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QUALITY AND INTEGRITY

Publishing multi-dimensional image data

JCB Data Viewer

jcb-dataviewer.rupress.org

Mike Rossner, Ph.D.

Executive Director, The Rockefeller University Press

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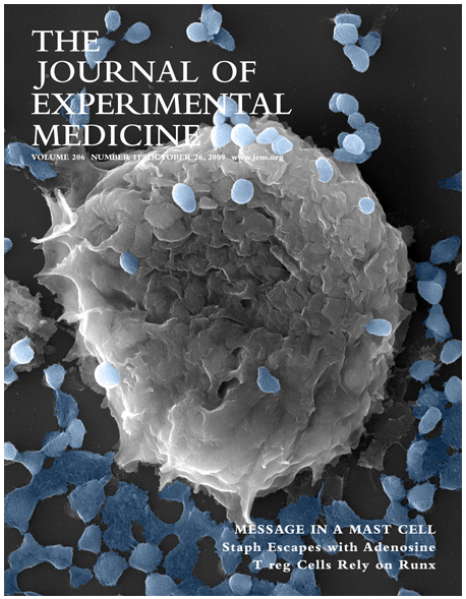

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“The future of scientific publishing lies in providing access to the data underlying a publication and giving the reader the ability to interact with those data.”

Colloquium on Rethinking the Future of Scientific Communication, March 9, 2012, Stanford University Libraries

Data need context

Publication

“Publication represents a determination by the scientist authors, reviewers, and editors that a body of work should be delivered to the community for dissemination and consideration. Following this well-established principle, data associated with experiments reported in a publication should be publicly available.”

Hill and Swedlow – Response to OSTP RFI on Public Access to Digital Data, January, 2012

“As a condition of publication, scientific journals should progressively enforce requirements for traceable and usable data available through an article, when they are intrinsic to the arguments in that article. This should be in line with the practical limits for that field of research. Materials should be uploaded to a repository before publication of the article, though their release may be subject to a temporary embargo.”

Science As An Open Enterprise - June 2012
The Royal Society

Federal Policies on Public Access to Data

- **NIH (2003)** – "The NIH expects and supports the timely release and sharing of final research data from NIH-supported studies for use by other researchers."

- **NSF (2010)** – "Investigators are expected to share with other researchers, at no more than incremental cost and within a reasonable time, the primary data, samples, physical collections and other supporting materials created or gathered in the course of work under NSF grants."

Federal Policies on Public Access to Data

"The MRC expects valuable data arising from MRC-funded research to be made available to the scientific community with as few restrictions as possible so as to maximize the value of the data for research and for eventual patient and public benefit. Such data must be shared in a timely and responsible manner."

UK Medical Research Council policy on research data-sharing

Federal Policies on Public Access to Data

"Publicly funded research data are a public good, produced in the public interest, which should be made openly available with as few restrictions as possible in a timely and responsible manner that does not harm intellectual property."

RCUK Common Principles on Data Policy

Federal Policies on Public Access to Data

"In accordance with important international organisations involved in funding and performing research, the Alliance supports the long-term preservation of, and the principle of open access to, data from publicly funded research."

Alliance of German Science Organisations

Federal Policies on Public Access to Data

"…digitally formatted scientific data resulting from…research supported…by Federal funding should be stored and publicly accessible to search, retrieve, and analyze."

U.S. Office of Science and Technology Policy
Memorandum for the Heads of Executive Departments and Agencies
February 22, 2013

Federal Policies on Public Access to Data

Implementation?

Enforcement?

Funding?

Publication!

Journal Mandates on Public Access to Structured Data Sets

Reliance on public repositories

- Protein Data Bank
- Genbank
- GEO (Gene Expression Omnibus)
- Peptidome / Pride

JCB Data Viewer

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GLENCOE SOFTWARE

OME

The challenges of presenting modern microscopy data

- **Multiple file formats** – >125

  Interpreter: Bio-Formats.

- **Multidimensional** – x, y, z, color, time

The challenges of presenting modern microscopy data

- **Number of images**

  Single z stack of 60 sections monitored over 200 timepoints = 12,000 images (512 x 512 pixels)

  There are low resolution ways of representing this, but they badly compress the original data and have limited interactivity.

  High content screens – 10^6 images

- **Size of images**

  (3×10^5) pixels x 10^6 pixels = ~300 gigapixels = ~20 Gb

  26,000 images, 1.5 mm x 0.6 mm, 16 million dpi

JCB Data Viewer

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- Browser-based application for viewing original image files - from various types of microscopes and gel-documentation systems - associated with JCB articles.
- The first browser-based system for viewing and analyzing multi-dimensional microscope image data.

JCB Data Viewer

jcb-dataviewer.rupress.org

Authors

- Present original data as acquired. [Link from published paper]
- Share data that were not possible to share previously.

JCB Data Viewer

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Users

- See data they could not see previously.
- Interact with the data within the browser (scrolling through a z stack or time series; zoom/pan a very large image), make your own movie, and perform simple analyses (e.g. line plots, plots of HCS data).
- Download the data in a standardized format for complex analyses.

