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Blood temperature regulation in white-throated sparrows. II. Mechanisms of maintaining a low body temperature during flight. The mechanisms involved in maintaining a low rectal temperature in white-throated sparrows (*Zonotrichia albicollis*) flying at a moderate to high altitude were studied. Birds were instrumented to measure body and rectal temperatures, and respiratory gas exchange was measured in a closed system. Three experiments were done. In the first, birds were tested at high ambient temperature (22 degrees C) on a cool (22 degrees C) day, during warm (35 degrees C) day, or on the reverse. The ambient temperature was kept between 17 and 22 degrees C. Rectal temperature was not affected by environmental conditions. On a cool day the birds increased their respiratory exchange and shed heat to the external environment. When environmental conditions were reversed, heat loss from body heat balance was reduced and energy was consumed to maintain body temperatures, which caused a hyperthermic response. The metabolic heat production and the muscle contractility of the birds were unchanged. In the second experiment, birds were tested at low ambient temperature (5 degrees C) on a cool (5 degrees C) day or on a warm (30 degrees C) day. Rectal temperatures in birds tested at low ambient temperature were not different from baseline and remained within the thermoneutral zone. Birds in the warm test were significantly warmer than birds in the cold test. The third experiment tested the effect of increasing rectal temperature on fat mobilization. Rectal temperature increased to 38 degrees C when birds were exposed to 8 h of cold (5 degrees C) and to 32 degrees C when birds were exposed to 8 h of warm (25 degrees C) at ambient temperatures of 25 degrees C and 30 degrees C, respectively. No differences in metabolic rate, respiratory exchange rate, or evaporative heat loss were observed between treatments. Results suggest that a progressive decrease in ambient temperature inhibits thermoregulatory adjustments by sparrows to a warm environment. Fonction SYSCONF

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