# SSBD: an integrated database of quantitative data and microscopy images of biological dynamics

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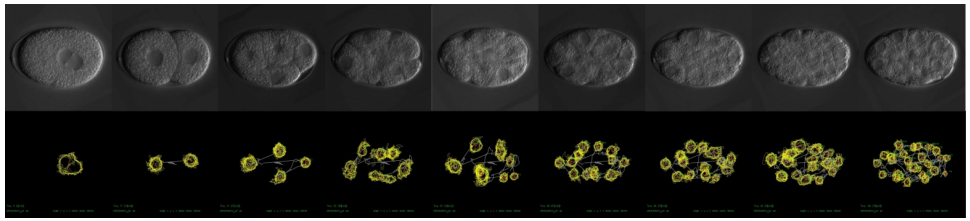
# Quantitative data of biological dynamics

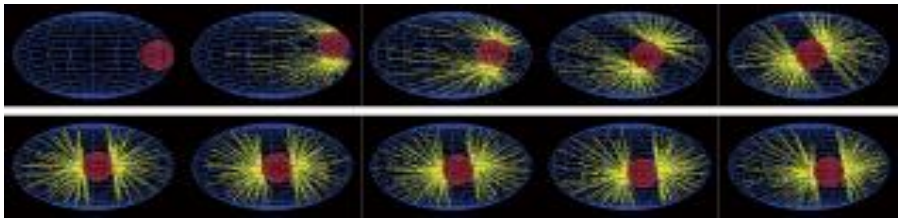
Spatiotemporal numerical data ranging from molecules to organisms

Microscopy image analysis



(Kyoda et al. 2012)

Computer simulation



(Kimura et al. 2010)

For understanding biological phenomena

Problem: lower re-usability

- Data formats are different
- Data are stored separately all over the internet

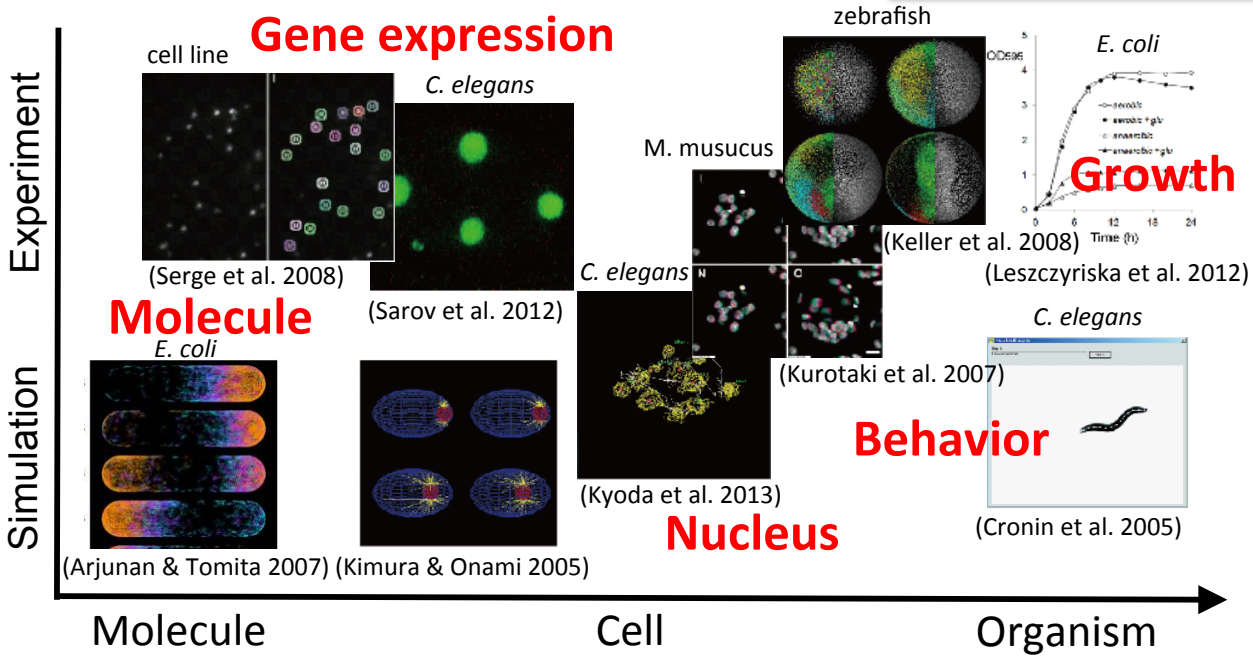
# BDML: Biological Dynamics Markup Language

