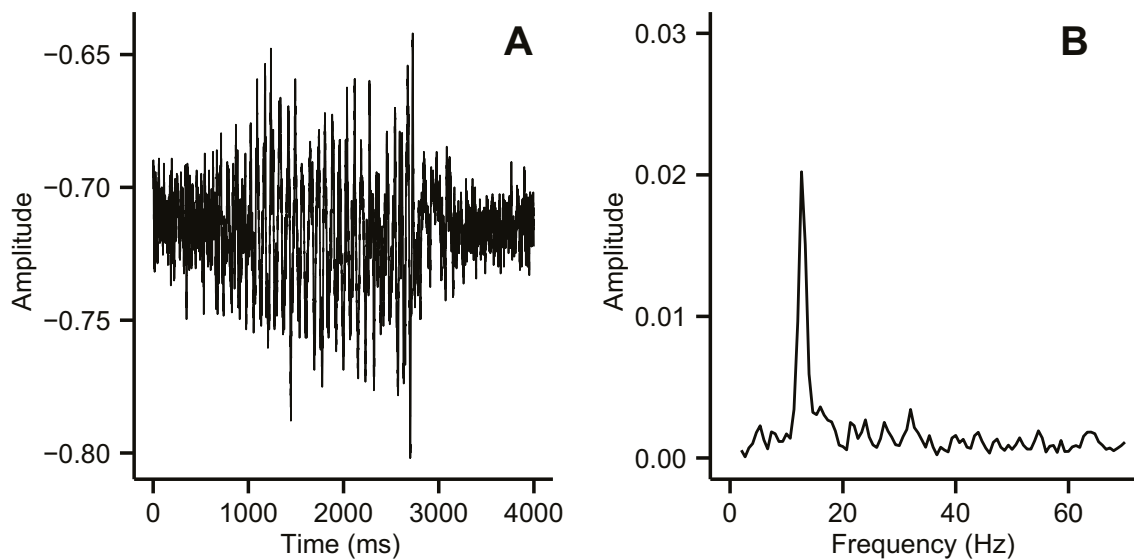


**Fig. S1.** Representative oxygen and flow measurement. In this example, the animal was placed in the chamber at 100 s and removed at 2000 s, at which times the chamber was opened and flow dropped. When the animal was in the chamber, the oxygen level dropped due to the animal's oxygen consumption. Measurements were taken when the animal was resting and after adjusting to the new environment for a minimum of 20 min; the data that fit these parameters are indicated by the gray box. Oxygen levels were calibrated using ambient oxygen levels (20.95%) and a calibration gas with a known level of oxygen. Combining oxygen levels and flow allowed us to determine oxygen consumption per unit time.



**Fig. S2.** Measurement of tremor frequency during shivering. (A) These representative accelerometer data show one bout of shivering from an *mdm* mutant. (B) A fast Fourier transform was used to find the most prevalent tremor frequency in each bout of shivering. In this example, the most prevalent frequency was about 12 Hz.

Table S1. Samples Sizes by Experiment.

Note:  $T_a$  are in  $^{\circ}\text{C}$  and all measurements were taken within  $\pm 1^{\circ}\text{C}$  of given temperature.

Genotype	Shivering	Metabolic Rate and $T_b$ Measurement												
		$T_a$ :	20	24	26	28	30	31	32	33	34	35	36	37
Wildtype	6		3	3	3	3	3	–	3	–	4	–	–	–
Heterozygous	6		3	4	3	4	4	–	6	–	4	–	–	–
Mutant	6		2	–	3	3	4	3	4	3	3	4	3	3