



臺大醫學院研發分處 第一共同研究室顯微影像核心

IMAGEJ顯微影像分析 與程式設計

零基礎的學生也能掌握基本顯微影像分析能力



海報網址

2025 3.3-4.28 周一 13:30-14:30 共7堂
影像前處理、AI應用、自動化分析

課程資訊 及 授課教師

2025/3/3(一) 【生物影像分析概論】
溫榮崑 中央研究院 生化所 生物影像核心設施
研究助理師

2025/3/10(一) 【生物影像流程與小組討論編組】
許紹君 臺灣大學分子影像重點技術平台
助研究專家

2025/3/17(一) 【影像分析自動化】
張仁乾 日本理化學研究所
專門技術員

2025/3/24(一) 【互動式影像分析流程建立】
朱韋臣 中央研究院 細生所 公共儀器室影像組
專案研發學者

2025/3/31(一) 【物件追蹤分析】
黃紀穎 中央研究院 植微所 細胞核心實驗室光學顯微鏡組
專案研究人員

2025/4/7(一) 【AI: 機器學習與深度學習工具介紹】
羅安琦 臺灣大學分子影像重點技術平台
副技師

2025/4/28(一) 小組發表
許紹君 臺灣大學分子影像重點技術平台 助研究專家
朱韋臣 中央研究院 細生所共儀影像組 專案研發學者

主辦單位：臺大醫學院研發分處 第一共同研究室顯微影像核心
協辦單位：中央研究院 生物化學研究所
地點：基醫大樓講堂區 5 樓 未來教室 (原508教室)

課程簡介

本課程將介紹生物影像的基本元素、如何利用FIJI進行影像前處理、影像切割、特徵萃取、程式設計與編程、互動式影像分析流程與GPU加速、AI(機器學習與深度學習工具)、物件追蹤、常用的資料庫以及如何分享自己的作品。將視報名人數進行小組發表與討論，利用工作中學習的方式提升課程效果。

課程目標

希望零基礎的學生參與課程後，都能具備基本分析顯微影像的能力。

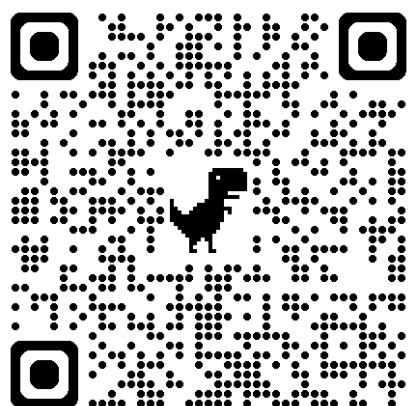
上課須知

- 即日起開放報名，報名方式如下：
 - 提供姓名、EMAIL、任職/就學單位、實驗室主持人姓名。
 - 以一張A4篇幅文字說明實驗目的與欲解決的問題，並以一張投影片頁面作為輔助材料。
- 優先錄取自備影像分析問題並想透過課程學會如何自己解決問題者。
- 課程會同步紀錄影音並於課後上傳至教學影音平台。
- 每堂課皆會點名，上課出勤不得缺課超過一堂。
- 需自備筆電。

招生人數：實體招收24人、線上30人。
報名截止日：額滿為止，恕不開放現場候補。
聯絡人：第一共同研顯微影像核心 林惠廷 szuting@ntu.edu.tw

上課注意事項：

- 教室內禁止攜帶食物飲料入內，僅允許“白開水”，請大家將食物飲料放置於教室外的桌上。
- 請實體與線上學員掃描以下QR code進行線上簽到。
- 請線上學員於課程開始前關閉自己的麥克風。
- 線上學員若有問題，請先按下“舉手”，或於聊天室寫下問題，將於課程結束後在場地時間允許下，安排QA時間。
- 現場學員發問時請使用麥克風才可進行收音。



線上簽到



課程材料與資訊連結

IMAGEJ 顯微影像分析 與程式設計

生物影像分析概論

Jung-Kun Wen

Assistant Research Specialist

Bio-Imaging Core Facility, Institute of Biological Chemistry, Academia Sinica



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East Asia Bioimage Analysts' Society (EABIAS)

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聯絡人：第一共同研究室顯微影像核心 林思廷 szuting@ntu.edu.tw

National Taiwan University College of Medicine

National Science and Technology Council

NSC

IBS

<https://eabias.github.io/zh-TW/>

EABIAS (zh-TW)

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Home

歡迎來到 EABIAS (東亞生物影像分析協會)

EABIAS 是一個開放且包容的社群，歡迎所有對生物影像分析感興趣的人士加入。

目標：

社群建立：聯繫對生物影像分析充滿熱情的科學家、工程師和開發者。

知識分享：提供資源、教程和活動，以促進生物影像社群的發展。

工具開發：推動開源工具的創建和改進，應對生物影像分析中的挑戰。

我們誠邀個人及機構加入我們，共同推進生物影像分析領域的發展。貢獻您的專業知識，向他人學習，並成為致力於創新和發現的成長型社群的一部分。

請瀏覽我們的網站，了解更多資訊以及即將舉行的活動更新。

目錄

GloBIAS 2025 in Kobe, Japan

ImageJ Workshop in Taipei (2025)

Outline

- Part I : Introduction of Bio-image & Bioimage analysis
 - Terminology & Image preparation tips
- Part II : Bioimage analysis workflow
 - Processing & Image Operators
- Part II : Open-source tools for Bioimage analysis - (Fiji)

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Dr. Robert Haase

Center for Scalable Data Analytics and Artificial Intelligence (ScaDS.AI)
Dresden/Leipzig, Leipzig University,
Germany
<https://haesleinhuepf.github.io/>



Dr. Peter Bankhead

Center for Genomic & Experimental Medicine, University of Edinburgh, UK

Introduction to Bioimage Analysis (2022)
<https://bioimagebook.github.io/>



Dr. Wei-Chen Chu, ICOB

Imaging Core Facility Manager (ICOB)

<https://www.youtube.com/@icobcorefacilitiesacademia43/featured>

Bio-Image Analysis Workshop

Huang, Cheng-Yu (Kou)

Ph.D. Candidate

University of Cambridge

<https://www.youtube.com/watch?v=PSyxUaw67g>

臺大顯微影像核心 **NTU Imaging Core**

<https://www.youtube.com/@imagingcore9084>

Part I:

Introduction of Bio-image - Terminology &
Image preparation tips

Bio-image

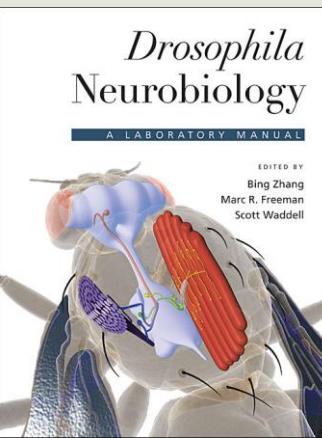
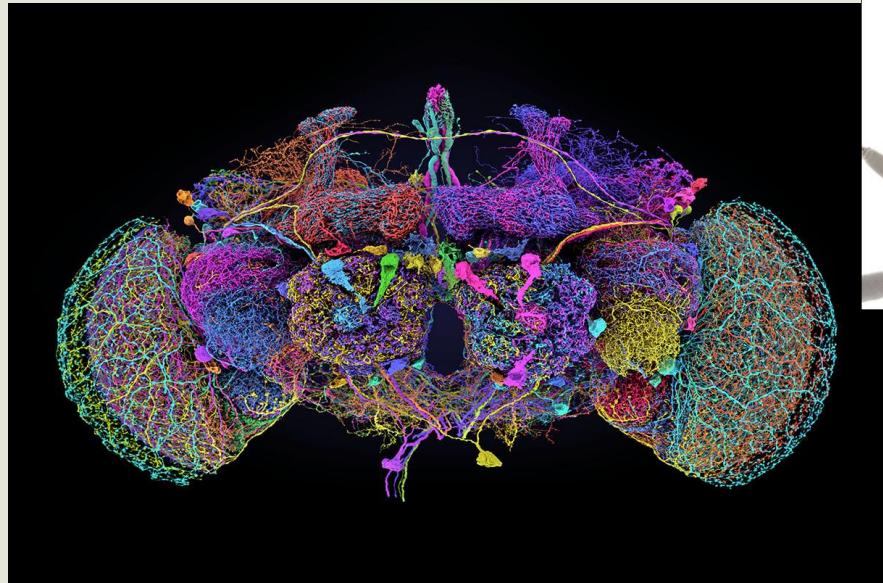
Why Bio-imaging technology is so important to modern scientific research?

Explain phenomenon?
Awesome image?

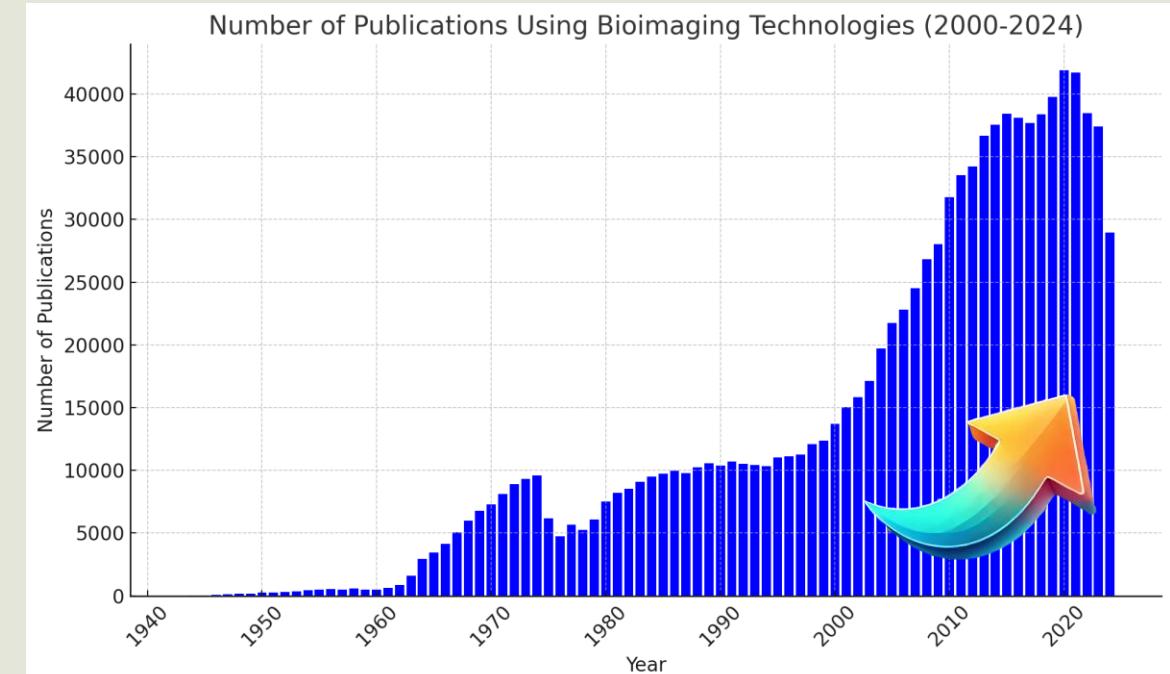


Make records ?
Generate data ?

Visualization and Quantification in Life Sciences



The 50 largest neurons in the fly's brain, Dorkenwald et al., Nature, 2024



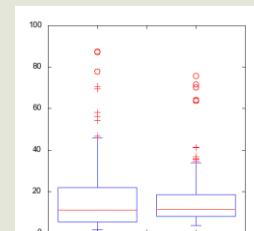
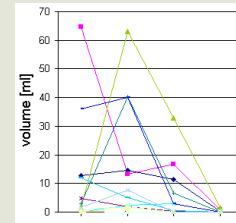
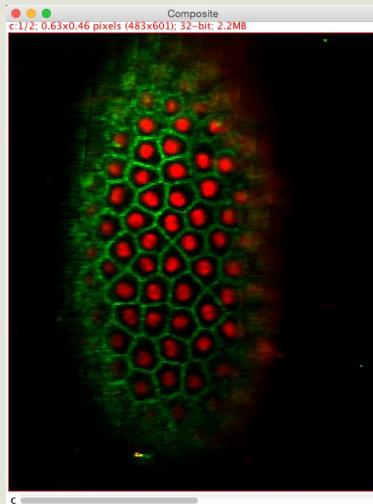
PubMed

Bioimage analysis

BioImage Analysis?

Understanding and quantifying microscopy, medical or any other calibrated image data.

Bioimages → Numbers → Knowledge



Publications.

Image analysis software universe

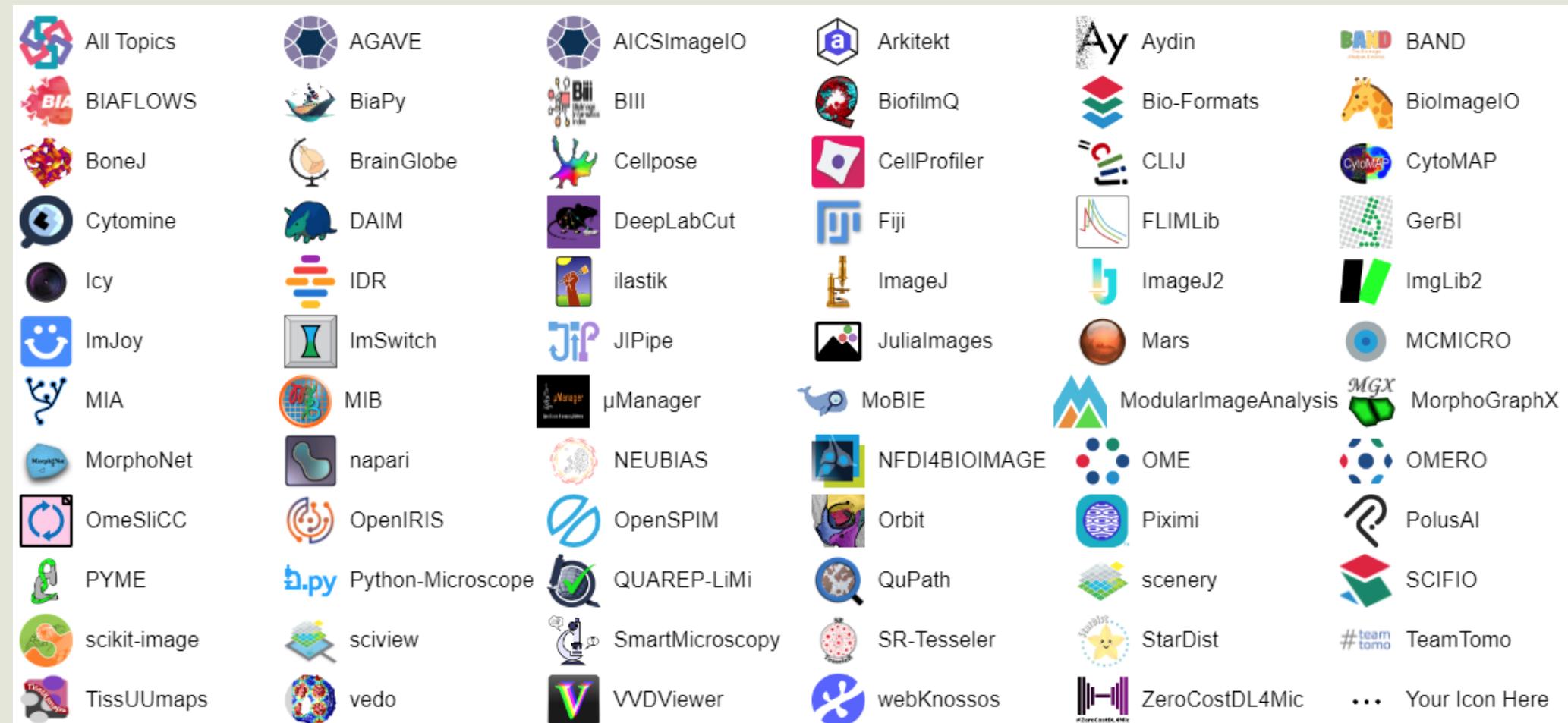
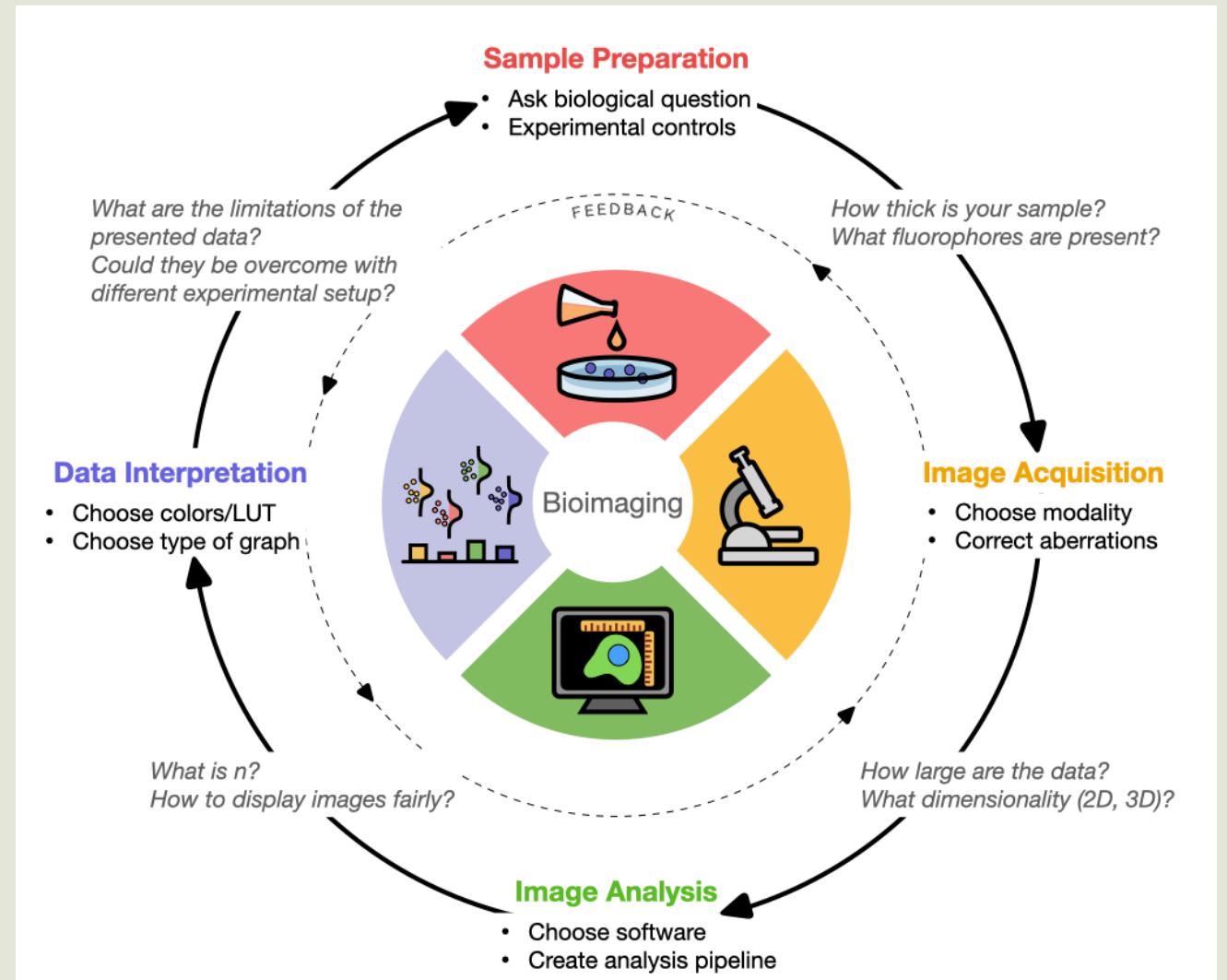


Image from <https://forum.image.sc/>

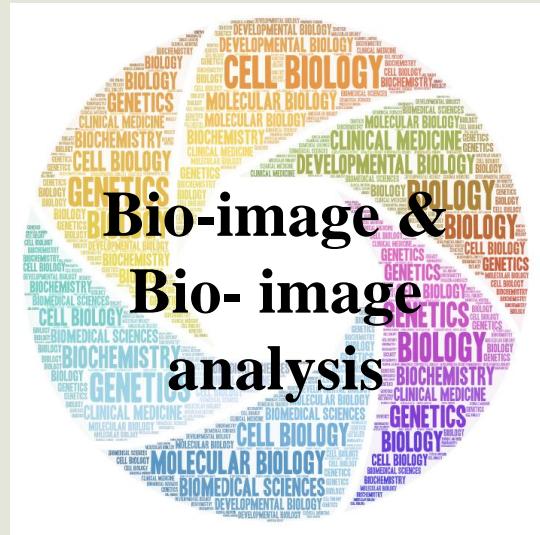
The steps of bio-imaging experiment



<https://www.bioimagingguide.org/>

<https://doi.org/10.1371/journal.pbio.3002167>

Bio-image & Bio- image analysis



- Tools
- Part of Experiment
- Knowledge



Support your research.

Four elements of Bioimage analysis in publications.

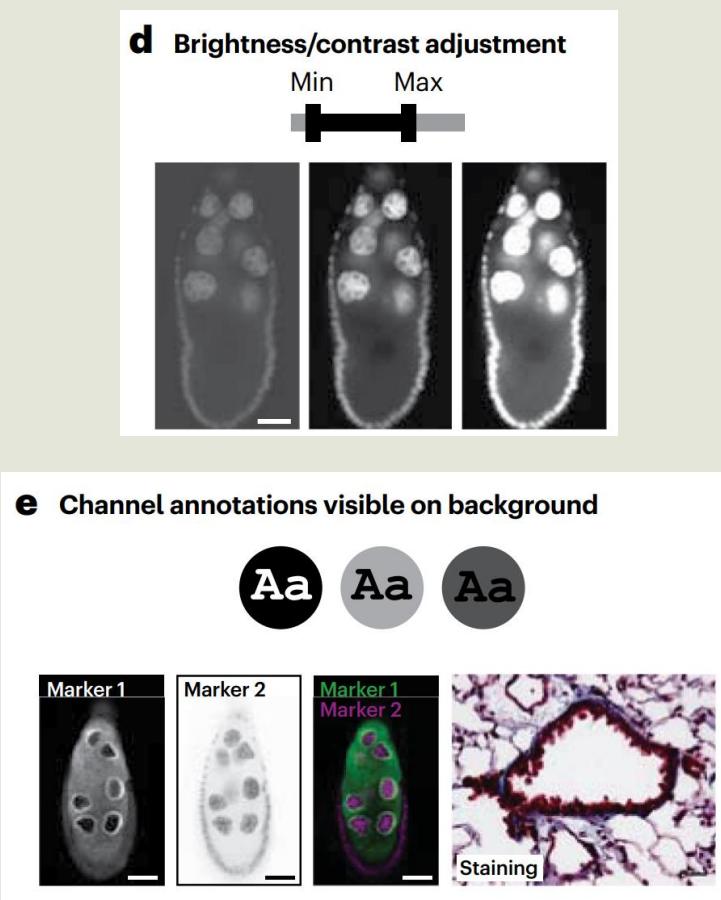
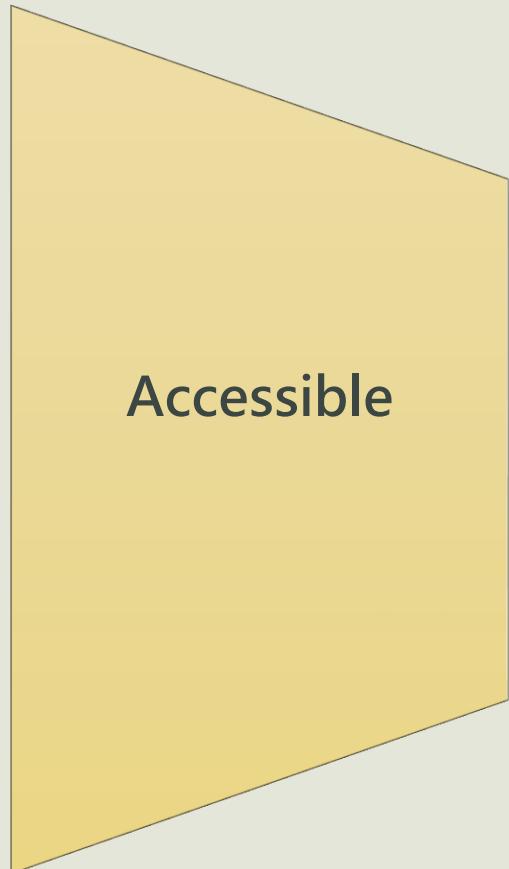
Accessible

Representative

Understandable

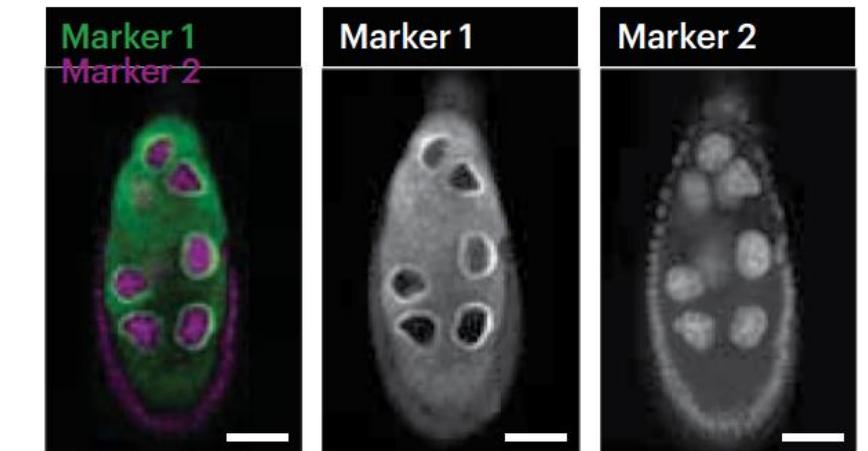
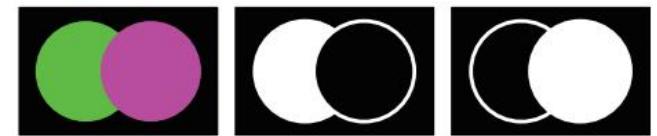
Reproducible

Four elements of Bioimage analysis in publications.



