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INDIVIDUAL VARIATION IN THE THERMOREGULATORY BEHAVIOR OF FREE-RANGING GARTER SNAKES, Thamnophis elegans. C.R. Peterson and S.J. Arnold. University of Chicago.

We examined individual variation in the thermoregulatory behavior of free-ranging snakes by surgically implanting temperature sensitive radiotransmitters in 15 pregnant garter snakes in northeastern California. After release, the snakes were monitored at ten-minute intervals from June through August 1986. Their body temperature (Tb) patterns typically consisted of a long cooling phase during the night, a rapid heating phase in the morning, and a warm stable phase during the day. Preliminary analyses indicate significant variation in thermoregulatory behavior among individuals. For example, mean times of emergence (indicated by a rapid increase in Tb during the morning) varied by almost two hours among snakes (8:25 vs. 10:22 AM). Some snakes emerged at similar times each day while others often emerged at different times from day to day (the ranges of emergence times within individuals varied from approximately 30 to 150 minutes). The significance of such variation will be evaluated by combining the field data with results from lab experiments of the thermal dependency of development.

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BEHAVIORAL THERMOREGULATION OF SMALL AMERICAN ALLIGATORS IN WATER: POSTURAL CHANGES IN RELATION TO THE THERMAL ENVIRONMENT. F.E. Fish and L.A. Euker. West Chester Univ., West Chester, PA.

The regulation of posture and body temperature was studied in five small alligators (Alligator mississippiensis) floating in water at 15, 25, and 35 C. Infrared radiation (IR) was varied with an IR heat lamp situated directly over the alligator. The angle of the body to the water surface was measured for each alligator tested at each water temperature and IR condition, and the colonic temperature was obtained after the experiment. A highly significant interaction was found between the water temperature and IR condition for both postural angle and temperature differential. The postural angles of the alligators were low at 15 and 25 C with IR, but high at the same temperatures without IR. The alligators were able to raise their colonic temperature slightly above ambient by floating close to or at the water surface when exposed to IR. At 35 C, no significant difference was found for either colonic temperature or postural angle of alligators tested with or without IR.

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ENERGETICS OF HIBERNATION IN THE LIZARD DIPSOSAURUS DORSALIS. W.J. Mautz and K.A. Nagy. University of California, Irvine and Los Angeles.

Energy expenditure of hibernating D. dorsalis was studied using doubly labeled water. Lizards hibernated from mid-Oct to mid-March in the same burrows used as daily retreats in summer. Winter burrows were lightly compacted with soil and lizards were found buried or in air pockets. Energy expenditure of hibernators (mean mass 43g) was 0.53 ± 0.05 SE kJ/d, n=5) and was estimated to consume 2.2g of fat over winter. While hibernation occupied 44% of the annual period, hibernation energy expenditure accounted for only 6.2% of total annual energy expenditure. From Oct-Jan lizards were found at an average of 14 cm below the surface (range 10-23 cm, n=10). In Feb-March, they tunneled upward and at the threshold of emergence, they were positioned just beneath the surface (mean depth 2.9 cm, range 1-5 cm, n=13). Energy expenditure of 3 lizards measured both before and after vertical movements was increased by a factor of 2.8. Shallow positions subjected lizards to greater extremes of daily temperature variation, and while less conservative of energy reserves, probably provided an effective thermal cue for springtime emergence.

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METABOLIC RESPONSES OF DARK-EYED JUNCOS (JUNCO HYEMALIS: AVES) TO TEMPERATURE AND WIND. M.T. Murphy*, G.S. Bakken, D.J. Erskine. Indiana State University, Terre Haute.

Measurements of postabsortive metabolism (M; oxygen consumption) and evaporative water loss (E) by juncos to simultaneous variation in air temperature (-13 to 32 C) and wind speed (u; 0.1, 0.6, 2.0 and 3.0 m/s) were made on winter-acclimatized birds in an open-circuit system. Juncos (n = 60) were captured on the day of testing. Standard metabolic rate and the lower critical temperature (LCT) at u = 0.1 m/s were close to allometrically predicted values. Evaporative water loss increased from -13 to 32 C. Below the thermoneutral zone (TNZ) dry metabolism (M -E) increased with falling temperature (r^2 = 0.55) and increased wind speed (r^2 = 0.25). Thermal conductance (C) at u = 0.1 m/s was near the predicted value, and an analysis of covariance indicated that C was independent of u up to 2 m/s. C increased significantly at u = 3 m/s, suggesting wind penetration of the plumage. Wind raised the LCT, but did not significantly affect (M - E) within the TNZ.