Supporting Information

van der Vinne et al. 10.1073/pnas.1413135111

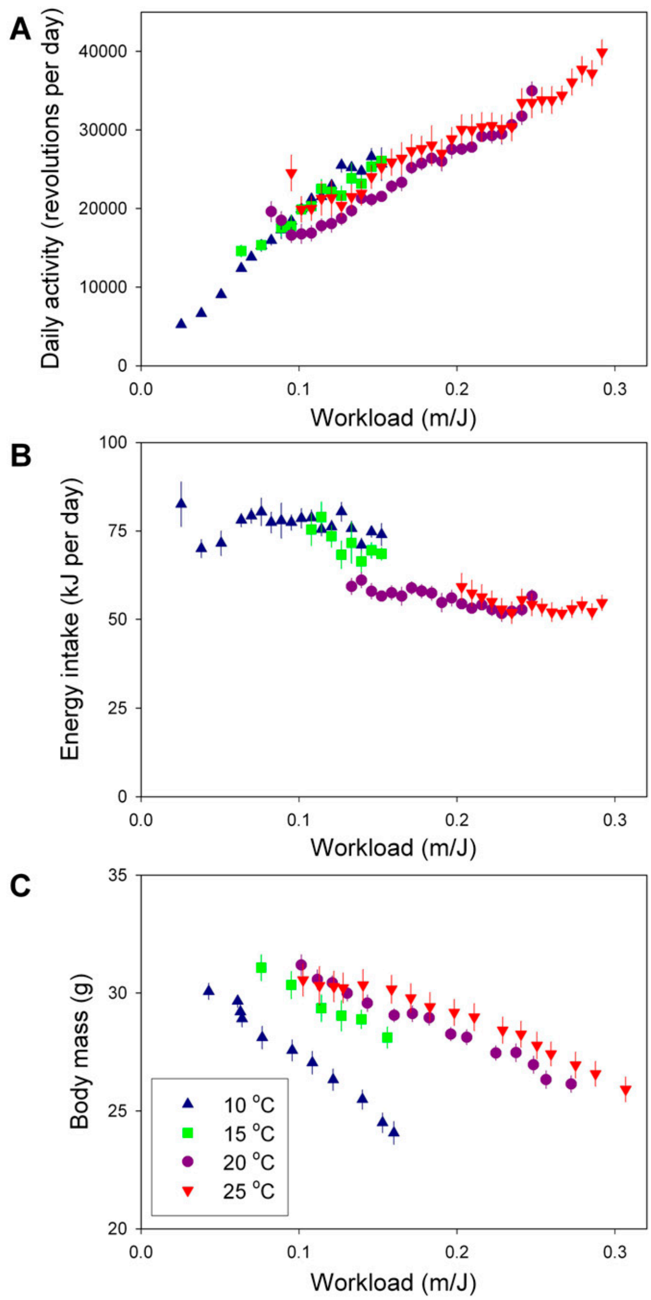

Fig. S1. Daily activity levels, energy intake and body mass per WFF workload for different T_as. (*A*) Daily activity increases with WFF workload at all different T_a. (*B*) Daily energy intake depends on T_a and decreases slightly during the WFF protocol although daily energy intake remains roughly constant with workload due to the increase in daily activity. Only days on which mice ate all available food pellets are included in analysis. (*C*) Body mass decreases during the WFF protocol, indicating an overall negative energy balance during the WFF protocol at all T_as.