## Unified format for representing quantitative data

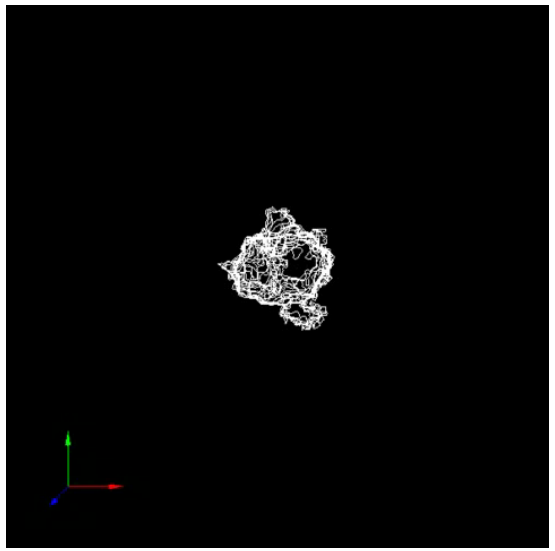
(Kyoda et al., Bioinformatics, 2015)

XML
- High extensibility
- High readability

```
<component>
  <componentID>100</componentID>
  <time>1</time>
  <measurement>
     <line><coords>10.32,30.42,18.32</coords>…
  </measurement>
</component>
<component>
```




Biological dynamics by representing BDML format



Nuclear division dynamics in *C. elegans* embryo

# SSBD database

## http://ssbd.qbic.riken.jp

SSBD Database

Sign in to SSBD

Browse through categories: Home Resources Manuals Publicatons News Downl

Search Services: "C. elegans" [organism] and wild-type [description] Search Advanced Hel

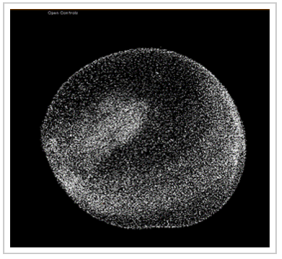
### Introduction of SSBD

**Systems Science of Biological Dynamics (SSBD)** database provides a rich set of resources for analyzing quantitative biological data, such as single-molecule, cell, and gene expression nuclei. Quantitative biological data are collected from a variety of species, sources and methods. These include data obtained from both experiment and computational simulation. These quantitative numerical data are represented in a new **Biological Dynamics Markup Language (BDML)**. The new data format allows users to exchange, store, compare and analyze data through the SSBD database.Users can download quantitative biological dynamics data directly in BDML format from the SSBD database. The system utilizes OMERO server to manage image data and experimental conditions. A range of software tools and applications for visualizing and analyzing quantitative biological dynamical data are being developed through a set of SSBD APIs.

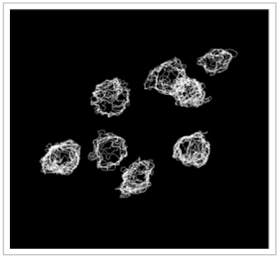
### News and Events

June 18, 2014: *BDML schema 0.18 released!*
BDML schema version 0.18 has been released. All BDML-files and software have been updated.
March 17, 2014: *System maintenance notice (Date: Mar. 19 (JST))*
Due to system maintenance, SSBD database will be unavailable Mar. 19, 2014 10:00 am to 13:00 pm (About 4 hours, JST).
Older news ...

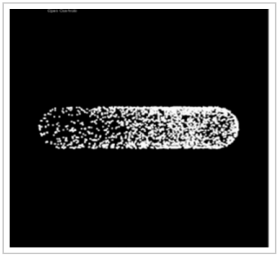
### Sample Datasets



Nuclear division dynamics in zebrafish wild-type embryo



Nuclear division dynamics in C. elegans wild-type embryo

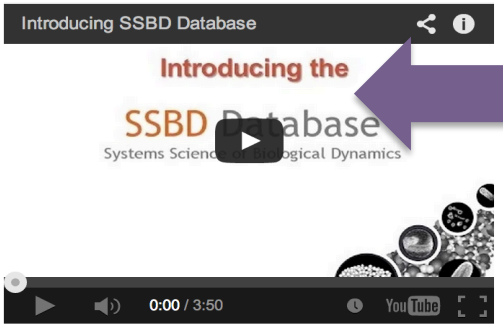


Single molecule dynamics in E. coli wild-type

### Menu

**BDML and PDPML schemas** can be found here.

**OMERO web**: Some images can be viewed on OMERO.web. If you have problem viewing the images on the website, please click on the drop-down arrow on the right of 'public data' on the bar above the data tree, select 'Public' group and 'public data' to view the images (click here for more details).




### Copyright notice

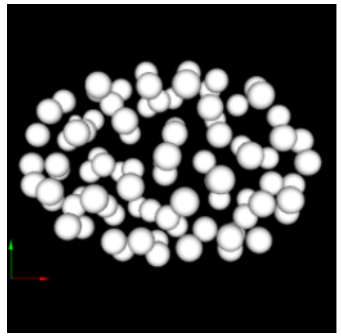
Details can be found here.

