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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), ∏ (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 (*M. galloprovincialis*)	**N**	**Nh**	**Nps**	**h**	**∏**	**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	-	-	-
Istanbul: Anadolu Kavagi (TS3)	13	3	2	0.410 (0.154)	0.00076 (0.00031)	-0.90920	-0.790	0.1507
Istanbul: Rumeli Hisari (TS4)	11	2	1	0.182 (0.144)	0.00032 (0.00025)	-112.850	-0.410	0.2875
Istanbul: Kuzguncuk (TS5)	16	4	19	0.350 (0.148)	0.00714 (0.00362)	-11.432	3.837	0.0990
Istanbul: Kalamiş (TS6)	17	3	2	0.228 (0.129)	0.00041 (0.00024)	-150.358	-1.680	0.1611
Istanbul: 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 (*M. galloprovincialis*)	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: Kalamiş (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), ∏ (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 (*P. elegans*)	**N**	**Nh**	**Nps**	**h**	**∏**	**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 (*P. elegans*)	**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	***M. galloprovincialis***			***P. elegans***		
	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
Black Sea	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
Turkish Straits System	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		0.05	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
Eastern Mediterra-nean Sea	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	-0.08	0.21	0.09	-0.16	0.06	