

Supplementary Materials for **Latitudinal trends in shell production cost from the tropics to the poles**

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Published 20 September 2017, *Sci. Adv.* **3**, e1701362 (2017)

DOI: 10.1126/sciadv.1701362

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table S1. Species, locations of collection sites, and VBGF parameters. Fitted using $L_t = L_\infty[1 - e^{-K(t-t_0)}]$, where $t_0=L_0$ mm.

Species	Location	GPS coordinates	L_∞ (mm)	k	r^2	s.e. of estima te	F	df	p
Gastropods: family Buccinidae									
<i>Phos senticosus</i>	Lucinda, Queensland, Australia	18.531°S, 146.341°E	33.967	0.595	0.349	2.046	17.19	1,32	0.0002
<i>Pollia fumosa</i> (synonym <i>Cantharus fimosus</i>)	Townsville, Queensland, Australia	19.240°S, 146.796°E	21.229	0.963	0.913	1.110	199.87	1,19	<0.0001
<i>Cominella lineolata</i>	Barwon Heads, Victoria, Australia	38.292°S, 144.499°E	24.199	0.710	0.510	2.044	31.22	1,30	<0.0001
<i>Buccinum undatum</i>	Southampton, United Kingdom	50.878°N, 1.384°W	93.689	0.172	0.489	6.524	39.29	1,41	<0.0001
<i>Neobuccinum eatoni</i>	Rothera Point, Adelaide Island, Antarctica	67.578°S, 68.165°W	54.856	0.222	0.560	4.475	26.69	1,21	<0.0001

<i>Buccinum glaciale</i>	Ny Ålesund, Svalbard, Arctic	78.956°N, 11.970°E	81.427	0.196	0.650	2.558	12.98	1,7	0.0087
<i>Buccinum cf. groenlandicum</i>	Ny Ålesund, Svalbard, Arctic	78.956°N, 11.970°E	42.944	0.339	0.722	2.800	28.58	1,11	0.0002
Bivalves: genus <i>Laternula</i>									
<i>L. boschasina</i>	Straits of Johor, Singapore	1.444°N, 103.741°E	12.742	0.337	0.944	0.583	778.69	1,46	<0.0001
<i>L. truncata</i>	Straits of Johor, Singapore	1.444°N, 103.741°E	30.741	0.147	0.956	1.116	1387.31	1,64	<0.0001
<i>L. recta</i>	Port Phillip Bay, Victoria, Australia	38.093°S, 144.657°E	29.545	0.0992	0.960	0.845	1674.26	1,70	<0.0001
<i>L. elliptica</i>	Rothera Point, Adelaide Island, Antarctica	67.578°S, 68.165°W	187.628	0.0245	0.953	2.783	2554.15	1,125	<0.0001

table S2. Scaling factors used to convert metabolism into annual metabolism for species from seasonal locations. Published data on scaling factors for study taxa. Mean polar bivalve scaling factors were used for polar gastropods because temperate scaling factors are similar for gastropod and bivalve molluscs and we know of no polar gastropod scaling factors available. The metabolic scaling factors used for *Laternula elliptica* were the means of the two summer (mean=0.651) and winter (mean=2.175) conversion values published for this species.

Taxa	Species	Region	Seasonal difference in energy consumption	Reference	Multiplication factor for summer to annual metabolism	Multiplication factor for winter to annual metabolism
Gastropod	<i>Buccinum undatum</i>	temperate	2.3-fold	(59)	0.71739	1.65
Bivalve	<i>Laternula marilina</i>	temperate	~2-fold	(60)	0.75	1.5
Bivalve	<i>Laternula elliptica</i>	polar	3.0-fold	(61)	0.66667	2
Bivalve	<i>Laternula elliptica</i>	polar	3.7-fold	(62)	0.63514	2.35

table S3. Specific dynamic action. Published data on the postprandial rise in metabolism following feeding used (adapted from (63)).

Taxa	Species	Region	Increase from standard metabolic rate (SMR)	Reference
Gastropod	<i>Nassarius reticulatus</i>	temperate	2.2-5.2	(64)
Gastropod	<i>Buccinum undatum</i>	temperate	~2	(59)
Gastropod	<i>Nacella concinna</i>	polar	2.3	(65)
Bivalve	<i>Mytilus edulis</i>	temperate	2.2	(66)

