Announcing the JCB DataViewer, a browser-based application for viewing original image files

Emma Hill
Executive Editor, The Journal of Cell Biology

Over the lifetime of the JCB, the technology available to cell biologists has advanced immensely, producing more complex data with higher information content. Despite the advent of the Internet, the presentation of data in publications has not kept pace. Authors still present single, static, “representative” images and compressed movie files. I am therefore excited and proud to announce the launch of the JCB DataViewer (http://jcb-dataviewer.rupress.org).

The JCB DataViewer provides our authors with the option to present the original image data associated with their articles, and enables our readers to view and interact with these data. It is the first browser-based system for viewing and analyzing multidimensional microscope image data. The JCB DataViewer was developed by The Rockefeller University Press in collaboration with Glencoe Software, Inc. using technology developed by the Open Microscopy Environment (Swedlow et al., 2003). Access to original data provides full transparency in data presentation and heralds a completely new scope of analysis and discussion within scientific articles.

How it works
The JCB DataViewer makes any published image as accessible to readers as if they had acquired it. The user can interact with the data in a variety of ways; for all images, users can rescale the images and adjust the intensity range of the display, just like they normally do with their own image display software.

For multi-dimensional microscopy images, users can scroll through a stack of image sections or a stack of images from a time course. Users can view specific image channels and use a built-in tool to calculate plots of signal intensities along any horizontal or vertical line within an image to compare signal and background. Three-dimensional data can be viewed either as individual sections or as a two-dimensional projection of the maximum intensities from the complete stack. In addition, image metadata, such as rendering details, dimensions, and acquisition conditions are readily available. The reader can thus access a maximum amount of information from published images far more than can be gleaned from a single, two-dimensional optical slice.

The data in the JCB DataViewer are uploaded by authors at the time of submission. Although the system was designed for microscopy image data, it can also display the output from gel documentation systems. The JCB DataViewer is compatible with an extensive list of proprietary file types (see Table I), which are rendered into JPEG images.

A screenshot of the full viewer within the JCB DataViewer. This link http://jcb-dataviewer.rupress.org/jcb/img_detail/127/134/ will open the full viewer displaying these data; take a look and see what it can do.

Correspondence to Emma Hill: ehill@rockefeller.edu

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Table I. File types supported by the JCB DataViewer at the time of publication

| Supported format               | File extensions                                      |
|-------------------------------|------------------------------------------------------|
| Bio-Rad                       | .pic                                                 |
| Bitmap                        | .pic                                                 |
| DeltaVision                    | .dvi, .r3d, .r3d_d3d                                 |
| Digital Imaging and Communications in Medicine | .dcm, .dic, .dcm                                    |
| Amersham Biosciences GEL       | .gel                                                 |
| Graphics Interchange Format    | .gif                                                 |
| Image Cytometry Standard       | .ica, .ids                                           |
| Bitplane Imaris                | .ims                                                 |
| Improvision Tiff               | .tif                                                 |
| Joint Photographic Experts Group | .jpeg, .jpg                                        |
| Leica “leif” Format            | .lei                                                 |
| Leica Image Format             | .lif                                                 |
| Li-Cor L2D                     | .l2d                                                 |
| MetaMorph                     | .stk                                                 |
| Nikon NIS Elements             | .nd2                                                 |
| Olympus FluoView FV1000        | .oib, .oif                                           |
| Openlab Raw                    | .raw                                                 |
| Openlab LIFF                   | .liff                                                |
| PerkinElmer UltraView          | .tiff, 0.2, 0.3, etc.                                |
| PICT (Macintosh Picture)       | .pict                                                |
| Portable Gray Map              | .pgm                                                 |
| Portable Network Graphic       | .png                                                 |
| Prairie Technologies TIFF      | .png                                                 |
| Tagged Image File Format       | .tif, .tiff                                          |
| Visitech XYS                   | .xys                                                 |
| Zeiss LSM                      | .lsm                                                 |
| Zeiss AxioVision               | .zvi                                                 |

that can be viewed in a web browser. We will add support for other formats as they become prevalent. An up-to-date list of all supported formats can be found here: http://jcb-dataviewer.rupress.org/jcb/page/imageformats/.

What’s in it for our authors? The JCB DataViewer not only benefits readers, but also the authors of our papers. All uploaded original data can be accessed directly from the published article at http://www.jcb.org. This truly harnesses the power of the Internet; it enables authors to better showcase their data and to better substantiate the conclusions drawn in their JCB article. Such transparency enhances the value of the science presented, as readers have all of the information necessary to evaluate authors’ interpretations. A further benefit to the author is the creation of an archive of all of the primary data that accompany an article.

Data submitted to the JCB DataViewer will become part of a searchable database, which we provide as a resource for the community. Authors are encouraged to input legends with details beyond those provided in the article itself, such as precise methodology or acquisition information, to enhance the search potential.

Data sharing
For several years, major funding agencies have stipulated that the original data generated using their research funds must be made available to the public. For many types of data, such as protein structures, sequence data, or microarray and gene expression data, there are established databases for complying with this stipulation. The same has not been true for image data—until now.

While a manuscript is under review, uploaded data will only be visible to a paper’s authors and reviewers. Once a paper is published, the associated original data will be made available to all readers, whether or not they have a subscription to the JCB. As with all material submitted to the JCB, the copyright to the submitted data remains with the author. At this time, uploaded data files will not be available for others to download; viewers will only have access to the rendered JPEG images.

Data integrity
The JCB DataViewer is also an important tool to ensure data integrity. The ability to verify the figures presented in a JCB article with the original data from the acquisition apparatus represents the next step in our ongoing commitment to image data integrity (Rossner and Yamada, 2004). Although we don’t require our authors to submit their original data to the JCB DataViewer, we encourage it, as providing them ensures complete transparency. We are not just asking to see a larger section of a microscope field or a larger piece of a blot, but the actual data files acquired by authors (that have not had a whiff of Photoshop!). As we have done for the past six years, we will continue to screen all assembled figures in JCB articles for evidence of manipulation.

Who can upload their data to the JCB DataViewer?
As of December 1, 2008, all submitting authors have the option to upload their data to the JCB DataViewer. Authors submitting new manuscripts to the JCB will indicate during the submission process whether they have original data they wish to upload. The Editorial Office will then send instructions on how to do so. These data will be peer reviewed alongside the article.

In addition, over the past few weeks, we have invited authors who recently published in the JCB to upload the original data corresponding to their articles. All such retrospectively uploaded data have not been peer reviewed. A disclaimer to this effect will be posted prominently on the JCB DataViewer website. We encourage authors to continue the retrospective upload of data for papers already published in the Journal. If you published a paper in the JCB that was submitted before December 1, 2008 and would like to upload your original data, please contact us.

The JCB DataViewer is the next logical step in publishing image data and sets a new standard for making primary data accessible. We are convinced that it will be a useful tool for cell biologists and will facilitate and improve the communication of scientific data. Try it out as a user and benefit from it as an author!

References
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Swedlow, J.R., I. Goldberg, E. Brauner, and P.K. Sorger. 2003. Informatics and quantitative analysis in biological imaging. Science. 300:100–102.