

## Organizing an Image Database on the Web for Teaching and Research

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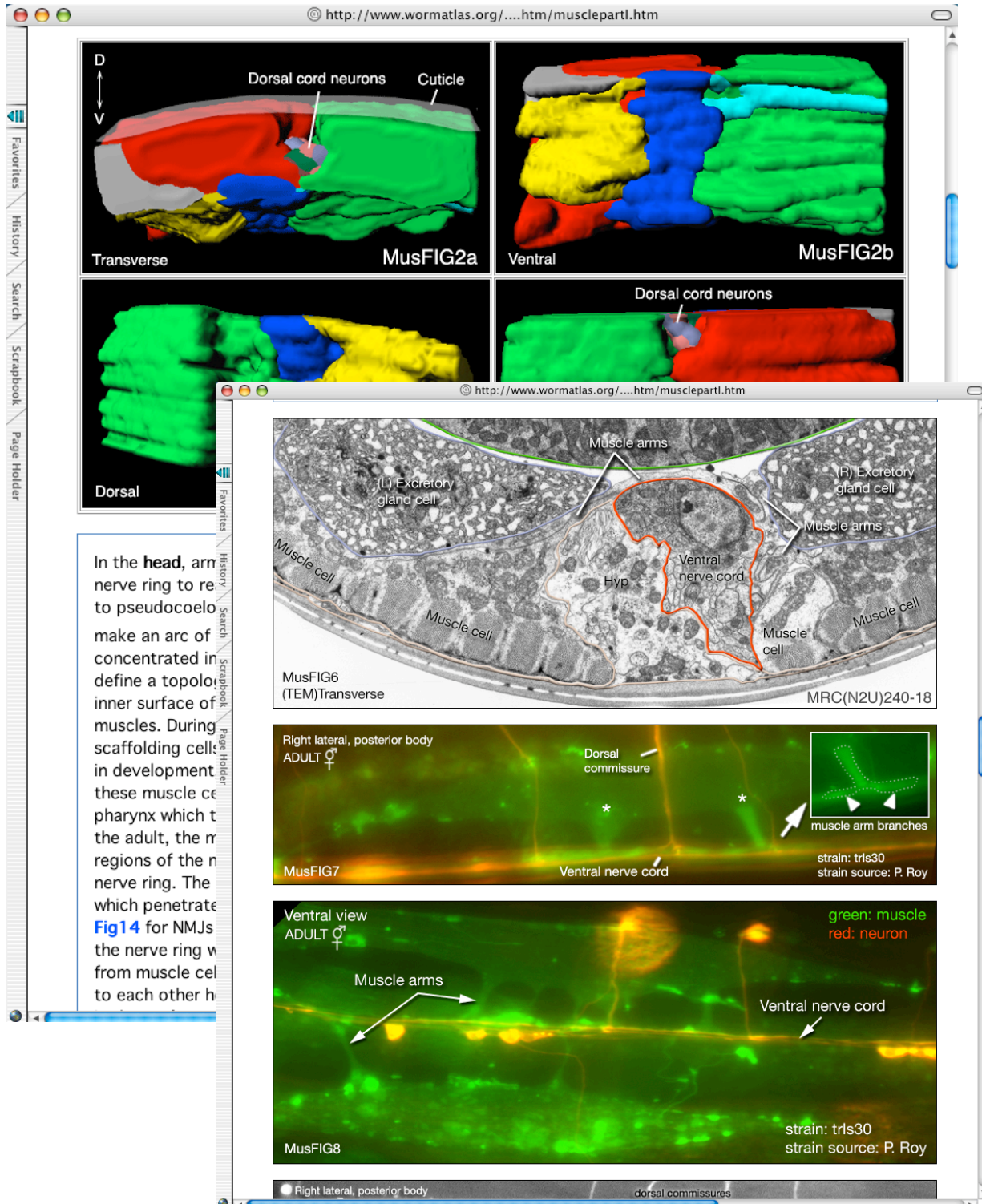
After four decades of anatomical research on the model organism *Caenorhabditis elegans*, a soil nematode, a great many microscopic images have been collected and annotated. The original research was conducted in many research settings around the world, using film imaging, photographic prints and hand drawn annotations. Now we want to share and interpret the original data in a digital format that can be viewed over the Internet. The WormAtlas website ([www.wormatlas.org](http://www.wormatlas.org)) presents the detailed anatomy of every cell in the nematode, based upon these data. Several unique new features have been developed over the past five years to help to teach the anatomy of the whole animal. These combine information from TEM serial sections, SEM, DIC, polarized light, and confocal imaging to produce a coherent anatomical story. A Methods section gives protocols for all of these modalities, and an online Discussion Group answers questions related to either the anatomy or the research methods. A Glossary of anatomical terms and several User Guides are available. The most important anatomy papers from the 1970s and 1980s are presented as HTML texts; links are provided to pdf files for more recent anatomy literature. The site is heavily linked to other independently organized websites that provide relevant molecular data, gene knockout resources, abstracts for *C. elegans* literature, etc. The overall goal is to give the user a seamless experience in exploring any cell or gene of interest in this key experimental animal.

A Handbook of *C. elegans* anatomy is organized by cell type to describe every possible cell fate found in the normal adult animal [Fig. 1]. We are now completing the description of every cell type in the adult hermaphrodite, and have begun a parallel description of every cell type in the male adult. In future years we will present the embryonic anatomy, the larval anatomy, and mutant phenotypes in the same format. The Handbook includes information on the known lineages of all cells and the time course of their development. Essential information on the genetic control of tissue development is provided, with links to WormBase [1] for full molecular details about these genes.

The Slideable Worm feature presents sample TEM cross sections of the adult animal along its entire length, using a color code to annotate each cell type in a given thin section. The color annotations can be turned on or off by the user. The Worm Tiler feature is linked to Slideable Worm, and permits the same images to be further explored at higher magnification, with or without annotation. Our goal is to present 800 annotated images for the hermaphrodite adult.

Building a comprehensive resource requires the cooperation of many people. Original TEM data (100,000 annotated prints, negatives and related metadata) have been shipped to us for curation from the MRC/LMB (Cambridge, England), Wisconsin, Pittsburgh, Missouri and Johns Hopkins, among others. Useful images from GFP transgenic strains are often sent to us for illustration purposes; more often these live strains are shipped to us so that we can collect new LM images to best tell the story. All contributions are acknowledged within the pages of WormAtlas, so that the enterprise can be seen as a partnership between ourselves and the research community as a whole.

[1] [www.wormbase.org](http://www.wormbase.org)



**Figure 1:** Sample pages from the [www.wormatlas.org](http://www.wormatlas.org) website (The Illustrated Handbook of *C. elegans* Hermaphrodite Anatomy - Chapter 2: Mesodermal Organs).