

Supplementary Materials:

Table S1. Q₁₀ values of cathepsin D activity in muscle homogenates at various temperatures in *P. brachycephalum*. For the Q₁₀ calculation, the slope of cathepsin D activity at several temperature steps ($\Delta T = 19^\circ\text{C}$) was determined for samples from 6 individuals at different temperatures (0, 4, and 10 °C).

| Acclimation Temperature | Q ₁₀ |
|-------------------------|-----------------|
| 0°C | 2.54 |
| 0°C | 2.88 |
| 4°C | 1.95 |
| 4°C | 2.06 |
| 10°C | 2.15 |
| 10°C | 2.05 |
| Average | 2.27 ± 0.33 |

Table S2. SAM analysis comparison between metabolic profiles of *P. brachycephalum* and *Z. viviparus*. It describes the results of the SAM (Delta value 5.7, FDR 0.003, False 0.13) comparing *P. brachycephalum* and *Z. viviparus* at 4°C and 10°C.

| Metabolite | d.value | stdev | rawp | q.value |
|------------------|---------|-----------|------------|------------|
| Alanine | 54.298 | 0.020949 | 0 | 0 |
| Asparagine | 34.678 | 0.0344 | 0 | 0 |
| Glycine | 34.124 | 0.035371 | 0 | 0 |
| Tyrosine | 29.339 | 0.039696 | 0 | 0 |
| Trimethylamine | 27.177 | 0.083969 | 0 | 0 |
| Tryptophan | 26.941 | 0.020915 | 0 | 0 |
| Leucine | 26.763 | 0.054808 | 0 | 0 |
| Isoleucine | 26.728 | 0.069668 | 0 | 0 |
| Valine | 24.481 | 0.065498 | 0 | 0 |
| Choline | 22.99 | 0.017189 | 0 | 0 |
| Taurine | 22.532 | 0.01147 | 0 | 0 |
| Dimethylamine | 17.399 | 0.17601 | 0 | 0 |
| TMAO | 15.119 | 0.049399 | 0 | 0 |
| Serine | 13.897 | 0.0079914 | 0 | 0 |
| Glutamine | 13.67 | 0.0074317 | 0 | 0 |
| O-Phosphocholine | 13.307 | 0.027079 | 0 | 0 |
| Methionine | 12.91 | 0.076114 | 0 | 0 |
| Lysine | 9.4739 | 0.034614 | 0 | 0 |
| Hypotaurine | 8.3763 | 0.045886 | 0.00022222 | 0.00025571 |
| O-Acetylcholine | 7.7886 | 0.024056 | 0.00044444 | 0.00044169 |
| Fumarate | 7.5165 | 0.012557 | 0.00044444 | 0.00044169 |
| Histamine | 7.4313 | 0.025264 | 0.00044444 | 0.00044169 |
| Histidine | 6.6808 | 0.043659 | 0.0028889 | 0.0025265 |

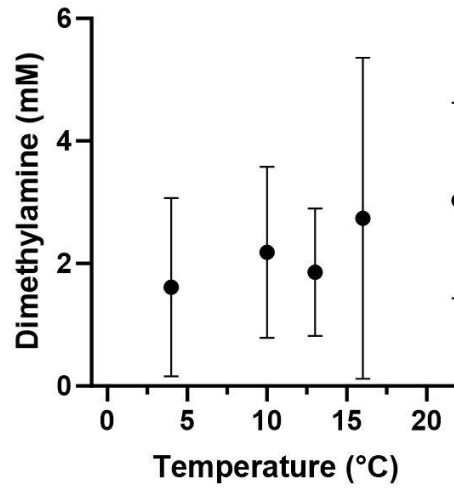


Figure S1. Changes of the concentration of dimethylamine during acute warming in *Zoarces viviparus*. Dimethylamine is not increasing significantly (significant difference using Significance Analyses of Microarray SAM (Delta value 0.5, FDR 0.188, False 0.46, (4 °C (n = 5), 10 °C (n = 6), 13 °C (n = 6), 16 °C (n = 4) and 22 °C (n = 4))).

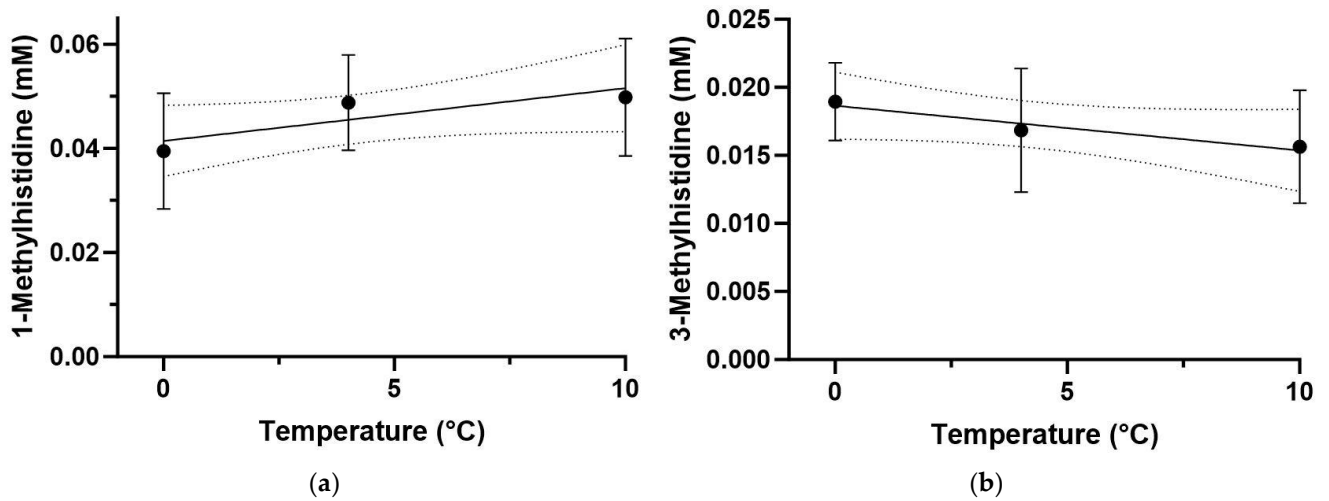


Figure S2. Changes of the concentration of 1-Methylhistidine and 3-Methylhistidine during acute warming in *Pachycara brachycephalum*. Neither 1-Methylhistidine ($Y = 0,001013x + 0,04142$, $R^2 = 0.137$, $p\text{-value} < 0.05$) nor 3-Methylhistidine ($Y = -0,0003283x + 0,01865$, $R^2 = 0.113$, $p\text{-value} < 0.05$) changed significantly during acute warming.