Be friendly to colorblindness

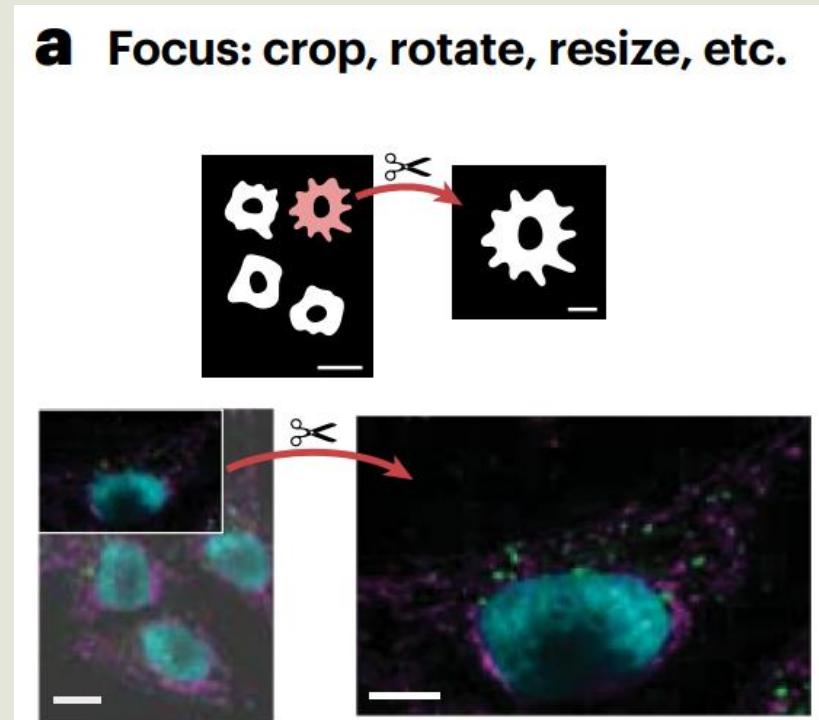
f Grayscale channels improve visibility of image features



Red/Green only: → Replace Red with Magenta

Four elements of Bioimage analysis in publications.

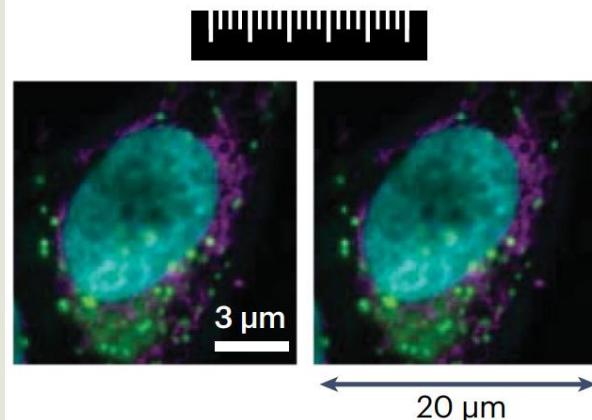
Representative



Four elements of Bioimage analysis in publications.

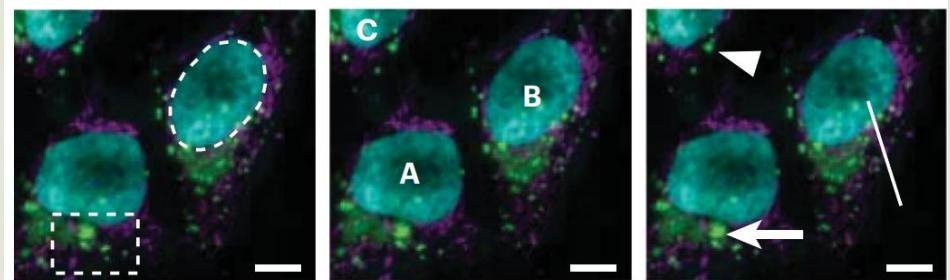
Understandable

a Scale information

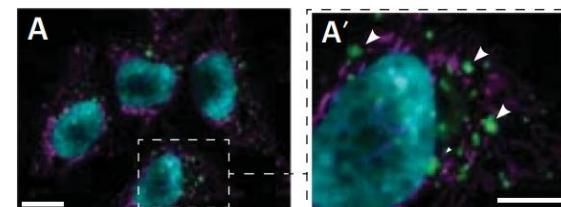
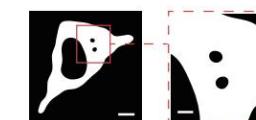


b Annotations: explained, visible, not obscuring content

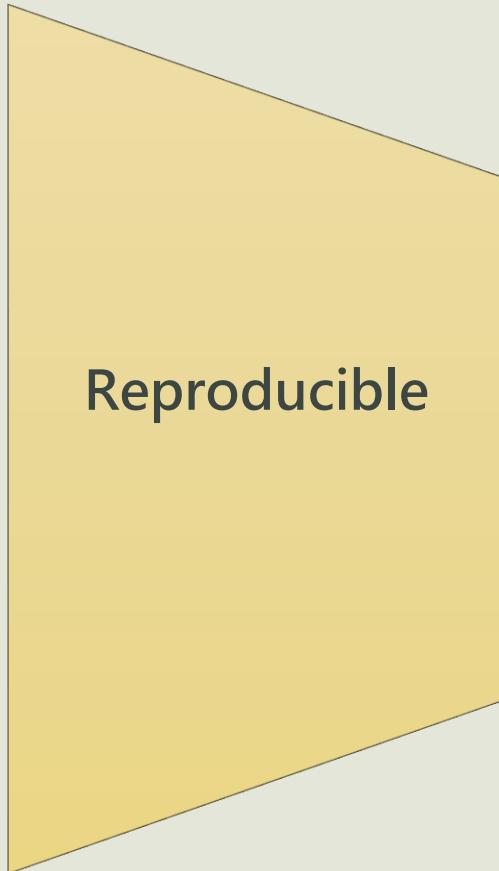
Aa



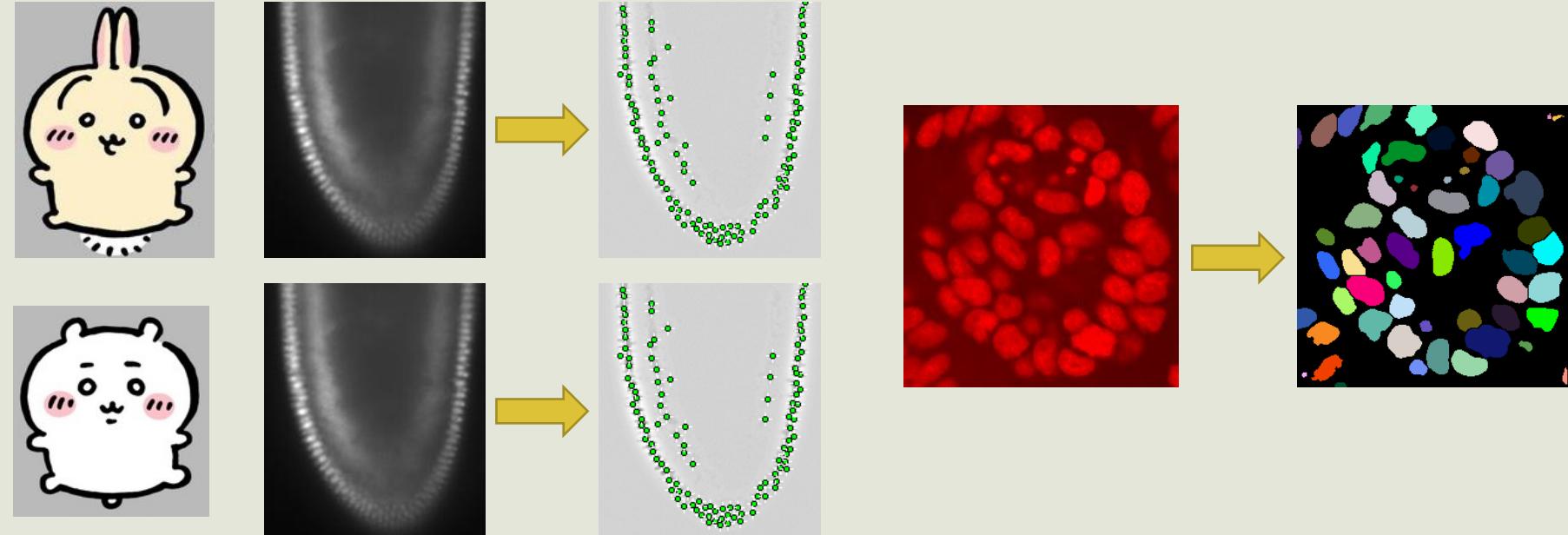
c Show origin of inset Consider showing full-size image



Four elements of Bioimage analysis in publications.



- Bio-image analysis is supposed to be **reproducible**
Experiments have to be documented so that others can repeat them.
- Bio-image analysis is supposed to be **repeatable**
The experiment must be designed so that one can repeat it with the same sample.



Checklists of Bioimage analysis in publications.

nature methods

Perspective

<https://doi.org/10.1038/s41592-023-01987-9>

Community-developed checklists for publishing images and image analyses

Nature Methods | Volume 21 | February 2024 | 170–181



Christopher Schmied
Senior Research Data Scientist at
Leibniz-Forschungsinstitut für
Molekulare Pharmakologie (FMP)



Helena Klara Jambor
Mildred Scheel Early Career
Center, TU Dresden (Germany)

Checklists of image analysis in publications.

Image colors and channels

	Annotation of channels (staining, marker etc.) visible
	Adjust brightness/contrast, report adjustments, use uniform color-scales
	Image comparison: use same adjustments
	Multi-color images: accessible to color blind
	Channel color high visibility on background
	Provide grey-scale for each color channel
	Provide color scales for intensity values (greyscale, color, pseudo color...)
	Pseudo-colored images: additionally provide greyscale version for comparison.
	Gamma adjustments: additionally provide linear-adjusted image for comparison



Minimal



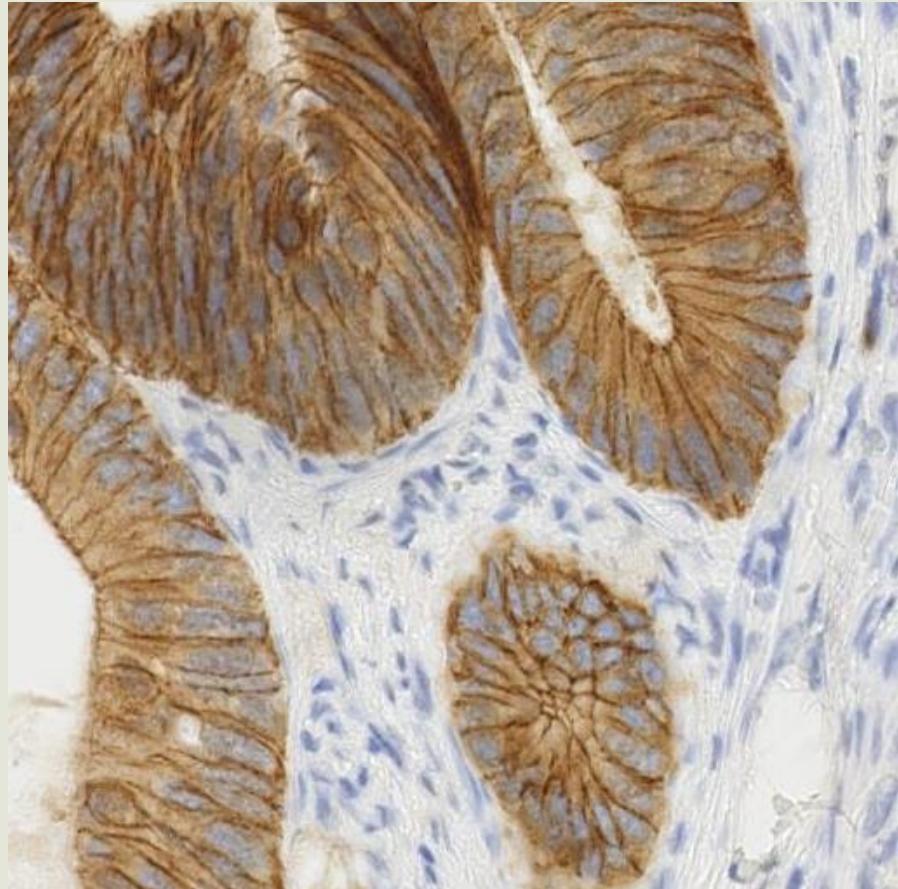
Recommended



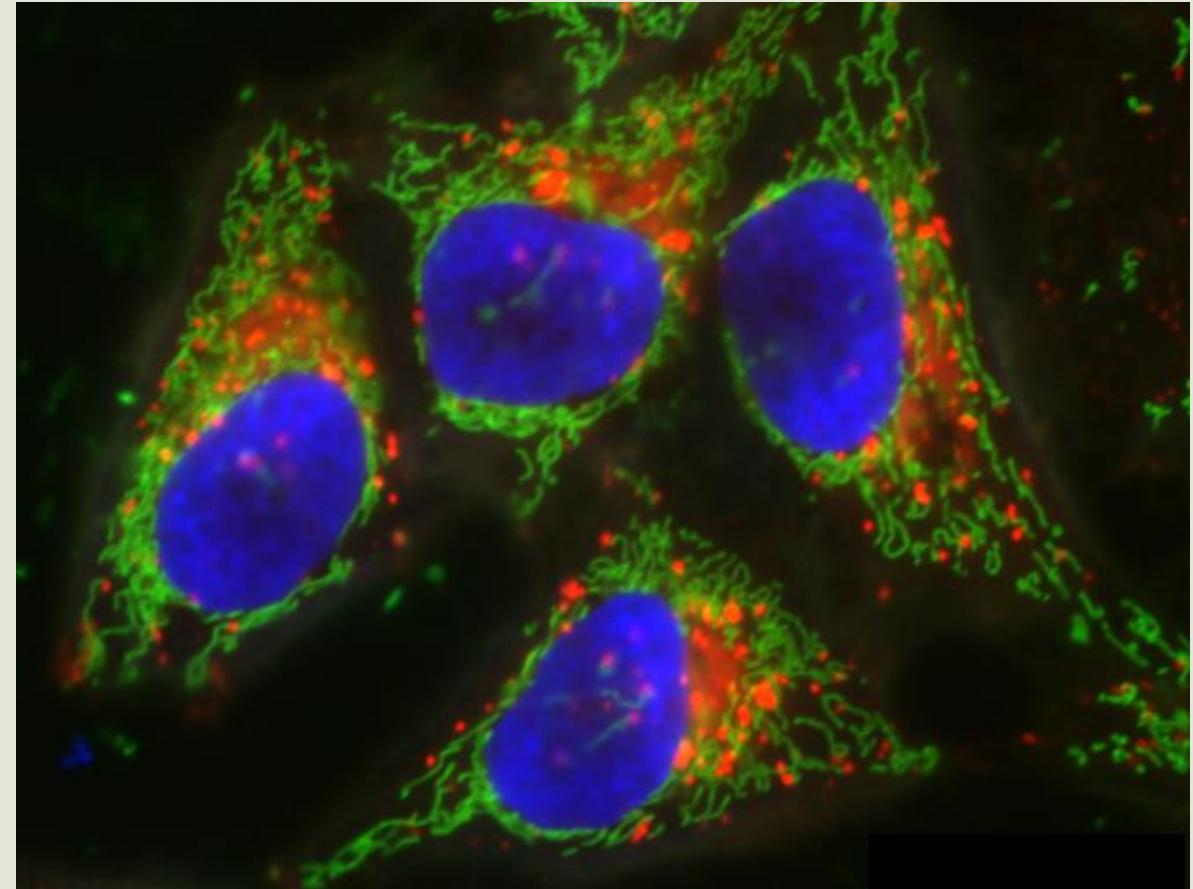
Ideal



Color Image vs. Intensity-based Image (e.g. fluorescence images)

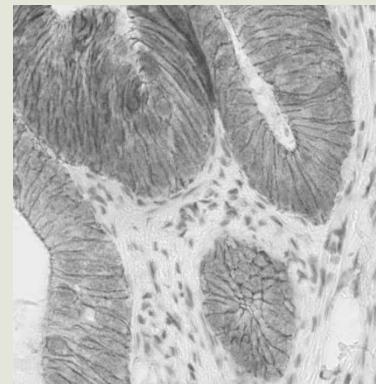
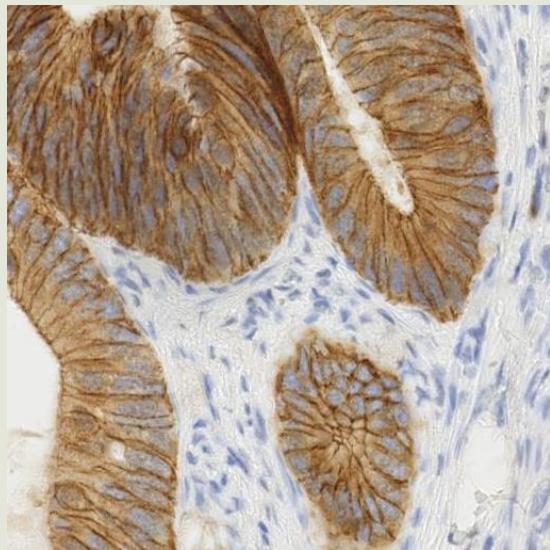


Transmitted light microscope

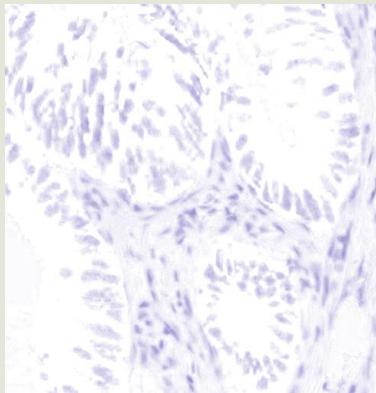


Fluorescence microscope

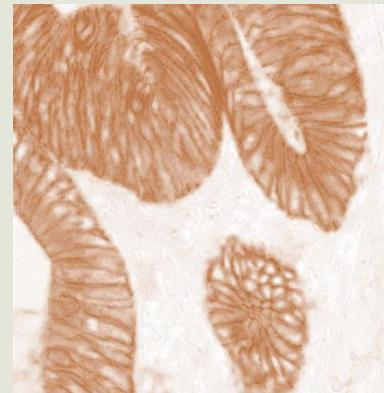
Color Image (RGB format)



R

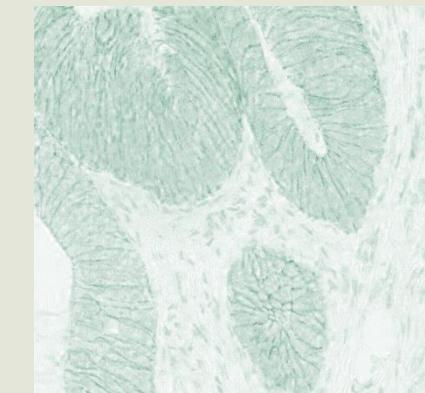


G



B

Color deconvolution



Source: Napari sample image

Slide adapted from Dr. Wei-Chen CHU , Bioimage Analysis with FIJI/ImageJ and Friends, licensed [CC BY 4.0](#)

Fluorescence images

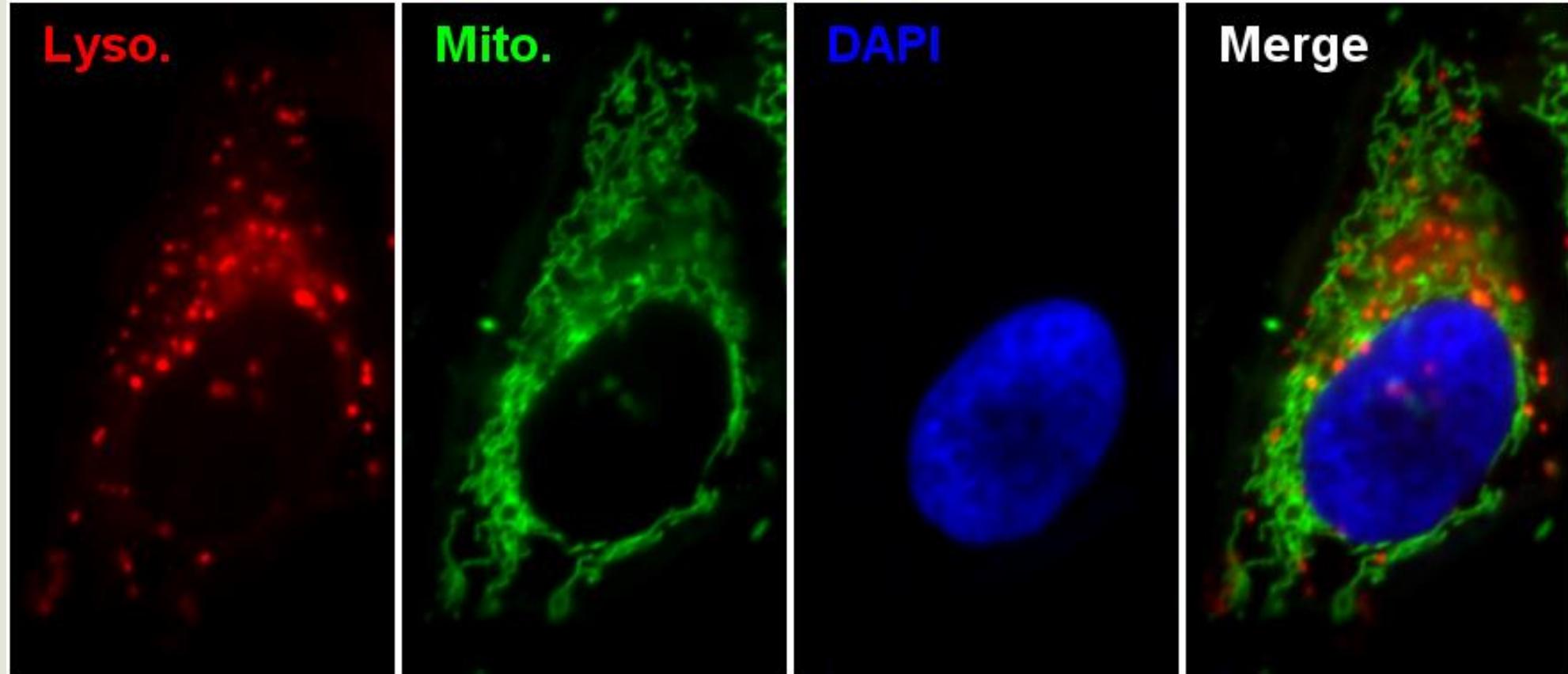


Image source: FIJI sample images (Hela cells, cropped)

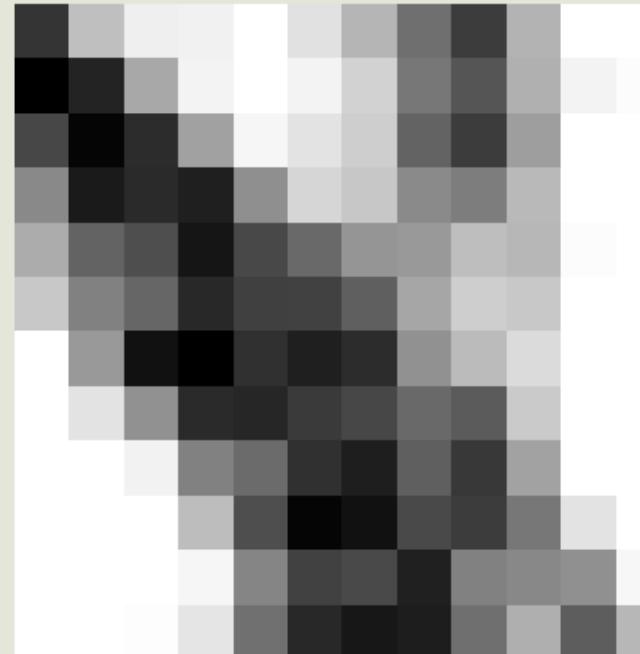
Slide adapted from Dr. Wei-Chen CHU , Bioimage Analysis with FIJI/ImageJ and Friends, licensed [CC BY 4.0](#)

Image are composed of pixels (picture + element)

