

Physiological Control of Body Temperature

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I. Introduction

Until 40 years ago it was generally assumed that the body temperature of reptiles passively tracked that of the environment. This assumption would be correct only in a uniform environment. However, the environment, particularly the terrestrial environment, is rarely uniform. The complex interactions of convective, conductive, and radiative heat exchanges there usually prevent any single measurement from accurately characterizing the effective temperature of the terrestrial environment. The pioneering investigations of R. B. Cowles and associates in the late 1930s and early 1940s (see particularly Cowles and Bogert, 1944) made it clear that reptiles can control their body temperatures by selective exploitation of the thermal variation in the environments they occupy; behavioral manipulation of the thermal flux affecting their bodies allows active reptiles to maintain body temperature during activity within a narrow range. These levels of body temperature are often similar in congeners that occur in markedly different climates, and may differ substantially in sympatric species of different genera. This situation implies that reptiles show physiological adjustments to particular body temperatures and that these adjustments vary adaptively from taxon to taxon. Such is indeed the case.

An extensive literature now available, documents the fact that postural adjustments, basking, and utilization of appropriate microclimates allow many species of reptiles while active to maintain body temperature within a characteristic and restricted range, the *activity temperature range*. These activity temperature ranges are clearly of profound physiological significance. They are of sufficient stability and (presumably) antiquity that a remarkably extensive series of physiological adjustments has become associated with them. The linkage of physiological function to behaviorally controlled body temperature has been particularly well documented in