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Locke, S. A., McLaughlin, J. D., and Marcogliese, D. J. 2012. Predicting the similarity of parasite communities in freshwater fishes using the phylogeny, ecology and proximity of hosts. – Oikos 122: 73–83.

Appendix 1

Table A1. Habitat use by six focal fish species. Numbers represent abundance (0-3) taken from Table 3 in Keast (1978) and, for *Etheostoma nigrum*, from Scott and Crossman (1973), except "Water column / substrate ", which is based on the observations of the authors and represents abundance in the water column (across all habitat types) versus the substrate.

	Weedy shallows	Weedy deep	Mixed bottom shallows	Sandy shallows	Gravel beds	Rocky shelf	Cattail fringes	Submerged stumps	Open water inshore	Mid-lake water column	Water column / substrate (1 / 0)	Source
Pimephales notatus	1	3	1	0	0	0	0	0	0	0	1	Keast 1978
Notemigonus crysoleucas	0	3	0	0	0	0	0	0	0	1	1	Keast 1978
Lepomis gibbosus	3	2	2	3	1	1	0	0	0	0	1	Keast 1978
Ambloplites rupestris	2	1	1	1	1	2	2	0	1	0	1	Keast 1978
Perca flavescens	1	2	1	0	1	0	0	1	2	0	1	Keast 1978
Etheostoma nigrum	1	0	2	2	1	0	0	0	0	0	0	Scott and Crossman 1973

Table A2. Diets (% contribution) of six focal fish species. Numbers are averaged values from year class I in Table 2 in Keast (1977), Table 4 in Keast (1985) and Table 1 in Strange (1991).

	Anisoptera	Zygoptera	Chironomidae	other Diptera	Ephemeroptera	Plecoptera	Trichoptera	Hydracarina	Source
Pimephales notatus	0	0	15	3	0	0	0	0	Keast 1985
Notemigonus crysoleucas	0	0	12	10	0	0	0	0	Keast 1985
Lepomis gibbosus	0	0	47	0	10	0	0	0	Keast 1985
Ambloplites rupestris	15	9	34	0	8	0	0	0	Keast 1985
Perca flavescens	1	15	28	0	11	0	0	0	Keast 1977
Etheostoma nigrum	0	0	71	1	1	2	0	0	Strange 1991

Table A2. Continued

	Amphipoda	Cladocera	Isopoda	Ostracoda	Gastropoda	Fish	Algae	Detritus	Source
P. notatus	0	75	0	0	0	0	0	7	Keast 1985
N. crysoleucas	0	58	0	0	0	0	20	0	Keast 1985
L. gibbosus	0	12	20	6	4	0	0	0	Keast 1985
A. rupestris	8	18	3	3	0	3	0	0	Keast 1985
P. flavescens	4	24	7	10	0	0	0	0	Keast 1977
E. nigrum	0	0	0	25	0	0	0	0	Strange 1991

Table A3. Trophic levels of six focal fish species (data from Froese and Pauly 2000)

	Trophic level
Pimephales notatus	3.1
Notemigonus crysoleucas	2.62
Lepomis gibbosus	3.12
Ambloplites rupestris	3.37
Perca flavescens	3.7
Etheostoma nigrum	3.19

Table A4. The number of base substitutions per site between six concatenated sequences of partial cytochrome *c* oxidase I and partial cytochrome *b* from six fish species (Genbank accessions EU523904, EU501080, EU524714, AY828960, EU524940, U01318, EU524245, AY374280, EU524056, AF183945, EU524276, GQ275155). Distances were calculated with the maximum composite likelihood model, with rate variation among sites estimated with gamma distribution (shape parameter = 0.1746). Differences in the composition bias among sequences were considered in evolutionary comparisons. There were 1792 positions in the dataset.

	Pimephales notatus	*Notemigonus crysoleucas*	*Lepomis gibbosus*	*Ambloplites rupestris*	*Perca flavescens*
Pimephales notatus					
Notemigonus crysoleucas	0.484				
Lepomis gibbosus	1.349	1.341			
Ambloplites rupestris	1.455	1.403	0.704		
Perca flavescens	1.459	1.315	0.875	0.813	
Etheostoma nigrum	1.462	1.461	0.807	0.867	0.555

Table A5. Mean abundance of parasites, which were identified and distinguished based on the works of Harding (1950), Beverly-Burton (1984), Kabata (1988), Arai (1989), Caira (1989), Gibson (1996), Hoffman (1999), Amin (2002), Kuchta et al. (2007), Amin and Muzzall (2009), Locke et al. (2010a, b, 2011) and Caffara et al. (2011)

