

# AUTHOR'S PREFACE

## About *Digital Zoology*

*Digital Zoology* has existed in a variety of different forms over the years. It started as a series of digital photos that I used in class to help bring the specimens that students saw in lab to the lecture hall. It then grew with the addition of more specimens and interactive cladograms. Soon after, it found a home on the computer networks at the university. When students wanted to take it home, it ultimately became the CD-ROM that evolved into the *Digital Zoology* Free Preview Version, published in December, 2000. By January 2001 over 15,000 students across North America were using the program. Version 1.0 followed a year later with the addition of more vertebrate specimens and an expanded interactive glossary. It's now a year later, and like any good arthropod, *Digital Zoology* has molted once again. We've added more invertebrate specimens, doubled the size of the interactive glossary, and provided you with what we call "Read Abouts," which take a detailed look at the over 100 animal groups included in *Digital Zoology*. But the biggest change is in the program. It is now an Internet, web browser-based program and you can run it from the CD-ROM included in this workbook or from the *Digital Zoology* website: [www.digitalzoology.com](http://www.digitalzoology.com). If you use the website you'll find additional features that aren't available on your CD-ROM: the ability to take notes and place personalized bookmarks in the program for handy reference to sections important for your studies. This workbook provides a quick look at different animals traditionally studied in zoology labs and serves as a useful study tool for review of lab dissection exercises.

## What's new in *Digital Zoology* Version 2.0

- Coverage of seventeen new phyla: Placozoa, Ctenophora, Cycliophora, Sipuncula, Onychophora, Tardigrada, Bryozoa, Rotifera (including Acanthocephala), Gnathostomulida, Chaetognatha, Gastrotricha, Nematomorpha, Priapulida, Kinorhyncha, Loricifera, Phoronida, and Brachiopoda. The Annelida has been updated to include the Echiura and Pogonophora. Protozoans have been reorganized based on the infrakingdoms of Actinopoda, Alveolata, Discicristata, and Sarcomastigota.
- Ten new lab modules for Version 2.0: Broyzoans, Brachiopods, Leech, Sea Cucumber, Gastrotrichs, Rotifers (including Acanthocephala), Hemichordata, Protochordates, Lamprey, and a special module on insect mouthparts. Similar in style to the other lab modules in *Digital Zoology*, each new module includes a quiz. New lab modules for Hemichordata and for the chordate subphyla Urochordata and Cephalochordata replace the previous chordate origins units, providing a complete taxonomic organization to *Digital Zoology* Version 2.0.
- New taxon "Read Abouts" in Version 2.0 replace the taxon boxes in Version 1.0 and include information on over 100 taxa, the number of living and extinct species, habitats, and how they function.
- Updated taxonomy of the animal phyla allows for easy comparison of the differences between traditional morphological phylogenies and those created with molecular data.
- The number of video clips in *Digital Zoology* Version 2.0 is almost twice that of Version 1, with forty new video sequences for clam, jellyfish, sea star, sea cucumber, sea urchin, perch, rotifer, gastrotrich, frog, shark, and more protozoans.
- More than 250 glossary terms have been added, bringing the total interactive key terms in *Digital Zoology* Version 2.0 to over 750 terms. The full glossary can be consulted at any time or by clicking on highlighted key terms found throughout the program.
- Image galleries are now available for many of the major phyla, providing photos that detail diversity within the phyla.

## ***The CD-ROM and Online Components***

*Digital Zoology* is organized around four components. The first provides illustrations, photos, and video clips of the various specimens that will help students to understand the specimens and groups of animals commonly studied in the lab. *Digital Zoology* contains over forty-five different species, covering a full range of organisms from microscopic amoebas to vertebrates such as the frog and fetal pig. It provides students in whole animal biology courses such as general zoology, invertebrate zoology, and vertebrate zoology with an interactive guide to the specimens and materials that they will be studying in their laboratory and lecture sessions. Each lab module contains illustrations, photographs, and annotations of the major structures of organisms and microscope slides commercially available from the suppliers used by high schools, colleges, and universities. The second component involves interactive cladograms that explore the origins and phylogeny of the various animal taxa at the phylum, subphylum, and class level. The third is synoptic “Read Abouts” that provide information on over 100 different animal groups. Special terms and text in each “Read About” are linked to an interactive glossary to help students understand the terms unique to the group. (You can browse through the full glossary by selecting “Glossary” from program tools found on the green taxon bar.) The fourth and final component of *Digital Zoology* is self-evaluation tools that help you assess how well you know the material. Interactive crossword puzzles test your knowledge by taking traditional one-word answer questions and organizing them into a crossword puzzle. Self-tests in each chapter of the *Digital Zoology* student workbook are combined with drag-and-drop quizzes in each lab module to test your knowledge of the anatomy of the different specimens you’ll encounter in your zoology course.