Home Page

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Welcome to the JCB DataViewer! The JCB DataViewer facilitates viewing, analysis, and sharing of multi-dimensional image data associated with articles published in The Journal of Cell Biology.
View
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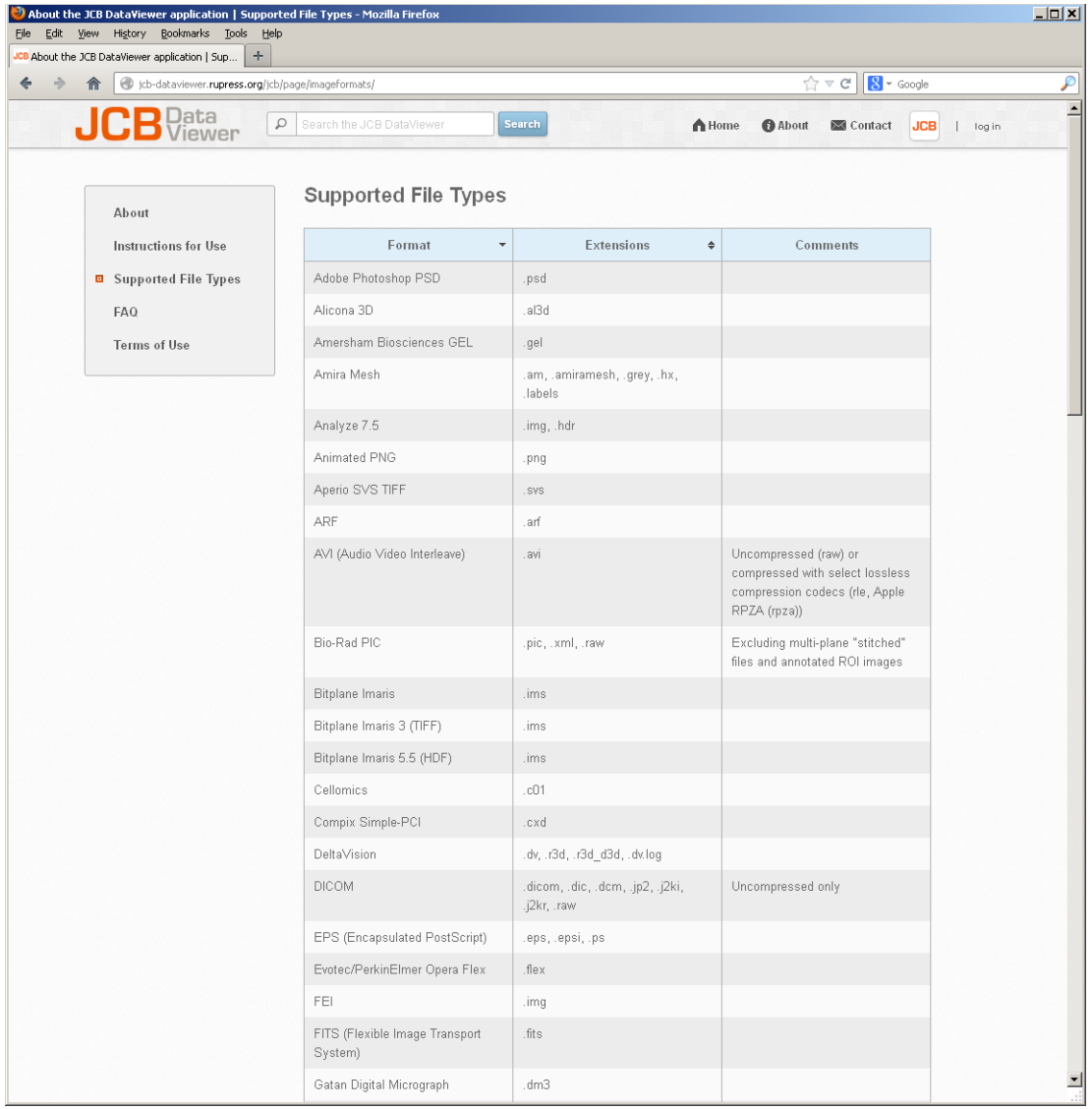
Conserved and divergent features of kinetochores and spindle microtubule ends from five species
J. Richard McIntosh, (...), Ekaterina L. Grishchuk
jcb. 2013. 200:459-474 DOI: 10.1083/jcb.201209154.
Obscurin is required for ankyrinB-dependent dystrophin localization and sarcolemma integrity
Davide Randazzo, (...), Vincenzo Sorrentino
jcb. 2013. 200:523-536 DOI: 10.1083/jcb.201205118.
Condensin II initiates sister chromatid resolution during S phase
Takao Ono, Daisuke Yamashita, Tatsuya Hirano
jcb. 2013. 200:429-441 DOI: 10.1083/jcb.201208008.
Robust polarity establishment occurs via an endocytosis-based cortical corralling mechanism
Mini Jose, (...), Derek McCusker
jcb. 2013. 200:407-418 DOI: 10.1083/jcb.201206081.
APC binds intermediate filaments and is required for their reorganization during cell migration
Yasuhisa Sakamoto, Batiste Boëda, Sandrine Etienne-Manneville
jcb. 2013. 200:249-258 DOI: 10.1083/jcb.201206010
Myosin VI small insert isoform maintains exocytosis by tethering secretory granules to the cortical actin
Vanesa M. Tomatis, (...), Frédéric A. Meunier
jcb. 2013. 200:301-320 DOI: 10.1083/jcb.201204092.
jcb-dataviewer.rupress.org/jcb/browse/6005/