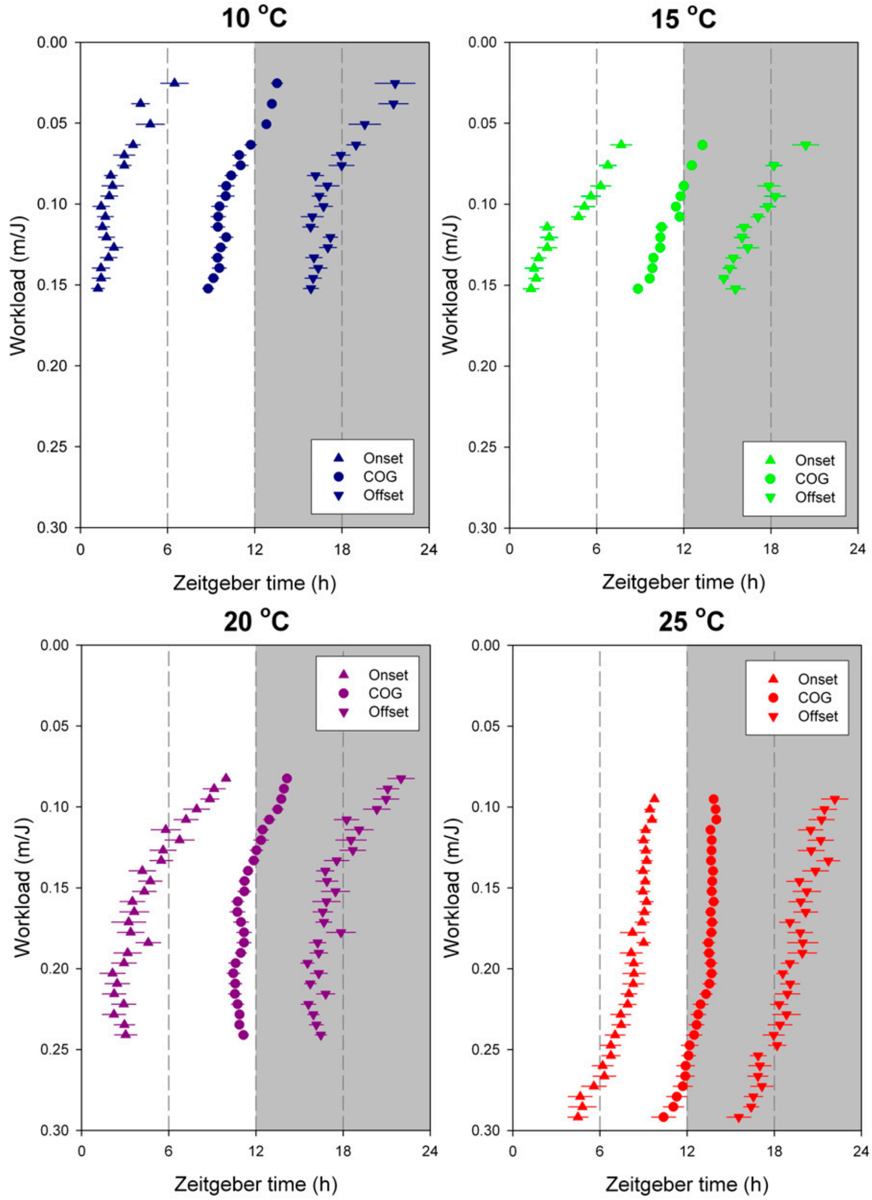

Fig. S2. Onset, center of gravity (COG), and offset of activity per WFF workload for different T_as. White–gray background indicates the light–dark (LD) cycle. Activity onsets and offsets were calculated as the intersects of the 2-h running average with a 24-h running average (calculated using Chronoshop v1.02). COG is calculated as the time at which activity in the preceding and subsequent 8 h is equal. Data are summarized as mean ± SEM.

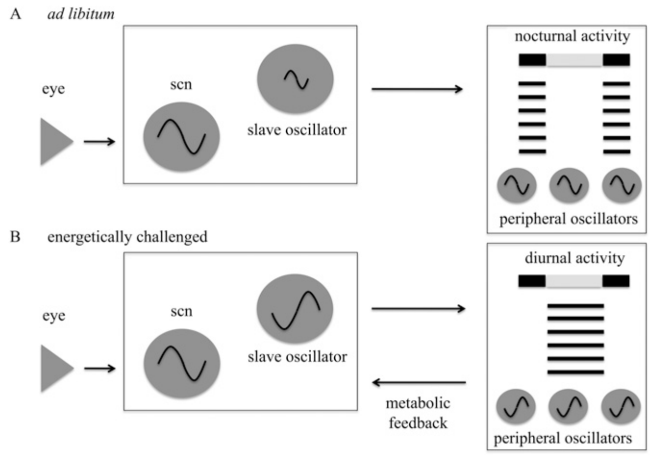

Fig. S3. Possible regulatory mechanisms behind metabolically induced diurnality. (*A*) A nocturnal phenotype is supported by a nocturnal distribution of peripheral oscillators. (*B*) When energetic demands are increased, the phase relation of a slave oscillator (activity oscillator) with the suprachiasmatic nucleus (SCN) is shifted leading to a diurnal distribution of peripheral oscillators and a diurnal activity profile. Different possible mechanisms for the regulatory relation between the SCN and slave oscillator are presented in ref. 1.

1. Hut RA, Kronfeld-Schor N, van der Vinne V, De la Iglesia H (2012) In search of a temporal niche: Environmental factors. *Prog Brain Res* 199:281–304.

