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The Water Vapor Conductance of Squamate Reptilian Eggs: The Influence of Scaling on Nesting Ecology.

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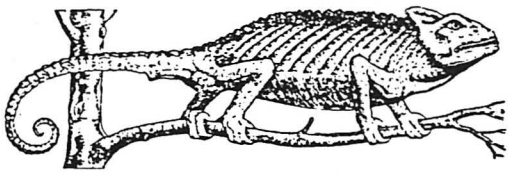

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ABSTRACTS

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THE WATER VAPOR CONDUCTANCE OF SQUAMATE REPTILIAN EGGS: THE INFLUENCE OF SCALING ON NESTING ECOLOGY.

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Flexible-shelled eggs of squamate reptiles are strongly influenced by their surrounding microclimate, particularly the hydric conditions of the nest. The eggshell water vapor conductance of an egg can be an indication of its requirement for water from the nest. Ackerman et al. (1985. Physiol. Zool. 58:129-137) have described the scaling relationship for eggshell water vapor conductance (G_{H_2O}) of flexible-shelled reptilian eggs ($G_{H_2O} = 981.8M^{0.52}$). This scaling relationship was investigated with water vapor conductance data obtained from 8 species of lizards representing the families Iguanidae (Anolis carolinensis, A. sagrai, Sceloporus woodi, S. virgatus) and Scincidae (Eumeces laticeps, E. obsoletus, E. septentrionalis, Scincella laterale). Data from these species, along with published data, was compared with respect to the nesting ecology of each species.

A species' position on the scaling curve was related, in part, to its nesting habits. Eggs that are relatively small (initial mass <0.25 g: A. carolinensis, A. sagrai, S. laterale) will have a relatively small water budget as a consequence of having a low water vapor conductance. Therefore, these species can oviposit in relatively superficial nest, and abandon their eggs. Species with larger eggs (initial mass >0.25g) must place their eggs in relatively deep, protected or hydrically stable nests because of their greater requirement for water from their nests. The genus Eumeces is an exception; females have the ability to oviposit and brood their eggs (initial mass >0.25 g) in shallow or exposed nests. Brooding behavior in Eumeces may serve to enhance hydroregulation of the eggs and/or nest (Somma & Fawcett. 1989. Zool. J. Linn. Soc. 95:in press). This nesting behavior may allow females to brood their eggs in hydrically unstable microenvironments, thus allowing them to take advantage of a greater selection of potential nest sites not available to nonbrooding species with similarly sized eggs. Ongoing studies aimed at testing the hydroregulatory abilities of brooding Eumeces could provide further support for this hypothesis.

Revised Abstract

THE WATER VAPOR CONDUCTANCE OF SQUAMATE REPTILIAN EGGS: THE INFLUENCE OF SCALING ON NESTING ECOLOGY.

Somma, L. A. 1989. (Department of Zoology, 223 Bartram Hall, University of Florida, Gainesville, Florida 32611, U.S.A.)

Flexible-shelled eggs of squamate reptiles are strongly influenced by their surrounding microclimate, particularly the hydric conditions of the nest. The eggshell water vapor conductance of an egg can be an indication of its requirement for water from the nest. Ackerman et al. (1985. Physiol. Zool. 58:129-137) have described the scaling relationship for eggshell water vapor conductance (G_{H_2O}) of flexible-shelled reptilian eggs ($G_{H_2O}=981.8M^{0.52}$). This scaling relationship was investigated with water vapor conductance data obtained from 17 species of lizards and snakes representing the families Anguidae (Ophisaurus ventralis), Iguanidae (Anolis carolinensis, A. sagrai, Holbrookia maculata, Sceloporus garmani, S. undulatus, S. virgatus, S. woodi), Scincidae (Eumeces egregius, E. inexpectatus, E. laticeps, E. obsoletus, E. septentrionalis, Scincella laterale), Teiidae (Cnemidophorus sexlineatus), and Colubridae (Diadophis punctatus, Elaphe obsoleta). Data from these species, along with published data, was compared with the nesting ecology of each species.

A species' position on the scaling curve was related, in part, to its nesting habits. Eggs that are relatively small (initial mass<0.25 g:A. carolinensis, A. sagrai, S. laterale) will have a relatively small water budget as a consequence of having a low water vapor conductance. Therefore, these species can oviposit in relatively superficial nests, and abandon their eggs. Species with larger eggs (initial mass>0.25 g) must place their eggs in relatively deep, protected or hydrically stable nests because of their greater requirement for water from their nests. The genera Eumeces and Ophisaurus are exceptions; females have the ability to oviposit and brood their eggs (initial mass>0.25 g) in shallow or exposed nests. Brooding behavior in Eumeces may serve to enhance hydroregulation of the eggs and/or nest (Somma & Fawcett. 1989. Zool. J. Linn. Soc. 95:245-256). This nesting behavior may allow females to brood their eggs in hydrically unstable microenvironments, thus allowing them to take advantage of a greater selection of potential nest sites not available to nonbrooding species with similarly sized eggs. Ongoing studies aimed at testing the hydroregulatory abilities of brooding Eumeces could provide further support for this hypothesis. Additionally, ongoing SEM and TEM studies on eggshell morphology will shed light on the interrelationships between morphology, water relations and nest ecology of squamate reptilian eggs.

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