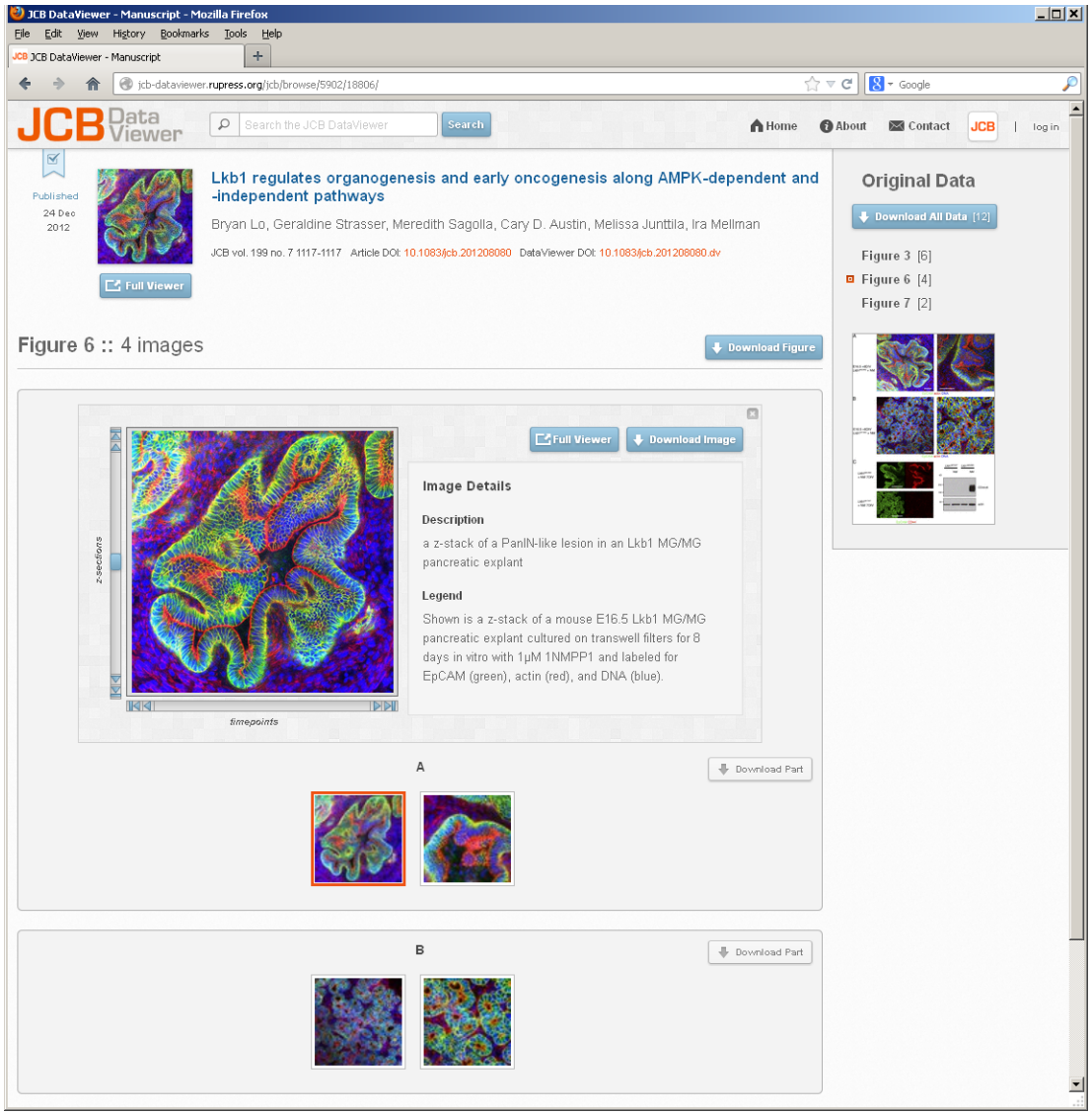
Supported File Types



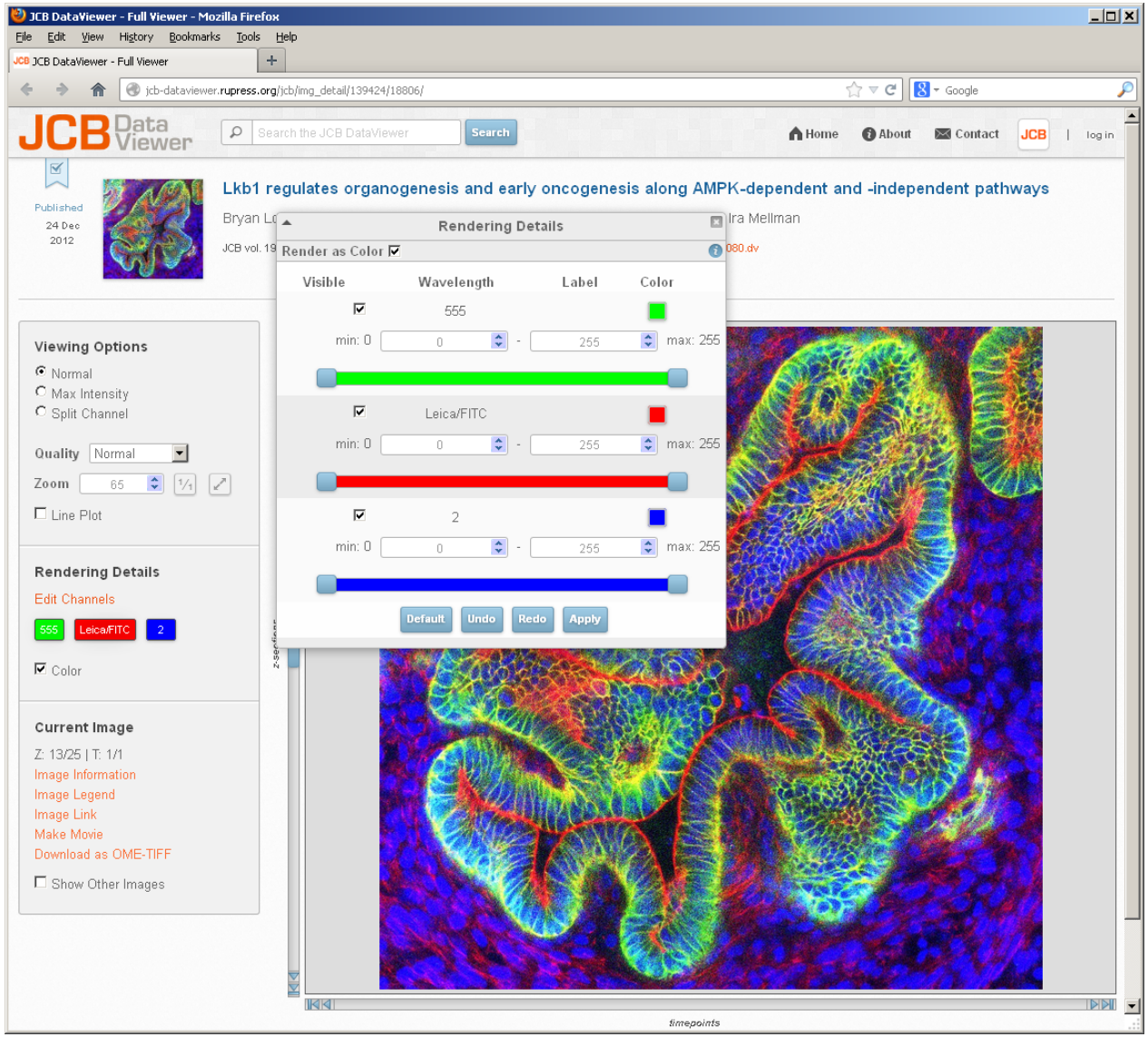
Format	Extensions	Comments
Adobe Photoshop PSD	.psd	
Alicona 3D	.al3d	
Amersham Biosciences GEL	.gel	
Amira Mesh	.am, .amiramesh, .grey, .hx, .labels	
Analyze 7.5	.img, .hdr	
Animated PNG	.png	
Aperio SVS TIFF	.svs	
ARF	.arf	
AVI (Audio Video Interleave)	.avi	Uncompressed (raw) or compressed with select lossless compression codecs (rle, Apple RPZA (rpza))
Bio-Rad PIC	.pic, .xml, .raw	Excluding multi-plane "stitched" files and annotated ROI images
Bitplane Imaris	.ims	
Bitplane Imaris 3 (TIFF)	.ims	
Bitplane Imaris 5.5 (HDF)	.ims	
Cellomics	.c01	
Compix Simple-PCI	.cxd	
DeltaVision	.dv, .r3d, .r3d_d3d, .dv.log	
DICOM	.dicom, .dic, .dcm, .jp2, .j2ki, .j2kr, .raw	Uncompressed only
EPS (Encapsulated PostScript)	.eps, .epsi, .ps	
Evotec/PerkinElmer Opera Flex	.flex	
FEI	.img	
FITS (Flexible Image Transport System)	.fits	
Gatan Digital Micrograph	.dm3	

