

Short communication: New data support phylogeographic patterns in a marine parasite *Tristriata anatis* (Digenea: Notocotyliidae)

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Supplementary Table S1. Data on *Tristriata anatis* isolates and their partial *cox1* and *nadh1* gene sequences analyzed in the paper; sequences obtained in this study have GenBank accession numbers starting with “MN”; sequences obtained in Gonchar & Galaktionov, 2017 have GenBank accession numbers starting with “KX”. *f* adult female bird; *m* adult male bird; *j* juvenile bird; *hapl* haplotype; *Promezhut. Bay* Promezhutochnaya Bay

Isolate	Life cycle stage	Host species	Year	Site	Location	Region	<i>cox1</i>		<i>nadh1</i>	
							GenBank ID	hapl	GenBank ID	hapl
10	redia/cercari	<i>L. saxatilis</i>	2010	—	Dolgy Island	Pechora Sea	MN160008	cH1	MN159931	nH1
13	adult	<i>S. mollissima</i> f	2010	Lyamchina Bay	Vaygach Island	Pechora Sea	KX833019	cH1	NA	NA
14	adult	<i>S. spectabilis</i> m	2010	NA	Dolgy Island	Pechora Sea	KX833018	cH1	NA	NA
17	redia/cercari	<i>L. saxatilis</i>	2010	NA	Dolgy Island	Pechora Sea	KX833017	cH1	MN159932	nH1
18	redia/cercari	<i>L. saxatilis</i>	2010	NA	Dolgy Island	Pechora Sea	KX833016	cH1	NA	NA
19	redia/cercari	<i>L. saxatilis</i>	2010	NA	Dolgy Island	Pechora Sea	KX833015	cH4	MN159933	nH2
20	redia/cercari	<i>L. saxatilis</i>	2010	NA	Dolgy Island	Pechora Sea	KX833014	cH1	MN159934	nH1
25	redia/cercari	<i>L. saxatilis</i>	2006	Gulf of Sedov	Vaygach Island	Pechora Sea	KX833013	cH1	MN159935	nH1
26	redia/cercari	<i>L. saxatilis</i>	2006	Gulf of Sedov	Vaygach Island	Pechora Sea	KX833012	cH1	NA	NA
46	redia/cercari	<i>L. sitkana</i>	2012	Promezhut. Bay	KekurnyiGulf	Sea of Okhotsk	KX833011	cH2	NA	NA
47	redia/cercari	<i>L. sitkana</i>	2012	Promezhut. Bay	Kekurny Gulf	Sea of Okhotsk	KX833010	cH5	MN159936	nH3
48	adult	<i>H. histrionicus</i> f	2012	Shkipеров Bay	Babushkin Bay	Sea of Okhotsk	KX833009	cH7	NA	NA
49	adult	<i>S. mollissima</i> j	2012	Shkipеров Bay	Babushkin Bay	Sea of Okhotsk	KX833008	cH8	NA	NA
57	adult	<i>S. mollissima</i> j	2012	Shkipеров Bay	Babushkin Bay	Sea of Okhotsk	KX833007	cH9	NA	NA
59a	redia/cercari	<i>L. sitkana</i>	2012	Promezhut. Bay	Kekurny Gulf	Sea of Okhotsk	MN160009	cH2	MN159937	nH4
60a	redia/cercari	<i>L. sitkana</i>	2012	Promezhut. Bay	Kekurny Gulf	Sea of Okhotsk	MN160010	cH2	MN159938	nH3
63a	redia/cercari	<i>L. saxatilis</i>	2014	Kem-ludy	Kem-ludy	White Sea	MN160011	cH1	MN159939	nH1
77	adult	<i>S. mollissima</i> f	2002	Skerjafjörður	Iceland	North Atlantic	KX832999	cH3	NA	NA
87a	redia/cercari	<i>L. saxatilis</i>	2015	Roscoff	Roscoff	English Channel	MN160012	cH10	MN159940	nH7