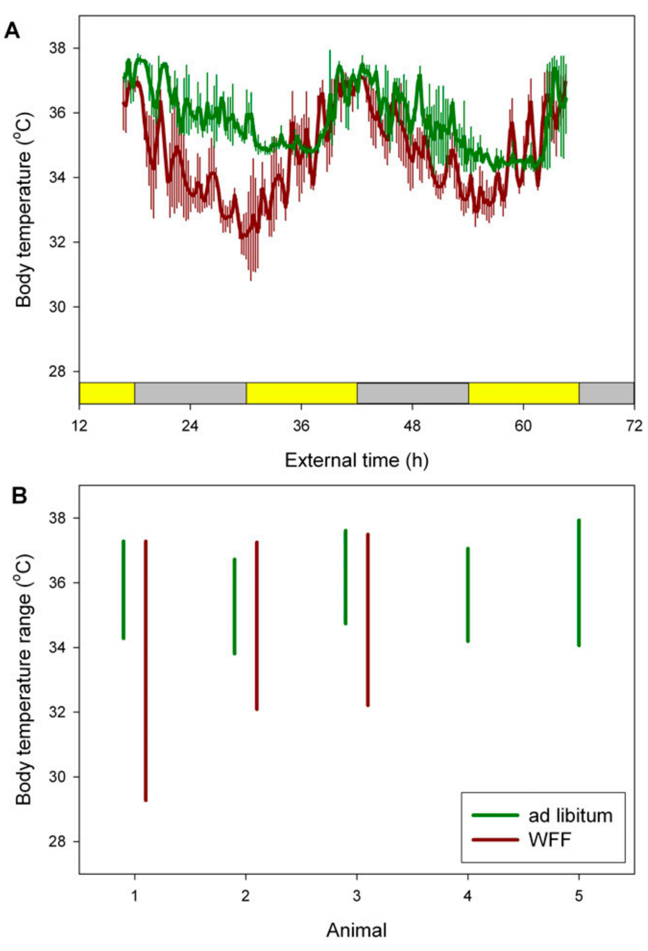

Fig. S4. Daily body temperature amplitude is increased during WFF. (*A*) Average body temperature cycles and SEM for ad libitum fed (green, $n = 2$) and WFF (red, $n = 3$) mice. The body temperature of WFF mice drops earlier and deeper during the rest phase compared with ad libitum fed mice. Horizontal bars in indicate the LD cycle (yellow = light). (*B*) The difference in daily maximum and minimum body temperature is increased during WFF compared with ad libitum feeding conditions. Maximum and minimum body temperature were determined in 48-h recordings of body temperature (15-min interval) under WFF (animal 1–3) and ad libitum (animal 1–5) feeding conditions.