Integration with the literature

Main data page / minimal viewer



Full Viewer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24 Dec
2012
Lkb1 regulates organogenesis and early oncogenesis along AMPK-dependent and -independent pathways
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Image Link
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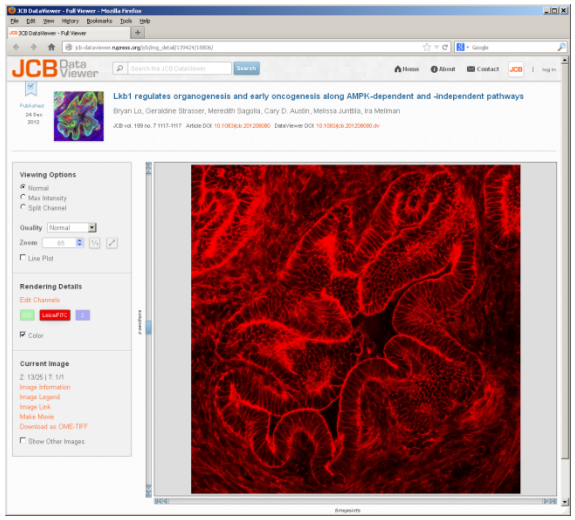
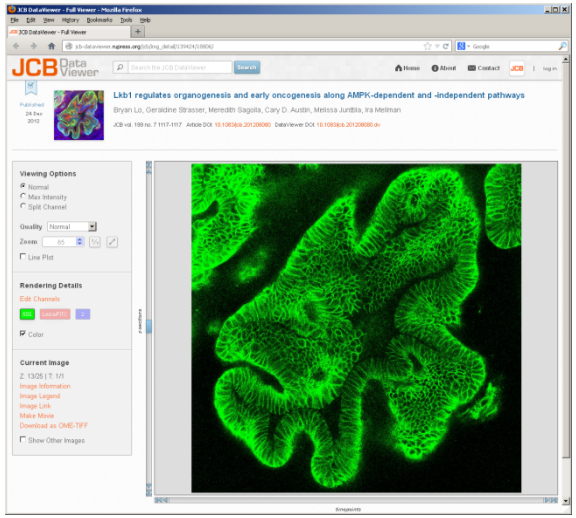
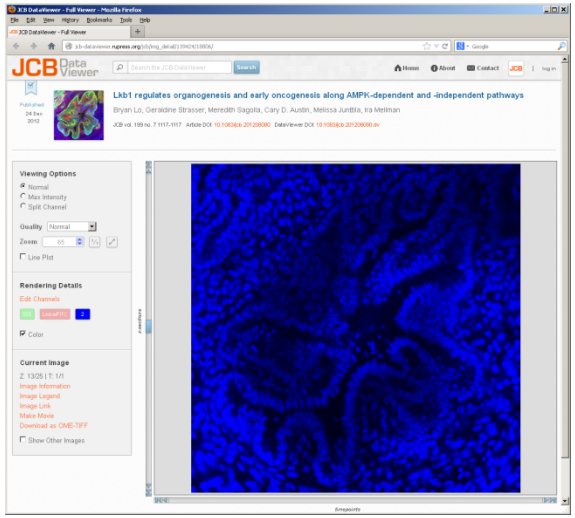
Show Other Images
timepoints

