

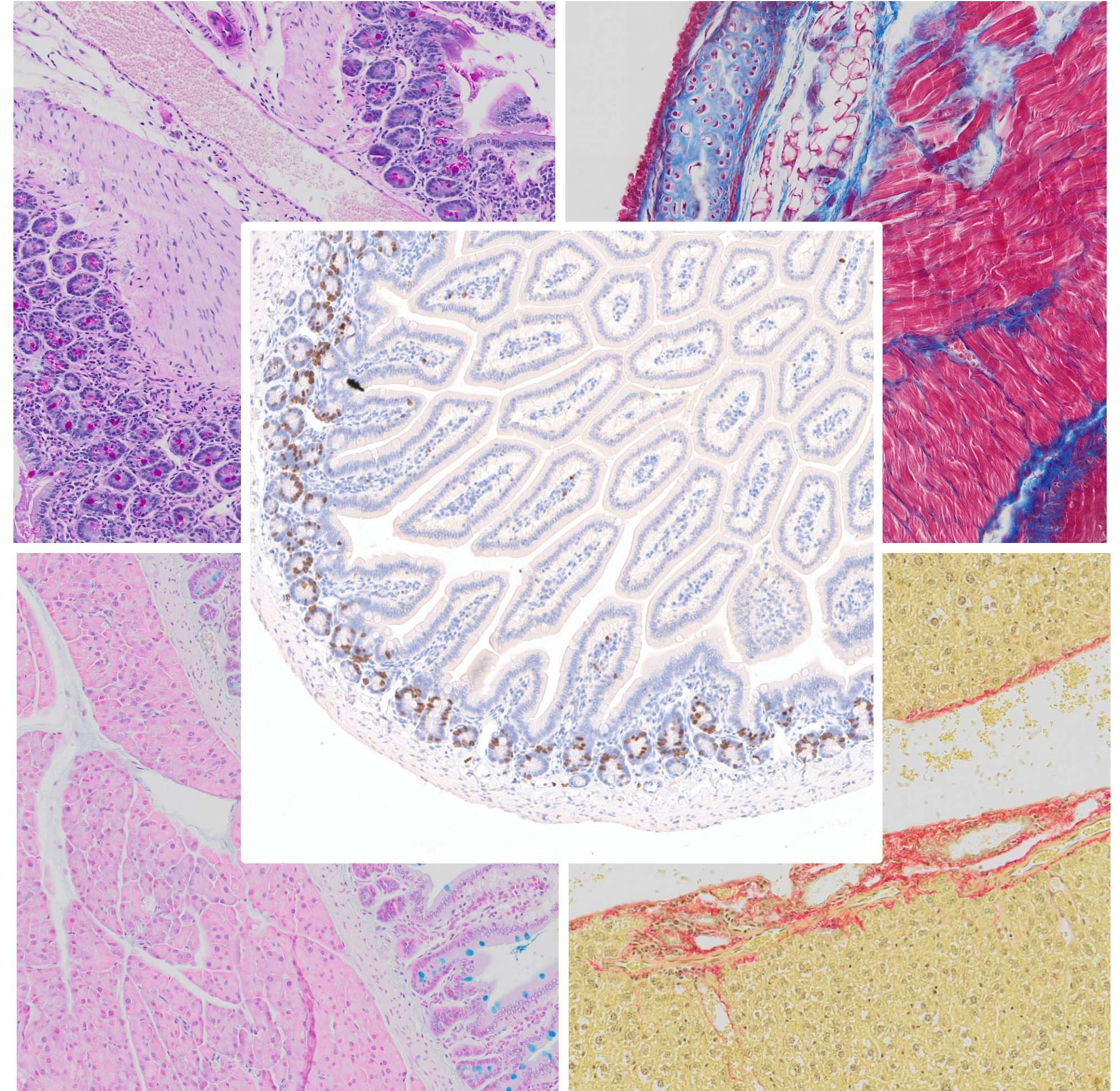
# **Color & Color Models**

**Image Processing & Analysis for Life Scientists**

Olivier