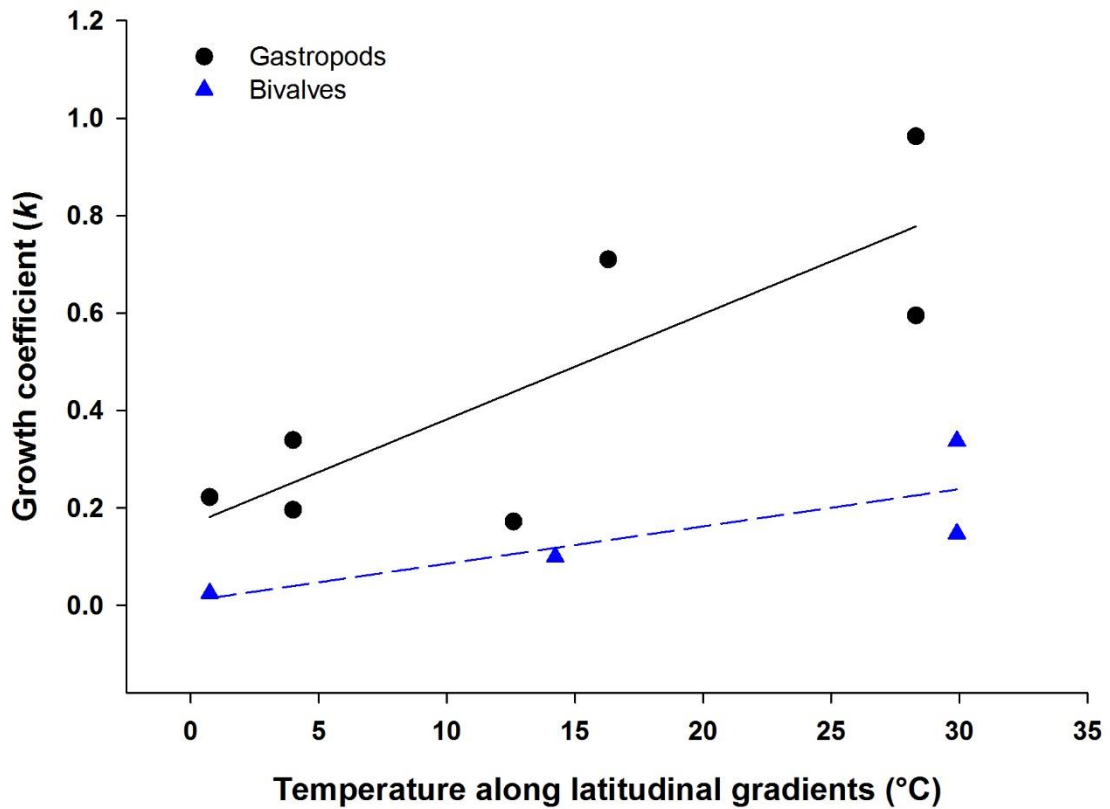


fig. S1. Growth coefficients (k) from VBGFs for gastropods and bivalves along latitudinal temperature gradients. Solid line indicates significant regression, dashed line indicates non-significant regression.

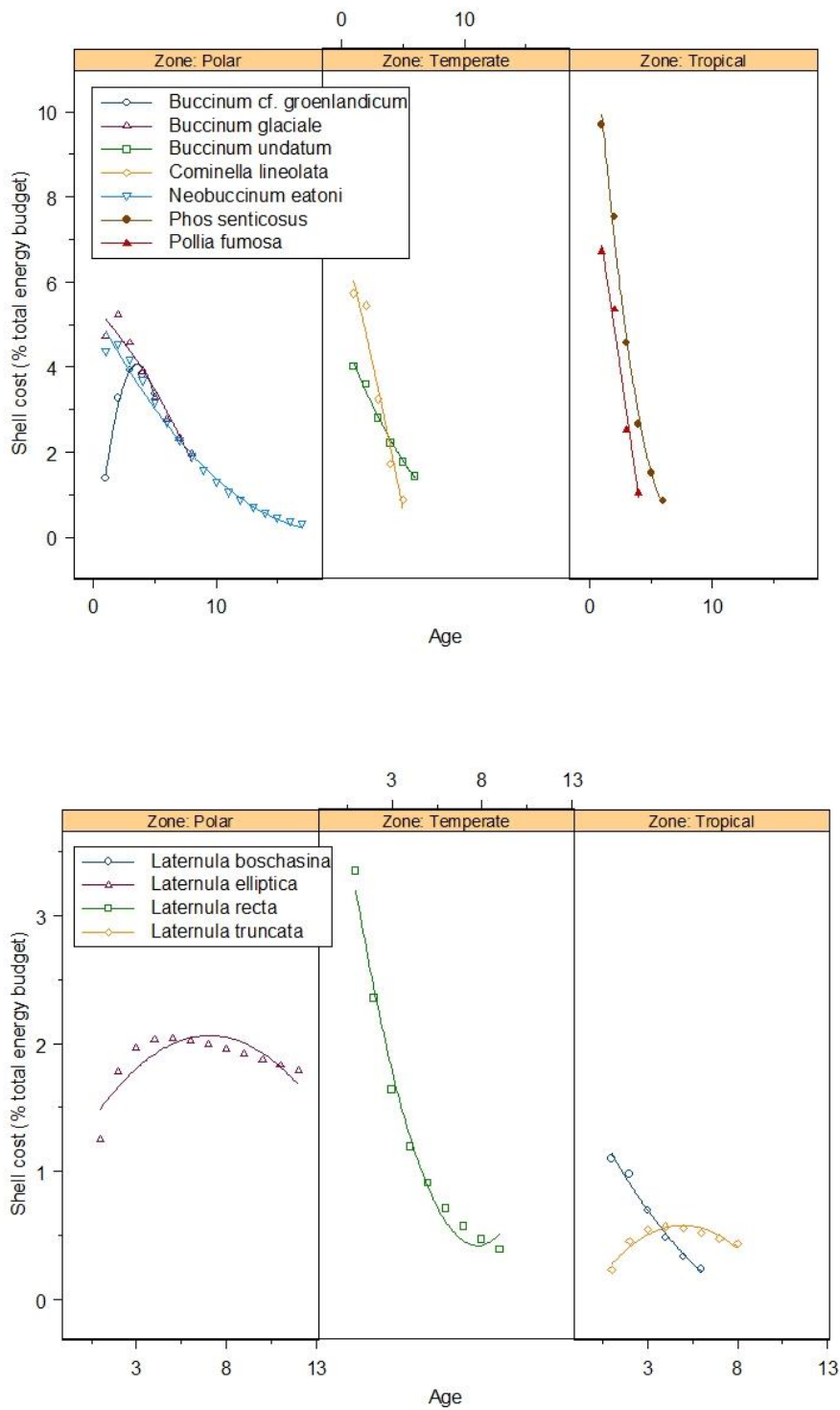


fig. S2. Shell production cost as a percentage of the total annual energy budget displayed for each latitudinal zone. Using the mean cost of $1.5 \text{ J} \cdot \text{mg}^{-1} \text{ CaCO}_3$ (top figure – gastropods, bottom figure – bivalves).