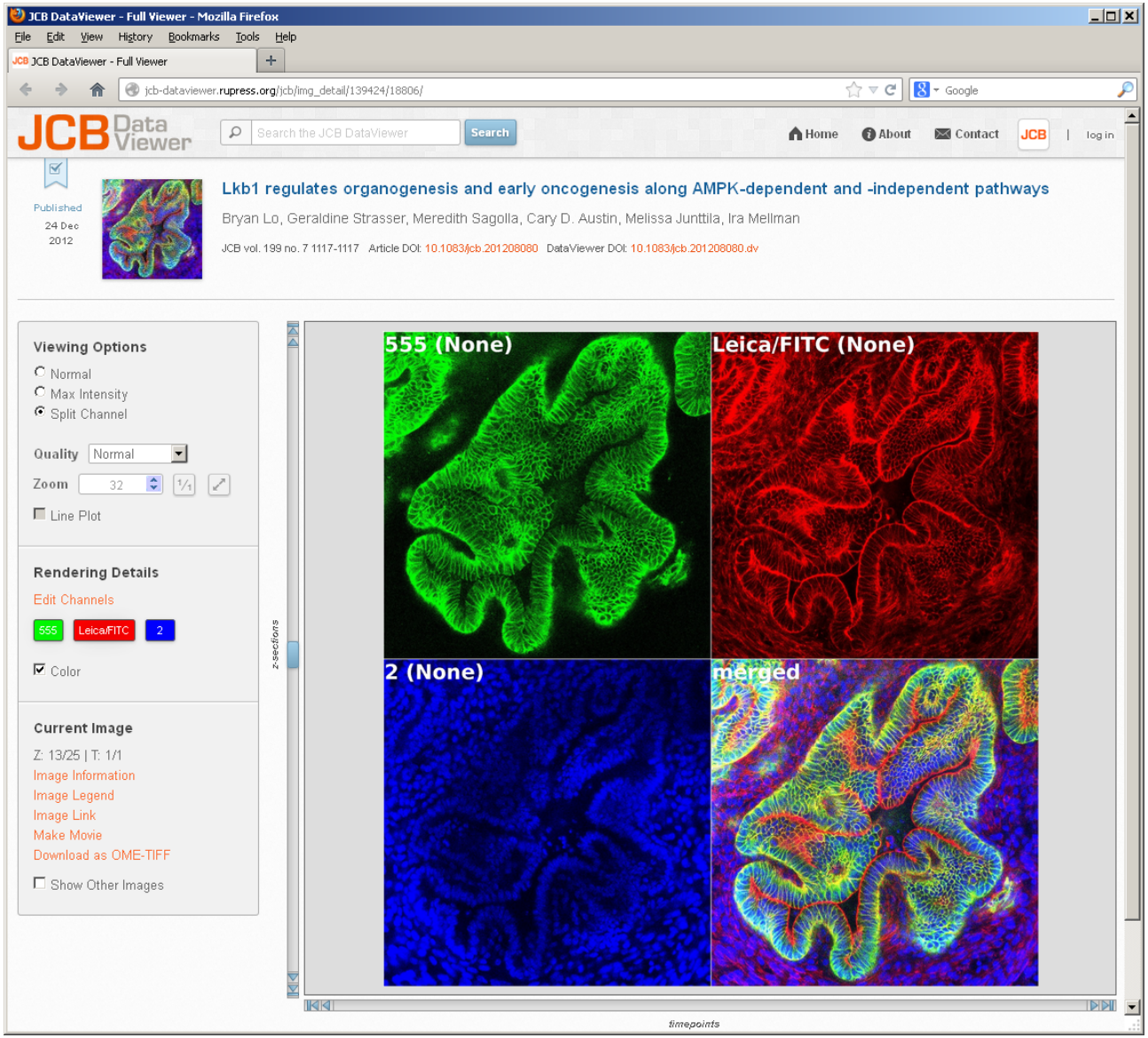
Individual channel view



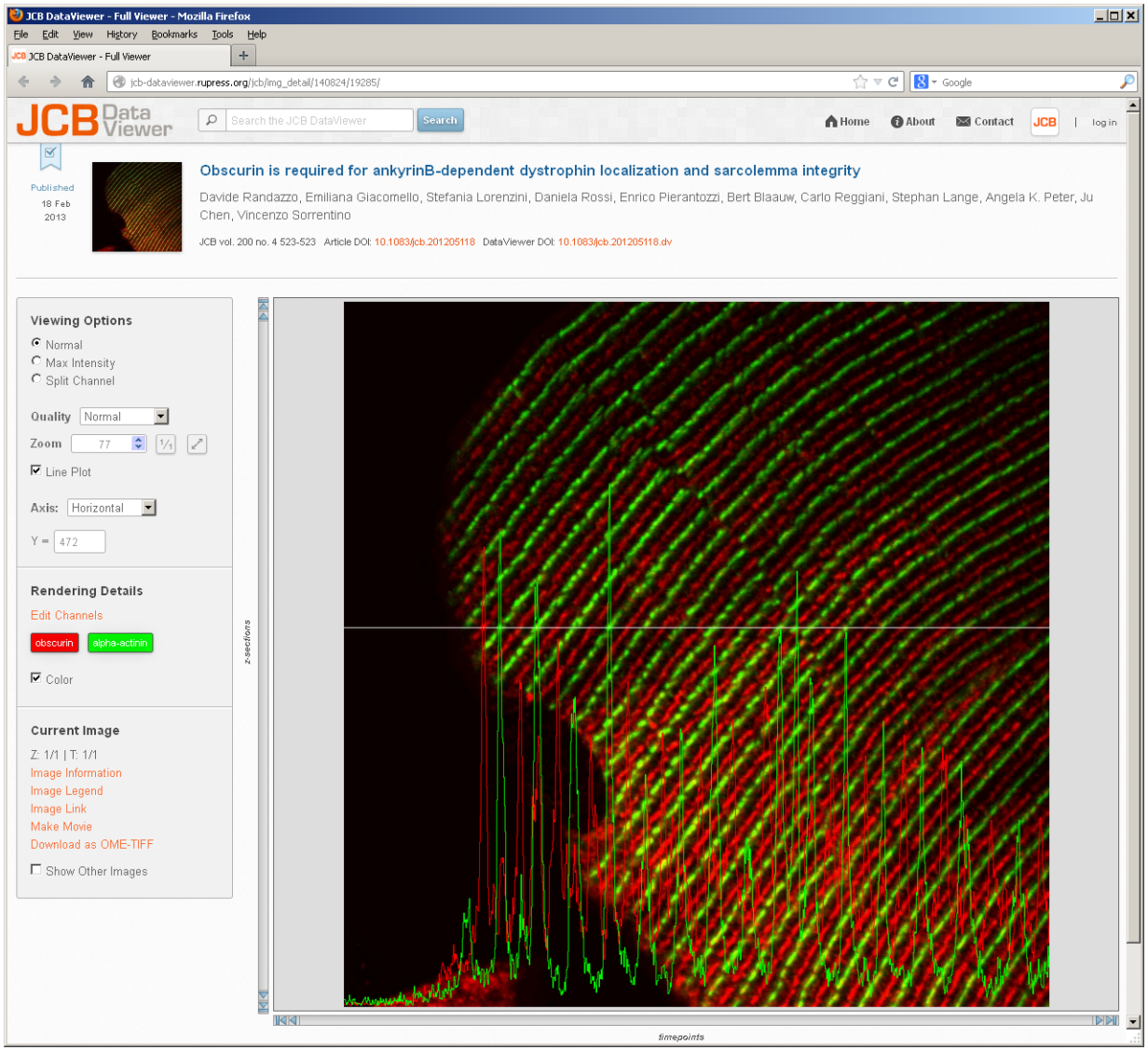




Split Channel View



Line Plots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2013
Obscurin is required for ankyrinB-dependent dystrophin localization and sarcolemma integrity
Davide Randazzo, Emiliana Giacomello, Stefania Lorenzini, Daniela Rossi, Enrico Pierantozzi, Bert Blaauw, Carlo Reggiani, Stephan Lange, Angela K. Peter, Ju Chen, Vincenzo Sorrentino