(A) Original image



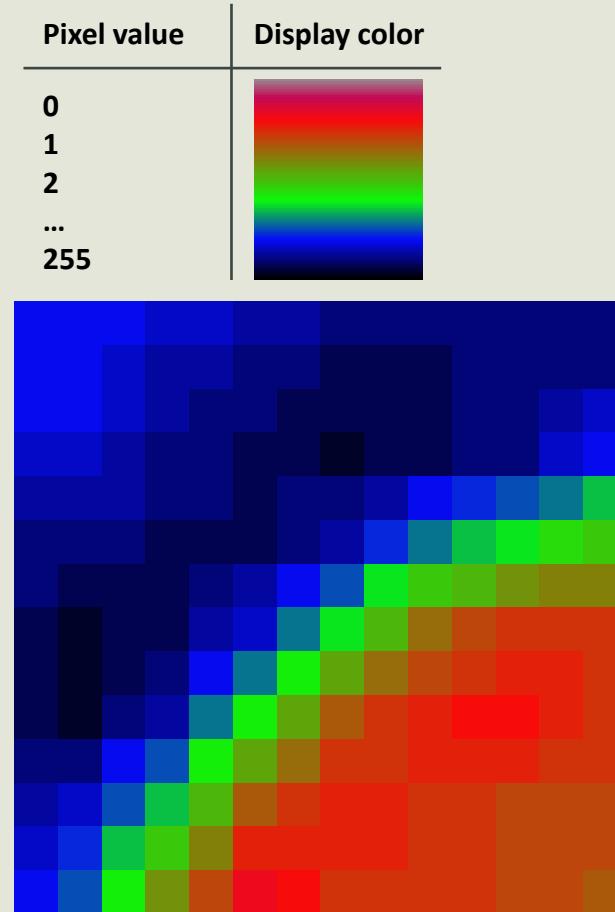
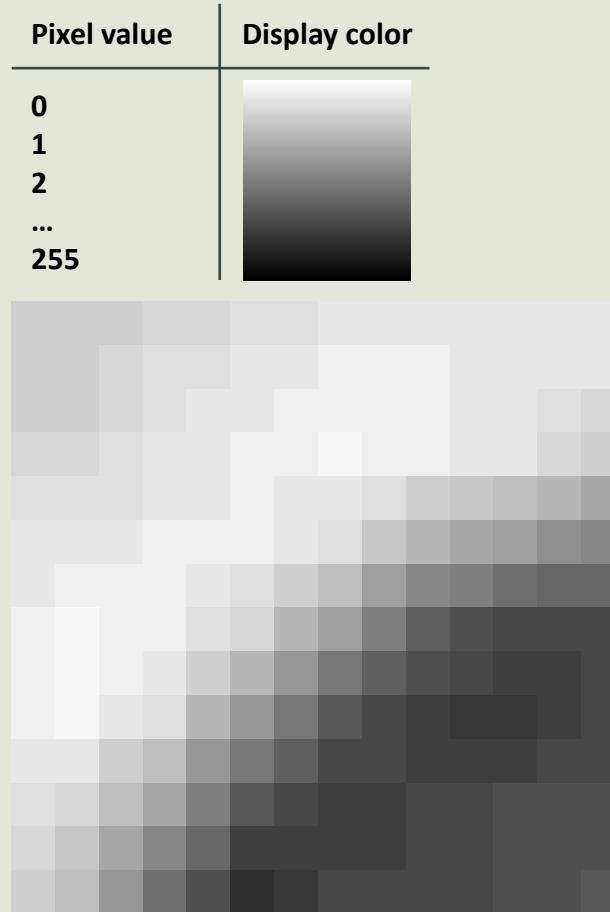
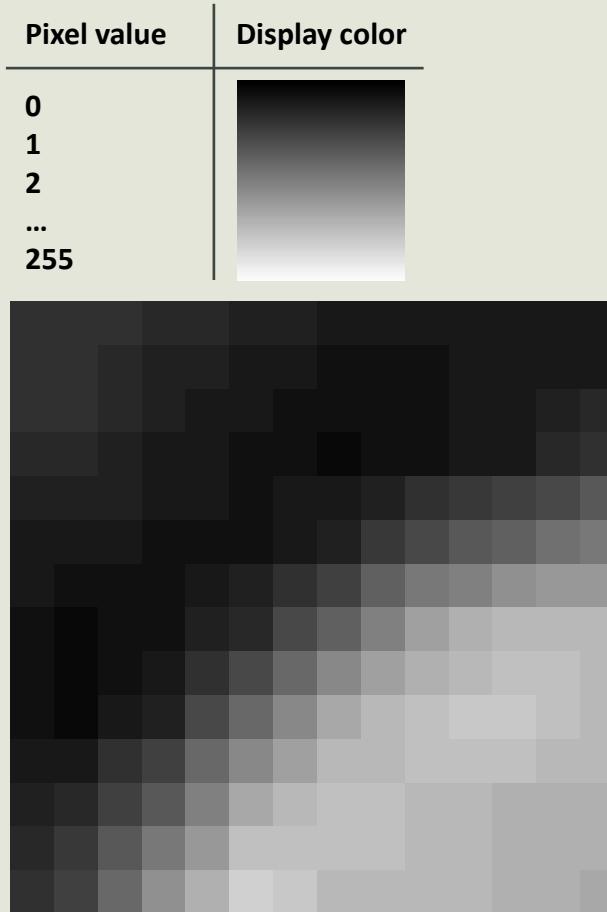
(B) Enlarged view from (A)



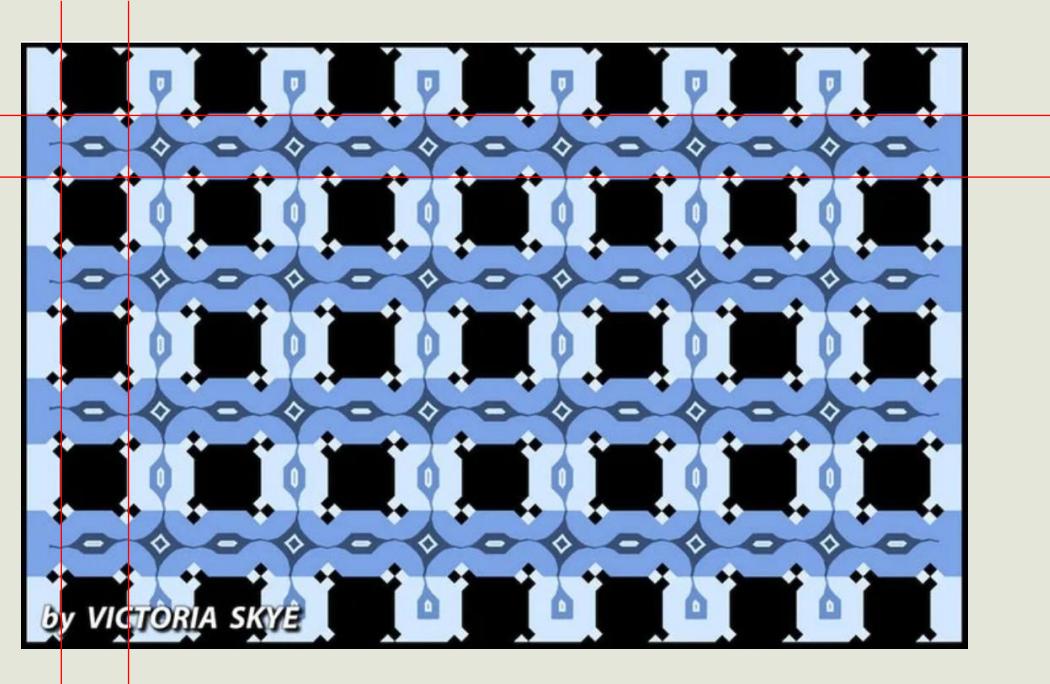
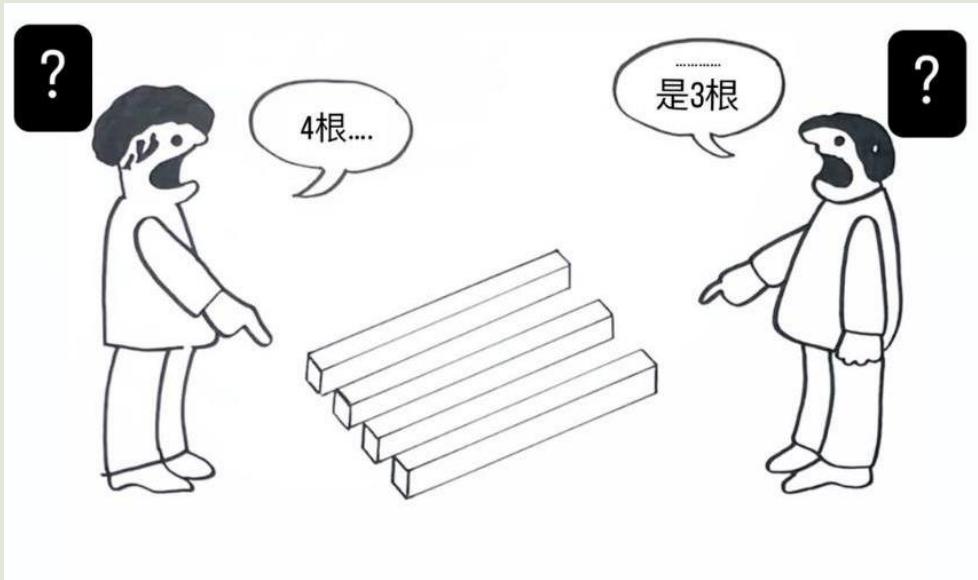
(C) Pixel values from (B)

53	191	239	241	255	225	181	111	61	180	255	255
	35	168	244	255	243	210	119	85	176	244	252
71		45	161	246	227	206	99	60	158	255	255
137	26	42	31	143	214	199	138	125	185	255	255
172	99	78	21	72	106	149	153	190	183	252	255
200	129	102	41	64	65	95	166	206	200	255	255
255	153	17		49	31	44	145	187	219	255	255
255	227	145	42	38	58	71	106	91	202	255	255
255	255	242	129	107	48	30	95	57	162	255	255
255	255	255	189	78		17	74	60	119	228	255
255	255	255	246	133	65	73	32	129	136	144	247
255	255	253	229	112	40	23	29	111	175	93	183

Lookup table (LUT)



Don't believe your eyes.



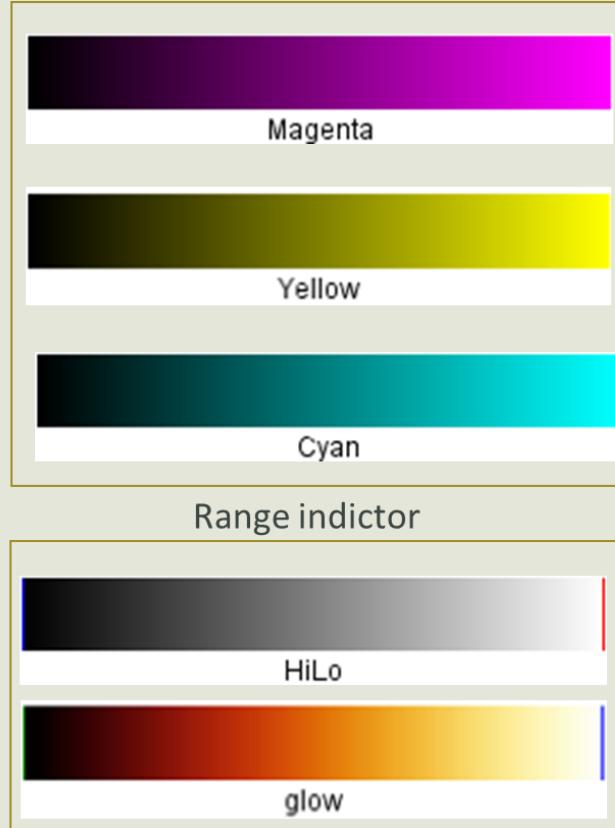
by VICTORIA SKYE

Useful LUT

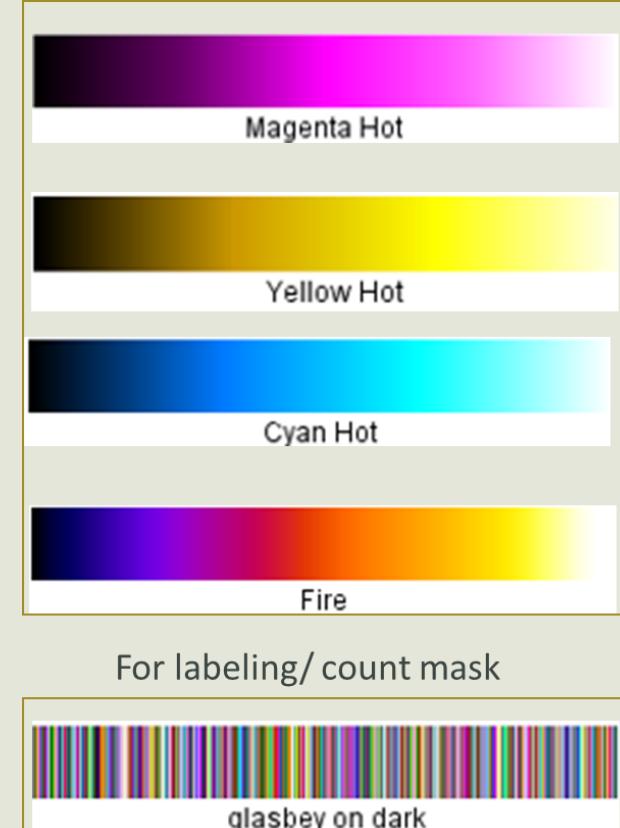
“Classic”



Color Blindness friendly



Good for weak signal visualization
(nonlinear, calibration bar is necessary)



Lookup-tables(LUT) / Pseudo-colors / Colormaps

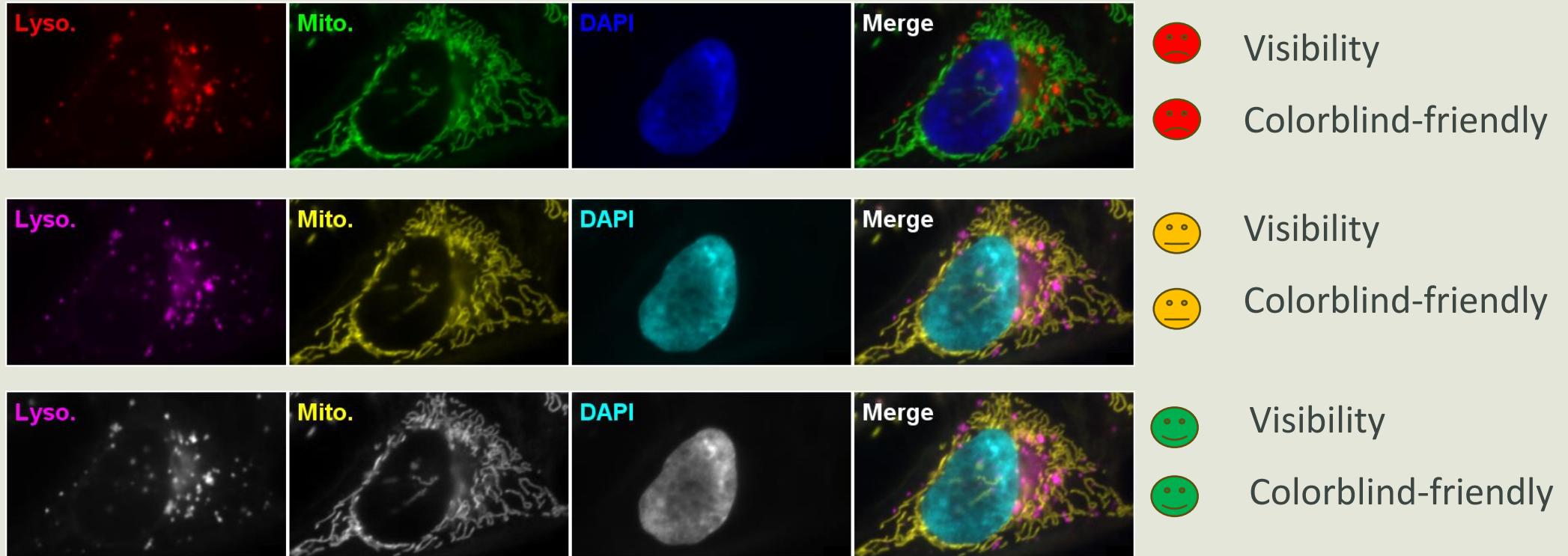


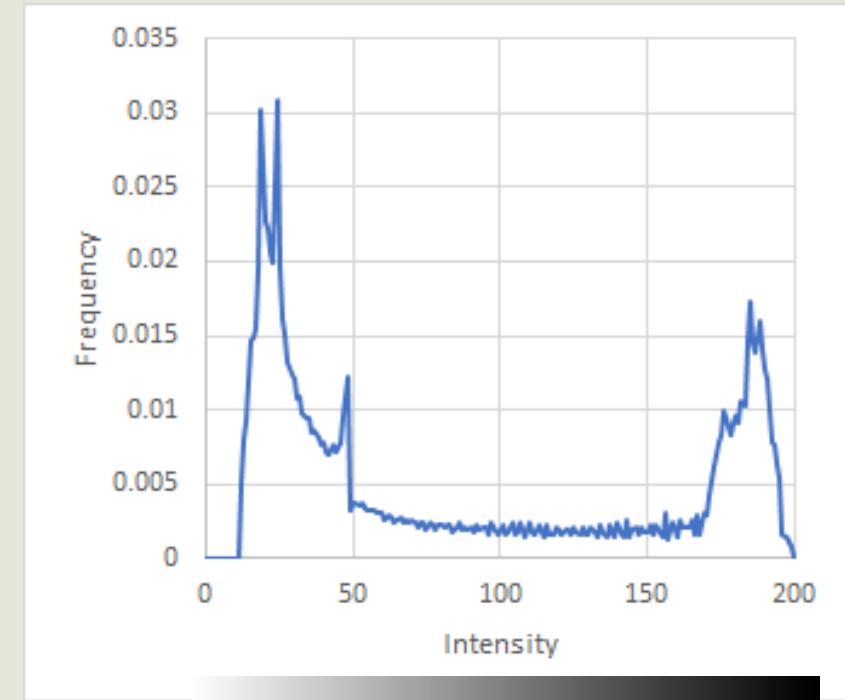
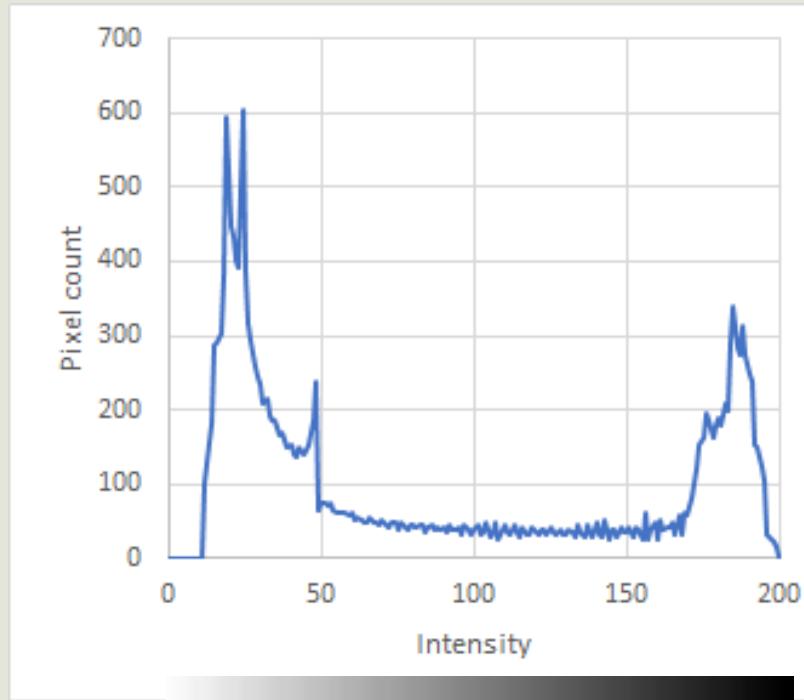
Image source: FIJI sample images (HeLa cells, cropped)

See also Figure Making Best Practices (2024) youtube.com

Slide adapted from Dr. Wei-Chen CHU , Bioimage Analysis with FIJI/ImageJ and Friends, licensed [CC BY 4.0](#)

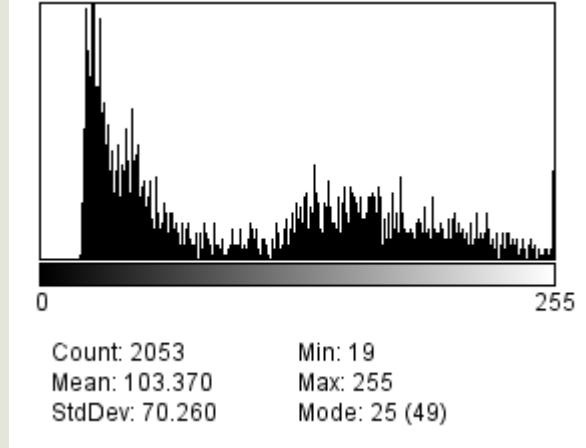
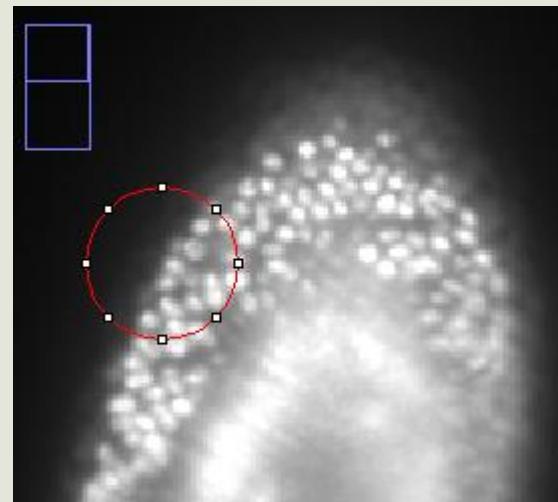
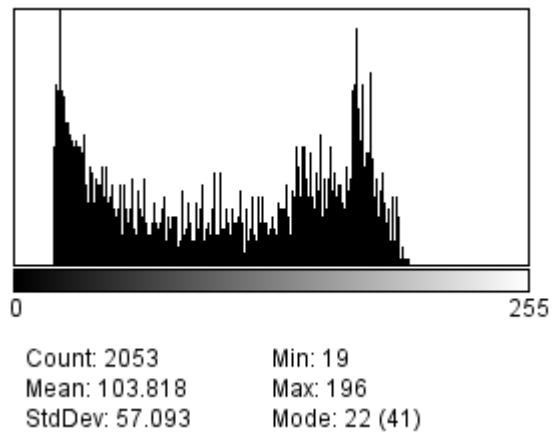
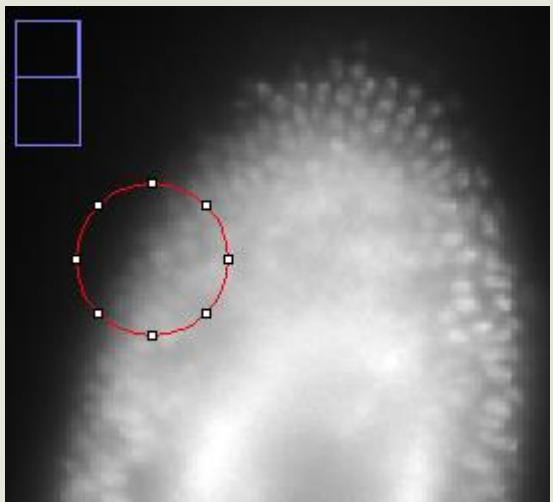
Histograms

A histogram shows the probability distribution of pixel intensities.



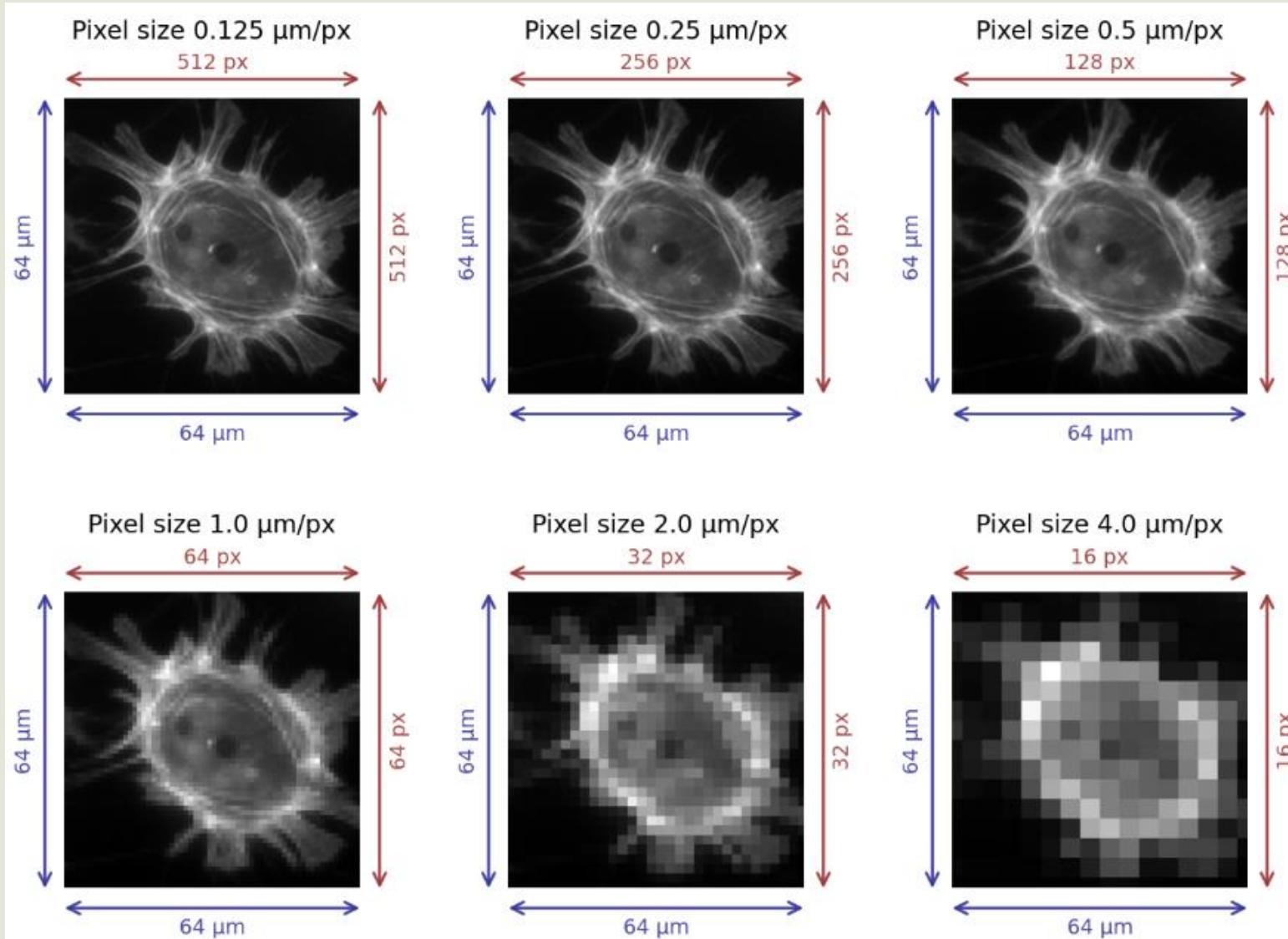
Histograms

Histograms are summaries of images



Quickly compare the images.
Selected LUTs.