	Lepto-rhynch-oides thecatus	*Neoechin-orhynchus* sp.	*N. cyclin-dratus**	*N. notemigoni*	*N. rutili*	*N. tenellus**	Hirudinida fam. gen. spp.	*Actheres pimelodi*	*Argulus* sp.	*Ergasilus* sp.
Pimephales notatus		0.0093								
Notemigonus crysoleucas				1.1652			0.0087			0.0174
Lepomis gibbosus	0.0074					2.2741	0.0148	0.0519		
Ambloplites rupestris						0.1084	0.0964	0.0723		
Perca flavescens		0.0365			0.0146	0.073	0.0803		0.0146	
Etheostoma nigrum	0.0078		0.0078			0.2558	0.093			

* = tentative identification

Table A5. Continued

	Ergasilus centrarchidarum	*E. luciopercarum*	*Lernaea* sp.	*Bothriocephalus cuspidatus*	*Haplobothrium globuliforme*	*Hymenolepididae* gen. sp.	*Pliovitellaria wisconsinensis*	*Proteocephalus* sp. 1	*Proteocephalus* sp. 2	*P. amblioplites*	*Triaenophorus nodulosus*
P. notatus											
N. crysoleucas							0.0348				
L. gibbosus	0.0074			0.0444	0.0963				0.0889	0.0593	
A. rupestris	0.1928							0.1446	0.012	0.0602	
P. flavescens		0.0073		0.0073				0.2336	0.0657	0.0146	0.0073
E. nigrum			0.0388	0.2558		0.0078		0.0078			0.0078

	Apatemon sp. 1	*Apatemon* sp. 1x	*Apatemon* sp. 3	*Apatemon* sp. 4	*Apharyngostrigea cornu*	Strigeinae gen. sp. 2	Strigeinae gen. sp. 7	Strigeinae gen. sp. 8	Strigeinae gen. sp. 9	Strigeinae gen. sp. 10	Strigeinae gen. sp. 16
P. notatus					0.0556		0.0185				
N. crysoleucas	0.0087				1.3043						
L. gibbosus			0.1556						0.0519		
A. rupestris			0.3494	0.0602							
P. flavescens						1.927					
E. nigrum	2.2636	0.0465						0.0155		0.2868	0.0388

Table A5. Continued (* = tentative identification)

	Strigeinae gen. sp. 17	Strigeinae gen. sp. 18	Strigeinae gen. sp. X	*Cono-diplo-stomum** sp.	*Apophallus brevis*	*A. venustus*	*Clinostomum marginatum*	*Crassiphalia*	Cryptogonimidae gen. sp.
P. notatus									0.1296
N. crysoleucas					0.1478		0.0087		
L. gibbosus						0.1333	0.1259	0.0074	
A. rupestris		0.0602					1.1807		
P. flavescens	0.0219				10.905		0.1022		
E. nigrum			0.0078	0.1085	0.4806		0.4574		

	Diplo-stomum spp.	*Diplo-stomum* sp. 1	*Diplo-stomum* sp. 2	*Diplo-stomum* sp. 3	*Diplo-stomum* sp. 4	*Diplo-stomum* sp. 5	*Diplo-stomum* sp. 6	*Diplo-stomum* sp. 7	*D. baeri*	*D. huro-nense*
P. notatus	6.0648	0.5463	0.0556	0.0278	1.287		0.0093	0.0093		0.0093
N. crysoleucas	5.4087	0.2087		0.0522	0.0174					0.1913
L. gibbosus	0.037	0.0741		0.0074	0.0741					
A. rupestris	0.0843	0.4217		0.0482	0.4217					0.0241
P. flavescens	0.3285	0.0876		0.0146	0.5693	0.0073			22.54	0.0073
E. nigrum	0.062	0.0543			0.1318					

Table A5. Continued

	Echino-chasmus sp.	*Hystero-morpha triloba*	*Ichthyo-cotylurus pileatus*	*I. platy-cephalus*	*Neo-chasmus* sp.	*Ornitho-diplo-stomum* sp. 1	*Ornitho-diplo-stomum* sp. 2	*Ornitho-diplo-stomum* sp. 3	*Ornitho-diplo-stomum* sp. 4	*Ornitho-diplo-stomum* sp. 8
P. notatus				0.0463	0.8889			0.4444	0.6481	0.0185
N. crysoleucas	0.0087	0.8087		0.0087	0.0435		3.2957			
L. gibbosus					8.8519					
A. rupestris			0.4578	0.0241	1.5783					
P. flavescens			5.4526	0.0657	2.0511	0.438				
E. nigrum			0.186		1.8992	9.7674				