JCB vol. 200 no. 4 523-523 Article DOI: 10.1083/jcb.201205118 DataViewer DOI: 10.1083/jcb.201205118.dv
Viewing Options
Normal
Max Intensity
Split Channel
Quality Normal
Zoom 77
Line Plot
Axis: Horizontal
Y = 472
Rendering Details
Edit Channels
obscurin
alpha-actinin
Color
Current Image
Z: 1/1 | T: 1/1
Image Information
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Image Link
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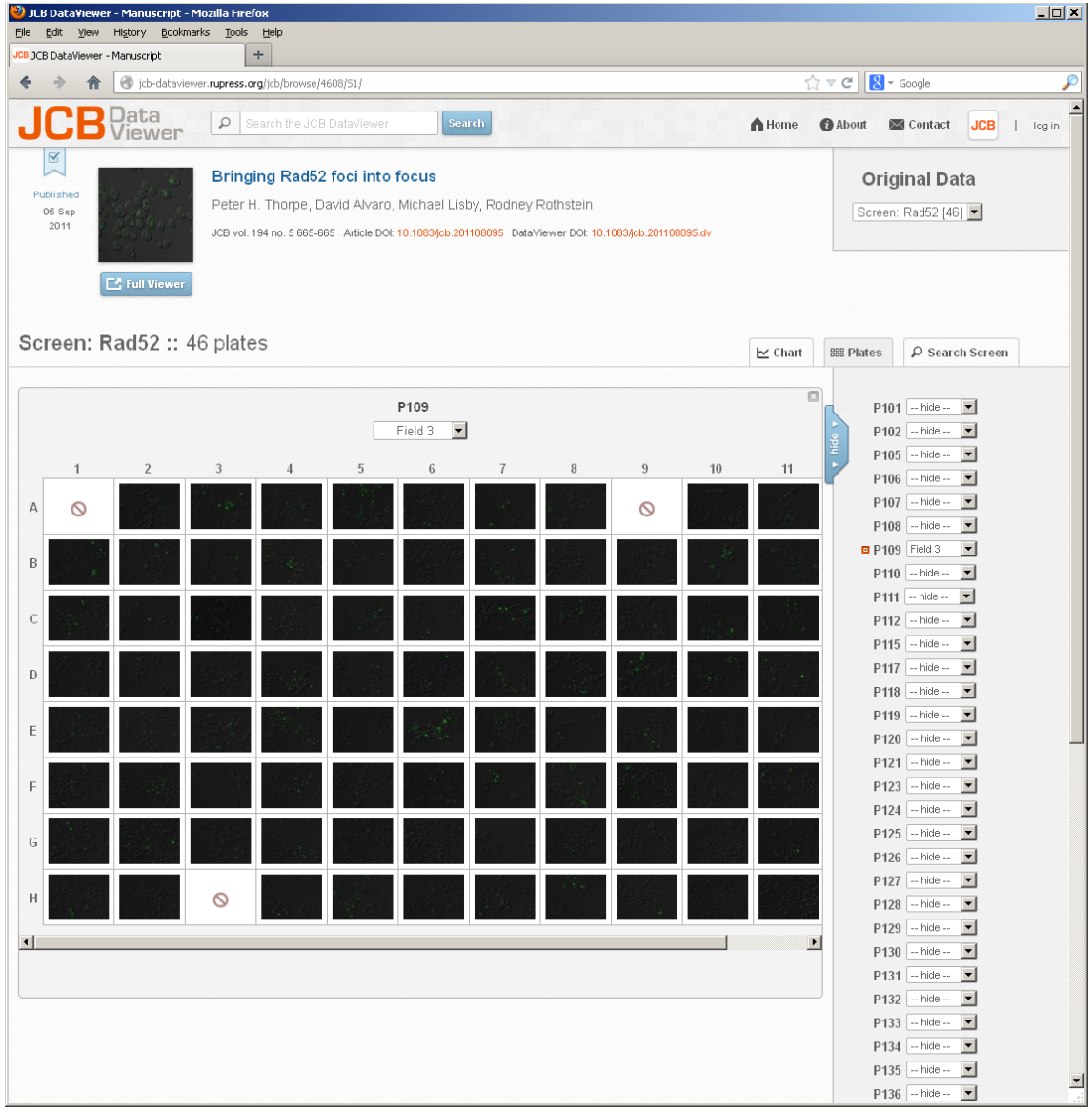
High Content Screening



