Supplemental Information
Kempf et al. 2023

1. **Broodstock Conditioning and Spawn**

Adult broodstock *L. staminea* were collected from Bodega Harbor, located in Bodega Bay, California during the winter of 2021 (n = 21) and brought to the Bodega Marine Lab for conditioning. Clams were placed in a plastic basket and set within a water table filled with circulating Bodega Bay seawater. To condition the clams for spawning, seawater temperature was gradually increased over the course of one week to 17 °C. During the 6-week conditioning period clams were fed twice a day with a dense mixture of *Nannochloropsis oculata* and *Isochrysis* algae. Water quality was maintained through a steady influx of filtered seawater, and by daily siphoning of waste from the holding containers. Prior to the spawn, to check if clams were gravid, two clams were sacrificed and the visceral mass was gently scraped with a scalpel. The gonadal fluid from the sacrificed clams was pipetted onto a microscope slide and mixed with a small amount of seawater, and checked for the presence of eggs and sperm. Once both males and females were gravid, we induced the broodstock using a mass spawn approach involving temperature manipulations. First, all conditioned clams (n=20) were gently rinsed with warm seawater (~20 °C) and placed in clean plastic baskets. Baskets were then placed in the single shallow rectangular container containing seawater, and adjusted to approximately 24 °C using heating rods. The clams sat together in this set-up for one hour before feeding.

As the water adjusted to 24 °C in their baskets, 30 L of dense *Nannochloropsis oculata* algae was gently stirred with heating rods and brought up to 24 °C as well. Then, ~10 L of algae was gently decanted into the clam container until the water was dense with algae and bright green in color. Clams were left in this setup to feed and the temperature was gradually raised to 30 °C. A second round of algae was heated to 30 °C then added to the clams approximately one hour after the first feeding. The clams were allowed to clear the water and kept at 28-30 °C using heating rods. A third and final round of 30 °C algae was added an hour later. The clams were allowed to feed on the algae for 2 hours, with the lights off, in this warm setup. Next, we flushed out the water/algae mix, and sacrificed one clam, checked for sperm, and then pipetted its gonadal fluid into the clams in the basket to try and induce spawning. After a couple more hours in their warm setup, clams were fed one last time with 10 L of *N.oculata* and *C. isochrysis*, and were left together in the experimental setup overnight and the system was allowed to gradually return to the ambient temperature of the room at approximately 20 °C. Clams spawned overnight and larvae were removed the following morning.

Planktonic larvae were removed from the spawning container via siphoning, and transported into 400 L tanks in the Bodega Marine Laboratory Shellfish Hatchery at a temperature of 18-20 °C, and fed bi-weekly with algae. Once some larvae began to settle at the bottom of the tank (approximately three weeks post-fertilization), larvae were transferred onto a 250 micron settling screen and placed in a shallow water table supplied with filtered Bodega Bay seawater in the same hatchery room (18-20 °C). Lights were kept on during the day and turned off at night, and salinity was maintained between 34-37 and checked approximately every 3 days. The entire cohort was fed twice weekly with a 30 L mixture of *N. oculata* and *Isochrysis* algae. All individuals were kept in identical laboratory conditions during the juvenile rearing period (200 days).

2. **Annotated cross sections of 200-day-old juvenile shells (n=18)**. Red dots denote growth lines. Affinity designer files located in Zenodo: DOI: 10.5281/zenodo.7909172

Figure S1. Line profiles for gray-scale variance. Line profiles (black arrows) along which gray-scale variance was calculated in Fiji. Example shown is a sulfur map.