	Postho-diplo-stomum sp. 1	*Postho-diplo-stomum* sp. 2	*Postho-diplo-stomum* sp. 3	*Postho-diplo-stomum* sp. 4	*Postho-diplo-stomum* sp. 5	*Postho-diplo-stomum* sp. 6	*Postho-diplo-stomum* sp. 7	*Tylodelphys scheuringi*	*Uvulifer* sp.
P. notatus				1.0926					0.0093
N. crysoleucas									0.0174
L. gibbosus		0.0074	24.333		1.6148	0.0148			0.6444
A. rupestris	7.9639		0.0361					0.3373	0.988
P. flavescens							0.5839	0.5985	
E. nigrum								0.0078	0.0155

Table A5. Continued

	Allo-creadium lobatum	*Azygia angusticauda*	*Bunodera sacculata*	*Centro-varium lobotes*	*Crypto-gonimus chili* (adult)	*C. chili* (metacercaria)	*Crepido-stomum cooperi*	*C. cornutum*	*C. isostomum*
P. notatus				0.8241		0.2222			
N. crysoleucas									
L. gibbosus	0.3185	0.2					0.0148		
A. rupestris		0.1325			0.9639			0.1084	
P. flavescens		0.073	0.0657		0.1606			0.0219	
E. nigrum		0.7442			0.0078	0.0233		0.0233	0.1473

	Plagioporus sinitsini	*Proterometra macrostoma*	*Rhipidocotyle papillosa*	*Phyllo-distomum* sp.	*P. superbu m*	*Plagio-porus sinitsini*	*Proterometra macrostoma*	Unionidae. gen. sp. (glochidium)
P. notatus			1.7685					0.0185
N. crysoleucas	0.5565					0.5565		0.0087
L. gibbosus		0.0741		0.0074			0.0741	0.1556
A. rupestris		0.1687	0.0602	0.012			0.1687	
P. flavescens		0.0438	0.1606		0.219		0.0438	11.19
E. nigrum								

Table A5. Continued

	Actino-cleidus (*incus*?)	*Aethycteron nigrei*	*Cleido-discus robustus*	*C. venardi*	*Dactylo-gyrus aureus*	*D. bulbus*	*D. bychowski*	*Gyro-dactylus goerani*
P. notatus							0.0648	
N. crysoleucas					0.0435	0.1913		
L. gibbosus	13.348		0.563	0.1037				
A. rupestris								0.012
P. flavescens								
E. nigrum		0.3876						

	Haplo-cleidus dispar	*Lepto-cleidus mega-lonchus*	*Onchoclei dus* sp.	*O. ferox*	*Ptero-cleidus* sp.	*Tetra-cleidus stentor*	*Lyro-discus* sp.	*L.minimus*	*Uro-cleidus adspectus*
P. notatus									
N. crysoleucas									
L. gibbosus	0.0519	0.0074		1.5778	0.0148		0.0222		
A. rupestris		0.0602	6.5542			0.0241		0.2771	
P. flavescens									0.3285
E. nigrum									

Table A5. Continued

	Anisakidae gen. sp.	*Camallanus lacustris*	*Contra-caecum* sp.	*Dichelyne cotylophora* adult	*D. cotylophora* larva	*Hystero-thylacium* sp.	Nematoda fam. gen. sp.
P. notatus					0.0185		
N. crysoleucas							
L. gibbosus					3.0667		
A. rupestris					0.6627	0.012	
P. flavescens	0.073		0.0073	0.1752		0.0365	
E. nigrum		0.0155			1.9612		0.0155

	Philometra sp.	*P. cylindracea*	*Philo-metroides* sp.	*Raphidascaris acus*	*Rhabdochona* sp.	*Spinitectus gracilis*	*Spiroxys* sp.	*Tetrameres* sp.
P. notatus				0.0093				
N. crysoleucas				0.0783				
L. gibbosus				0.2296				
A. rupestris				0.0361		0.1084	0.0482	0.012
P. flavescens	0.0365	0.10220	.0146	0.3504	0.0073			
E. nigrum				0.7442				

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The following were used in Table A1-A5. In addition, the Γ^{+} index of phylogenetic similarity of parasite communities (see text) was calculated based on classifications in Beverly-Burton (1984), Kabata (1988), Arai (1989), Khalil et al (1994), Gibson et al. (2002), Jones et al. (2005), Bray et al (2008) and Anderson et al. (2009).