Pixel Size : How the data is saved



Pixel size:

- A property of a digital image.
- You configure it during the imaging session at the microscope (Pixel numbers, Objective, Zoom...etc.)

Representing an image using different bit-depths

- A bits is the smallest memory unit in computers.
- The bit-depth n enumerates how many different intensity values are present in an image:
 - 2^n grey values Ex : 8 bits $2^8 = 256$
- In microscopy, images are usually stored as 8, 12 or 16-bit images.

Bit = “0” or “1”

1 Bytes = 8 bits -> basic store unit

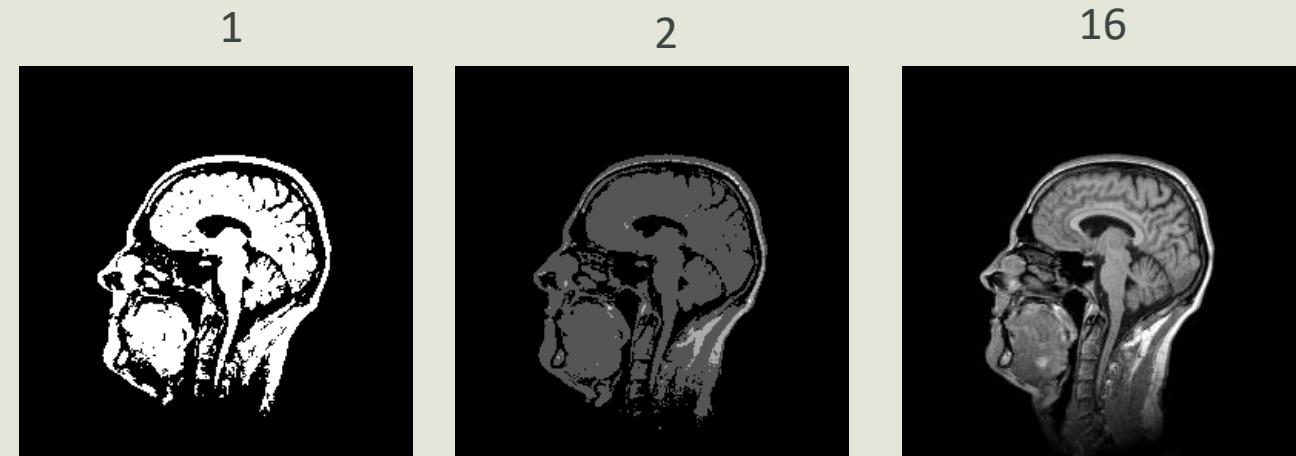
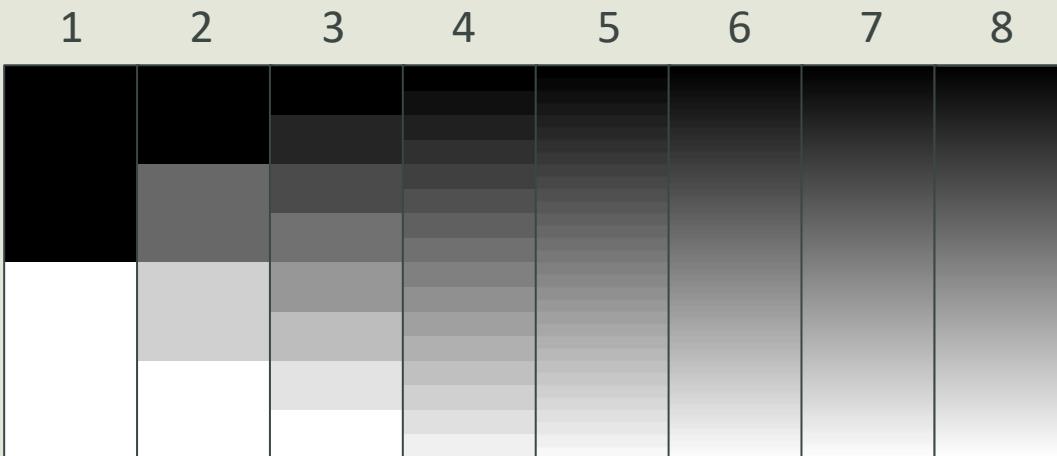
8 bits (1 byte) = 0 ~ 255

16 bits (2 bytes) = 0 ~ 65535

12 bits (2 bytes!) = 0 ~ 4095

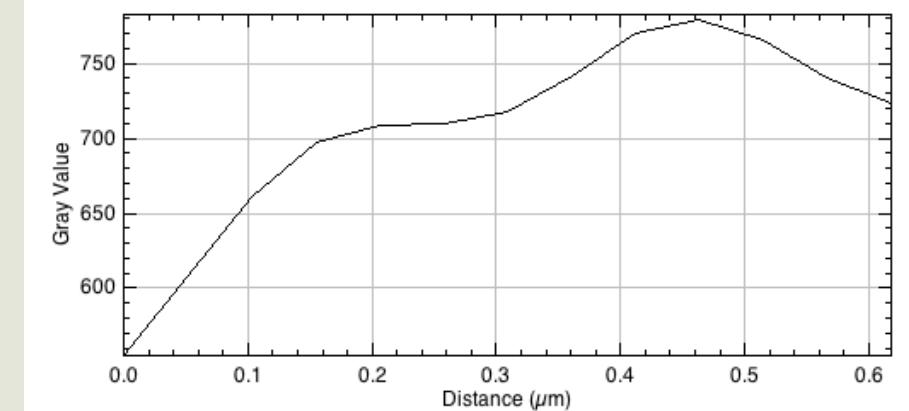
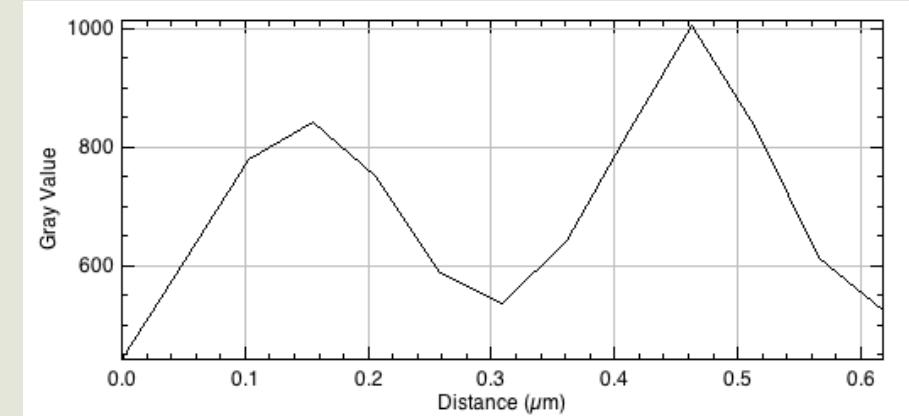
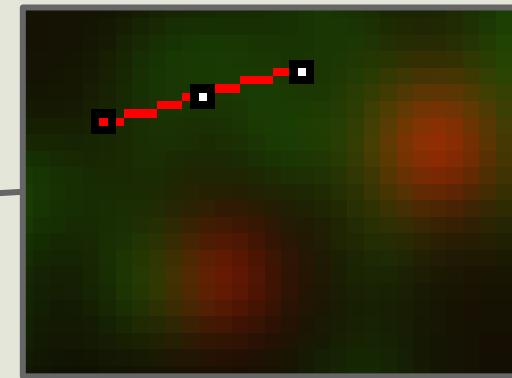
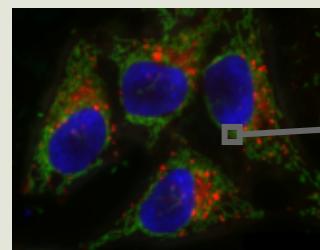
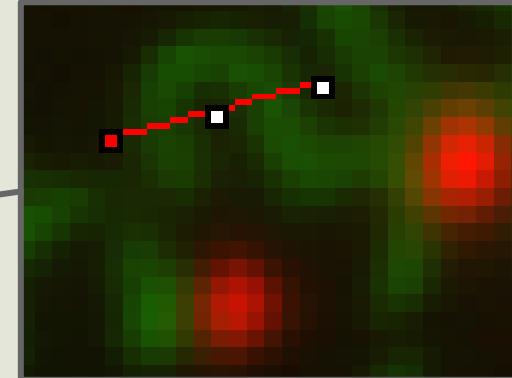
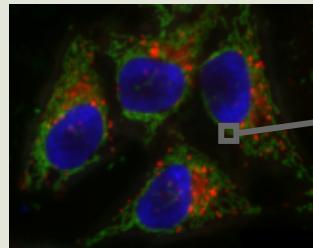
14 bits (2 bytes!) = 0 ~ 16383

32 bits (4 bytes, floating-point)

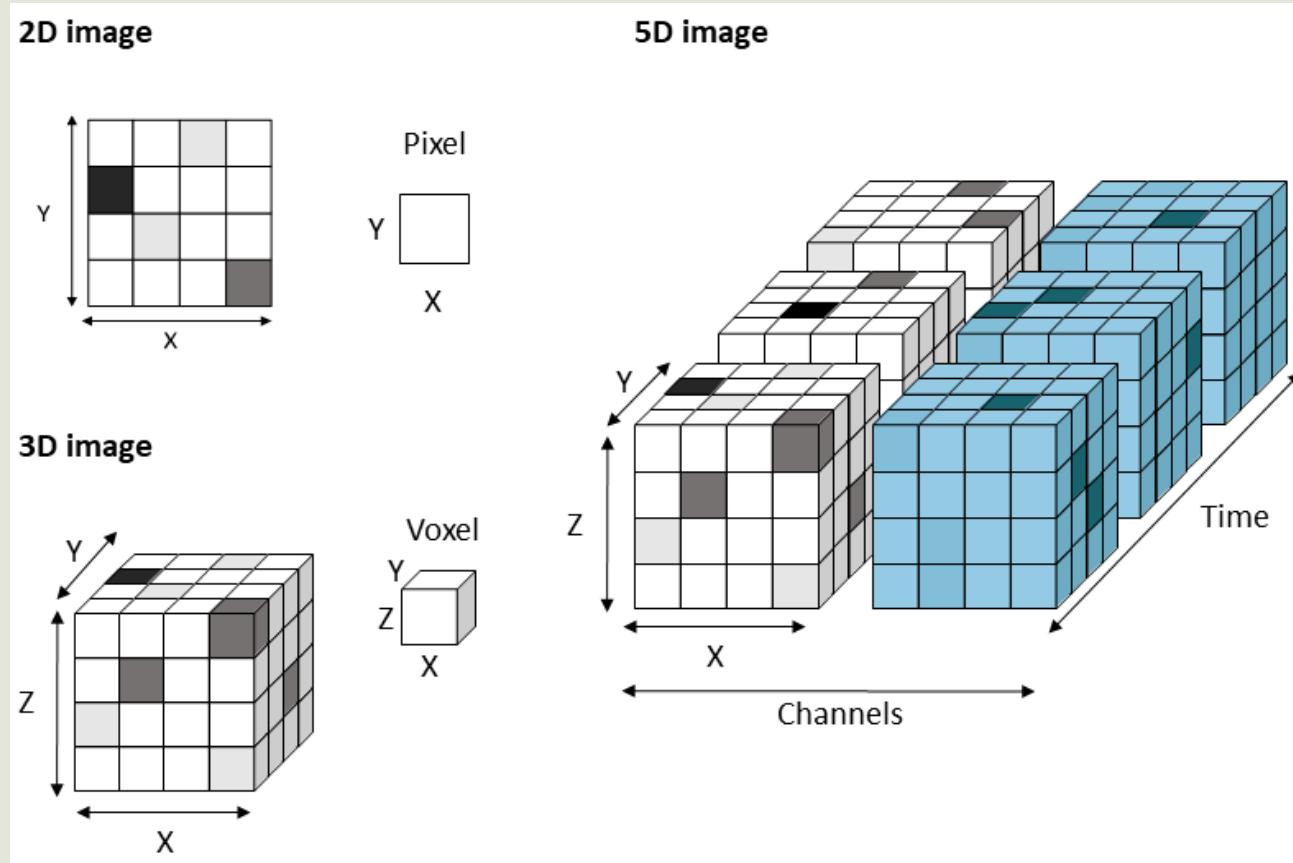


Resolution

- Resolution is a property of your imaging system.
- The measure of how close object can be in an image while still being differentiable, is called spatial resolution.



N-dimensional images



- Most fluorescence image:
(n color \rightarrow n Channels)
- Data from color camera:
RGB format
(n color \rightarrow R/G/B Value, 24 bits)

Files & file formats

Image files consist of **pixel values** and **metadata**

- **Pixel values** – the ‘raw numbers’ of the image
- **Metadata** – additional information, such as dimensions, image type, bit-depth, pixel sizes and microscope settings (‘data about data’)

Format	Extensions	Main use	Compression	Comment
TIFF	.tif, .tiff	Analysis, display (print)	None, lossless, lossy	Very general image format
OME-TIFF	.ome.tif, .ome.tiff	Analysis, Display (print)	None, lossless, lossy	TIFF, with standardized metadata for microscopy
Zarr	.zarr	Analysis	None, lossless, lossy	Emerging format, great for big datasets – but limited support currently
PNG	.png	Display (web, print)	Lossless	Small(ish) file sizes without compression artefacts
JPEG	.jpg, .jpeg	Display (web)	Lossy (usually)	Small file sizes, but visible artefacts

Part II :

Bio-image analysis workflow - Processing & Image Operators

Bio-image analysis workflow - Processing

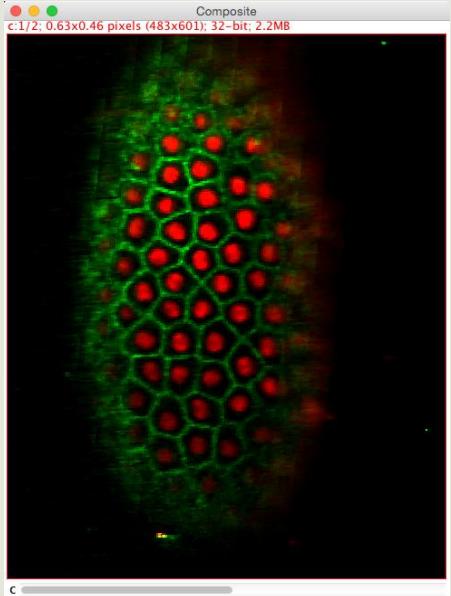


Image Processing

Preprocessing



Segmentation

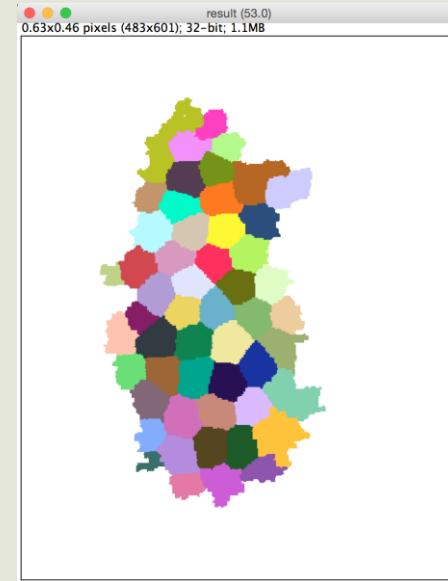
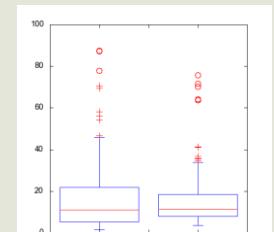
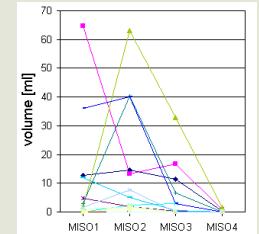


Image Analysis

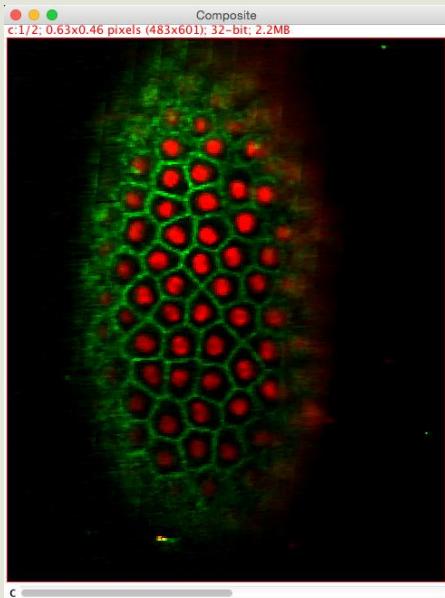
Quantification



Data Analysis



Bio-image analysis workflow – Image Operators



Preprocessing



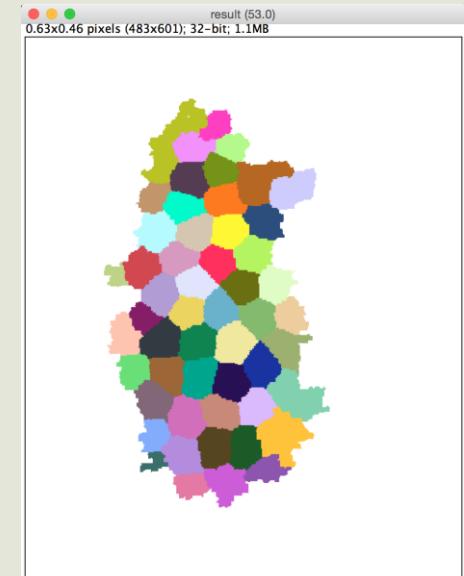
Segmentation

Image Processing

- Point operations
- Background Subtraction
- Filtering
- ...

- Thresholding
- Connected Component Labelling
- ...

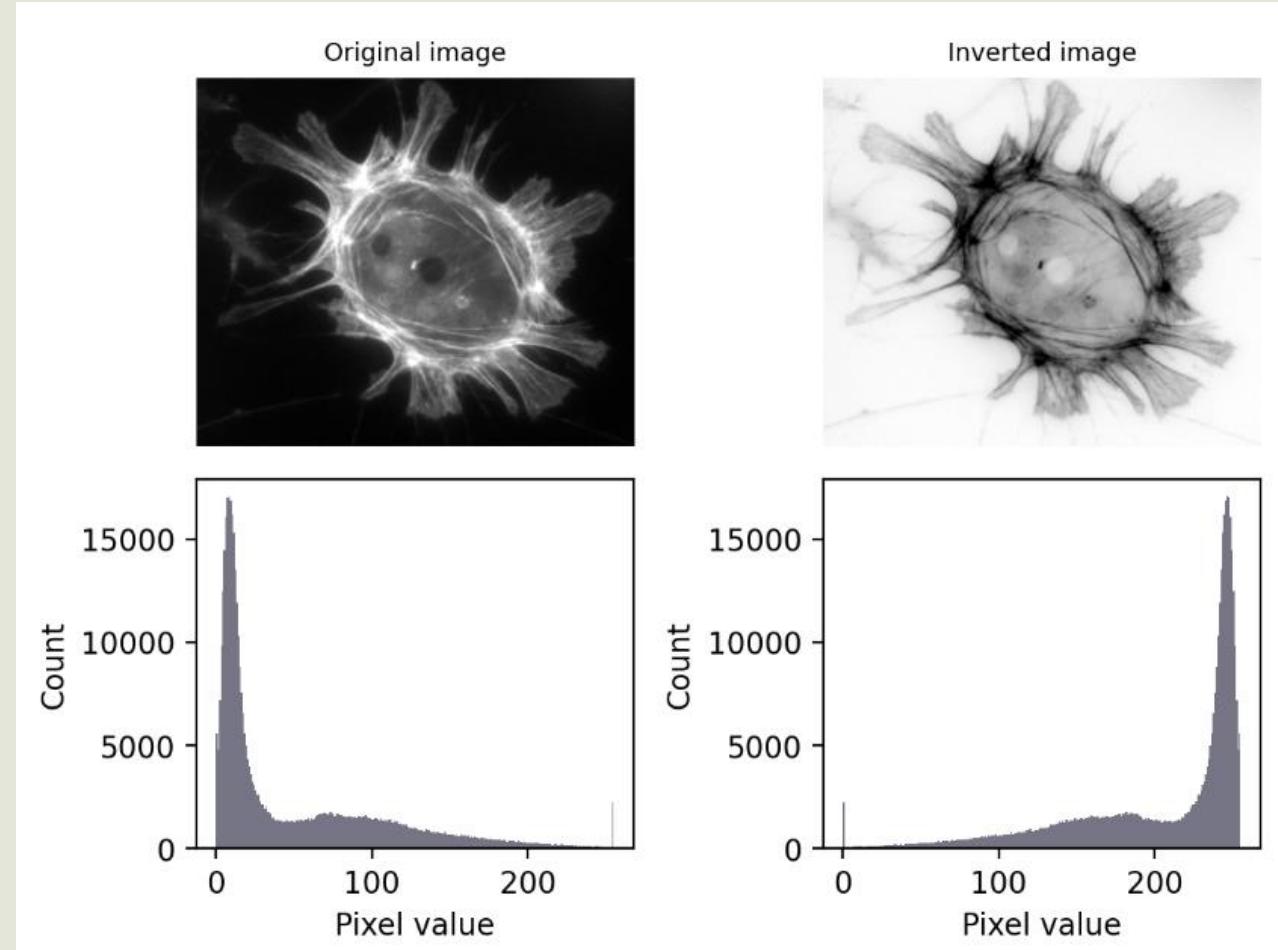
Image Operators



Point operations

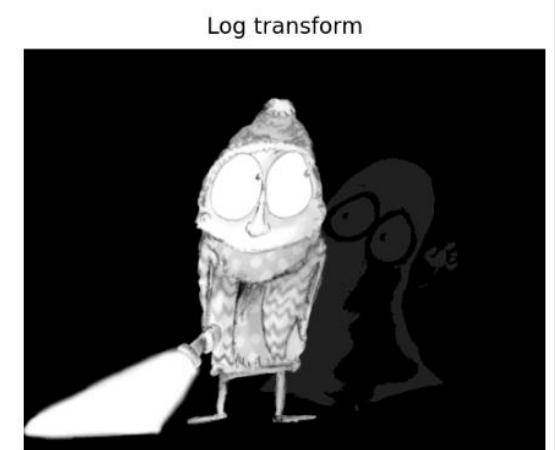
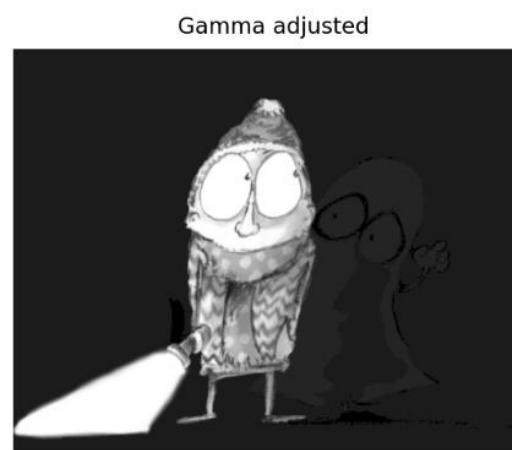
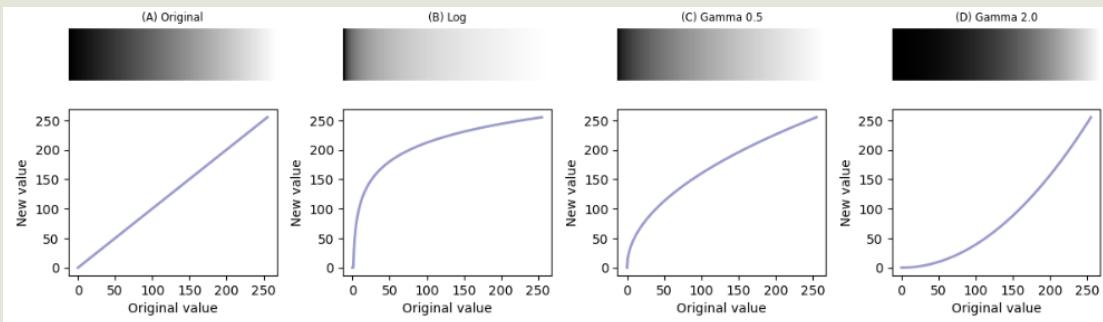
Point operations