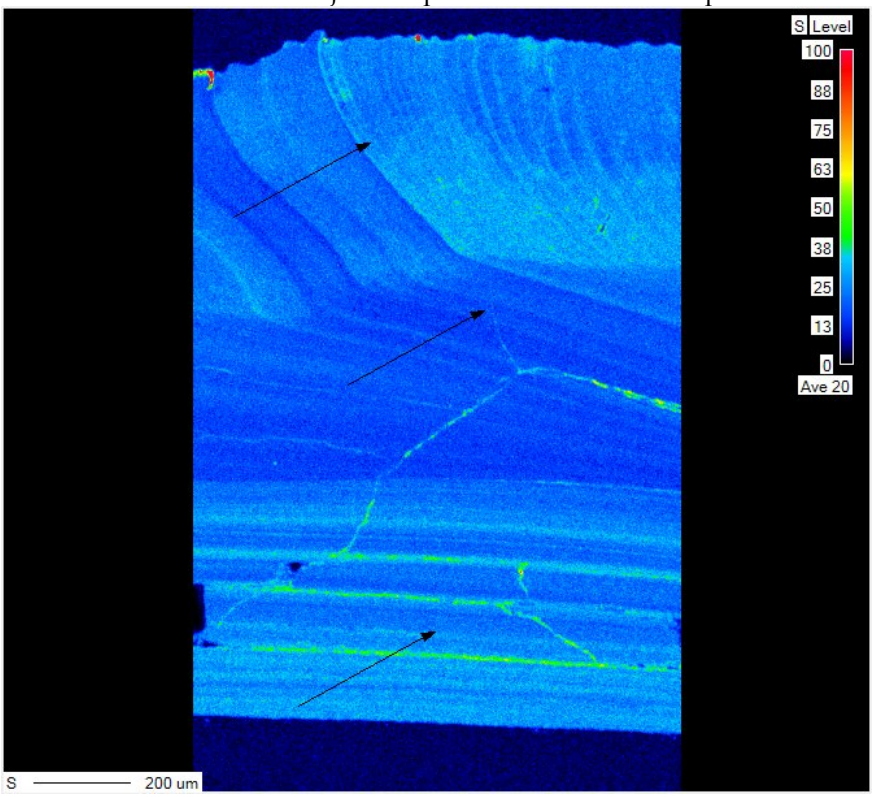

Figure S2. Irregular textures in adult shell, leading to incomplete element maps.