Burri, Romain Guiet & Arne Seitz

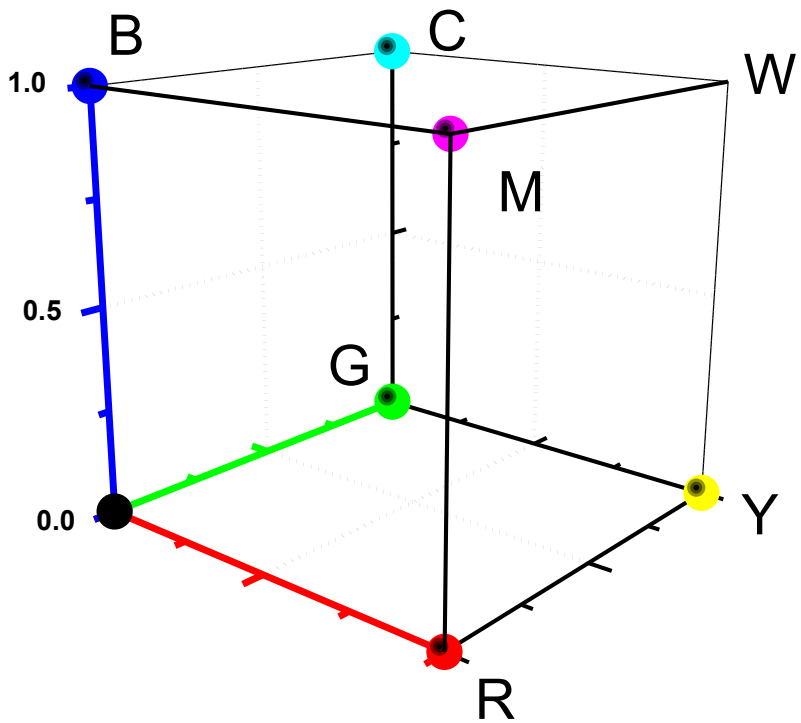


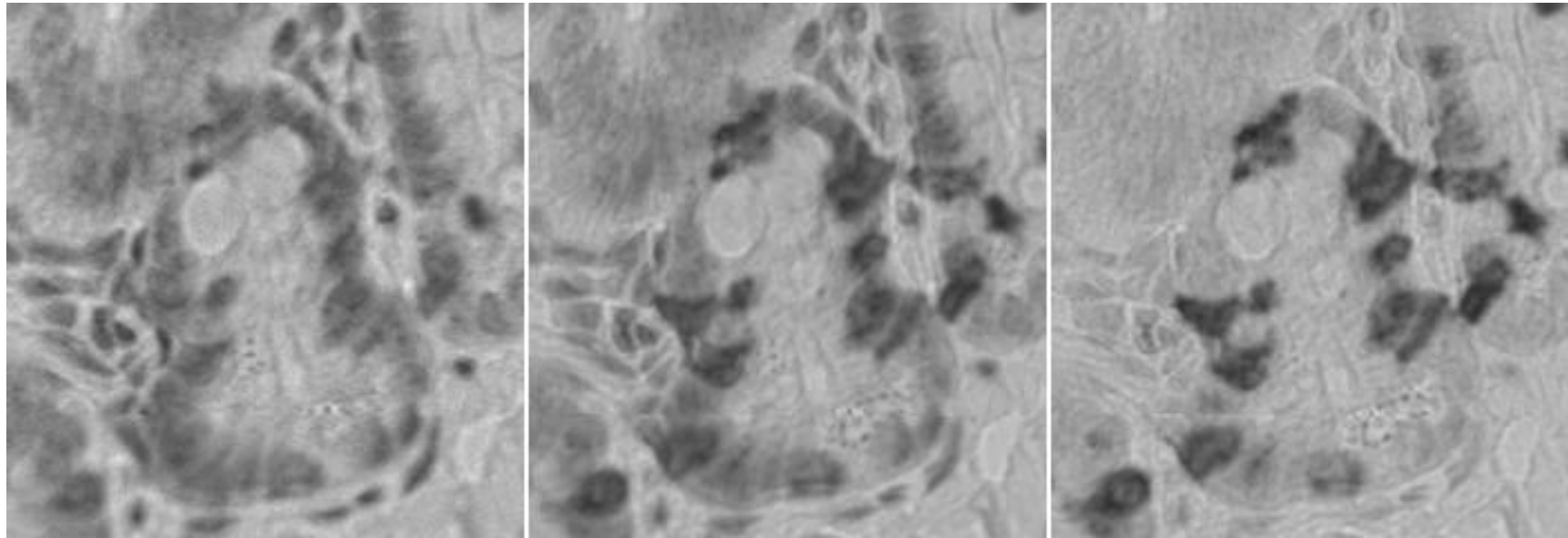
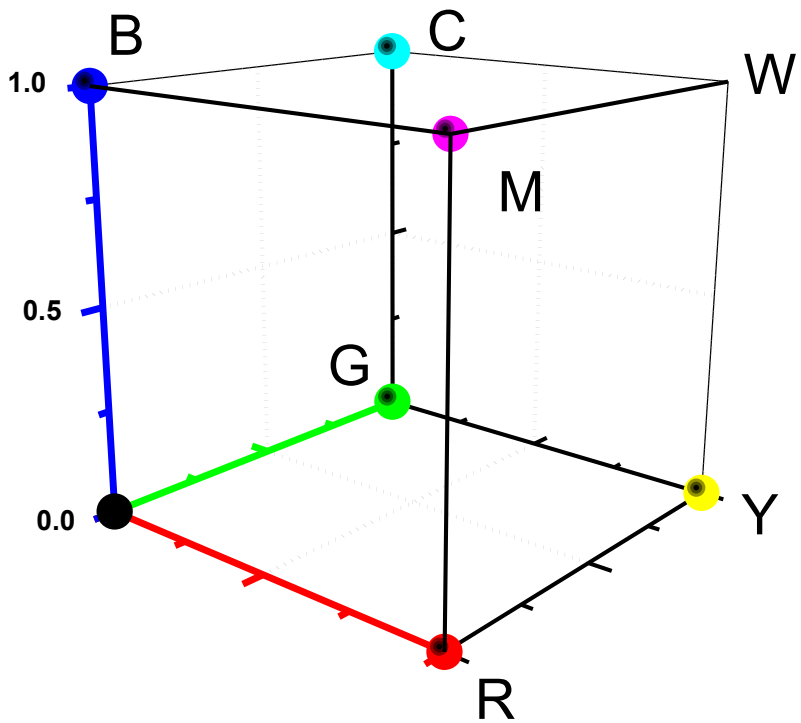