Pixel values are just numbers



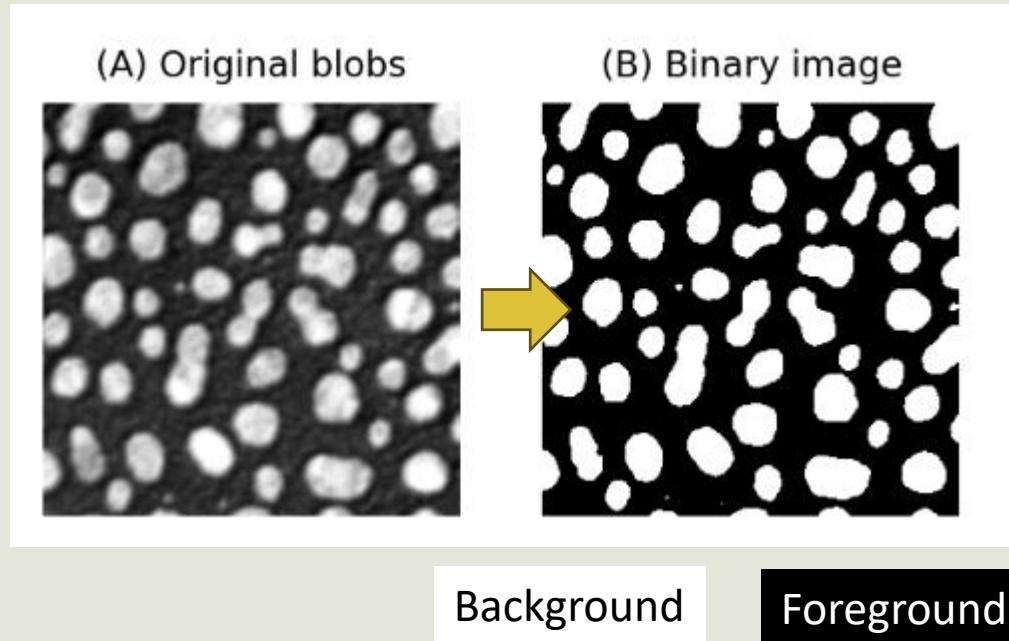
Nonlinear contrast enhancement

Nonlinear contrast enhancement



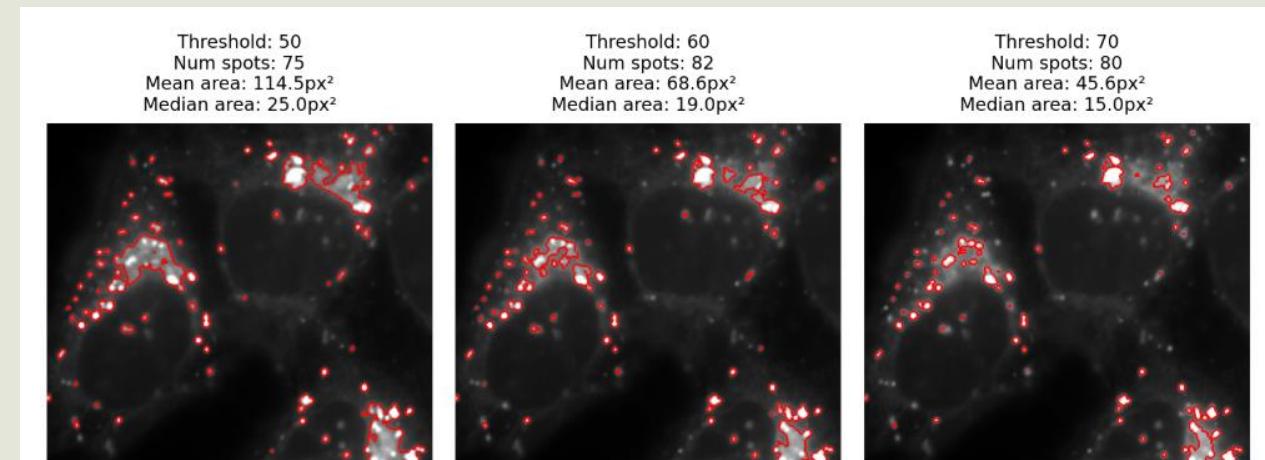
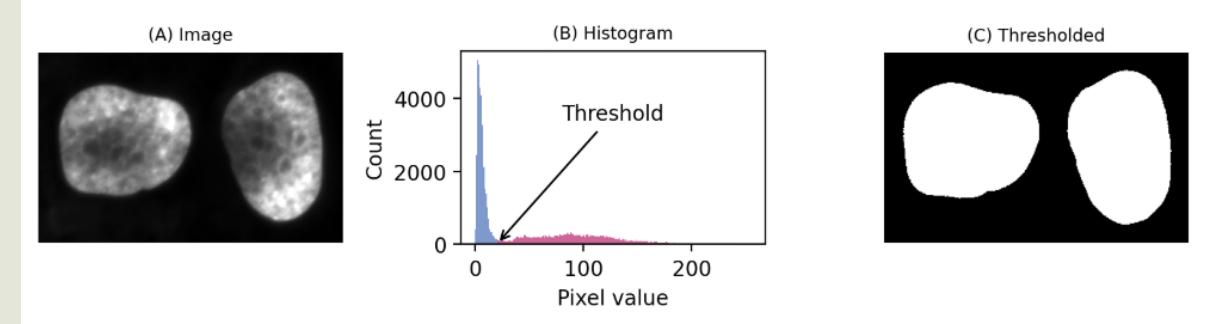
should be used with caution

Thresholding



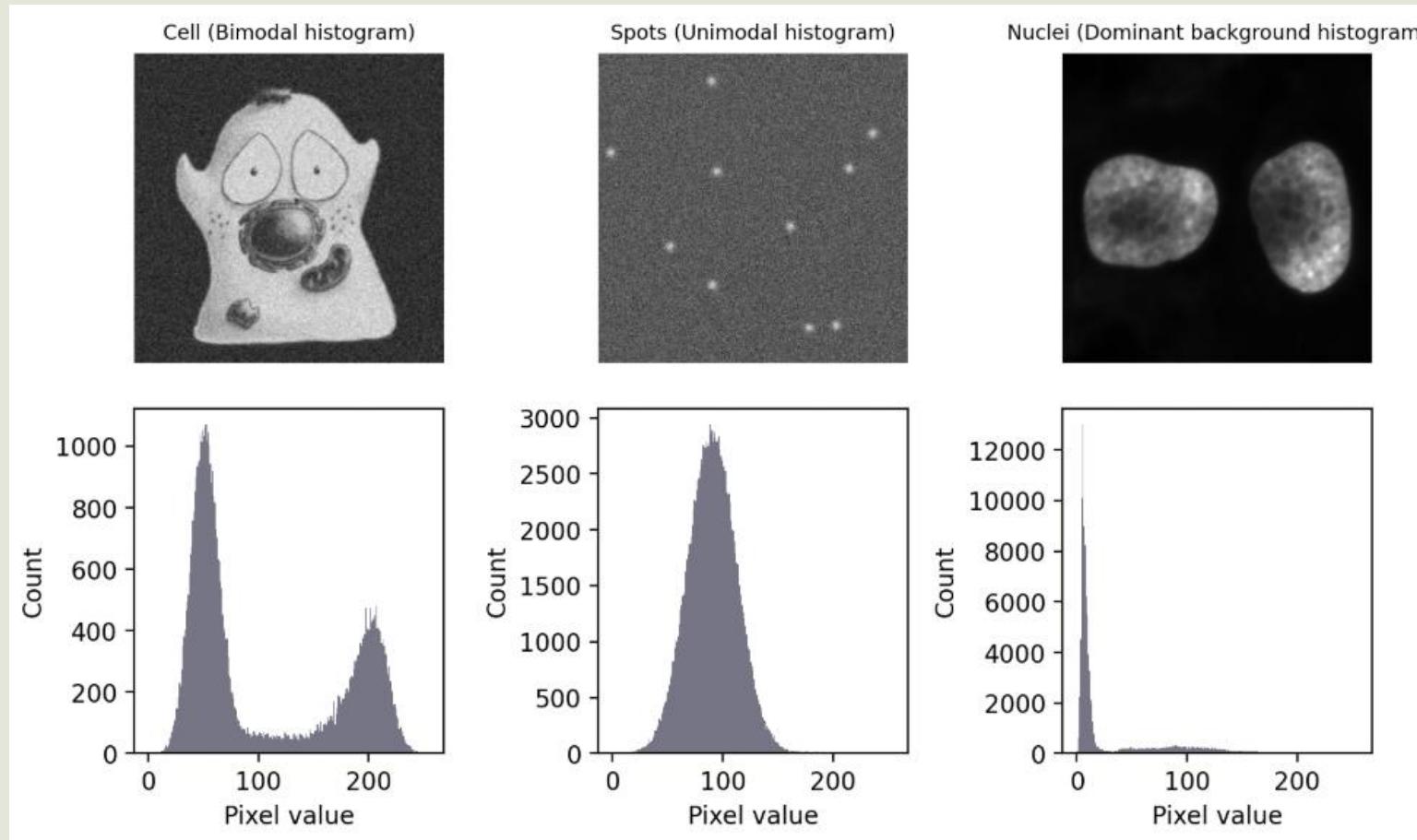
Avoid manual adjustments if possible.

Global thresholding



Thresholding

Automated thresholds

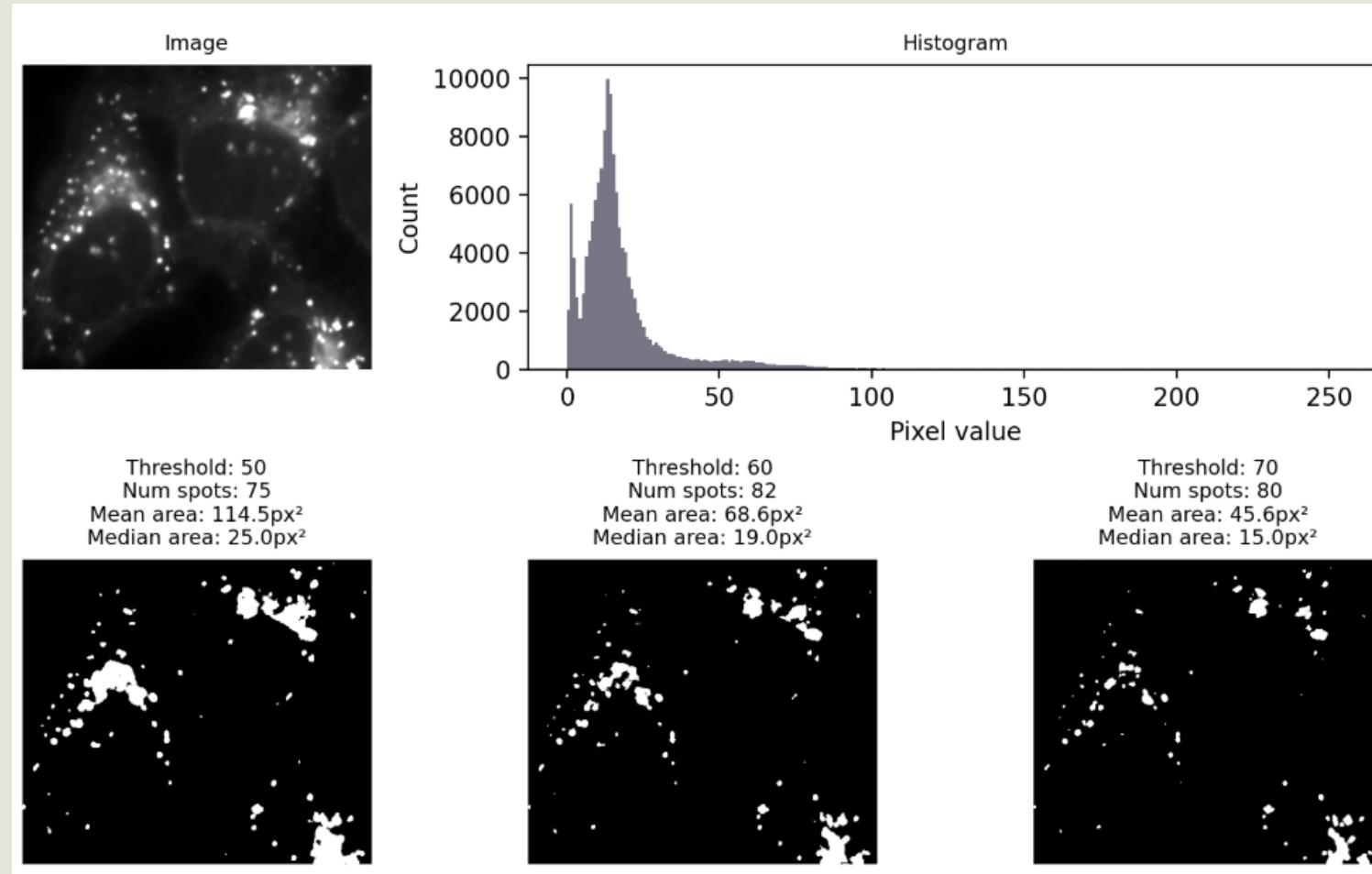


- **Otsu's method**
- **Minimum method**
- **Triangle method**
- **Mean method**
- **Mean & Standard deviation**
- **Median & Median Absolute Deviation**
- ...

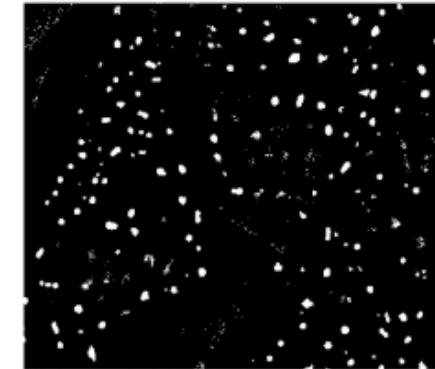
Reduce bias !

Thresholding

Local thresholding

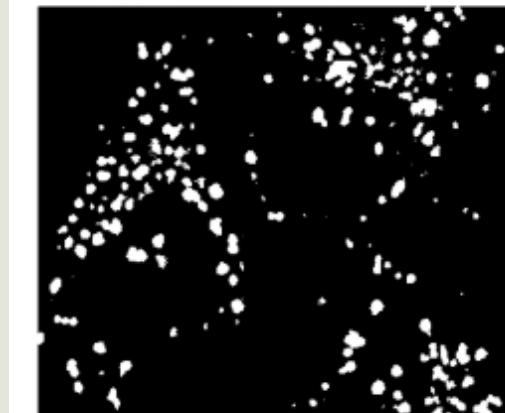


(C) Niblack threshold applied to (A)



Or Background subtracted

(F) Triangle threshold applied to (D)



Citing the thresholding algorithm

- Cite the thresholding method of your choice properly

"We segmented the cell nuclei in the images using Otsu's thresholding method (Otsu et al. 1979) implemented in Fiji (Schindelin et al. 2012)."

IEEE TRANSACTIONS ON SYSTEMS, MAN, AND CYBERNETICS, VOL. SMC-9, NO. 1, JANUARY 1979

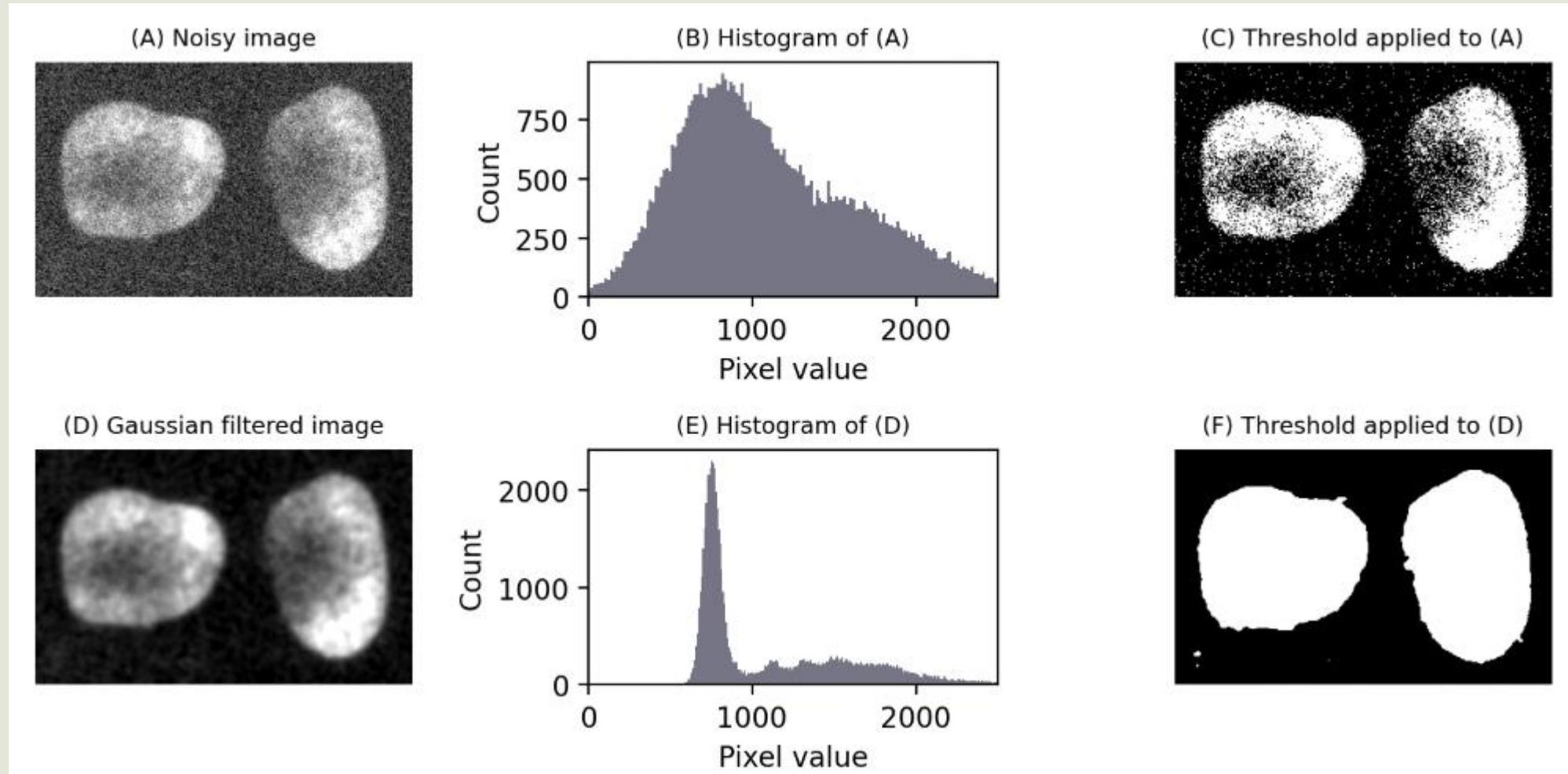
A Threshold Selection Method from Gray-Level Histograms

NOBUYUKI OTSU

Abstract—A nonparametric and unsupervised method of automatic threshold selection for picture segmentation is presented. An optimal threshold is selected by the discriminant criterion, namely, so as to maximize the separability of the resultant classes in gray levels. The procedure is very simple, utilizing only the zeroth- and the first-order cumulative moments of the gray-level histogram. It is straightforward to extend the method to multithreshold problems. Several experimental results are also presented to support the validity of the method.

Filters - improving thresholding results

Filtering can make segmentation much easier by **enhancing features** and **reducing noise**



Morphological Operators

- **Morphological operations** can be used to refine or modify the shapes of objects in images.
- Erosion, dilation, opening & closing
- Boundaries & outlines
- Filling holes
- Thinning & skeletonization

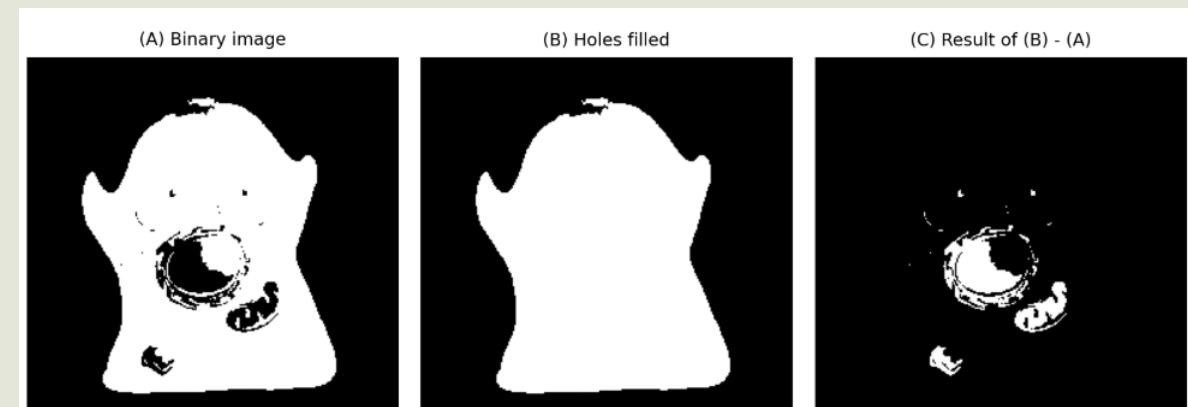
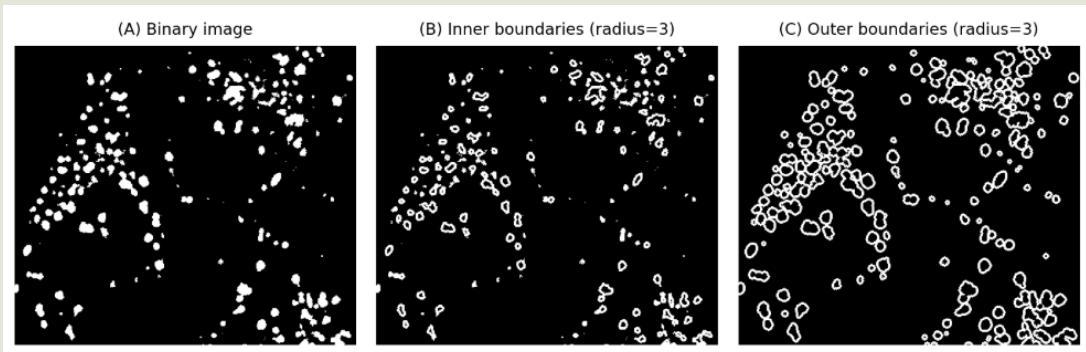


Image transforms (The watershed transform)