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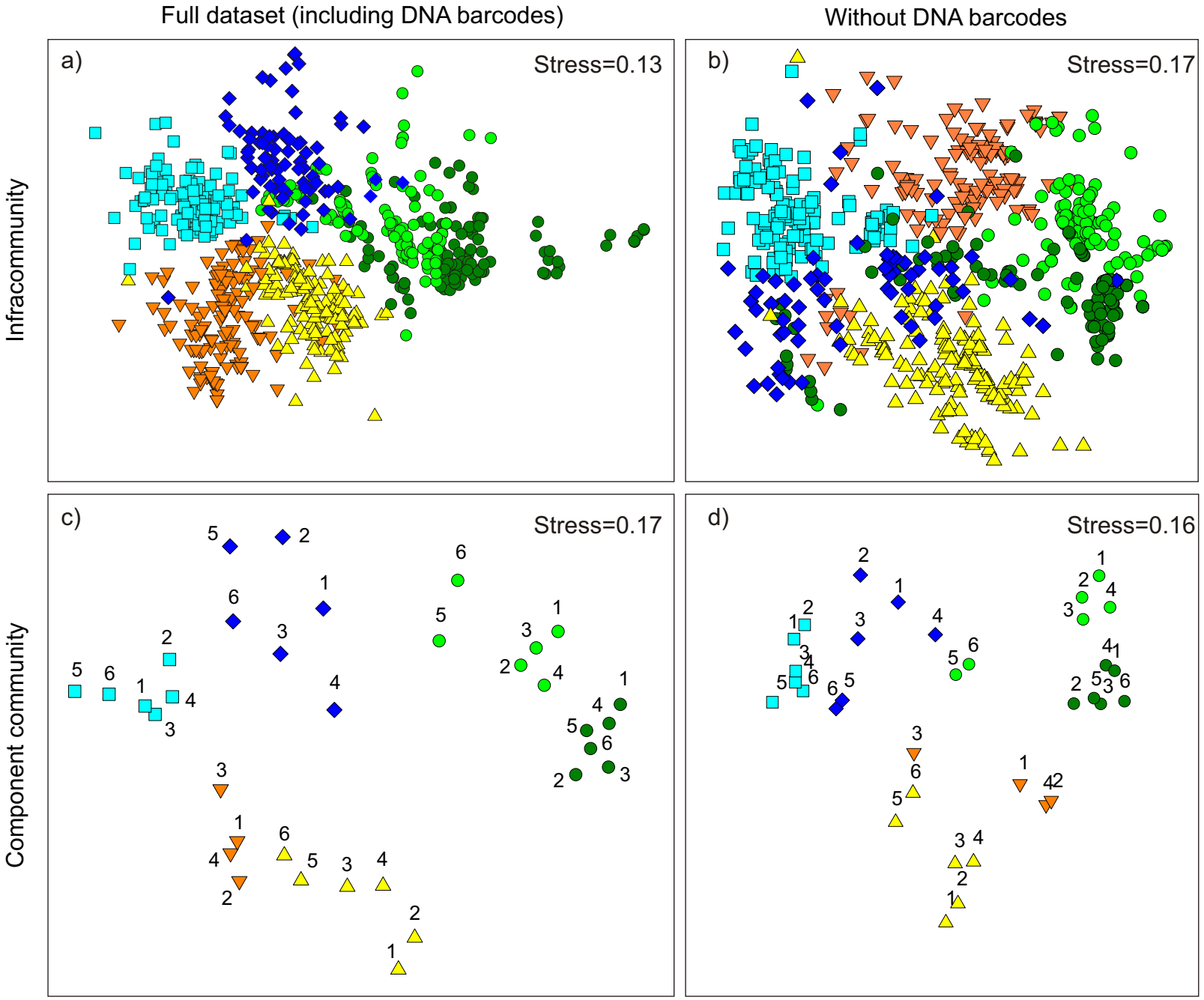

Supplementary Fig. A1: Non-metric multi-dimensional scaling of Bray-Curtis similarity among parasite communities in (a,b) 707 individual fish and (c,d) 34 fish populations from the St. Lawrence River, based on square-root transformed parasite abundance. Stress values indicate that multivariate distances are reasonably well represented in two dimensions (Clarke 1993). Numbers in (c,d) indicate localities as in Figure 1. Ordinations (a) and (c) show resemblance between communities of parasites, some of which were distinguished using DNA barcodes. In (b) and (d) parasites were identified based on morphology alone.

Perciformes
Percidae
- *Perca flavescens*
- *Etheostoma nigrum*

Centrarchidae
- *Ambloplites rupestris*
- *Lepomis gibossus*

Cypriniformes
Cyprinidae
- *Notemigonus crysoleucas*
- *Pimephales notatus*