Table S1. Summary of sample sizes for each treatment combination (species:temperature:food) used in the byssal thread strength and byssus strength analyses.

	Temp.	*M. galloprovincialis*		*M. trossulus*	
	(°C)	High Food	Low Food	High Food	Low Food
Thread strength	12	14	15	12	13
	15	14	15	10	14
	18	14	13	7	9
	21	15	16	4	3
Byssus strength	12	16	10	13	15
	15	15	14	11	17
	18	11	11	6	12
	21	14	16	3	3

Table S2. Summary of linear regression analyses of the relationship between thread strength and tissue and shell growth of two mussel species across all temperature and food treatments. None of the analyses showed a significant effect ($p < 0.05$).

	Factor	Sum Sq	df	*F*-value	p	R^2
M. trossulus	Tissue growth	3.6×10^{-8}	1	0.002	0.97	0.0003
	Residuals	0.0011	6			
	Shell growth	5.2×10^{-5}	1	0.298	0.61	0.0470
	Residuals	0.0011	6			
M. galloprovincialis	Tissue growth	2.1×10^{-6}	1	0.004	0.95	0.0007
	Residuals	0.0029	6			
	Shell growth	1.4×10^{-6}	1	0.003	0.96	0.0005
	Residuals	0.0029	6			

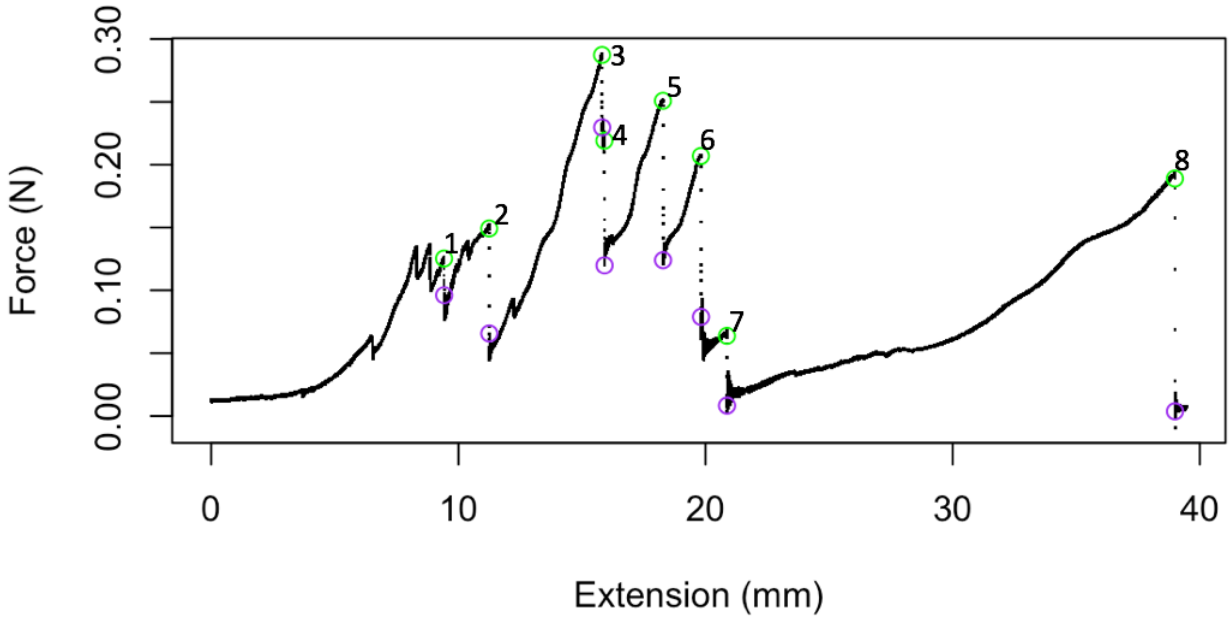

Figure S1. Representative force versus extension trajectory of a byssal tensile test.The strength of an individual thread in the network was quantified as the change in force associated with a rapid (catastrophic) drop in load when the thread failed. Eight thread failure events are numbered and the maximum and minimum load associated with each break are indicated by green and purple circles, respectively).