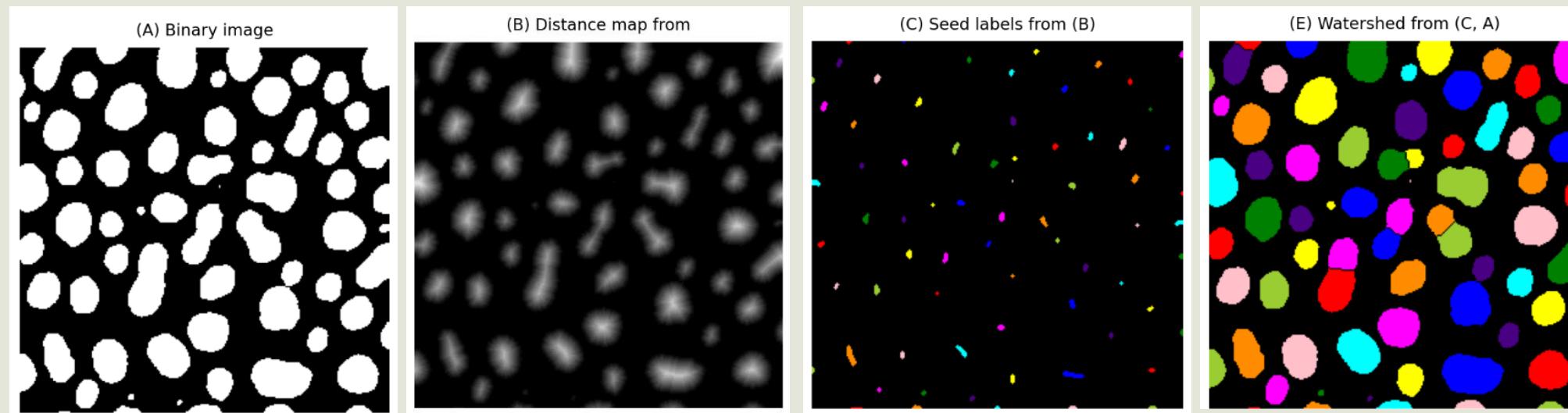
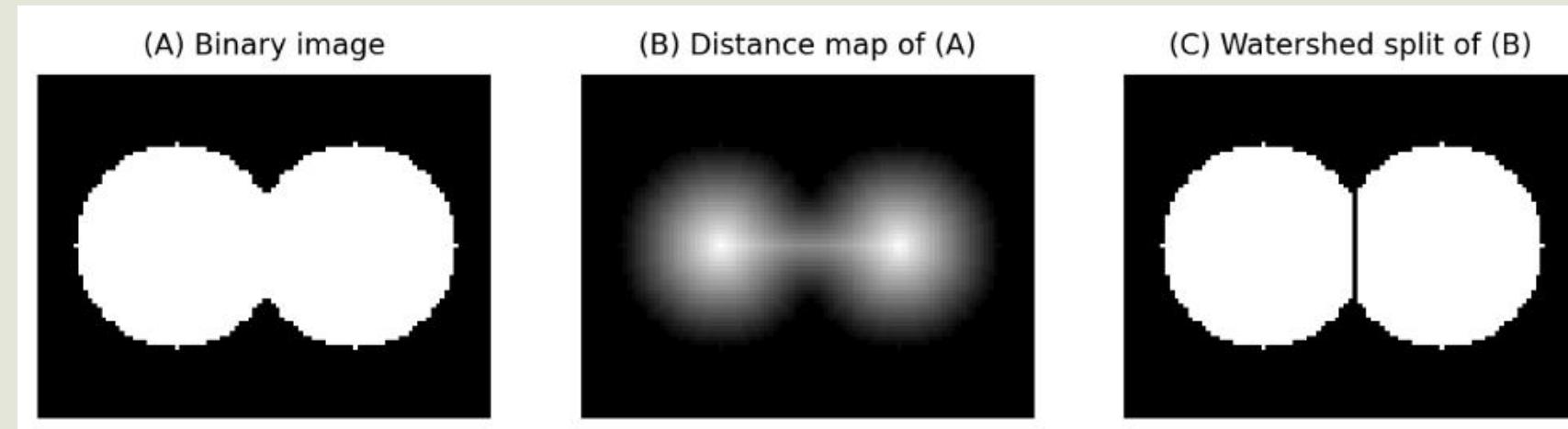
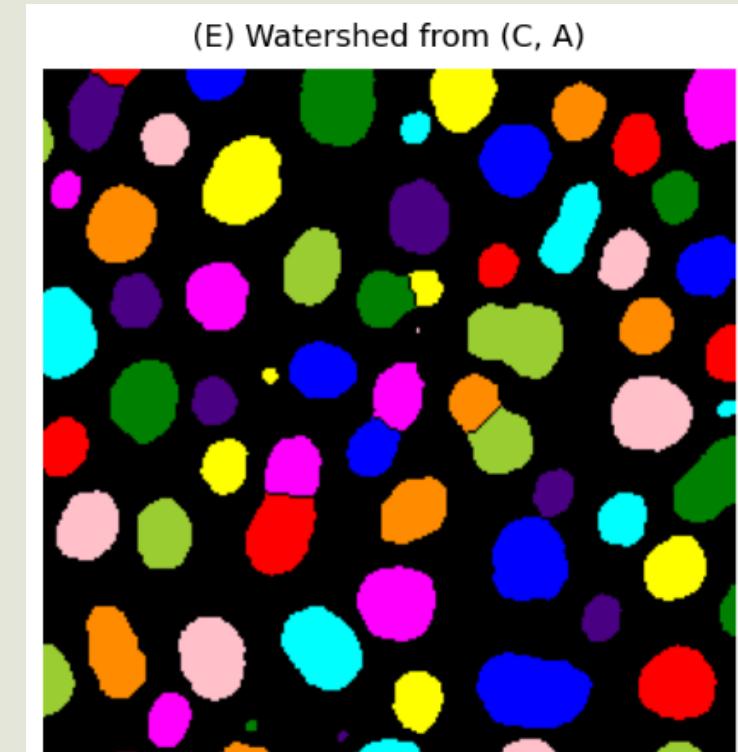
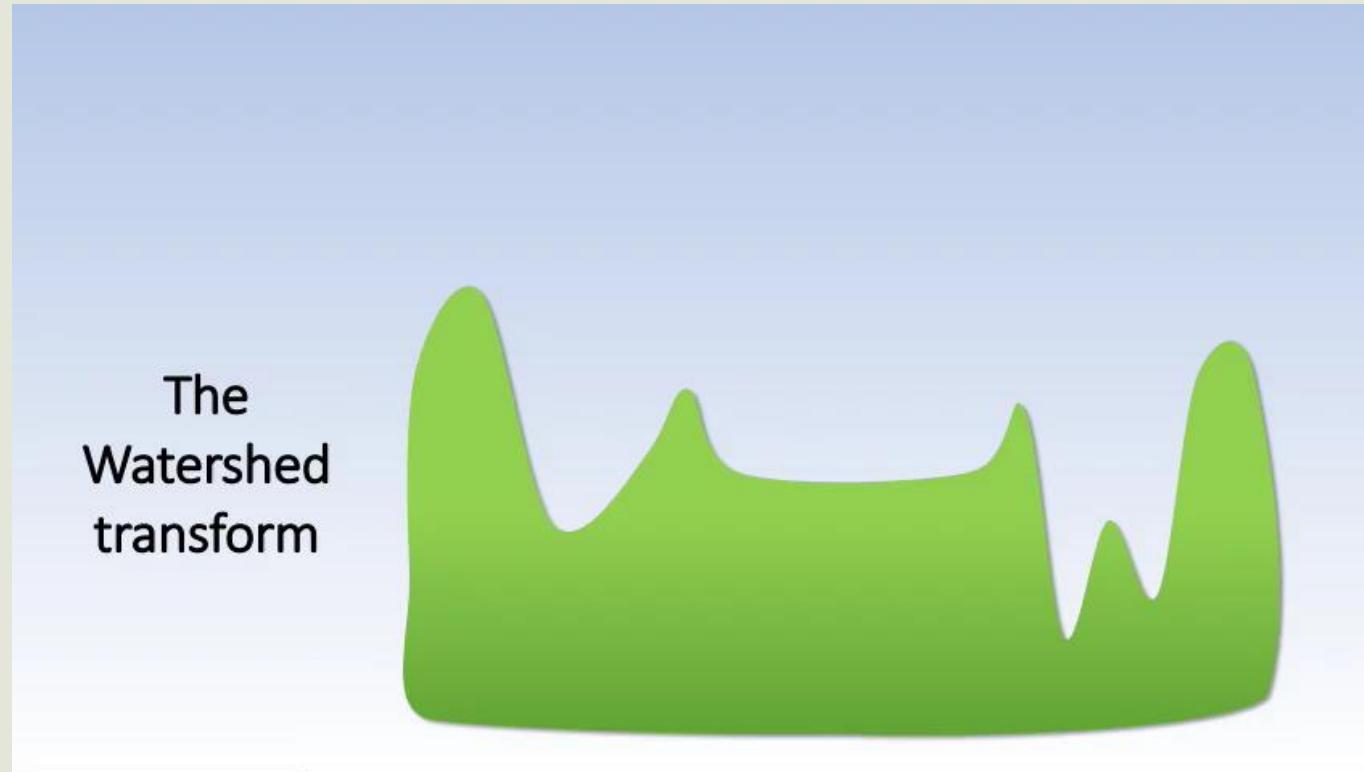
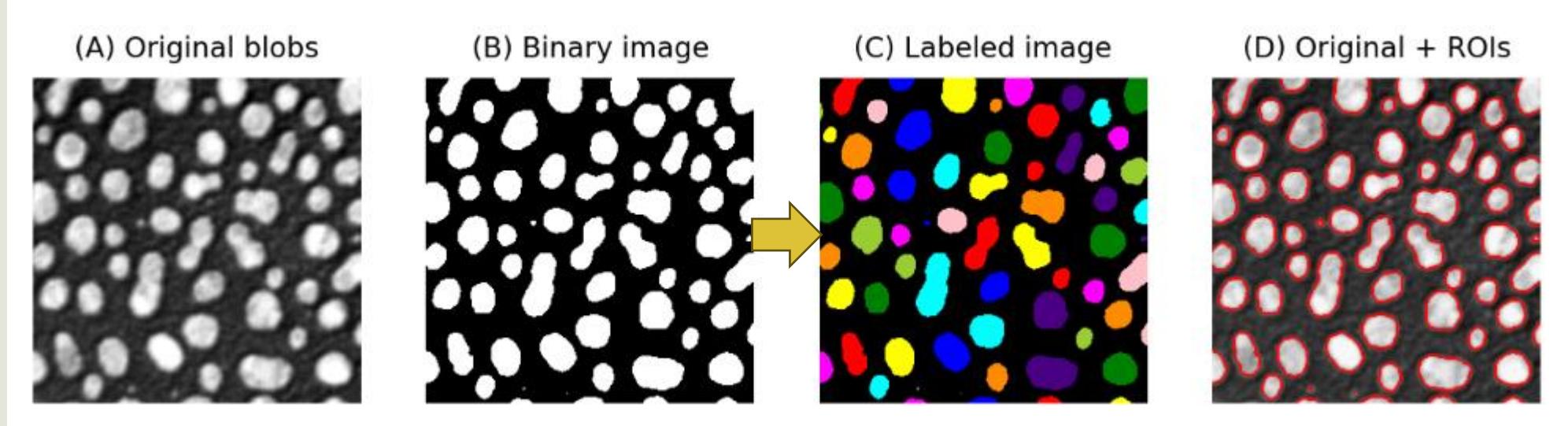


Image transforms (The watershed transform)

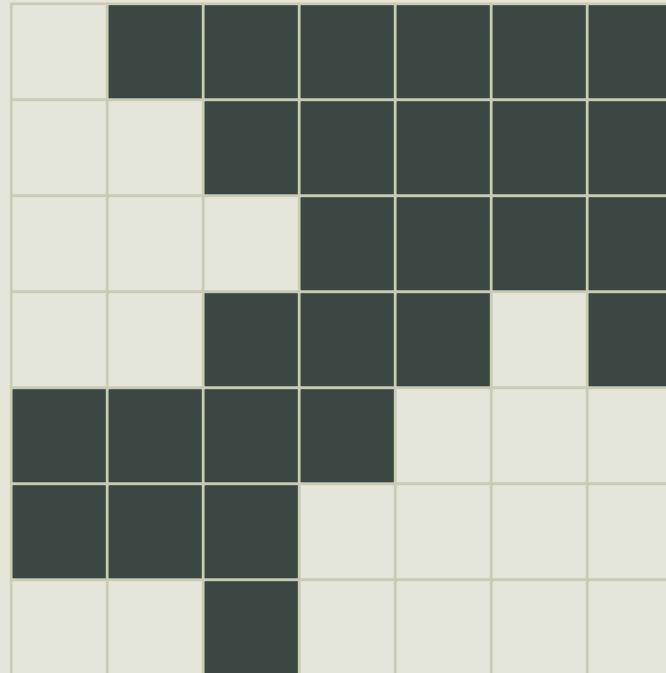


Connected Component Labelling & Region of Interest (ROI)



Connected Component Labelling & Region of Interest (ROI)

- In order to allow the computer differentiating objects, connected component analysis (CCA) is used to mark pixels belonging to different objects with different numbers
- Background pixels are marked with 0.
- The maximum intensity of a labelled map corresponds to the number of objects.



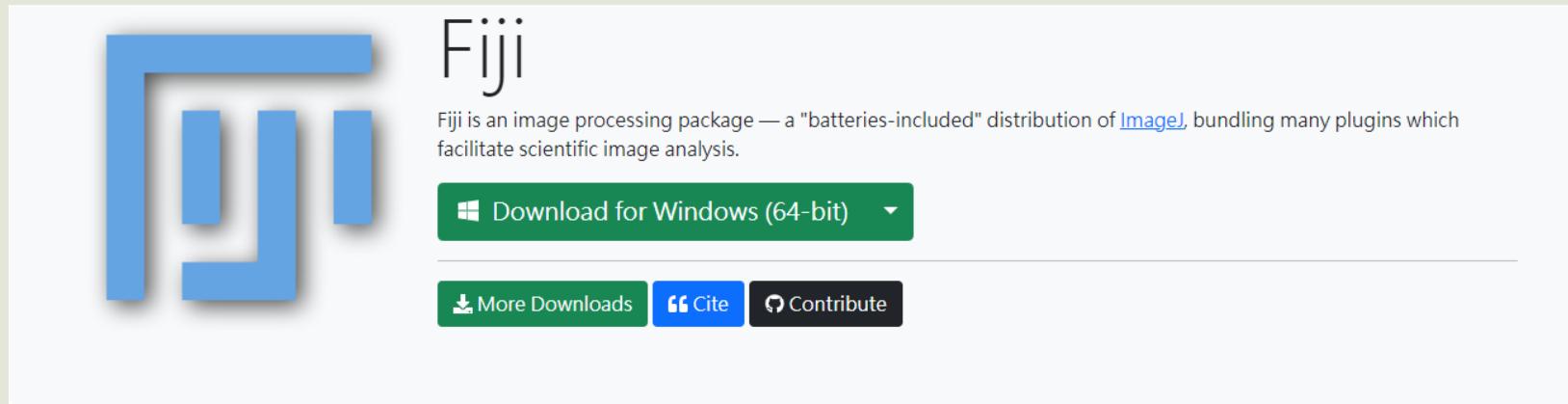
CCA

1	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0
1	1	1	0	0	0	0	0
1	1	0	0	0	3	0	0
0	0	0	0	3	3	3	3
0	0	0	3	3	3	3	3
2	2	0	3	3	3	3	3

Part III:

Open-source tools for Bio-image analysis -
(Fiji)

(Fiji is just) imageJ



The screenshot shows the official Fiji project website. At the top left is the Fiji logo, which consists of a stylized blue 'f' shape. To its right is the word "Fiji". Below the logo is a brief description: "Fiji is an image processing package — a "batteries-included" distribution of [ImageJ](#), bundling many plugins which facilitate scientific image analysis." Below this text are several buttons: a green "Download for Windows (64-bit)" button with a white icon, a green "More Downloads" button with a white icon, a blue "Cite" button with a white icon, and a black "Contribute" button with a white icon. The main content area features three sections: "Why Fiji?" with icons for "Easy to Use" (green checkmark), "Powerful" (blue gears), and "Free & Open Source" (red heart). Each section includes a brief explanatory paragraph. At the bottom right of the main content area is a blue link: <https://fiji.sc/>.

Why Fiji?

- Easy to Use**
Fiji is easy to use and install - in one-click, Fiji installs all of its plugins, features an automatic updater, and offers comprehensive documentation.
- Powerful**
Fiji bundles together many popular and useful ImageJ plugins for image analysis into one installation, and automatically manages their dependencies and updating.
- Free & Open Source**
Like ImageJ itself, Fiji is an [open source](#) project hosted on [GitHub](#), developed and written by the community.

ImageJ, ImageJ2 and FIJI



ImageJ Citation:

Schneider, C. A., Rasband, W. S., & Eliceiri, K. W. (2012).
NIH Image to ImageJ: 25 years of image analysis.
Nature Methods, 9(7), 671–675. [doi:10.1038/nmeth.2089](https://doi.org/10.1038/nmeth.2089)



ImageJ2 Citation:

Rueden, C. T., Schindelin, J., Hiner, M. C., DeZonia, B. E., Walter, A. E., Arena, E. T., & Eliceiri, K. W. (2017).
ImageJ2: ImageJ for the next generation of scientific image data.
BMC Bioinformatics, 18(1). [doi:10.1186/s12859-017-1934-z](https://doi.org/10.1186/s12859-017-1934-z)



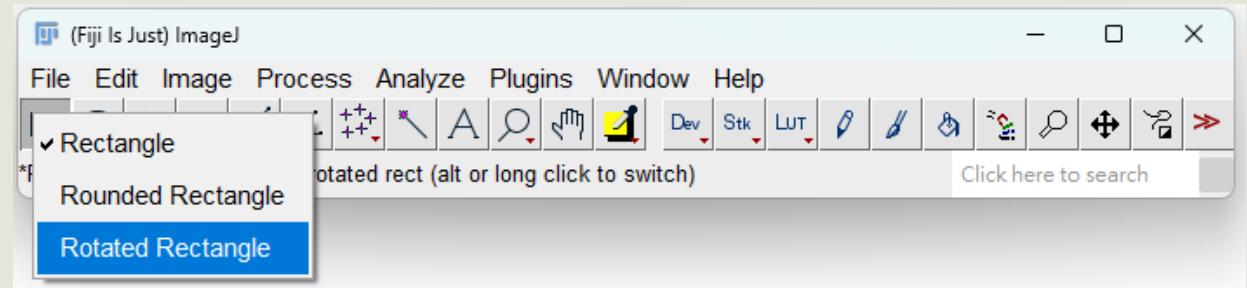
FIJI Citation:

Schindelin, J., Arganda-Carreras, I., Frise, E., Kaynig, V., Longair, M., Pietzsch, T., ... Cardona, A. (2012).
Fiji: an open-source platform for biological-image analysis.
Nature Methods, 9(7), 676–682. [doi:10.1038/nmeth.2019](https://doi.org/10.1038/nmeth.2019)

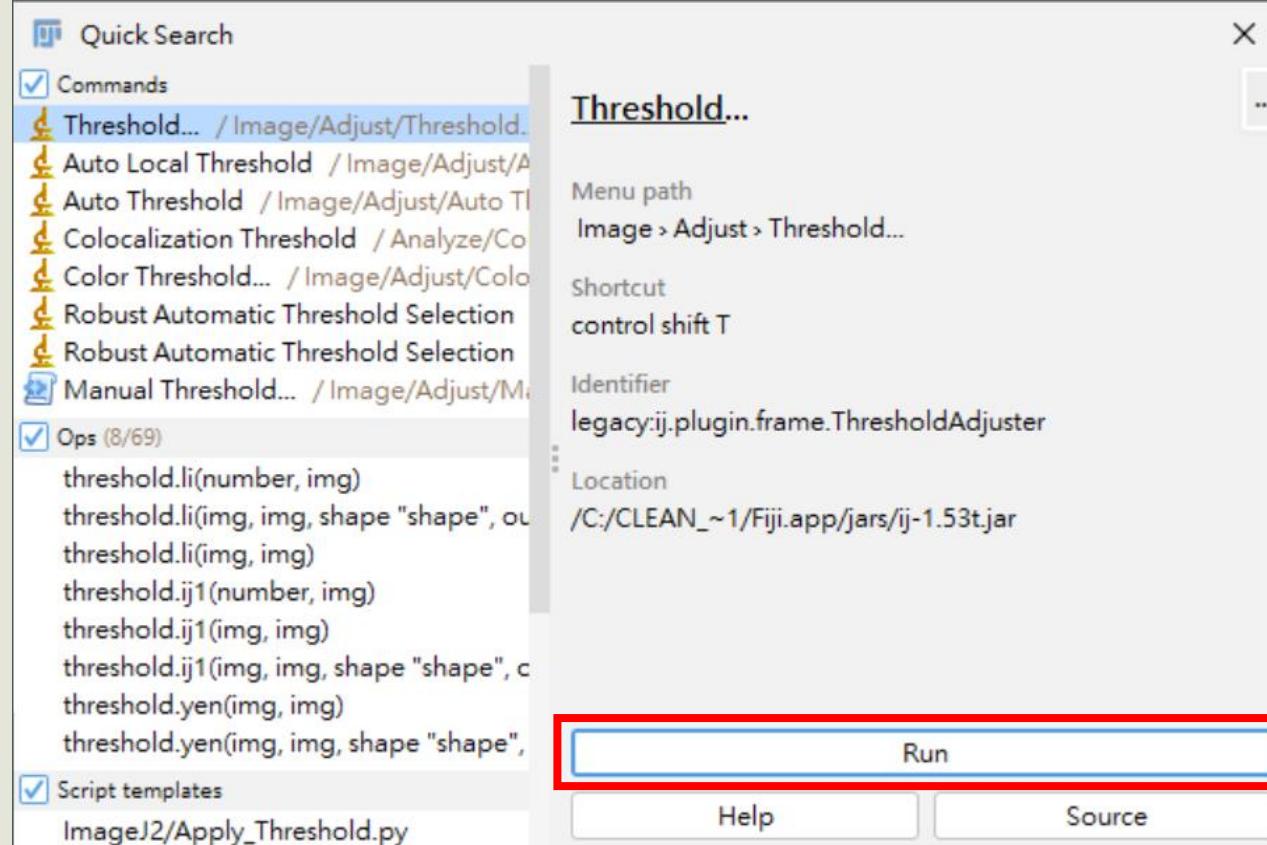
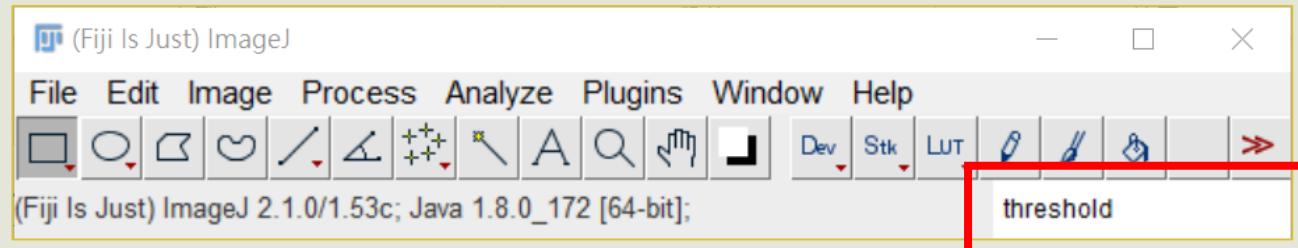
Also, cite the plugins and the algorithm used in your research.

Fiji's user interface

- There are more tools in the toolbar than expected...
- Use the right click or double click to discover them!



Search Bar

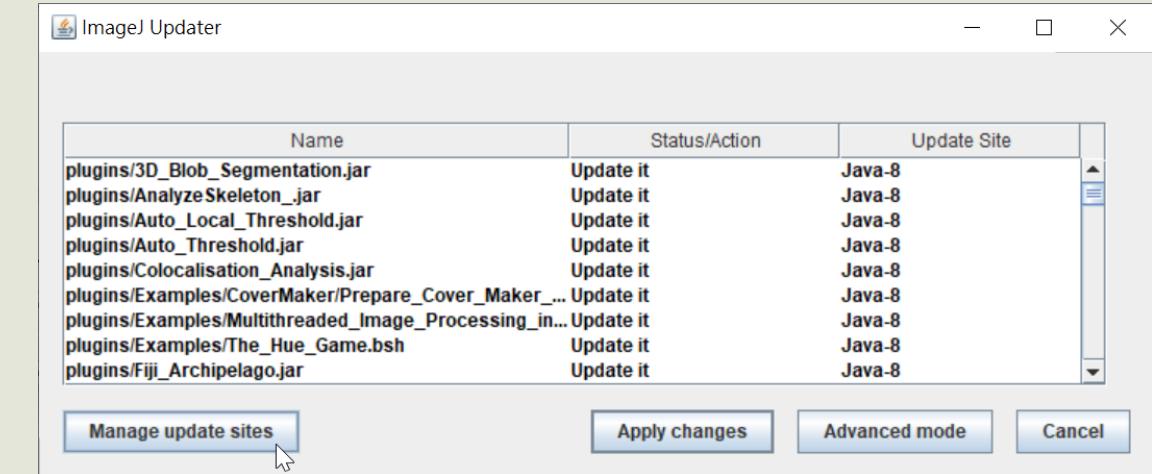
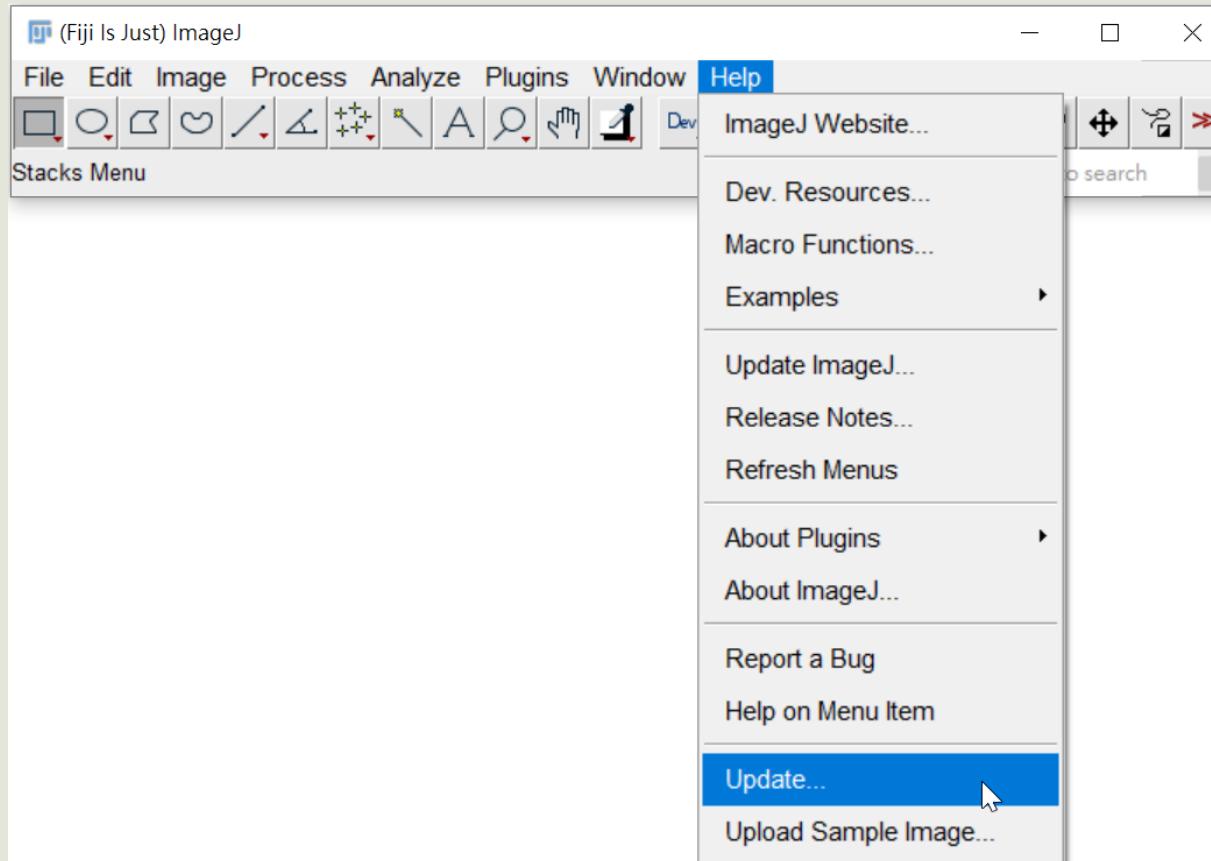


- It shows you where the plugin is located
- You can run it from here (press enter)

ImageJ : command finder (Hotkey “L”)

Command	Menu Path	Class	File
16 Colors	Image>Lookup Tables		
16-bit	Image>Type	ij.plugin.Converter("16-bit")	
3-2 RGB	Image>Lookup Tables	ij.plugin.LutLoader("3-2 RGB")	
32-bit	Image>Type	ij.plugin.Converter("32-bit")	
3D Project...	Image>Stacks	ij.plugin.Projector	
5 Ramps	Image>Lookup Tables		
6 Shades	Image>Lookup Tables		
8-bit	Image>Type	ij.plugin.Converter("8-bit")	
8-bit Color	Image>Type	ij.plugin.Converter("8-bit Color")	
AND...	Process>Math	ij.plugin.filter.ImageMath("and")	
AVI...	File>Import	ij.plugin.AVI_Reader	
AVI...	File>Save As	ij.plugin.filter.AVI_Writer	
About ImageJ...	Help	ij.plugin.AboutBox	
About Startup Macros...	Plugins>Macros		
About These Macros	Plugins>Examples>_Macros	ij.plugin.Macro_Runner("Example...")	
About These Scripts	Plugins>Examples>_Scripts	ij.plugin.Macro_Runner("Example...")	
About These Tools	Plugins>Tools	ij.plugin.Macro_Runner("Tools")	
About This Submenu...	Help>About Plugins	ij.plugin.SimpleCommands("about")	