88	redia/cercari	<i>L. saxatilis</i>	2015	Roscoff	Roscoff	English Channel	KX832998	cH3	MN159941	nH2
89	redia/cercari	<i>L. saxatilis</i>	2010	NA	Dolgy Island	Pechora Sea	KX833002	cH4	MN159942	nH2
90	redia/cercari	<i>L. saxatilis</i>	2010	NA	Dolgy Island	Pechora Sea	KX833001	cH1	MN159943	nH8
91	redia/cercari	<i>L. saxatilis</i>	2010	NA	Dolgy Island	Pechora Sea	KX833000	cH1	MN159944	nH1
92	adult	<i>S. spectabilis</i> m	2010	NA	Dolgy Island	Pechora Sea	KX832997	cH3	NA	NA
98	redia/cercari	<i>L. saxatilis</i>	2016	Kiberg	Kiberg	Western Barents Sea	KX832996	cH1	MN159945	nH1
99	redia/cercari	<i>L. saxatilis</i>	2016	Kiberg	Kiberg	Western Barents Sea	KX832995	cH1	MN159946	nH9
API24	adult	<i>A. platyrhynchos</i>	2014	Skerjafjörður	Iceland	North Atlantic	KX832994	cH11	NA	NA
API25	adult	<i>A. platyrhynchos</i>	2014	Skerjafjörður	Iceland	North Atlantic	KX832993	cH1	NA	NA
110-1	adult	<i>S. mollissima</i> j	2017	NA	Dolgy Island	Pechora Sea	MN160013	cH1	MN159947	nH1
110-2	adult	—	2017	—	—	—	MN160014	cH1	MN159948	nH1
110-3	adult	—	2017	—	—	—	MN160015	cH1	MN159949	nH10
110-4	adult	—	2017	—	—	—	MN160016	cH1	MN159950	nH1
110-5	adult	—	2017	—	—	—	MN160017	cH1	MN159951	nH11
110-6	adult	—	2017	—	—	—	MN160018	cH1	MN159952	nH1
110-7	adult	—	2017	—	—	—	MN160019	cH1	MN159953	nH1
110-8	adult	—	2017	—	—	—	MN160020	cH1	MN159954	nH2
111-1	adult	<i>S. mollissima</i> j	2017	NA	Dolgy Island	Pechora Sea	MN160021	cH1	MN159955	nH2
111-2	adult	—	2017	—	—	—	MN160022	cH1	MN159956	nH2
111-3	adult	—	2017	—	—	—	MN160023	cH1	MN159957	nH1
111-4	adult	—	2017	—	—	—	MN160024	cH1	MN159958	nH1
111-5	adult	—	2017	—	—	—	MN160025	cH1	MN159959	nH2
111-6	adult	—	2017	—	—	—	MN160026	cH1	MN159960	nH2
111-7	adult	—	2017	—	—	—	MN160027	cH1	MN159961	nH1
111-8	adult	—	2017	—	—	—	MN160028	cH1	MN159962	nH1
112-2	adult	<i>S. mollissima</i> j	2017	NA	Dolgy Island	Pechora Sea	MN160029	cH1	MN159963	nH2
112-3	adult	—	2017	—	—	—	MN160030	cH1	MN159964	nH5
112-4	adult	—	2017	—	—	—	MN160031	cH1	MN159965	nH1
112-5	adult	—	2017	—	—	—	NA	NA	MN159966	nH1
112-6	adult	—	2017	—	—	—	MN160032	cH12	MN159967	nH12
112-7	adult	—	2017	—	—	—	MN160033	cH1	MN159968	nH1