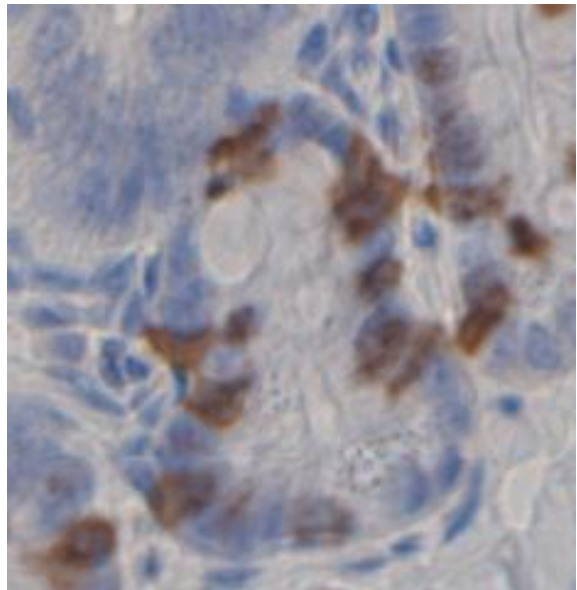
# (Immuno)histochemistry Staining





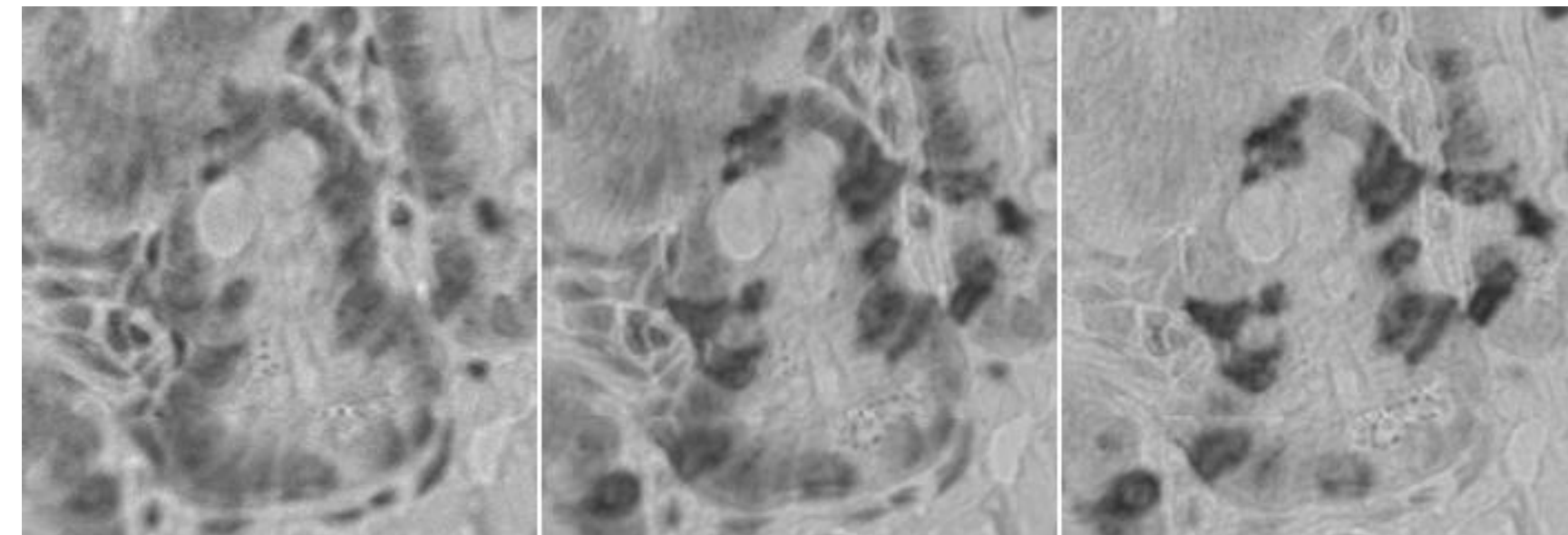
