



Vertebrates: Comparative Anatomy, Function, Evolution 8th Edition

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New and Expanded in the Eighth Edition

New fossil finds, modern experimental research, and new phylogenies continue to enrich vertebrate biology, some times solving old questions or surprising us with a new understanding of how vertebrates function and how they evolved. Much of this is added to this new edition.

Origin of Chordates. The evolutionary arrival of the chordate body plan continues to receive fresh ideas. I have revised the end of chapter 2 to incorporate the most recent views. This revision has also helped clarify the evolution of the gnathostome “The New Mouth,” discussed in chapter 13 (Box Essay 13.1). The origin of chordates also leads into the revised summary of phylogenetic relationships within the vertebrates, chapter 3.

Phylogenetic Relationships. Thanks to continuing use of improved genetic and morphological data sets, phylogenetic relationships are becoming better resolved, and natural groups are emerging from this analysis with better clarity. This is the basis for revisions in chapter 3. Many smaller adjustments in the placement of various vertebrate taxa are incorporated, but two in particular should be noted—turtles and dinosaurs. I incorporate the new placement of turtles, not basally as done historically within the reptiles, but further advanced within the archosauromorphs (figure 3.27). The second proposed change was published recently (Baron et al., 2017 doi:10.1038/nature21700) wherein dinosaurs were significantly reshuffled with the archosaurs. I have chosen not to incorporate this proposed new revision within this chapter. It hypothesizes significant changes in early dinosaur evolution, so I would first like to see how it stands up in the hands of other systemists.

The Musculature System. I have revised chapter 10 to better emphasize its overall themes as done in other chapters—morphology, function, evolution. I hope this revised organization will help the student to better assemble the evolutionary story of the muscle system. Lungs and the Rise of Archosaurs. The especially efficient lungs of birds are well known with air sacs and one-way flow of air. But in the seventh edition, I reported that a similar one-way air flow, even without air sacs, occurs in crocodiles. This can now be updated to see a similar possibility in other modern reptile groups. This surprising finding is tentatively attributed to Colleen Farmer, whose story of the discovery is highlighted in Box Essay 11.5. If true of archosaurs in general, it may represent a respiratory adaptation to low oxygen levels in the early Mesozoic and account for the rise of Archosaurs.

Updated and Revised. Countless changes and revisions throughout this new edition have been made, some major, some small. These changes have corrected misinformation, updated information, and often better clarified an explanation. For this I am indebted to students, reviewers, and colleagues for bringing these suggestions to my attention.

Serving the Student. Features of the textbook have been further expanded to make its presentation clearer and inviting. The use of color brightens these sections of the book. Color has also been used to better correlate and compare structures between figures in these chapters. Where feasible, I have added more color to the illustrations. Many illustrations are new, revised, or relabeled to improve clarity. The accompanying laboratory dissection guide (authored with E. J. Zalisko) is closely cross-referenced to this textbook. In addition, selective **functional laboratories** are available online to provide students with firsthand experience of working between the anatomy and its functional and evolutionary significance.

Serving Instructors. This eighth edition—new, revised, updated—can serve as reference and resource support for the course you put together on vertebrates. In addition to this, resources are available to you online. The functional laboratories may be downloaded and used as they supplement your course. **PowerPoint images**, chapter by chapter, are available online, along with additional images from McGraw-Hill that can be used to compose lectures and laboratory presentations.

Supplements

Comparative Vertebrate Anatomy: A Laboratory Dissection Guide

Newly revised, *Comparative Vertebrate Anatomy: A Laboratory Dissection Guide, Eighth Edition*, by Edward J. Zalisko and Kenneth V. Kardong is now available. At the end of this dissection guide, the authors include a Student Art Notebook. This notebook, promoted by students, is a reprinted collection of the most important and commonly used dissection figures in the current edition of the laboratory manual. It addresses a frustration inherent in most dissection guides, especially when comparing homologous systems between representative animals, of having to flip between text and distantly placed illustrations. This laboratory manual weaves the functional and evolutionary concepts from this textbook, *Vertebrates: Comparative Anatomy, Function, Evolution*, into the morphological details of the laboratory exercises. Using icons, the laboratory manual identifies cross references to this textbook, so students can quickly move from the dissection guide to this textbook to consult the expanded treatment of function and evolution. Each chapter of the dissection guide first introduces the system, makes comparisons, and demonstrates common themes in the animal systems. It also introduces central terms to be used next in the chapters. Then the written text carefully guides students through dissections, which are richly illustrated. Anatomical terms are boldfaced and concepts italicized. The dissection guide is written so that instructors have the flexibility to tailor-make the laboratory to suit their needs.

Website for Vertebrates: Comparative Anatomy, Function, Evolution, Eighth Edition

A website for this textbook, available at www.mhhe.com/kardong8e, includes further useful information upon which instructors can depend and students can consult. Here can be found the **functional laboratories**, helpful in a linked laboratory, if available, or selectively in lecture. End-of-chapter **selected references**, giving students a start into the literature, are located here.

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Art and Artists

Please indulge me a final moment of lament. For illustrations, modern textbooks have substituted photographs and figures made of computer-generated plastic figures, especially when rendering molecular events. There is nothing wrong with this, but what has been eliminated is involvement of the human touch, directly, namely the artist. Preparing this textbook has given me the chance, at no expense to students by the way, of engaging some of the best artists of our day. They bring a sharp eye and traditional talent to rendering of enlightening pieces of art. Many have contributed, but one is L. Laszlo Meszoly (Harvard University), who has contributed special figures to this and earlier editions. Another is Kathleen M. Bodley, whose remarkable ability to render soft tissue in particular has enriched our dissection guide and is quite stunning. Her work also graces the cover of this textbook. My thanks to these two in particular. This is a wonderful tradition of scientific illustration they carry forward.