112-8	adult	—	2017	—	—	—	MN160034	cH1	MN159969	nH13
113	redia/cercari	<i>L. saxatilis</i>	2017	NA	Dolgy Island	Pechora Sea	MN160035	cH1	MN159970	nH14
114	redia/cercari	<i>L. saxatilis</i>	2017	NA	Dolgy Island	Pechora Sea	MN160036	cH1	MN159971	nH1
115	redia/cercari	<i>L. saxatilis</i>	2017	NA	Dolgy Island	Pechora Sea	MN160037	cH1	MN159972	nH2
116	redia/cercari	<i>L. saxatilis</i>	2017	NA	Dolgy Island	Pechora Sea	MN160038	cH1	MN159973	nH1
117	redia/cercari	<i>L. saxatilis</i>	2017	NA	Dolgy Island	Pechora Sea	MN160039	cH1	MN159974	nH2
118	redia/cercari	<i>L. saxatilis</i>	2017	NA	Dolgy Island	Pechora Sea	MN160040	cH1	MN159975	nH5
119	redia/cercari	<i>L. saxatilis</i>	2017	Lyamchina Bay	Vaygach Island	Pechora Sea	MN160041	cH1	MN159976	nH1
120	redia/cercari	<i>L. saxatilis</i>	2017	Lyamchina Bay	Vaygach Island	Pechora Sea	MN160042	cH1	MN159977	nH1
121	redia/cercari	<i>L. saxatilis</i>	2017	Lyamchina Bay	Vaygach Island	Pechora Sea	MN160043	cH1	MN159978	nH2
122	redia/cercari	<i>L. saxatilis</i>	2017	Lyamchina Bay	Vaygach Island	Pechora Sea	MN160044	cH1	MN159979	nH1
123	redia/cercari	<i>L. saxatilis</i>	2017	Lyamchina Bay	Vaygach Island	Pechora Sea	MN160045	cH1	MN159980	nH1
124	redia/cercari	<i>L. saxatilis</i>	2017	Lyamchina Bay	Vaygach Island	Pechora Sea	MN160046	cH1	MN159981	nH1
125	redia/cercari	<i>L. saxatilis</i>	2017	Lyamchina Bay	Vaygach Island	Pechora Sea	MN160047	cH1	MN159982	nH15
126	redia/cercari	<i>L. saxatilis</i>	2017	Lyamchina Bay	Vaygach Island	Pechora Sea	MN160048	H10	MN159983	nH1
127	redia/cercari	<i>L. saxatilis</i>	2017	Lyamchina Bay	Vaygach Island	Pechora Sea	MN160049	cH1	MN159984	nH1
128	redia/cercari	<i>L. saxatilis</i>	2017	Lyamchina Bay	Vaygach Island	Pechora Sea	MN160050	cH1	MN159985	nH2
129	redia/cercari	<i>L. saxatilis</i>	2017	NA	Dolgy Island	Pechora Sea	MN160051	cH1	MN159986	nH1
130	redia/cercari	<i>L. saxatilis</i>	2017	NA	Dolgy Island	Pechora Sea	MN160052	cH1	MN159987	nH1
131	redia/cercari	<i>L. saxatilis</i>	2017	NA	Dolgy Island	Pechora Sea	MN160053	cH1	MN159988	nH1
132	redia/cercari	<i>L. saxatilis</i>	2017	NA	Dolgy Island	Pechora Sea	MN160054	cH1	MN159989	nH2
133	redia/cercari	<i>L. saxatilis</i>	2017	NA	Dolgy Island	Pechora Sea	MN160055	cH1	MN159990	nH1
134	redia/cercari	<i>L. saxatilis</i>	2017	NA	Dolgy Island	Pechora Sea	MN160056	cH1	MN159991	nH16
135	redia/cercari	<i>L. saxatilis</i>	2017	NA	Dolgy Island	Pechora Sea	MN160057	cH1	MN159992	nH17
136	redia/cercari	<i>L. sitkana</i>	2017	NA	Babushkin Bay	Sea of Okhotsk	MN160058	cH2	MN159993	nH6
137	redia/cercari	<i>L. sitkana</i>	2017	NA	Babushkin Bay	Sea of Okhotsk	MN160059	cH2	MN159994	nH18
138	redia/cercari	<i>L. sitkana</i>	2017	NA	Babushkin Bay	Sea of Okhotsk	MN160060	cH2	MN159995	nH19
139	redia/cercari	<i>L. sitkana</i>	2017	NA	Babushkin Bay	Sea of Okhotsk	MN160061	cH2	MN159996	nH4
140	redia/cercari	<i>L. sitkana</i>	2017	NA	Babushkin Bay	Sea of Okhotsk	MN160062	cH2	MN159997	nH3
141	redia/cercari	<i>L. sitkana</i>	2017	NA	Babushkin Bay	Sea of Okhotsk	MN160063	cH2	MN159998	nH6
142	redia/cercari	<i>L. sitkana</i>	2017	NA	Babushkin Bay	Sea of Okhotsk	MN160064	cH5	MN159999	nH3

