

Biology 390 **Problem: Evaporative Water Loss and Temp Reg.**

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The purpose of this problem is to illustrate, on a comparative basis, the potential difficulty encountered by small organisms living in hot environment.

Consider the following data: $T_a = 37^\circ\text{C}$
latent heat of vaporization: 575 Kcal/kg H_2O at 37°C

- a. Calculate the amount of water lost by evaporative cooling during one day by a 70 kg mammal whose rate of metabolism is 3,000 Kcal/day. Assume evaporative cooling is the only mode of heat exchange this mammal can use to regulate its body temperature, *i.e.*, no temperature differential exists between the organism and its external thermal environment.
Express you answer as a percentage of original body mass.

- b. Make a similar calculation for a 10 gram mammal whose rate of metabolism is 3.92 Kcal/day.

- c. Is comparison of you answers consistent with the observation that most small mammals living in desert regions are active at night? Explain.