FIJI updater



- Keep a backup of working version before you update.

http://imagej.net>List_of_update_sites

Loading data and the image formats

Drag to FIJI and release

- Generic image format
- Folder (Import Image Sequence)
- ROI (.roi, .zip)
- Macro files (.ijm)

Bio-Format Importer

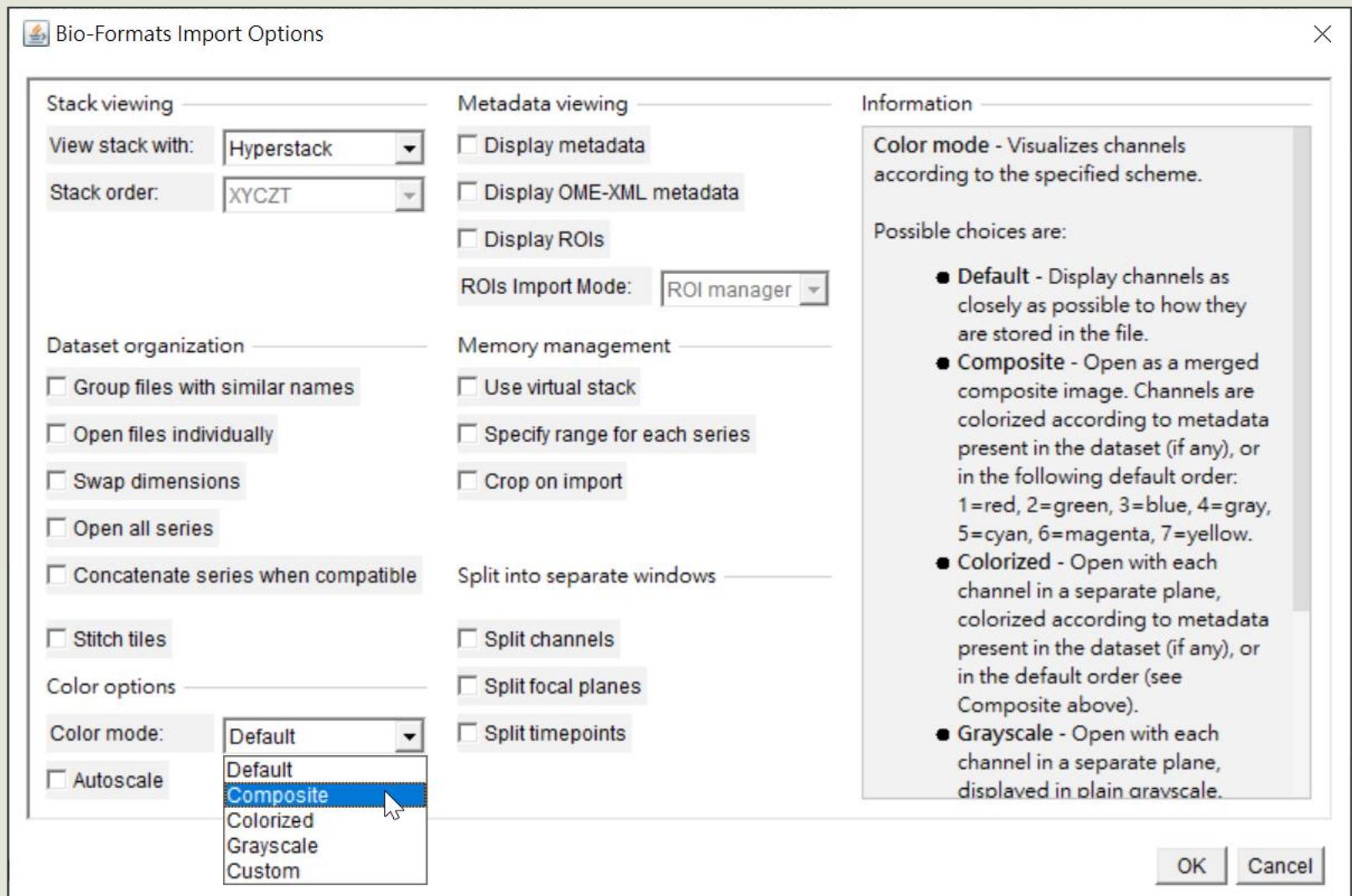
- Vendor specific image format (.czi, .lif, .oir...etc)
- Huygens deconvoluted image ICS2 format (.ics)
- Big Data (Use Virtual Stack)
- Grouped generic image format
- More details in the measurement “label”
(Channel, Z, T, ROI)

Generic image format

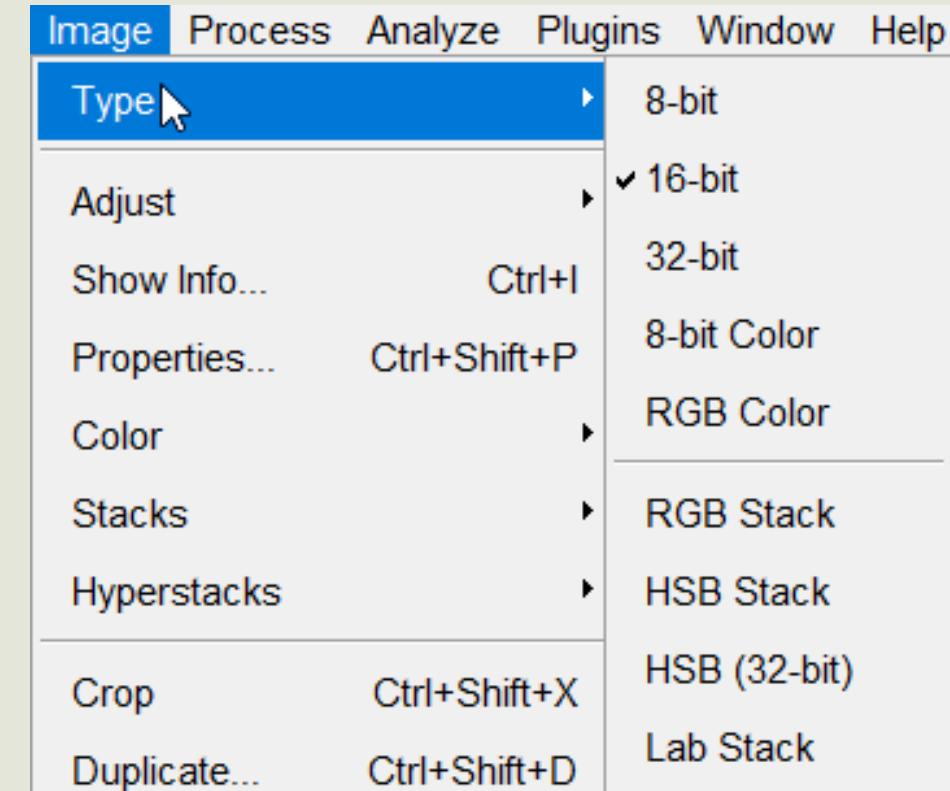
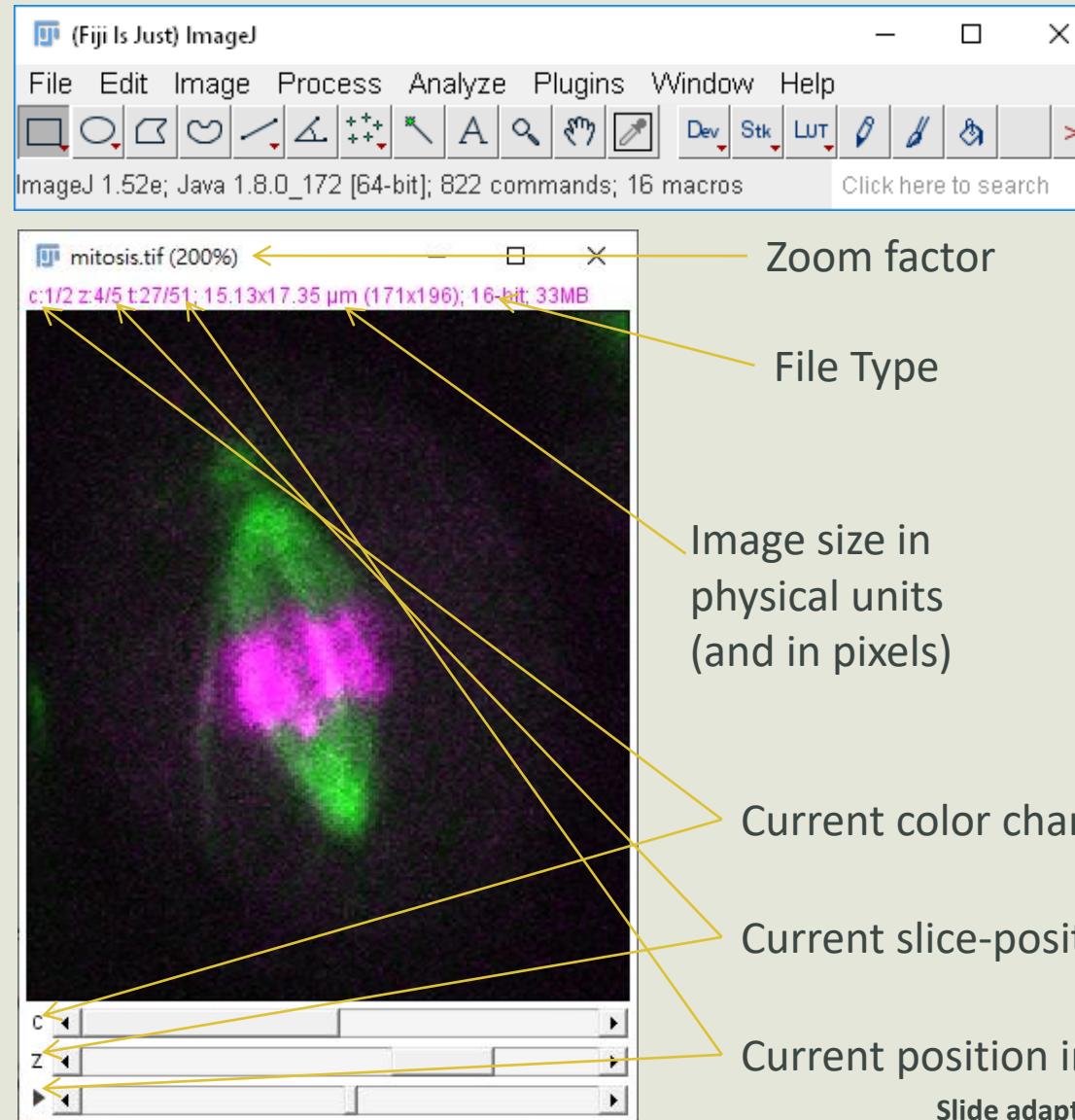
- Tiff/ Tif: 8 bits, 16 bits, 32 bits per channel
24 bits RGB
Can keep part of metadata (e.g. Pixel Size)
- Png: RGB mode only, metadata loss,
(no stacks possible)
- Jpg: lossy compression
- Zip: compressed Tiff (lossless)

Bio-formats importer

- **Composite** is useful for multi-color imaging
- **Autoscale** -> similar to auto contrast
- **Display OME-XML metadata**: easier to read image acquisition settings.
- **Virtual Stack** -> useful for large image (Lazy loading)



Fiji user interface



**Only 1 active window
Only 1 activate channel**

Explore your image

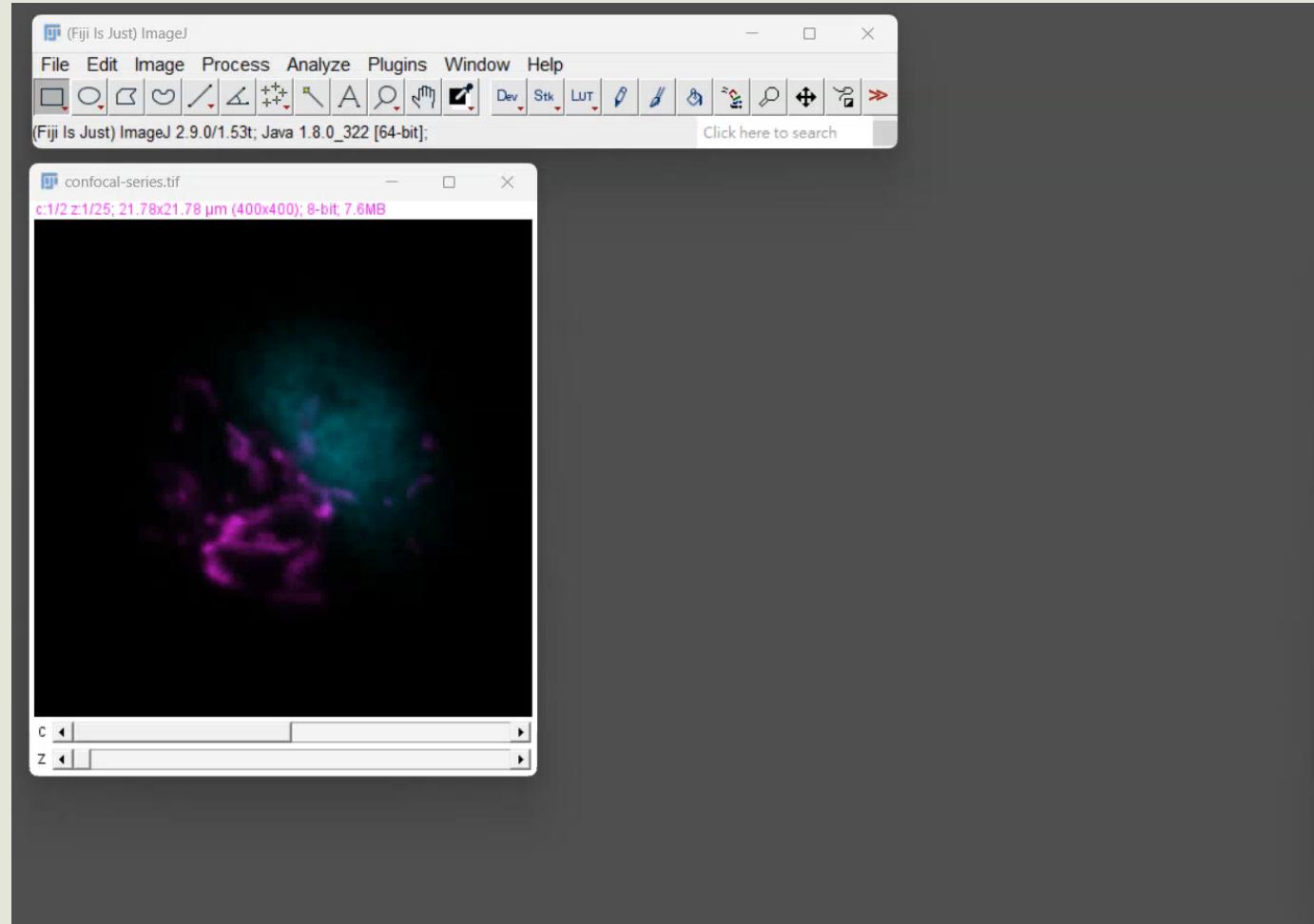
- **Image -> Channels Tool**



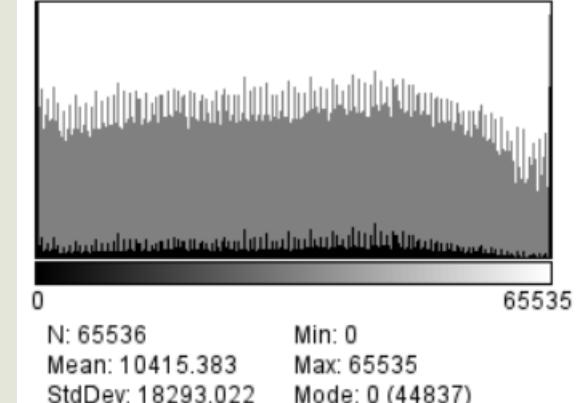
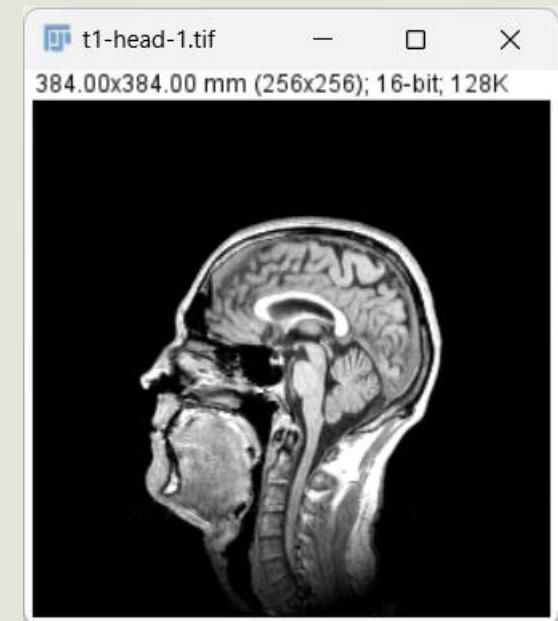
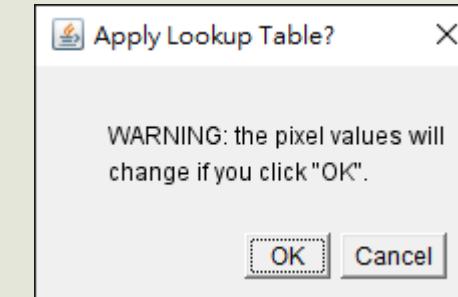
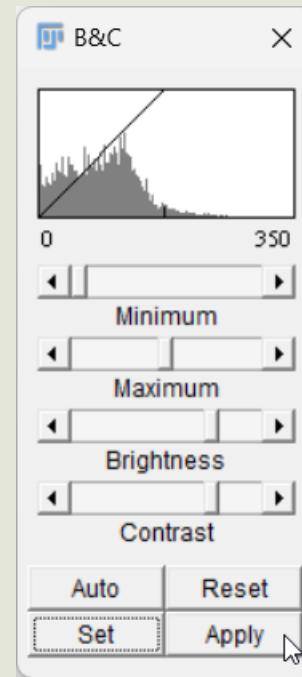
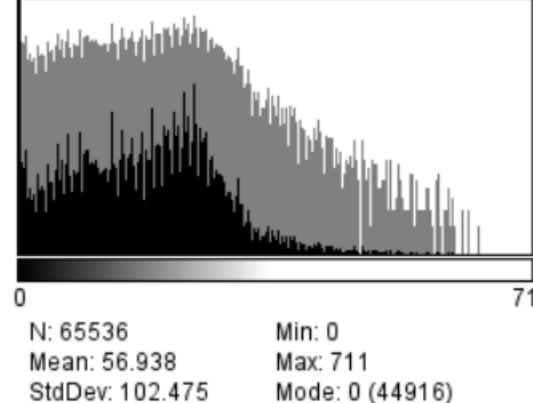
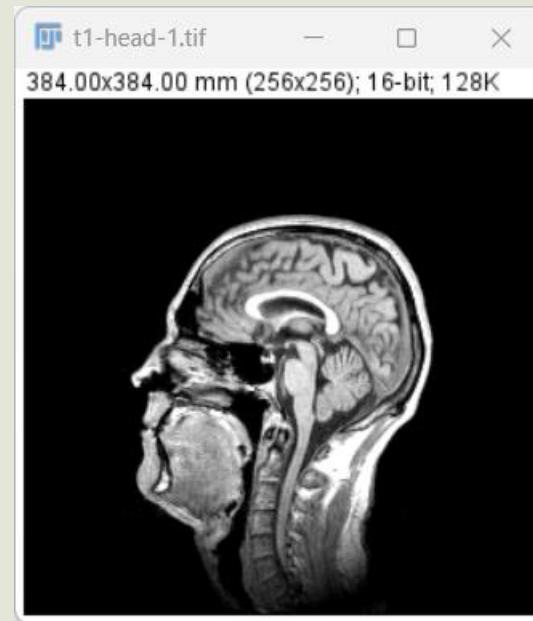
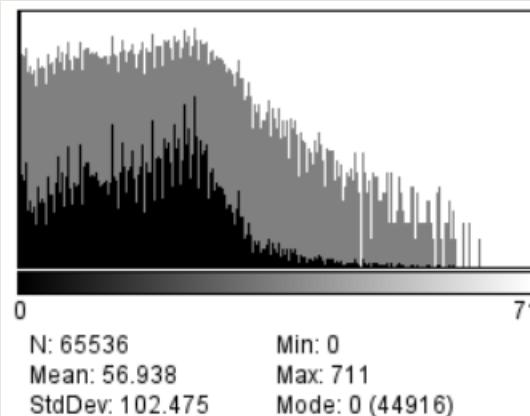
- **Image -> Adjust -> Brightness & Contrast**



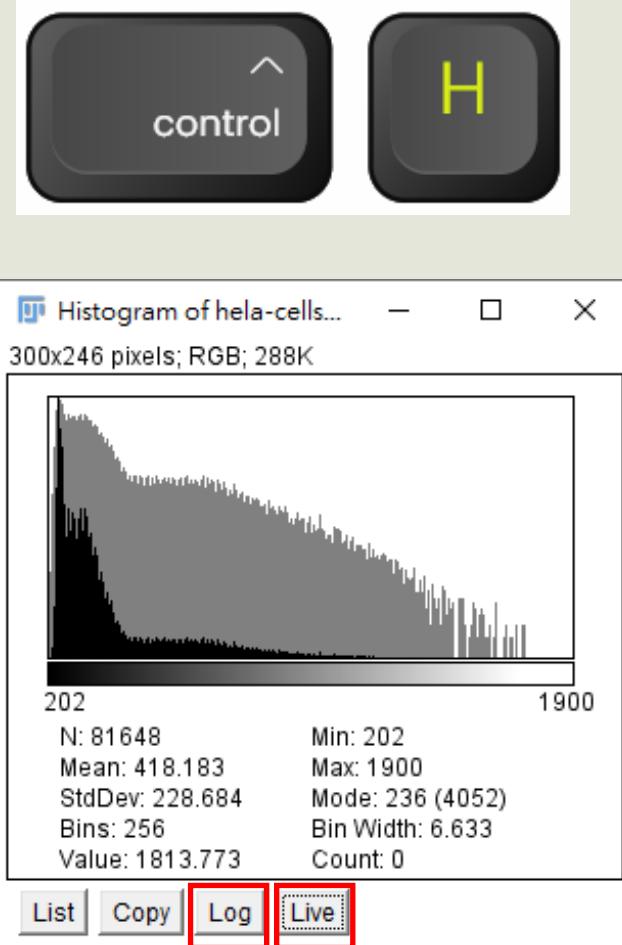
- **Analyze -> Histogram**



Don't "Apply" when you adjust the Brightness & Contrast



Histogram



- log scale
- normal view

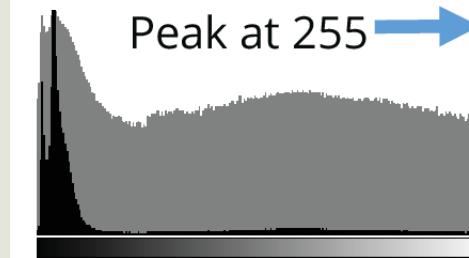
Image histogram examples

Offset, gap to 0

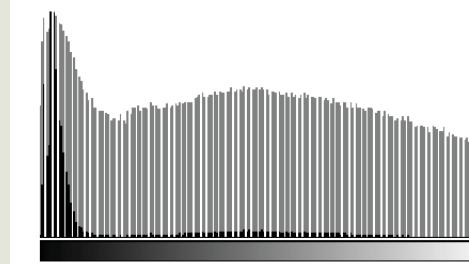


Properly sampled raw images have background!