143	redia/cercari	<i>L. sitkana</i>	2017	NA	Babushkin Bay	Sea of Okhotsk	MN160065	cH6	MN160000	nH4
144	redia/cercari	<i>L. sitkana</i>	2017	NA	Babushkin Bay	Sea of Okhotsk	MN160066	cH6	MN160001	nH4
145	redia/cercari	<i>L. sitkana</i>	2017	NA	Babushkin Bay	Sea of Okhotsk	MN160067	cH2	MN160002	nH20
146	redia/cercari	<i>L. sitkana</i>	2017	NA	Babushkin Bay	Sea of Okhotsk	MN160068	cH2	MN160003	nH21
147	redia/cercari	<i>L. sitkana</i>	2017	NA	Babushkin Bay	Sea of Okhotsk	MN160069	cH2	MN160004	nH3
148	redia/cercari	<i>L. sitkana</i>	2017	NA	Babushkin Bay	Sea of Okhotsk	MN160070	cH2	MN160005	nH4
152	redia/cercari	<i>Littorina</i> sp.	2017	NA	Tromsø	Norwegian Sea	MN160071	cH1	MN160006	nH2
153	redia/cercari	<i>L. saxatilis</i>	2017	NA	Tromsø	Norwegian Sea	MN160072	cH1	MN160007	nH2

Supplementary Table S2. Summary statistics for genetic diversity in *Tristriata anatis* based on *cox1* and *nadh1* sequences

Location	384 bp <i>cox1</i> gene fragment						275 bp <i>nadh1</i> gene fragment					
	N	S	H	Hd	π	K	N	S	H	Hd	π	K
Pechora Sea	58	3	4	0.165	0.00045	0.170	54	12	12	0.641	0.00310	0.852
North Atlantic	3	2	3	1.000	0.00347	1.333	0	NA	NA	NA	NA	NA
Norwegian Sea	2	0	1	0	0	0	2	0	1	0	0	0
Western Barents Sea	2	0	1	0	0	0	2	1	2	1	0.00364	1
the English Channel	2	2	2	1	0.00521	2	2	2	2	1	0.00727	2
White Sea	1	0	0	NA	NA	NA	1	0	0	NA	NA	NA
Sea of Okhotsk	20	7	6	0.579	0.00274	1.047	16	7	7	0.825	0.00579	1.592
All European locations	68	5	6	0.246	0.00068	0.259	61	14	14	0.663	0.00320	0.881
All locations	88	14	12	0.530	0.00714	2.706	77	26	21	0.782	0.01362	3.745

N number of samples, *S* Number of polymorphic sites, *H* number of haplotypes, *Hd* haplotype diversity, π nucleotide diversity, *K* average number of nucleotide differences, *NA* not applicable

Supplementary table S3. Non-synonymous substitutions in the *Tristriata anatis nadh1* alignment

Nucleotide position	Nucleotide substitution	Amino acid position	Amino acid substitution	Isolate
9	T → C	3	Met → Thr	135
17	G → A	6	Val → Ile	all North Pacific
33	T → C	11	Val → Ala	138
36	C → T	12	Pro → Leu	110.3
69	C → T	23	Ala → Val	125
110	A → G	37	Met → Val	146
112	G → T	37	Met → Ile	134
164	T → C	55	Phe → Leu	112-8
233	A → G	78	Ser → Gly	90

Supplementary table S4. Genetic differentiation between *Tristriata anatis* from different sampling locations, F_{st} values, based on *cox1* and *nadh1* sequences

	<i>cox1</i>							<i>nadh1</i>					
	PS	NA	NS	WBS	EC	SO	AE	PS	NS	WBS	EC	SO	AE
PS		-0.02984	0.01404	0.01404	-0.03164	0.91351	-0.0109		0.54902	0.07407	-0.16667	0.86978	-0.01667
NA			0	0	-0.25	0.83116	-0.06126			–	–	–	–
NS				0	0	0.92572	0.02322			0.66667	0	0.91992	0.52866
WBS					0	0.92572	0.02322				0	0.86269	0.06721
EC						0.78233	-0.06654					0.79907	-0.18739
SO							0.90723						0.8682

PS Pechora Sea, NA North Atlantic, NS Norwegian Sea, EC the English Channel, SO Sea of Okhotsk, AE “all northern European isolates” (PS–EC)