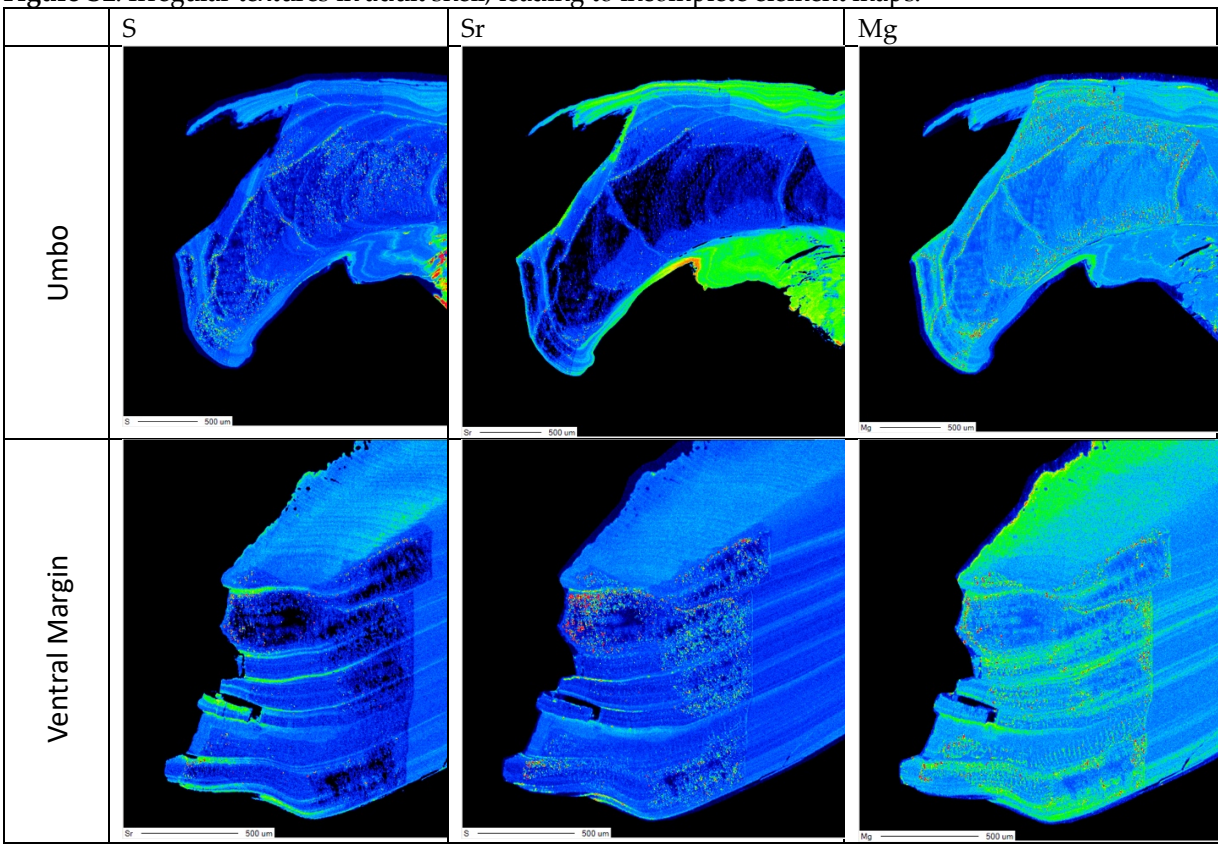

Figure S3. Haphazard expression of growth banding within a single juvenile shell. Bands are not spaced evenly and range in their visibility.

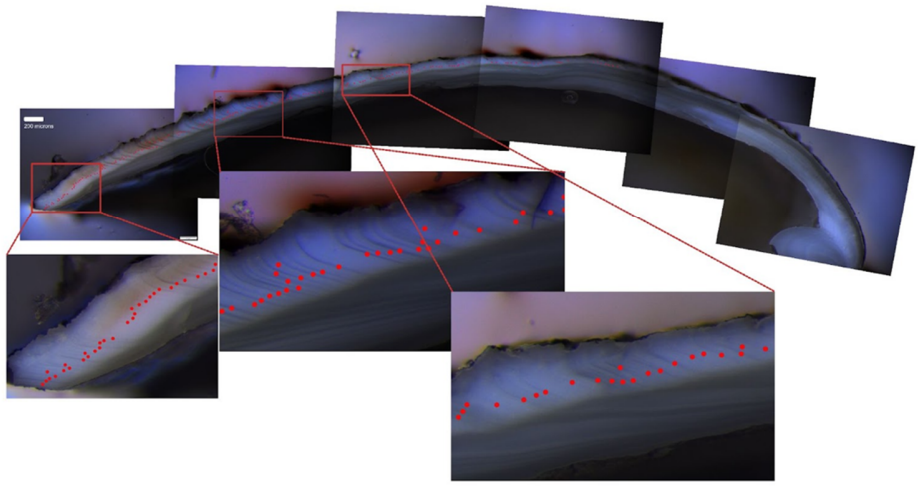

Table S1. Mean, standard deviation, max and minimum gray-scale values. Values calculated in different shell layers (oOSL, iOSL, and ISL) calculated along 330 micron line profiles (see Figure S1). On color images, mean gray-scale values are the average of the three component colors (R, B, G). Units are pixel value, where 0 is black and 255 is white.

	Sr				Mg				S			
	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD
oOSL	93.67	144.87	125.74	10.8	61.47	152	135.83	10.81	86.97	144.79	117.35	11.19
iOSL	92.87	135.4	113.57	7.71	119.41	149.64	134.12	6.47	93.03	133.02	109.33	7.411
ISL	91.09	166.38	126.38	22.34	88.96	152.72	129.27	15.66	111.34	149.13	133.51	7.17