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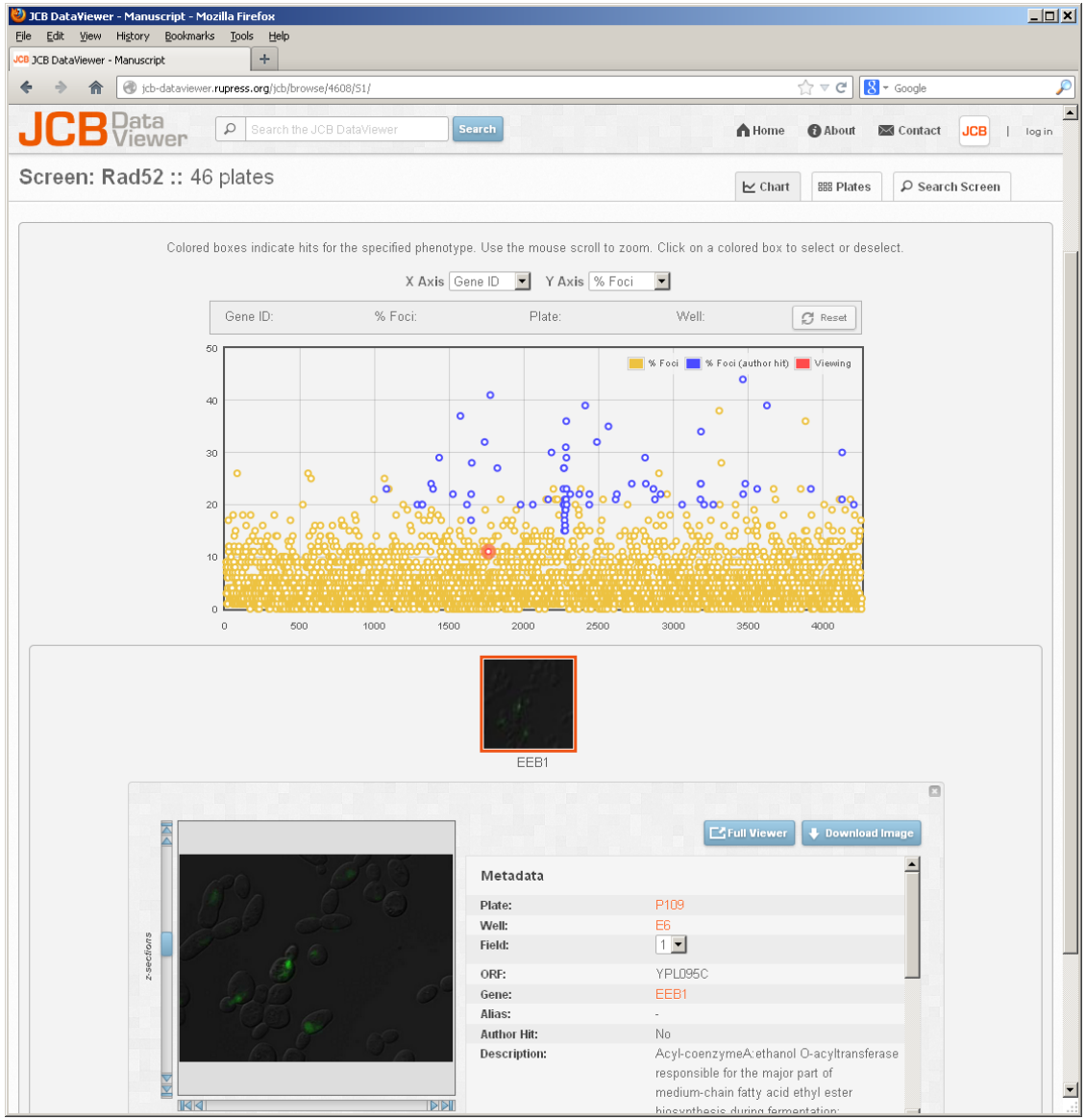
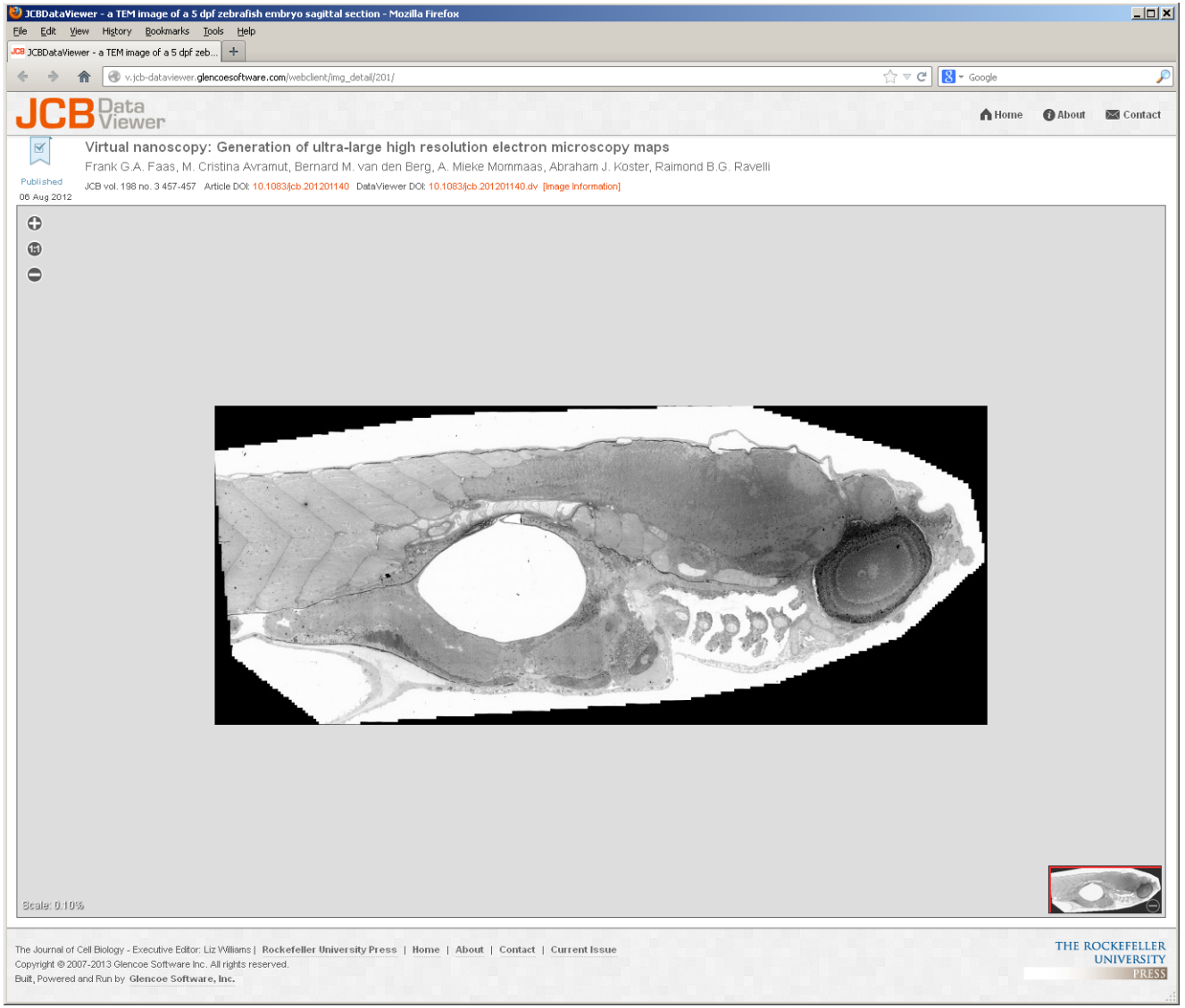


