Preface

Yet here too are five fingers, and the wing is evidently an expansion of the hand itself by the elongation and separation of the fingers ...
Burt G. Wilder (1875)

Bats represent about 10% of the living species of mammals with over 1,000 species currently known to be extant [Simmons, 2005]. Yet not so many years ago, scientists debated whether or not bats might be birds, and did not know much about where or how bats lived. Wilder [1875], a student of Louis Agassiz and the first Professor of Comparative Anatomy at Cornell University, asked if the males gather food for the females, while also inquiring about how female bats could fly bearing the weight of their offspring as well as themselves. Bats were recognized as a distinct lineage of mammals by John Ray [1693] but later listed as primates by Linnaeus [1758] in his tenth edition of *Systema Naturae*. Despite the many classifications that have been presented, the ability to perform true flight with a wing has set bats aside as unique and important vertebrates. How the hand of a primitive mammal might have evolved into a hand-wing remains an elusive yet challenging question facing biologists.

This Special Topics issue was designed to bring together ideas about the growth and development of bats, specifically looking to integrate ideas on how the bat wing emerges as a unique structure from the embryonic hand, and where some of the most rapid growth occurs within the growth plates of the long bones [Burnett and Kunz, 1982; Kunz and Anthony, 1996]. Thomas Kunz was involved in several early studies of the utility of digital growth plates of young bats as a tool in studying the ecology of young bats of many species. This work gave rise to multiple perspectives on bat ecology and digital growth that are reviewed in, or covered in, this Special Topics is-

sue. Karen Sears has worked with colleagues at several institutions to identify some of the molecular determinants of early development of chiropteran wing bones. Her review provides a concise comment on the state of this area of study which will, no doubt, continue to make major contributions to our knowledge about bats as well as other mammals. Rick Adams has published numerous papers on prenatal and postnatal growth of the hand-wing and has provided defining ideas about the ecological morphospace in which young bats feed. John Hermanson and Kenneth Wilkins had the serendipitous opportunity to study a doomed bat roost in central Florida nearly 25 years ago. This volume provides an opportunity to illustrate the subtle differences in growth observed in two bat species sharing this common maternity roost. Finally, the growth plate itself is analyzed in two contributions by Cornelia Farnum and John Hermanson to analyze the chondrocytic differentiation cascade comparing growth plates in the hand-wing and the hindlimb, and to compare chondrocytic kinetics leading to elongation in growth plates in the big brown bat and the mouse. All of this must be cast in light of the functional demands ultimately placed on the bat wing skeleton. To this end, Sharon Swartz and Kevin Middleton have contributed an extensive review of the current understanding of the biomechanics of bat wing bones spanning from their mineral properties to their motion during flight.

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