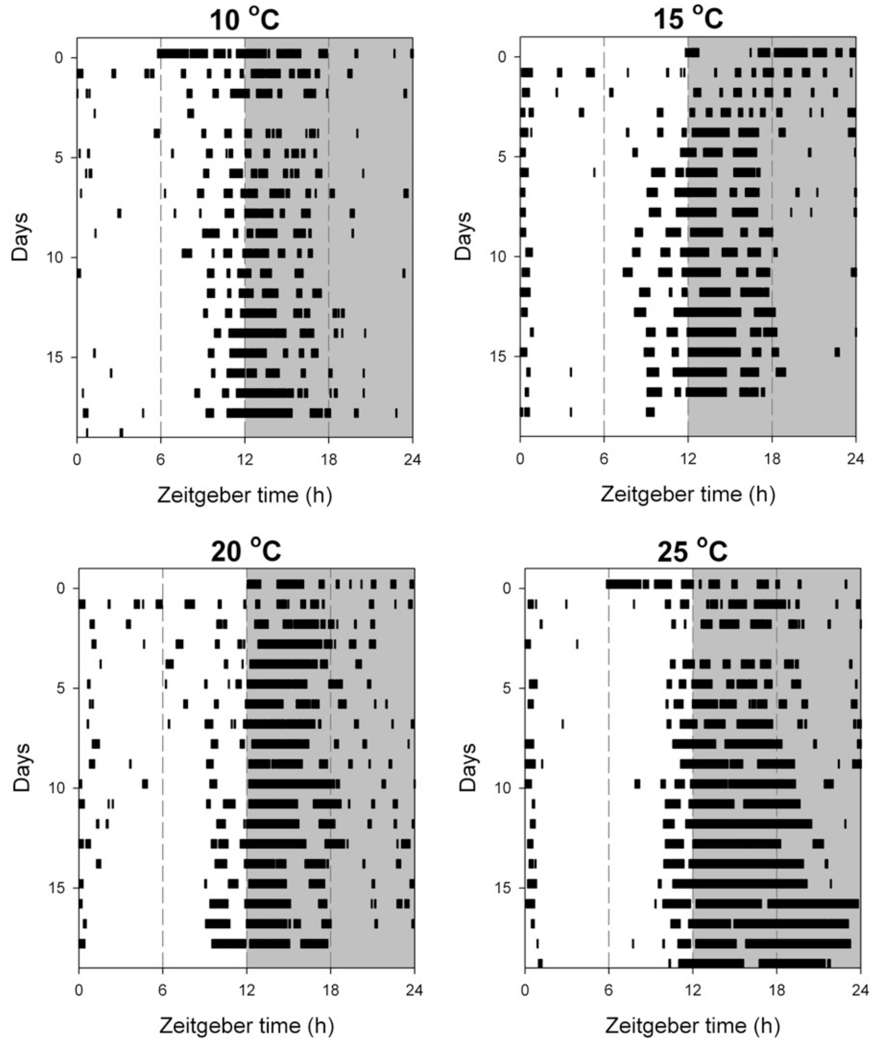

Fig. S5. Representative actograms of ad libitum fed mice housed in different ambient temperatures (T_as). Activity is plotted as a function of time of day with subsequent days being plotted under each other, white–gray background indicates the LD cycle. Increasing T_a decreases the daytime activity fraction, as shown in Fig. 1*A*.

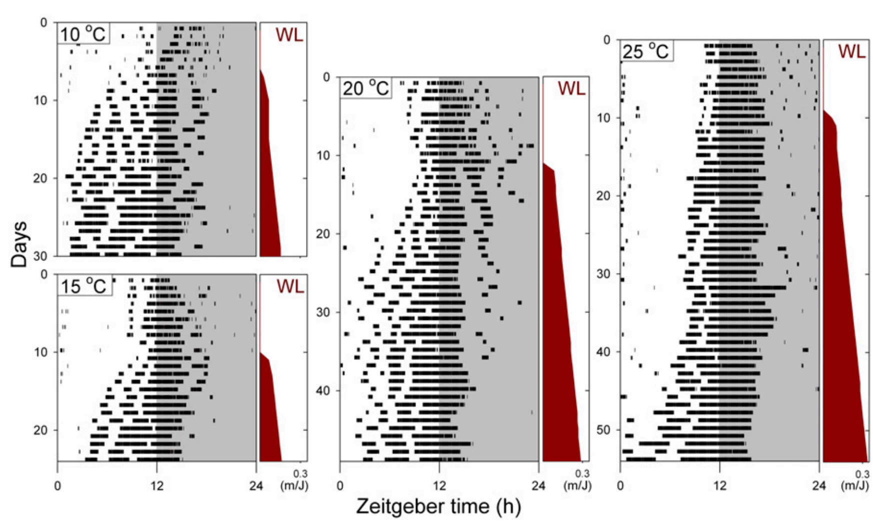

Fig. S6. Representative actograms of mice undergoing the working-for-food (WFF) protocol at different T_as. Activity is plotted as a function of time of day with subsequent days being plotted under each other, white–gray background indicates the LD cycle. (*Right*) The WFF workload in red. Mice become diurnal at lower WFF workloads at lower T_as, as shown in Fig. 1*B*.

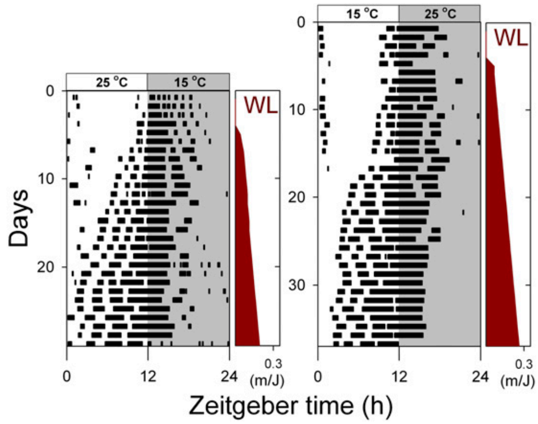

Fig. S7. Mice under work for food protocol become diurnal irrespective of the phase of the temperature cycle. Representative actograms of mice undergoing the WFF protocol in temperature cycles in phase (25–15 °C) and in antiphase (15–25 °C) with the LD cycle. (*Right*) The WFF workload in red. Both mice housed in a temperature cycle in phase and in antiphase to the LD cycle become diurnal in response to the WFF protocol, as shown in Fig. 1*C*.