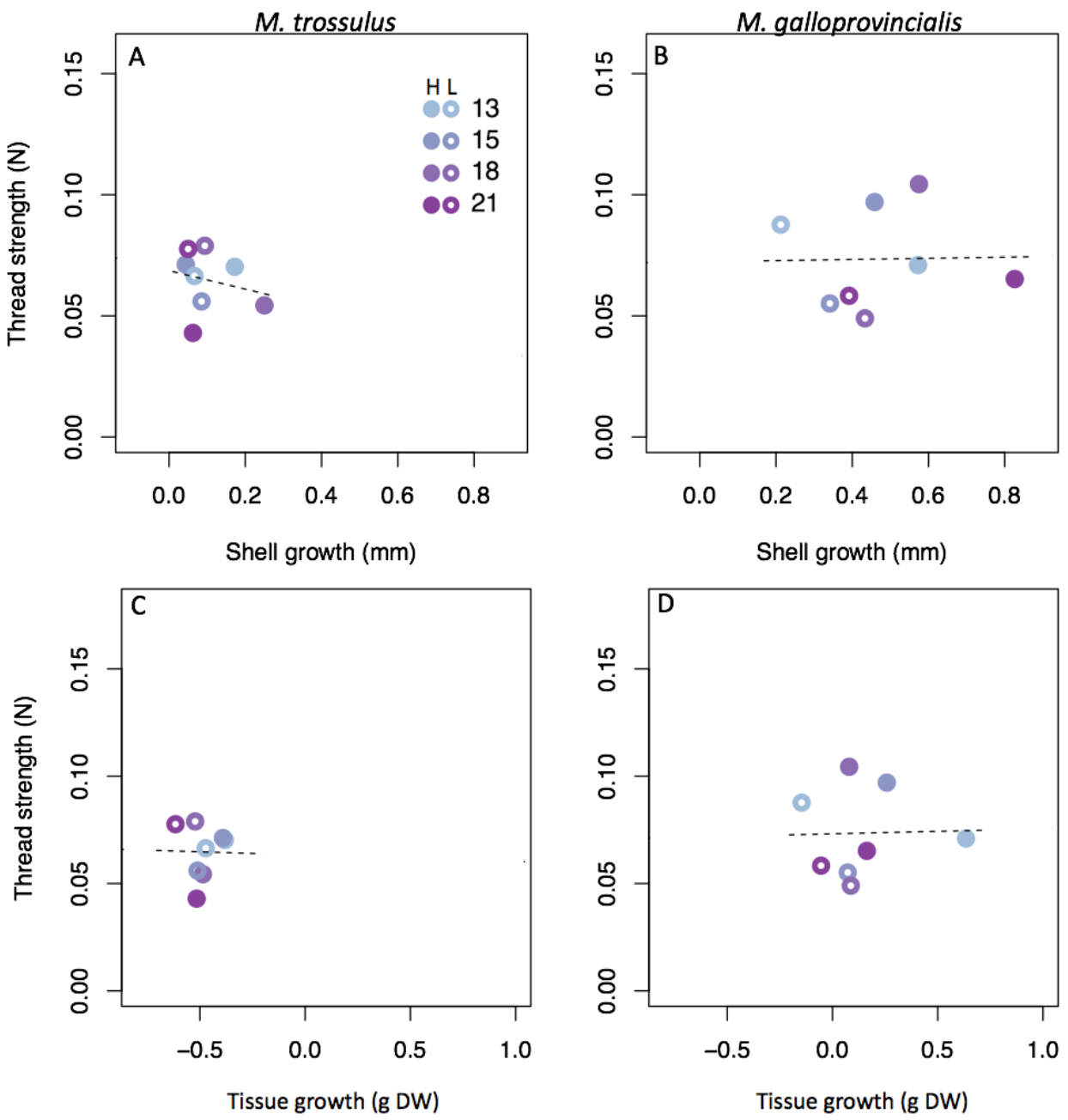

Figure S2. Thread strength as a function of shell or tissue growth. Thread strength as a function of shell growth (A, B) or tissue growth (C, D) of *M. trossulus* and *M. galloprovincialis* across the experimental of temperature and food levels. Measurements are binned by treatment. See inset for treatment combination.