## ***The Student Workbook***

The student workbook is designed to complement the specimens on the *Digital Zoology* CD-ROM and on-line. If a particular taxon isn’t included in the current version of *Digital Zoology*, there won’t be a chapter on it in the workbook. Each chapter begins with a short description of the defining differences for the group of organisms — phylum or class — covered in the chapter. These differences, many of which can be seen in the lab or in *Digital Zoology*, combine characteristics that define the taxon and highlight the unique ways that organisms in the group function. The workbook takes a closer look at a representative specimen for each taxon and explores the unique biology of the animal. A convenient “structures checklist” allows students to keep track of the key structures for each of the specimens they examine. Each chapter contains self-evaluation tools: crossword puzzles that test knowledge of key terms and concepts for that group, and a self-test quiz for lab exercises. For those of you who have seen previous versions of *Digital Zoology*, the labeling quizzes in this workbook are similar to the drag-and-drop quizzes in *Digital Zoology*. These quizzes are still in *Digital Zoology*, only there are many more of them: a quiz is now included for all the major animal groups covered.

There are a number of additional interactive elements in the student workbook. Questions in each chapter explore some of the key concepts about the group of animals discussed, and the *Digital Zoology* website provides answers to the questions raised in the workbook. Crossword puzzles provide a self-evaluation tool for each chapter’s content, and interactive versions of the puzzles, with solutions and hints, are available on the CD-ROM or the website. An additional interactive element in each chapter of the workbook is the self-test quiz. Students can identify and label key structures in photographs of microscope slides or dissected specimens.

This workbook is not intended to replace the zoology textbook or laboratory manual. Rather, it has been designed as a supplement to both. In a large part, *Digital Zoology* focuses on things that students will be able to see in their lab sessions. A full-color copy of the workbook is available from the *Digital Zoology* website.

## A Note to Students

I hope you'll find *Digital Zoology* to be a valuable tool in your studies of zoology. Here are some of the ways that my students have used the program.

**Lab Preparation.** *Digital Zoology* is a great way to prepare for lab sessions. Part of this preparation should always be to read through the lab manual before your lab. Unfortunately, manuals often have only a few illustrations or photos of the specimens you'll be looking at in the lab. They really don't prepare you for how things will look when you dissect your specimen. *Digital Zoology* contains many photos of the specimens at various stages in the dissection, and by working through the lab module prior to doing the lab you should be able to get a good idea of what to expect once you start your dissection.

Almost all lab courses have some sort of lab quiz where you have to look at a specimen and answer some question about it (for example: "identify the structure labeled A and what it does"). I've tried to duplicate that with the printed self-test here in the student workbook and the drag-and-drop quizzes on the *Digital Zoology* CD-ROM or on-line. Solutions to the printed self-tests are available on the *Digital Zoology* website, and the drag-and-drop quizzes in *Digital Zoology* are interactive, allowing you to find the correct answers. If you want even more practice at identifying structures, cover up the lower-right corner of the screen to hide the legend in *Digital Zoology*. Take out a piece of paper and write what you think the legend should be, using the lettered pointers on the screen. Compare your legend to the one in *Digital Zoology*.

**Learning the Language.** Zoology, like any discipline, has a set of terms, or lexicon, all its own. The text in *Digital Zoology* may appear to be full of words that don't have any meaning to you as you begin your course, but you'll know the terms by the end of it. In *Digital Zoology*, key words and terms are highlighted in blue. As you read the text in the taxon information boxes and within the interactive cladograms, resist the urge to click on a highlighted term right away. Instead, take a scrap of paper and write out a short definition for the term. Then, click on the term and compare your definition to the one in *Digital Zoology*. A full glossary is available in the student workbook and in the electronic version of the program in Program Tools.

One of my students' favorite activities are crossword puzzles, and so I've provided paper versions in the workbook and interactive versions in *Digital Zoology*. The clues in the crossword puzzles are similar to the type of one-word answers, or fill-in-the-blank type of questions, that often appear on exams and quizzes. Each puzzle has between thirty and forty different clues to test your knowledge on each of the different groups of animals.

Finally, throughout the workbook you'll find some short-answer questions on the animals in each chapter. You'll find answers to these questions on the *Digital Zoology* website.

## A Note to Instructors

Many of the photographs and illustrations in *Digital Zoology* are available for you to use in your class. You can download PowerPoint slides from the *Digital Zoology* website for each of the major taxa covered in *Digital Zoology*. Feel free to modify, alter, or customize the slides to meet your requirements. The design and color scheme of the slides has been optimized so the images can be used as 35mm slides, transparencies, or digital projection. If you find a photograph or illustration in *Digital Zoology* that isn't included in the PowerPoint slides, all of the images in *Digital Zoology* are available on the web.

The images used in *Digital Zoology* are part of the large BIODIDAC image base (biodidac.bio.uottawa.ca) created for biology teachers to use in their courses. BIODIDAC is funded in part by Heritage Canada, a ministry of the Government of Canada. The image bank consists of over 3,000 photographs, illustrations, annotated drawings, and video clips of biological materials. All the material in the BIODIDAC image bank has been donated by biology teachers and is available royalty- and

copyright-free for the creation of noncommercial teaching materials. BIODIDAC is always looking for additional materials, and if you would like to contribute you can find out how by visiting the BIODIDAC website.