### Links

OME, WDDD, WormBase

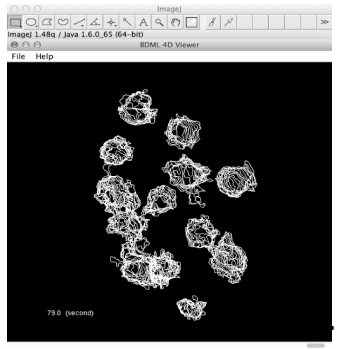
BDML

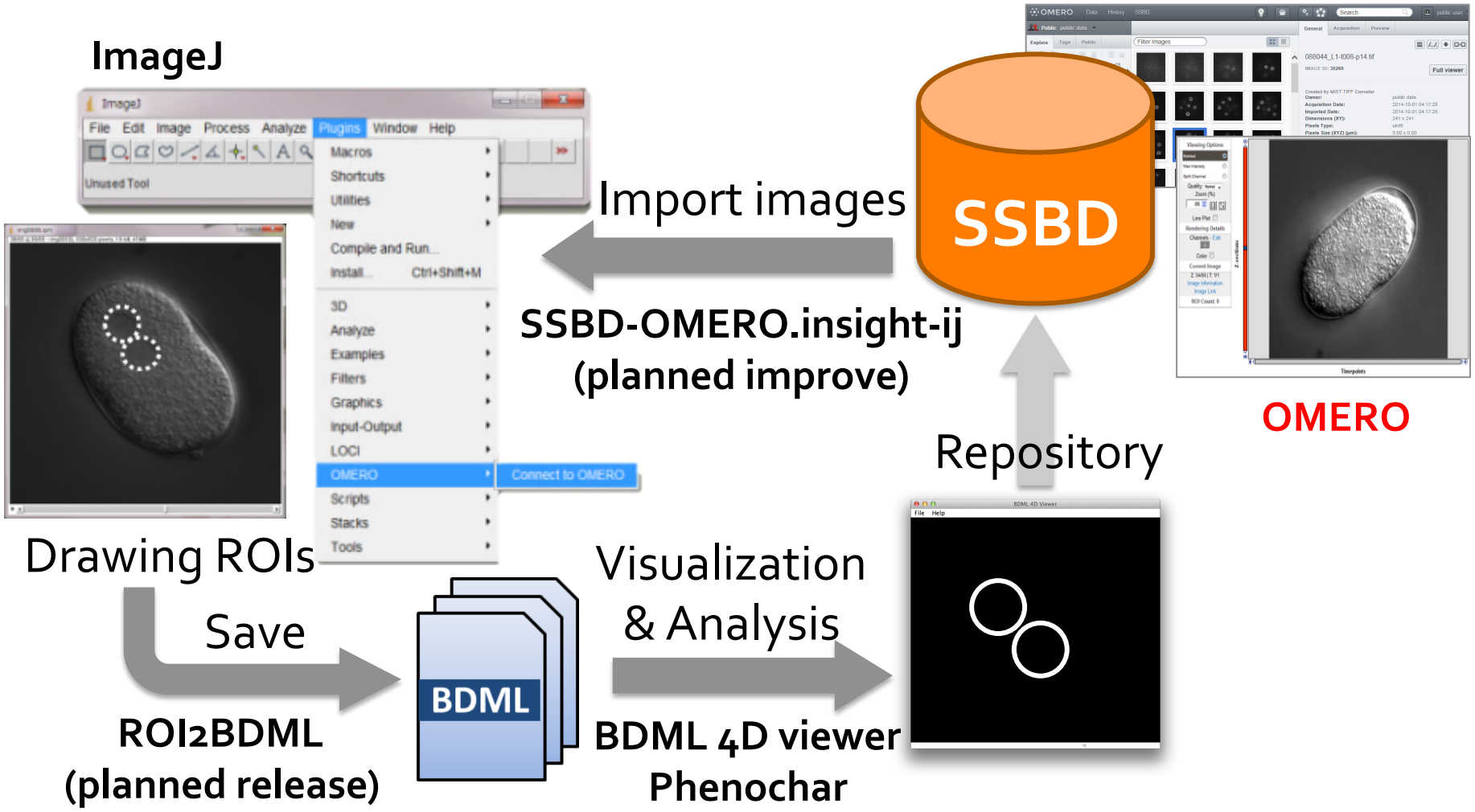
Quantitative data



Images

Tools



# ImageJ support with OMERO in SSBD

Developing ImageJ plugins to support users to produce quantitative data from microscopy images.