Ultra-large, high-resolution, tiled images



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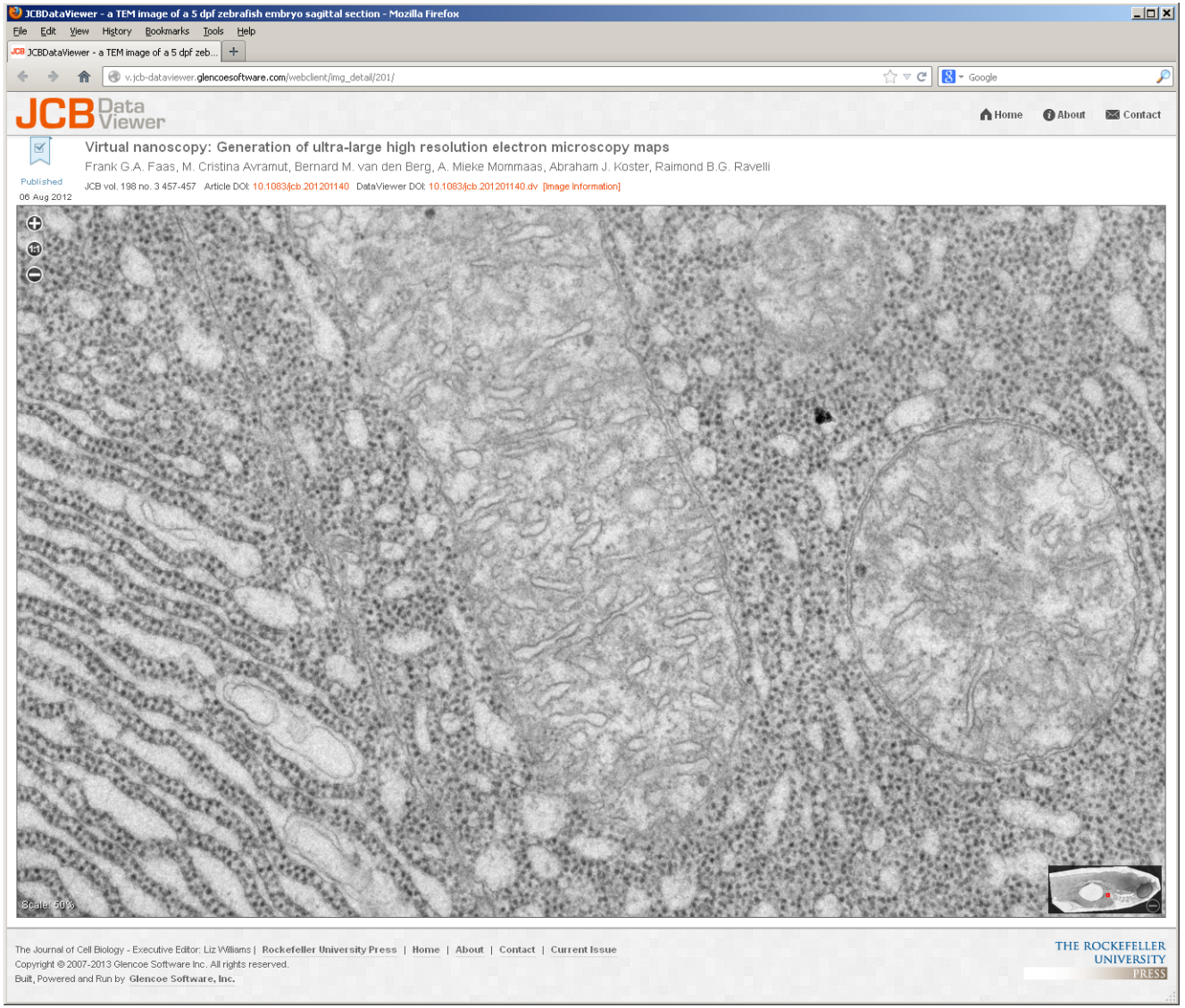
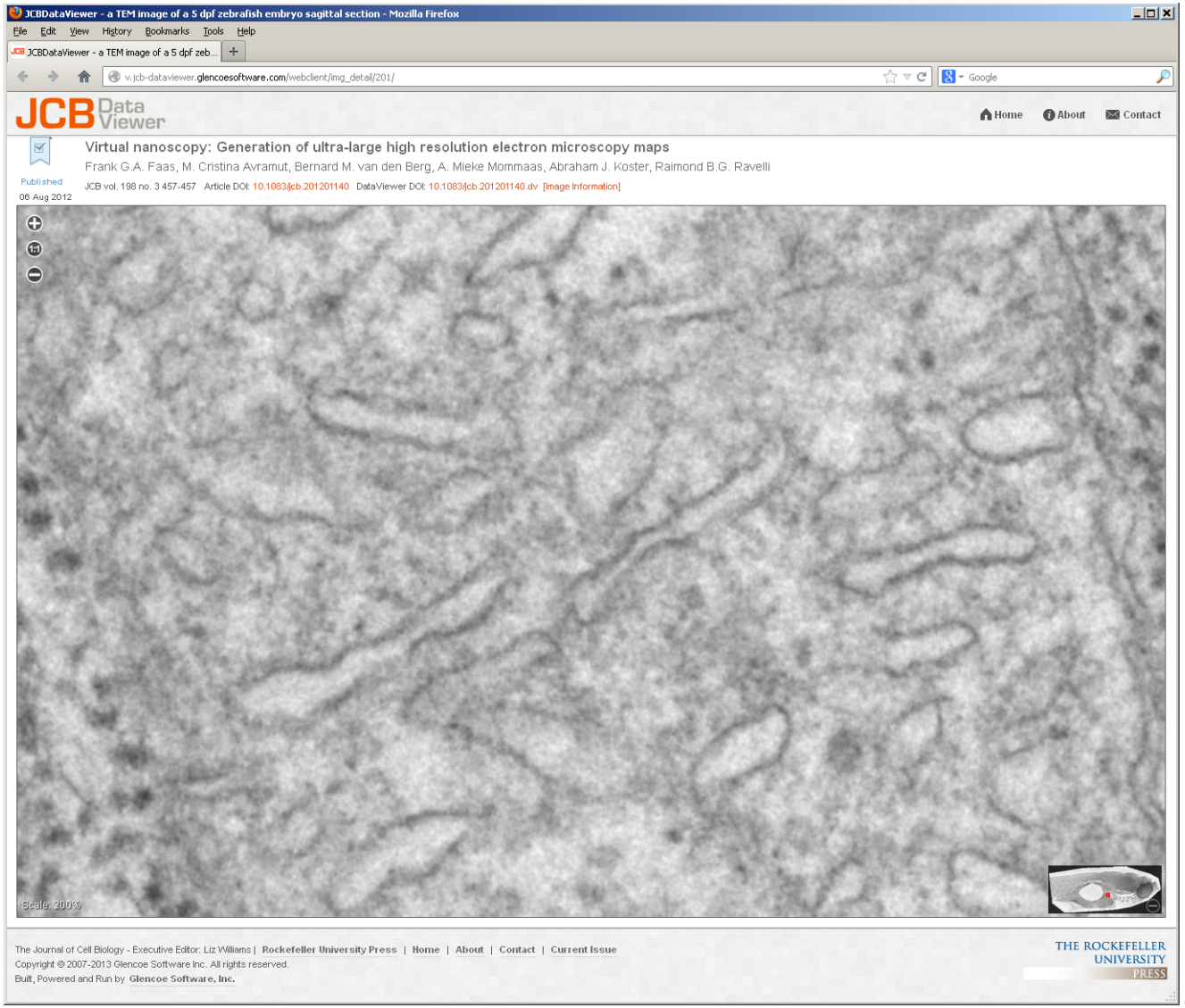


Ultra-large, high-resolution, tiled images



Home page – http://jcb-dataviewer.rupress.org

Link from HW to 5 dimensional image - http://jcb.rupress.org/content/186/1/11.full

4 dimensional image - http://jcb-dataviewer.rupress.org/jcb/browse/105/134/

Multiple images - http://jcb-dataviewer.rupress.org/jcb/browse/5468/16161/

Blots - http://jcb-dataviewer.rupress.org/jcb/img_detail/133657/15610/

HCS display - Thorpe Data - http://jcb-dataviewer.rupress.org/jcb/browse/4608/S1/

HCS display - Rohn Data - http://jcb-dataviewer.rupress.org/jcb/browse/4609/S2/

Very large image - http://v.jcb-dataviewer.glencoesoftware.com/webclient/img_detail/201/

JCB Data Viewer

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- Standard for publication of image data.
- Precursor to an international repository of original, published image data