I'd like to take this opportunity to share with you some observations on how *Digital Zoology* has changed my lectures and labs over the past ten years of its use. The ability to bring photos of the same materials students see in the lab to the lecture provides a clear link that binds these two components of the course that much closer together. Our analysis of student use of *Digital Zoology* has shown us that most of the students go through the lab module prior to doing the lab. Students tell me that the photos help them to anticipate what their dissection is going to look like during its various stages. We have a few computers in the lab with *Digital Zoology* running, and as students dissect they look for a visual concordance between their work and the modules. *Digital Zoology* wasn't designed to replace the dissection of specimens; instead it was my hope that students would gain a better understanding of the dissection through the use of the program. The crossword puzzles have been a tremendous success with my students. The clues in the puzzles are similar to fill-in-the-blank questions, and all the clues are available at the instructors' website for *Digital Zoology*.

## Purchasing Options

*Digital Zoology* Version 2.0 can be purchased individually or packaged with other McGraw-Hill textbooks at a discounted price. Contact your McGraw-Hill sales representative for details.

## A Selected Bibliography

The following resources were invaluable in preparing the *Digital Zoology* Version 2.0 and the student workbook.

- Barnes, R. S. K. 1984. *A Synoptic Classification of Living Organisms*. Blackwell Scientific Publishers.
- Brusca, R. C. and G. J. Brusca. 1990. *Invertebrates*. Sinauer Associates Inc.
- Grassé, P. P. *Traité de zoologie: anatomie, systématique, biologie*. Masson. A multivolume set published between 1948 and 1977.
- Hallan, J. 2000. *Synopsis of the Described Taxa of the Living World*. <http://entowww.tamu.edu/research/collection/hallan/all1.txt>
- Hickman, C. P., L. S. Roberts, and A. Larson. 2001. *Integrated Principles of Zoology*. 11<sup>th</sup> edition. McGraw-Hill Higher Education.
- Kardong, K. V. 1997. *Vertebrates: Comparative Anatomy, Function, Evolution*. 2<sup>nd</sup> edition. WCB/McGraw-Hill.
- Margulis, L. 1998. *Five Kingdoms: An Illustrated Guide to the Phyla of Life on Earth*. 3<sup>rd</sup> edition. Freeman.
- Moyle, P. B. and J.J. Cech. 2000. *Fishes: An Introduction to Ichthyology*. 4<sup>th</sup> edition. Prentice Hall.
- Nielsen, C. 2001. *Animal Evolution: Interrelationships of the Living Phyla*. 2<sup>nd</sup> edition. Oxford University Press.
- Parker, S. P. (ed.) 1982. *Synopsis and Classification of Living Organisms*. McGraw-Hill.
- Pechenik, J. A. 2000. *Biology of the Invertebrates*. 4<sup>th</sup> edition. McGraw-Hill Higher Education.
- Pough, F. H., R. M. Andrews, J. E. Cadle, M. L. Crump, A. H. Savitzky, and K. D. Wells. 2001. *Herpetology*. Prentice Hall.

Tudge, C. 2000. *The Variety of Life: A Survey and a Celebration of all the Creatures that have Ever Lived*. Oxford University Press.

Walker, W. F. and K. F. Liem. 1994. *Functional Anatomy of the Vertebrates: An Evolutionary Perspective*. Saunders College Publishing.

Willmer, P. 1990. *Invertebrate Relationships*. Cambridge University Press.

## A Special Thank You

I would like to thank A.E.R. Downe who first stimulated my interest in invertebrates and insects in particular and once again thank the past, present, and future students of my Animal Form and Function and Invertebrate Zoology courses here at the University of Ottawa. They have been tremendously patient with my adventures in the use of new technologies in teaching, and after eleven years I, and they, are convinced the adventure was well worth it. I would also like to thank reviewers of the *Digital Zoology* program, who provided a thorough commentary that allowed us to make continual improvements to the program and instructor support materials:

Patricia M. Biesiot, The University of Southern Mississippi

C. Leon Harris, State University of New York—Plattsburgh

Also, we extend our gratitude to the many users—students and instructors—of previous versions of the *Digital Zoology* program who provided useful comments to us through the *Digital Zoology* website, and through user surveys. It is our goal to make each version of *Digital Zoology* more expansive and exciting than the versions before, and your suggestions help us reach that goal.

Thanks to Anne Scroggin for her copyediting of the *Digital Zoology* CD and student workbook, and thanks to the folks at McGraw-Hill who have helped to make this all happen: Marge Kemp, Donna Nemmers, Dianne Berning, Linda Avenarius, Renee Russian, and Audrey Reiter, who were tremendously patient as the adventure unfolded. Thank you to the people at N8 Digital, especially Dedee Templeton and Pete Matthews, for their tremendous job in bringing *Digital Zoology* to the web.

As you progress through *Digital Zoology* Version 2.0, please let me know your comments. If there is something I can do better, or something that you would like to see added to the program, let me know. You can get in touch by using the *Digital Zoology* website at [www.digitalzoology.com](http://www.digitalzoology.com).

— Jon G. Houseman  
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