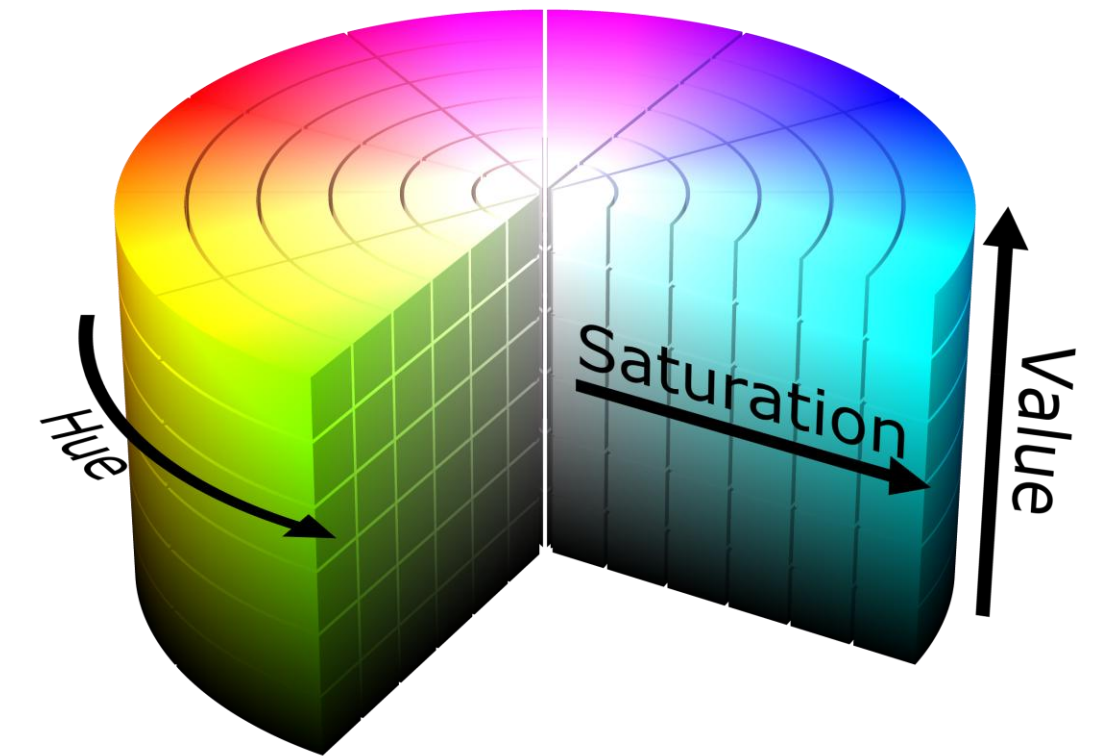
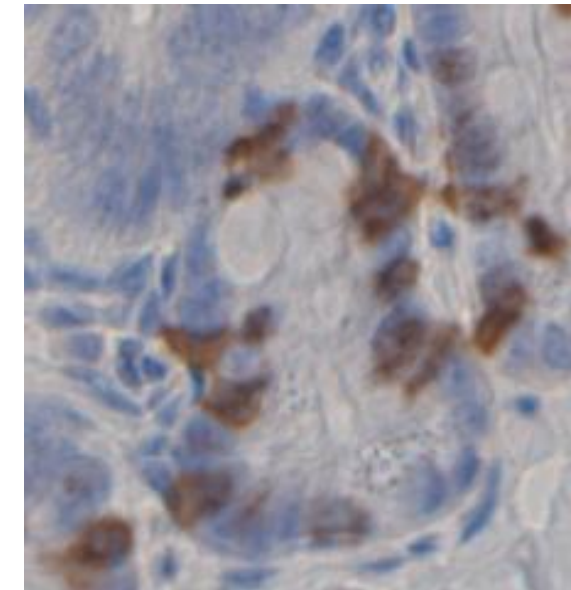
- Color & Color Models
- Color Deconvolution
