0.39	0.19	0.11		
B5	0.76	0.36	-0.16	-0.04		0	0.27	0.17	0.13	0.07	0.43	0.10	0.09	0.15	0.15	0.24	0.09	0.09	0.23	0.22	0.40	0.16	0.42	0.18	0.11		
B6	0.58	0.17	-0.43	-0.07	-0.02		0.30	0.27	0.19	0.10	0.57	0.10	0.11	0.14	0.17	0.33	0.15	0.18	0.32	0.30	0.48	0.14	0.49	0.26	0.21		
B7	0.57	0.26	0.46	0.61	0.49	0.14		0.11	0.27	0.06	0.67	0.18	0.16	0.33	0.14	0.44	0.11	0.20	0.43	0.27	0.62	0.18	0.64	0.19	0.30		
B9	0.41	0.14	-0.26	0.39	0.45	0.20	0.02		0.10	0.02	0.34	0.12	0.07	0.25	0.12	0.23	0	0.01	0.24	0.08	0.39	0.20	0.43	0	-0.03		
B10	0.16	-0.03	-0.96	-0.09	-0.05	-0.08	-0.08	0		0.10	0.30	0.02	0.06	0.08	0.17	0.03	0.08	0.04	0.03	0.04	0.12	0.18	0.15	0.06	-0.14		
B11	0.10	0.05	-0.24	0.36	0.46	0.22	0.01	-0.03	0		0.45	0.05	0	0.16	0.02	0.25	-0.03	0.02	0.25	0.15	0.43	0.07	0.46	0.06	0.03		
TS1	0.27	-0.03	-0.48	0.08	0.17	0.06	0.09	0.08	-0.10	0.05		0.43	0.43	0.54	0.53	0.27	0.36	0.22	0.27	0.20	0.45	0.63	0.46	0.27	0.33		
TS2	0.18	0.29	-0.14	0.48	0.53	0.34	0.03	0.09	0.10	-0.01	0.20		0	-0.01	0.09	0.14	0.04	0.06	0.13	0.12	0.25	0.06	0.28	0.10	-0.05		
TS3	0.26	0.22	-0.19	0.44	0.50	0.29	0	0	0.08	-0.07	0.16	-0.01	-0.01	0.05	0.08	0.18	0	0.03	0.19	0.13	0.33	0.05	0.36	0.08	-0.03		
TS4	0.09	0.31	-0.05	0.51	0.57	0.41	0.12	0.16	0.18	0.01	0.25	-0.03	0.05		0.21	0.19	0.16	0.18	0.18	0.22	0.30	0.10	0.32	0.22	0.05		
TS5	0.41	0.32	0.18	0.63	0.60	0.33	0.16	0.03	-0.24	-0.16	0.08	-0.17	-0.12	-0.08		0.35	0.07	0.13	0.33	0.21	0.52	0.10	0.54	0.16	0.18		
TS6	-0.07	0.29	0.26	0.59	0.65	0.52	0.36	0.32	0.26	0.12	0.30	0.19	0.24	0.11	0.24		0.20	0.10	-0.03	0.07	0.03	0.36	0.04	0.14	-0.05		
TS7	0.50	0.22	-0.17	0.41	0.44	0.17	0.01	-0.05	-0.10	-0.01	0.07	0.08	-0.01	0.16	0.07	0.37		-0.02	0.20	0.10	0.37	0.13	0.40	0.03	-0.01		
TS8	0.40	0.03	-0.28	0.25	0.35	0.12	0.07	-0.03	-0.02	-0.01	0.03	0.16	0.06	0.22	0.12	0.33	-0.02		0.10	0.03	0.27	0.19	0.30	-0.01	-0.07		
TS9	0.01	0.01	0.07	0.15	0.22	0.15	0.06	0.10	0.13	0.04	0.10	0.11	0.08	0.08	0.02	0.04	0.13	0.09		0.08	0.04	0.34	0.05	0.15	-0.04		
A1	0.01	0.16	0.17	0.51	0.57	0.43	0.27	0.16	0.16	-0.01	0.19	0.12	0.10	0.08	0.14	0.04	0.22	0.17	0.08		0.17	0.28	0.21	0	-0.09		
A2	0.10	0.59	0.75	0.86	0.85	0.75	0.78	0.66	0.34	0.41	0.48	0.41	0.51	0.28	0.66	0.02	0.71	0.65	0.05	0.26		0.51	-0.02	0.29	0.08		
A3	0.32	0.24	-0.39	0.41	0.46	0.23	-0.08	0	0.02	-0.03	0.13	-0.02	-0.03	0.06	-0.18	0.28	-0.04	0.06	0.11	0.17	0.57		0.53	0.23	0.18		
A4	-0.07	-0.07	-0.55	0.07	0.16	0.07	-0.05	-0.01	0.03	-0.07	-0.06	0.01	0	0.01	-0.28	-0.02	-0.05	-0.01	0	-0.10	0.02	0.01		0.33	0.14		
A5	0.17	-0.01	0.15	0.43	0.51	0.31	0.25	0.06	-0.01	-0.06	0.04	0.13	0.05	0.13	0.18	0.15	0.16	0.03	0.06	0.01	0.47	0.12	-0.14		-0.06		
A6	-0.12	0.20	0.38	0.71	0.71	0.44	0.44	0.23	0	-0.09	0.14	-0.06	0.04	-0.12	0.13	-0.09	0.33	0.25	-0.06	-0.06	-0.08	0.21	0.09	-0.16	0.06		