Peak at 255



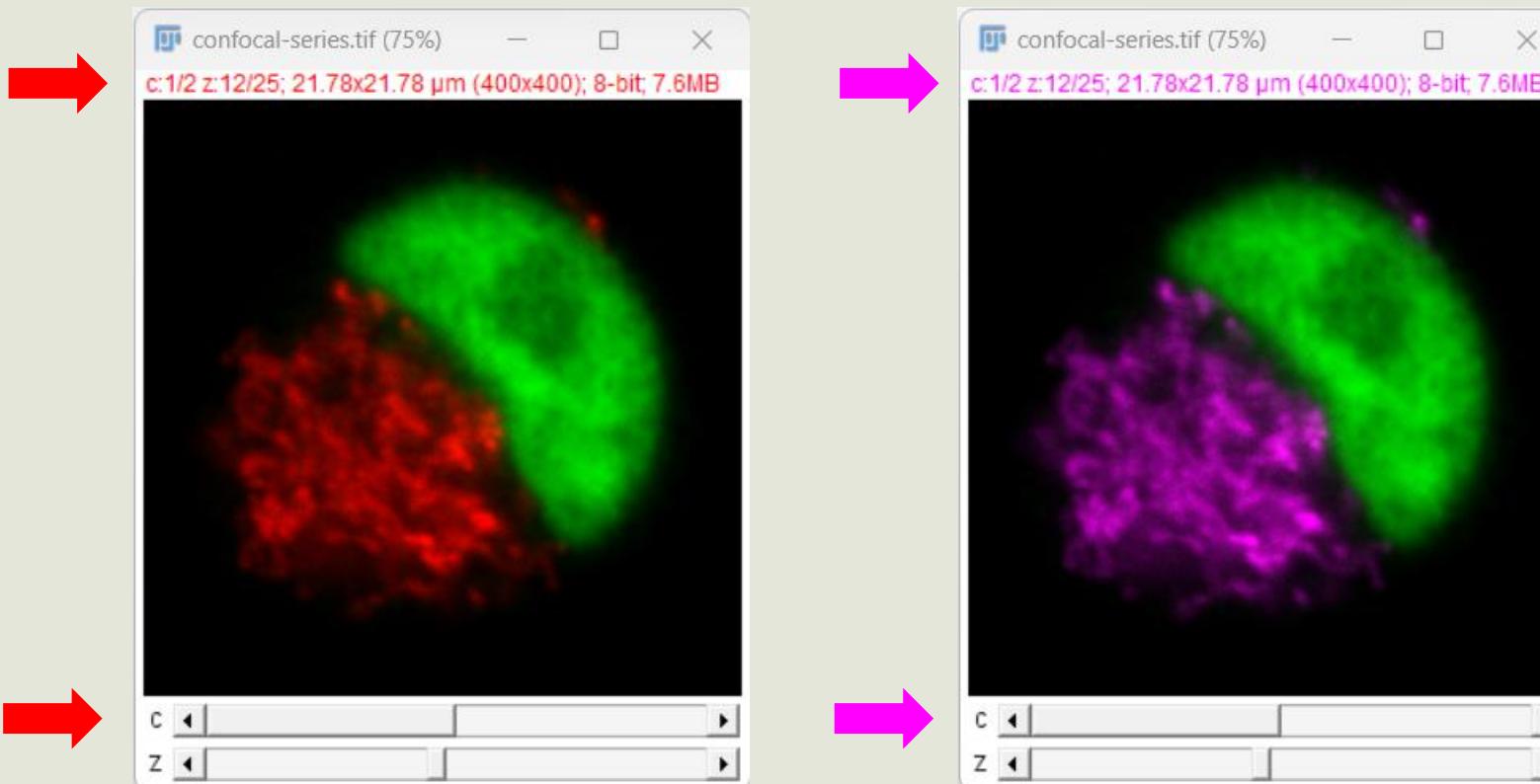
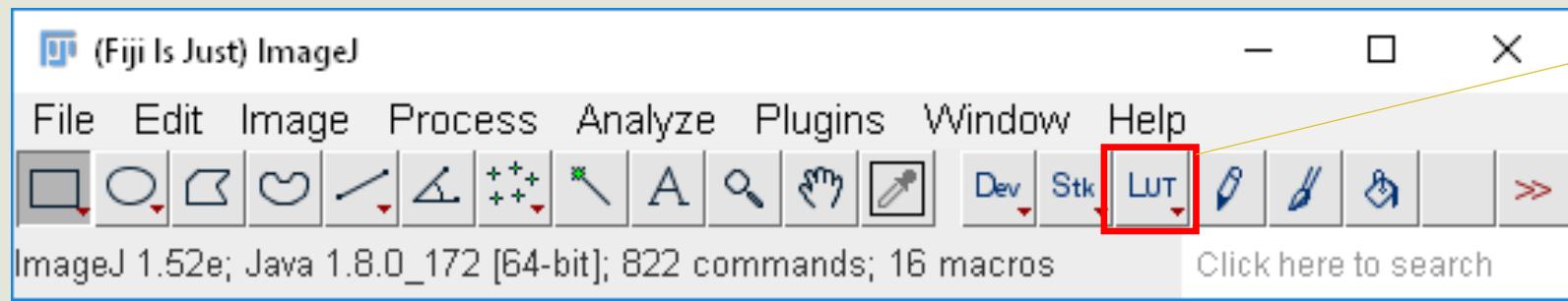
High values clipped
No background



Scaling artefact



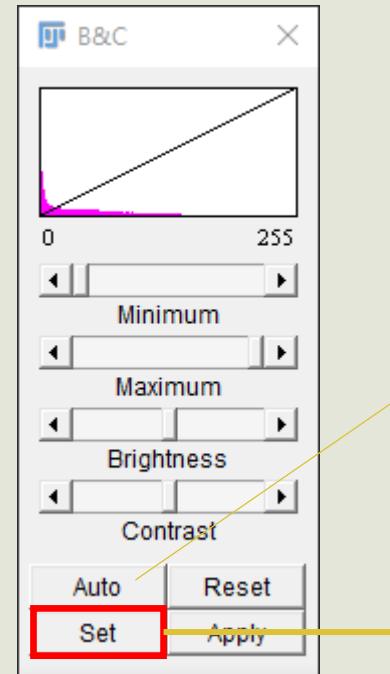
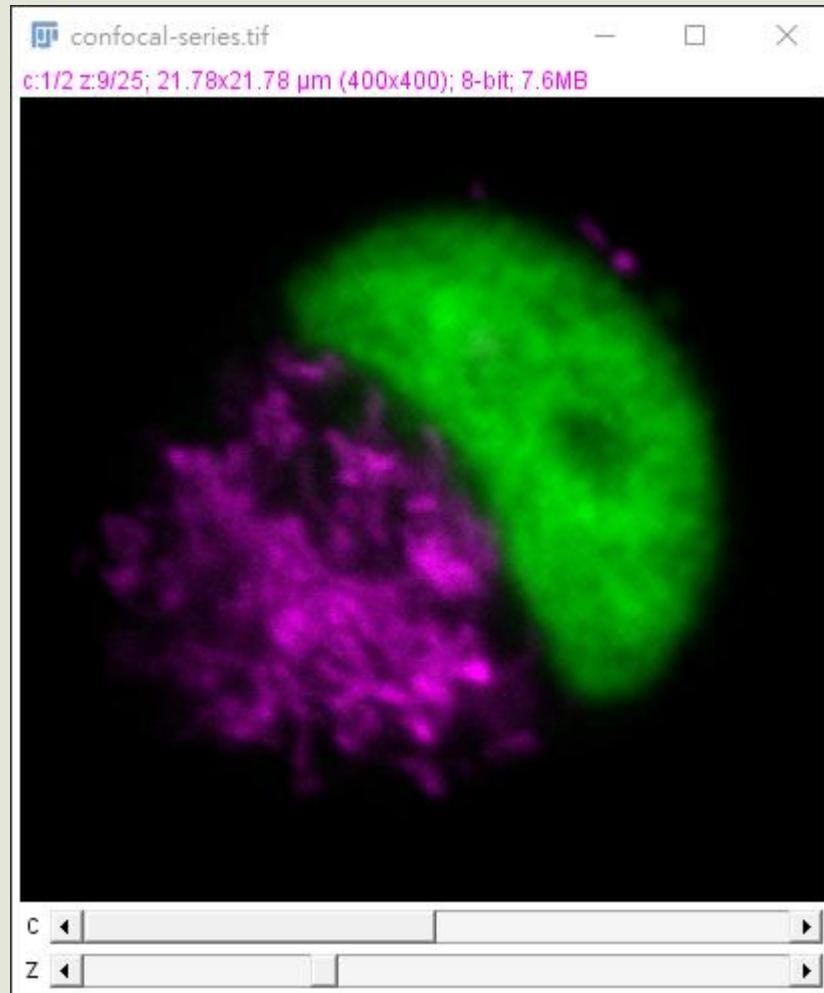
Change color (LUT /Pseudo-colors / Colormaps)



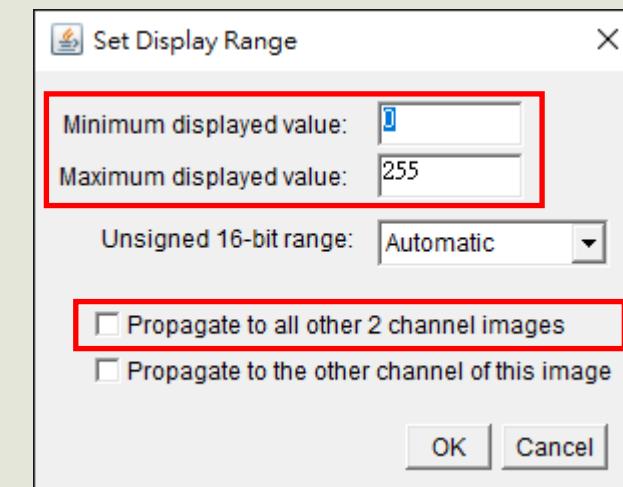
- **LUT button**
- **Image -> Lookup tables**



Use the same display range for the comparable images

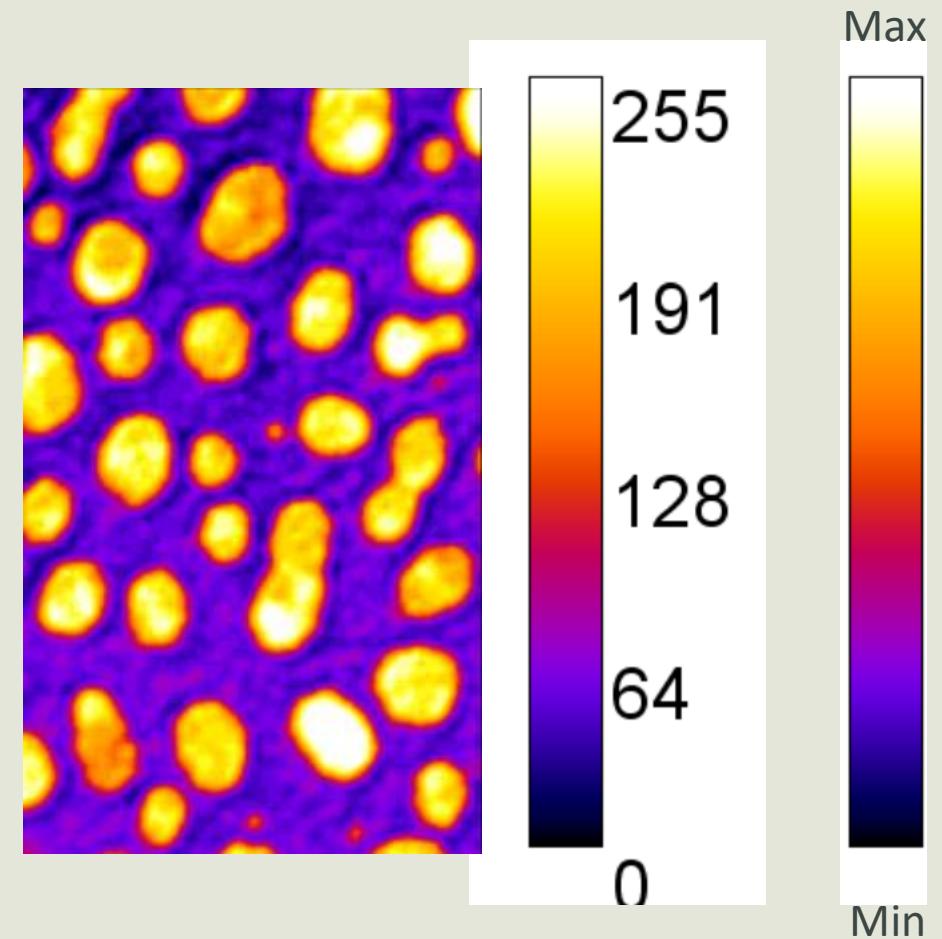
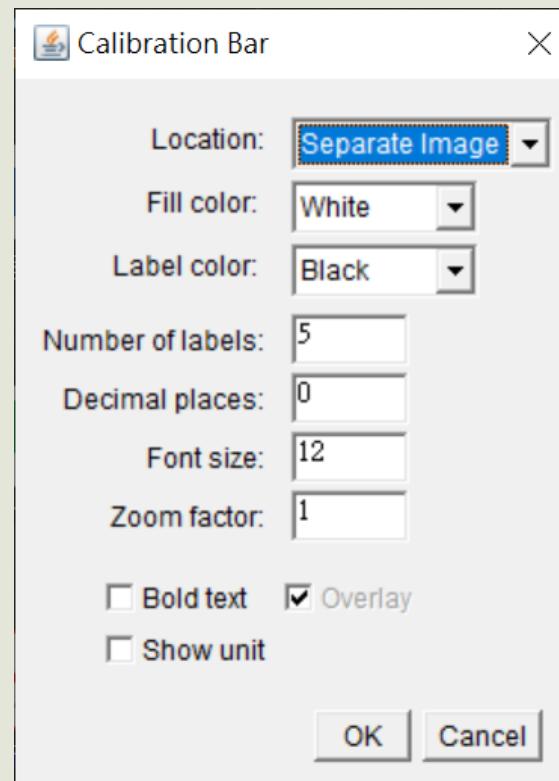


Don't use auto function independently on each images!

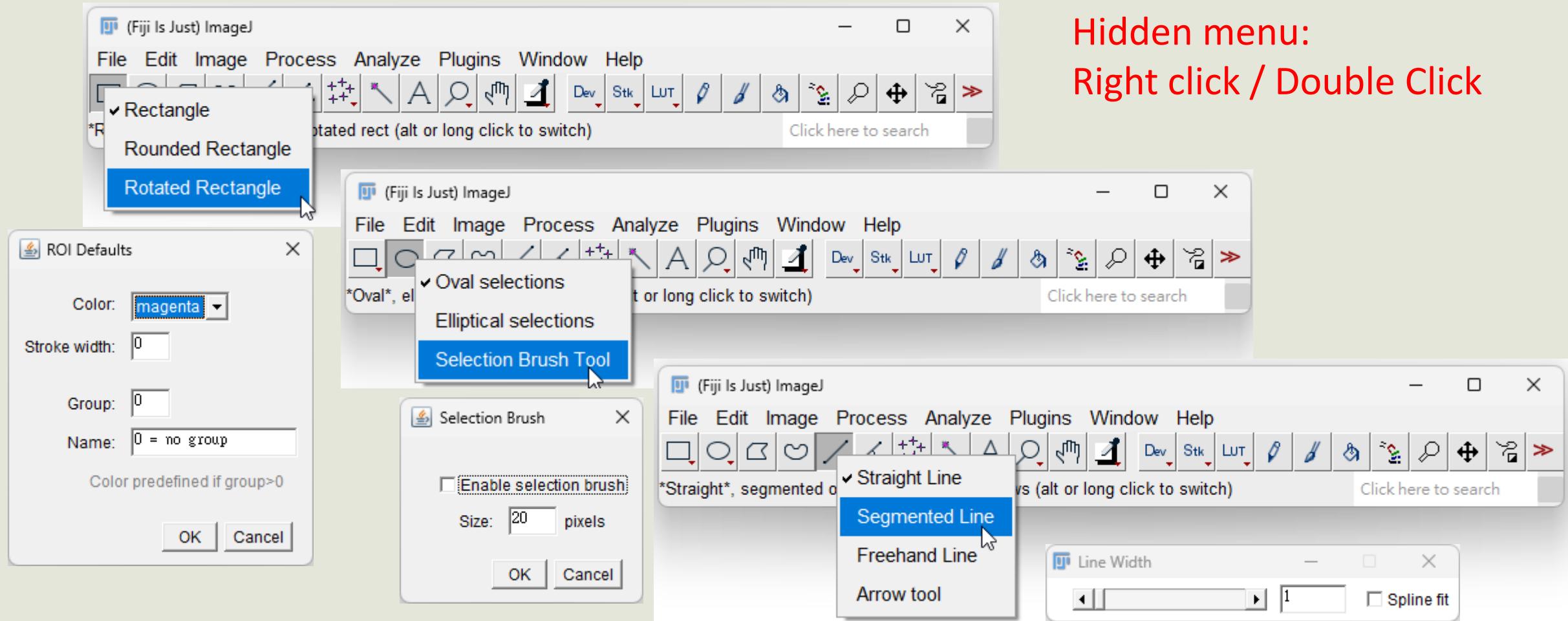


Calibration Bar (Color scale)

- Analysis -> Tools -> Calibration Bar
- Only work for single channel image
- Brightness and Contrast setting affect the Calibration Bar!



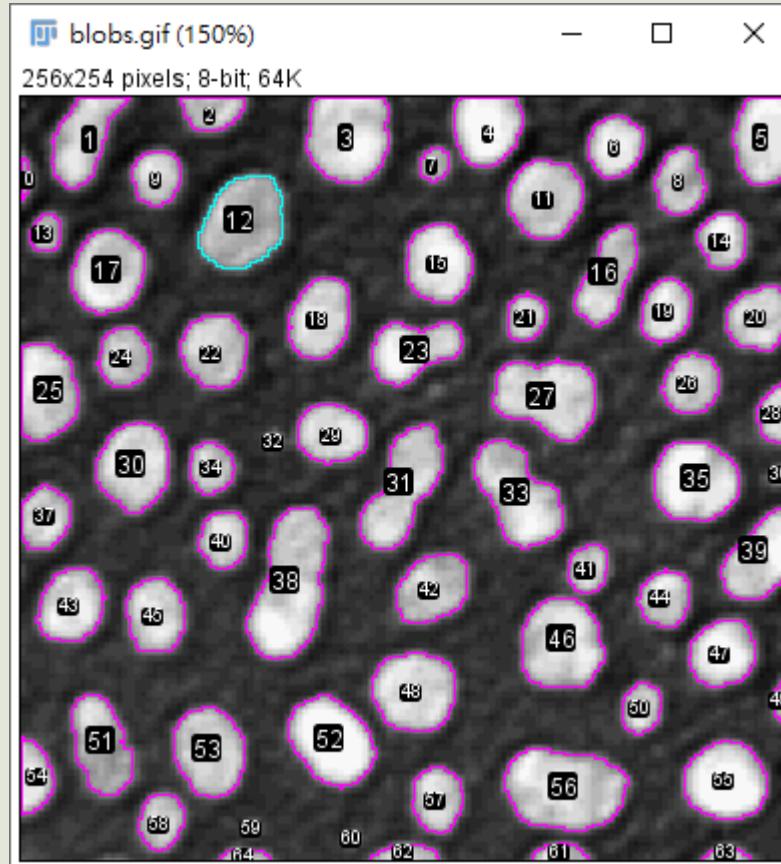
Region of Interest (ROI) Tools



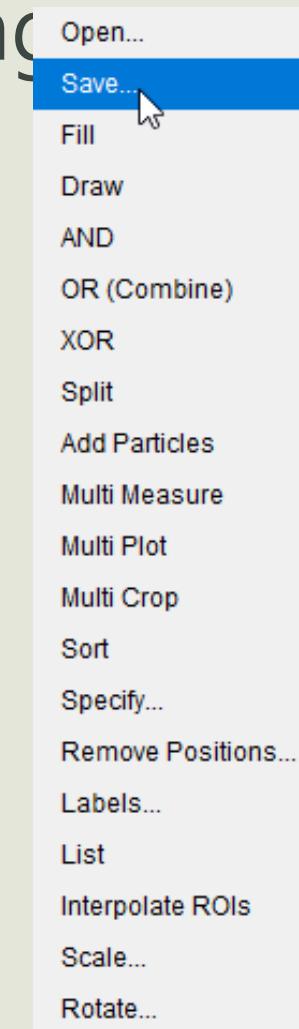
Hidden menu:
Right click / Double Click

ROI manager

■ Analysis -> Tools -> ROI Manager

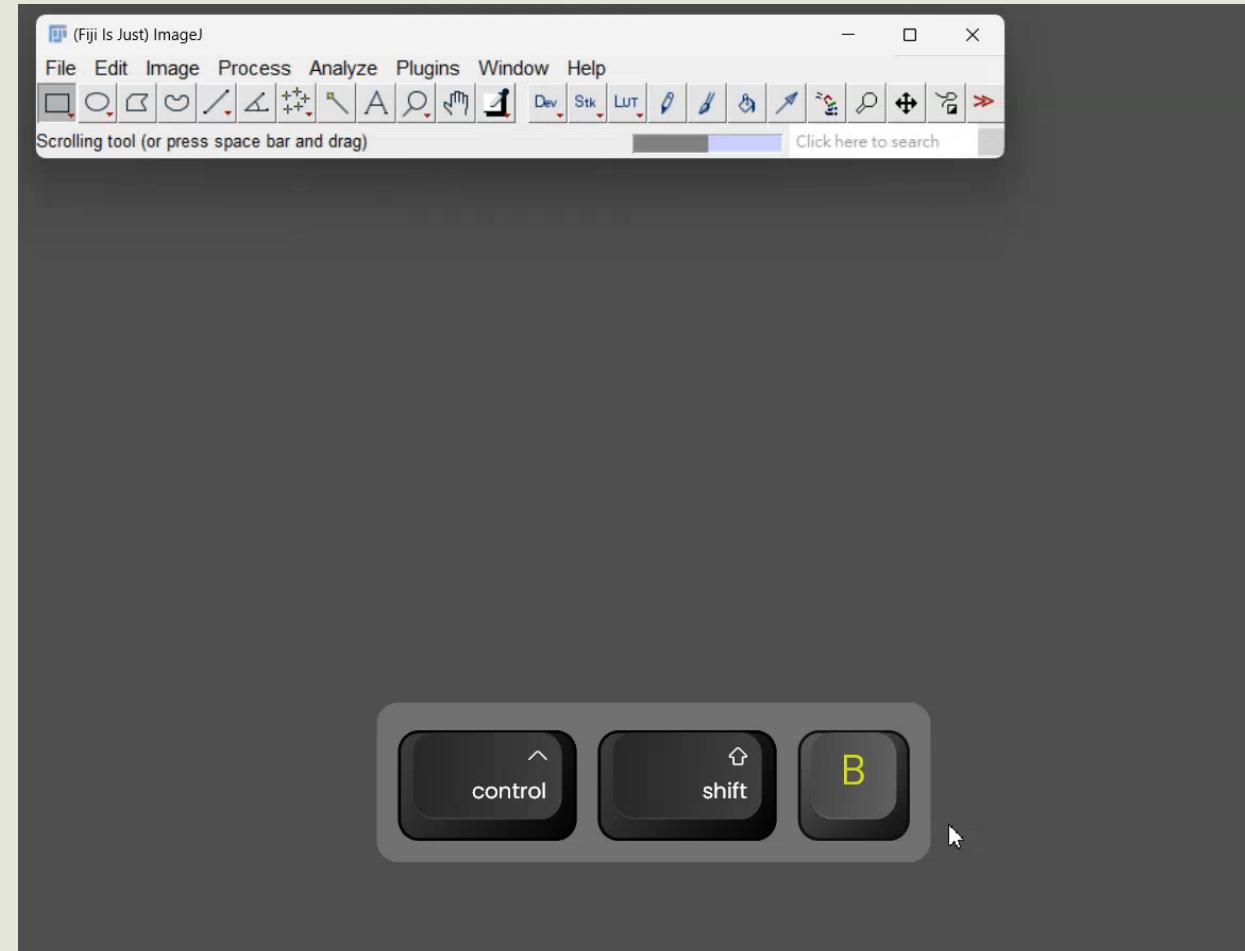
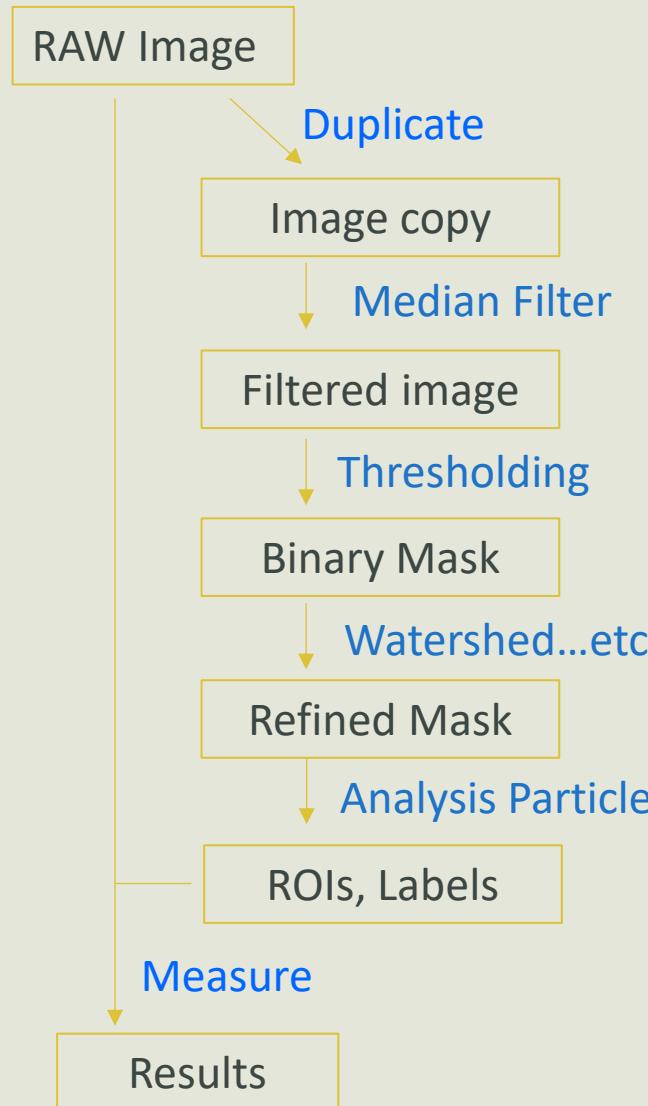


ROI ...
0001-0015
0002-0005
0003-0014
0004-0011
0005-0014
0006-0016
0007-0022
0008-0028
0009-0027
0010-0027
0011-0034
0012-0041
0013-0045



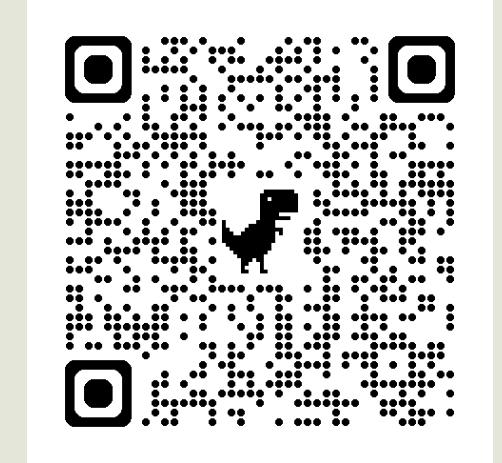
- Save the ROI files is important!
- Single ROI: *.roi
- Multiple ROI: *.zip

Segmentation Sample



Acknowledgements

The bioimage community (**EABIAS**) inspires this workshop. <https://eabias.github.io/>



課後意見調查