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

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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*.
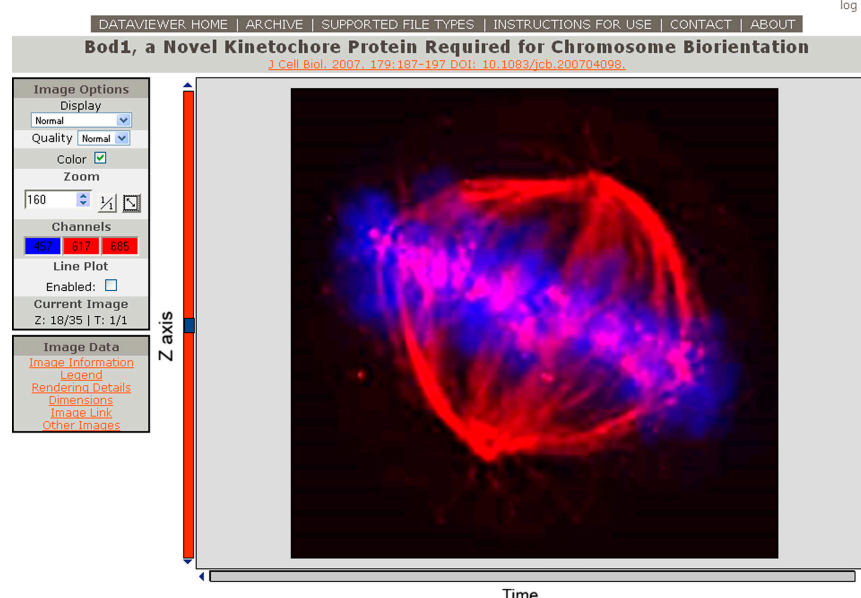
The *JCB DataViewer* provides our authors with the option to present the original image data associated with their articles, and enables our readers to view and interact with these data. It is the first browser-based system for viewing and analyzing multi-dimensional microscope image data. The *JCB DataViewer* 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.

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A screenshot of the full viewer within the *JCB DataViewer*.

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

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

Supported format	File extensions
Bio-Rad	.pic
Bitmap	.pic
DeltaVision	.dv, .r3d, .r3d_d3d
Digital Imaging and Communications in Medicine	.dicom, .dic, .dcm
Amersham Biosciences GEL	.gel
Graphics Interchange Format	.gif
Image Cytometry Standard	.ics, .ids
Bitplane Imaris	.ims
Improvision Tiff	.tif
Joint Photographic Experts Group	.jpeg, .jpg
Leica "lei" 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	.tif, 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.

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 Data-Viewer* 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 acquisi-tion 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

Rossner, M., and K.M. Yamada. 2004. What's in a picture? The temptation of image manipulation. *J. Cell Biol.* 166:11–15.

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