# NATURAL HISTORY RESEARCH REPORTS

## Turtles and Wetlands

Seasonal differences in wetland use by Spotted Turtles (*Clemmys guttata*) and Blanding's Turtles (*Emydoidea blandingii*) are complex and require a dynamic landscape to sustain these rare turtles. **Beaundry et al.** (2009. *Journal of Herpetology* 43:636–645) examined these factors in southern Maine, where wetlands are abundant and diverse. The study concluded that the characteristic of the wetlands used by the turtles

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Spotted Turtles (*Clemmys guttata*; top) and Blanding's Turtles (*Emydoidea blandingii*) differ in seasonal wetland use in southern Maine.

varies between the species. In the spring, Spotted Turtles used wetlands with abundant Wood Frog egg masses and showed a negative association with forested swamps. In the summer and fall, they used wetlands with high sun exposure. Blanding's Turtles used wetlands within deciduous forests and with a high cover of sphagnum in the spring. During late summer and fall, these turtles were associated with deep-water wetlands. Seasonally, Blanding's Turtles were active earlier than Spotted Turtles.

## Horned Lizards and Climate

The prediction that variation in species morphology is related to environmental features has long been of interest to ecologists and evolutionary biologists. **Luxbacher and Knouft** (2009. *Journal of Evolutionary Biology* 22:1669–1678) used morphological, environmental, and phylogenetic data compiled from studies of Horned Lizards (*Phrynosoma*) to examine morphological and climatic variation across the geographic ranges of these species in an evolutionary context. In the first study, patterns of environmental niche and morphological trait variation among Horned Lizards were examined in a phylogenetic context. The results indicated that closely related species of *Phrynosoma* occupy more similar environmental niches than distantly related species, which was suggestive of niche conservatism. In the second study, morphological characters of 14 Horned Lizard species were measured. The results suggested no discernable pattern in the evolution of body size or form among Horned Lizards. The lack of a phylogenetic signal in body size may seem surprising, but phylogenetic signals are responsive to sample sizes, and this analysis was limited to 14 species. The final study looked at associations between environmental niches and morphological traits. Although the study could not determine if morphological characters were responding directly

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Morphological traits (excluding body size) are correlated with climatic features among Horned Lizards. For example, short-limbed Mountain Short-horned Lizards (*Phrynosoma hernandesi*) occur at high elevations and cooler temperatures across the western United States and into Sonora, Chihuahua, and Durango, Mexico.

to climate or to, for example, vegetative communities that are affected by climate, the results showed that morphological traits (excluding body size) are correlated with climatic features among Horned Lizards. Species of *Phrynosoma* with long limbs occur in dry lowland habitats with relatively high temperatures and species with large heads occur in wet environments with high temperature seasonality (i.e., wide annual fluctuations in temperature). This pattern is also supported by empirical data.

## Bird and Crocodilian Lungs are Similar

When it breathes, the American Alligator (*Alligator mississippiensis*), a semi-aquatic ectotherm without air sacs, possesses the same unidirectional airflow in the lungs as birds. During inhalation and exhalation, airflow in the avian lung moves gases in the same direction through small tubes called the parabronchi. Crocodilian lungs are distinctly different than those of birds, but the topography of the intrapulmonary bronchi is similar in both. **Farmers and Sanders** (2010. *Science* 327:338–340) tested the hypothesis that airflow in alligator lungs is unidirectional and concluded that it was extremely bird-like. The mechanisms for unidirectional airflow in alligator lungs remain unknown, but crocodilians and birds both belong to the crown-group Archosauria, which includes crocodiles, dinosaurs, and pterosaurs of the Triassic Period (251–199 million years ago), suggesting that the unidirectional airflow in alligators and birds could have evolved before these groups diverged.

Unidirectional airflow through the lungs of American Alligators (*Alligator mississippiensis*) is essentially similar to that in birds, suggesting that airflow mechanisms evolved before crocodilians and birds diverged.