- Slide Scan Analysis





R, G, B

# HSB/HSV (Hue, Saturation, Brightness/Value)

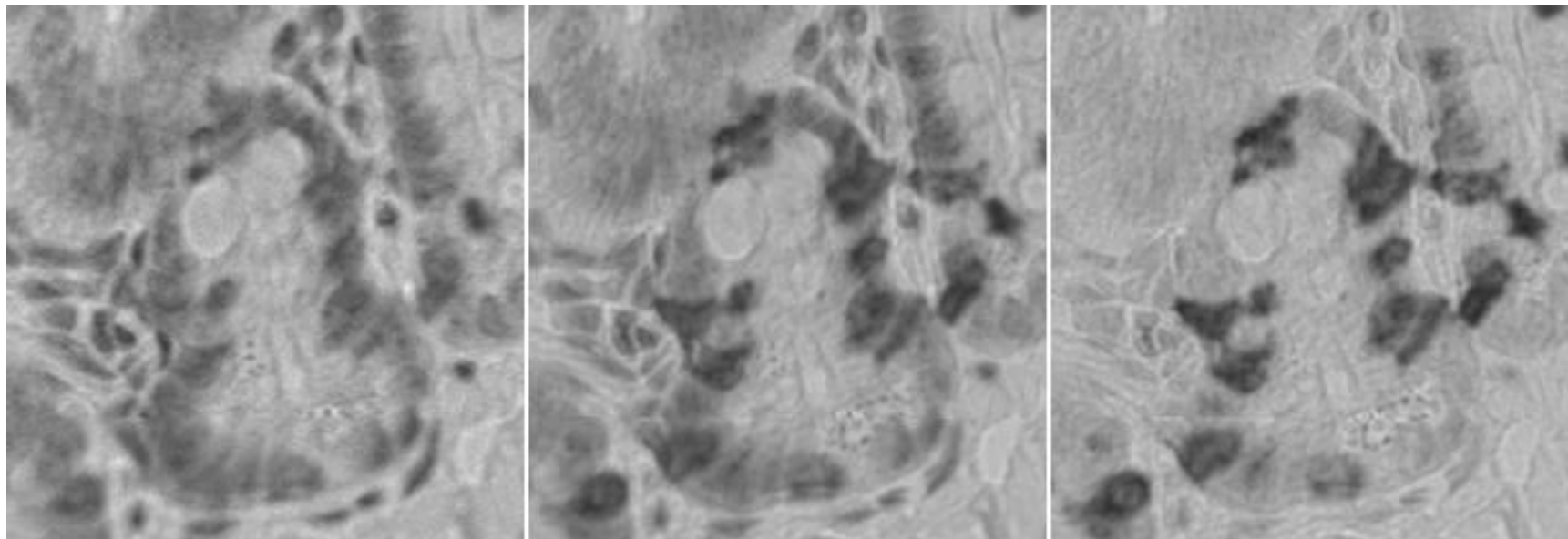
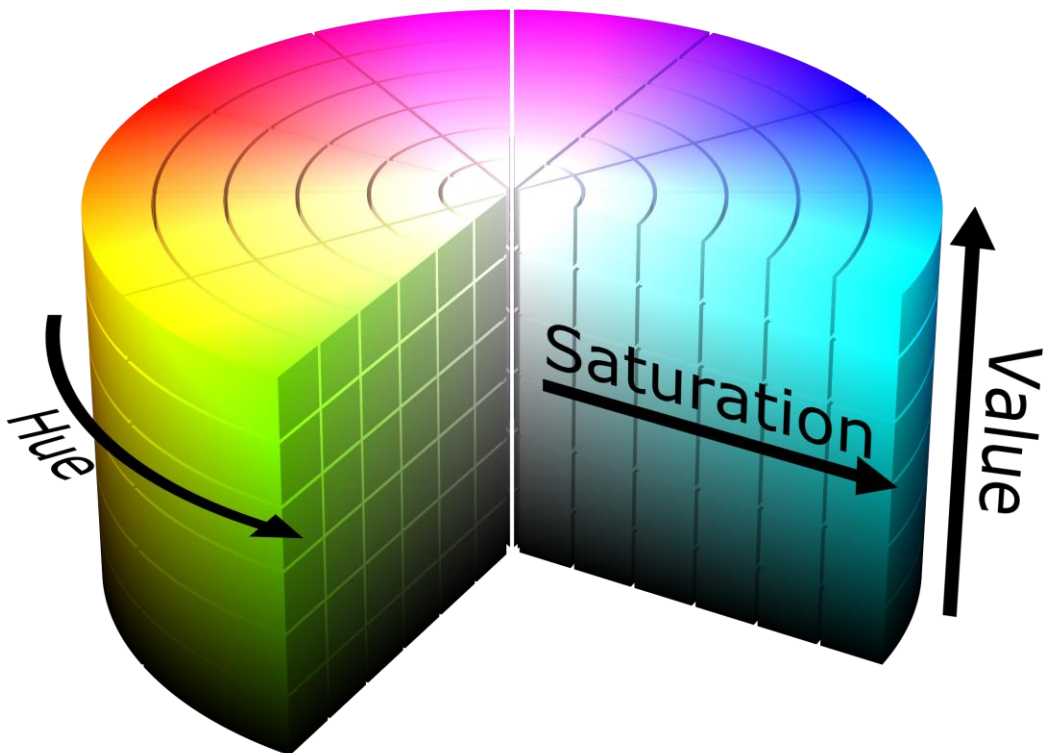
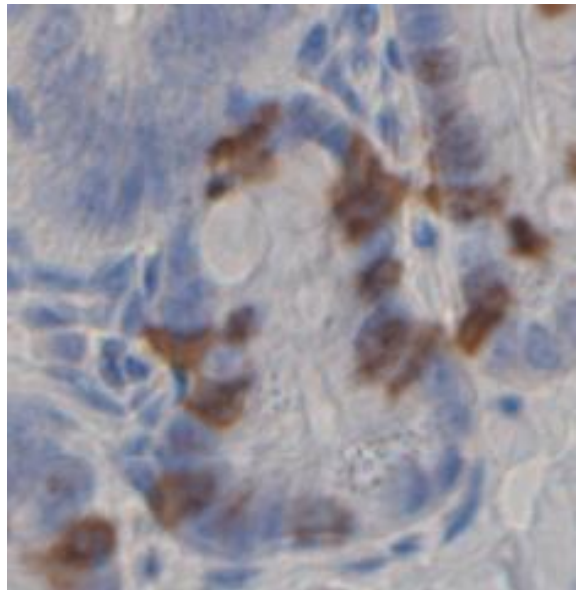


R, G, B

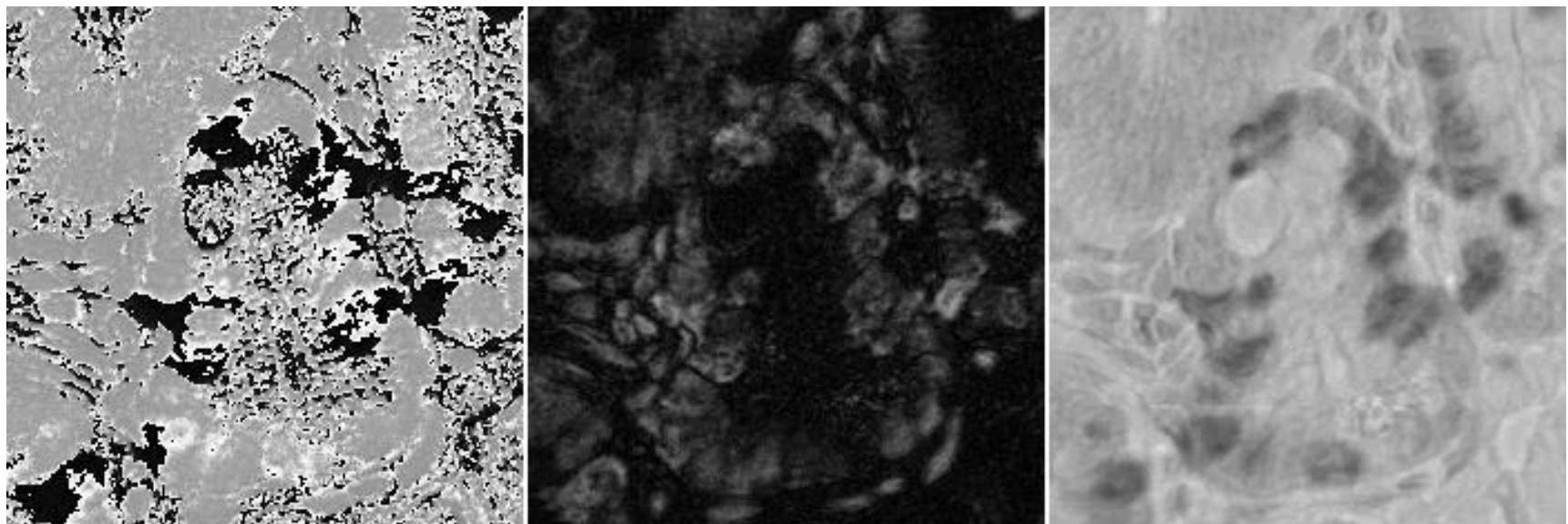
- Hue                      **Color**
- Saturation            **Purity of color**
- Brightness            **Brightness**



# HSB (Hue, Saturation, Brightness)

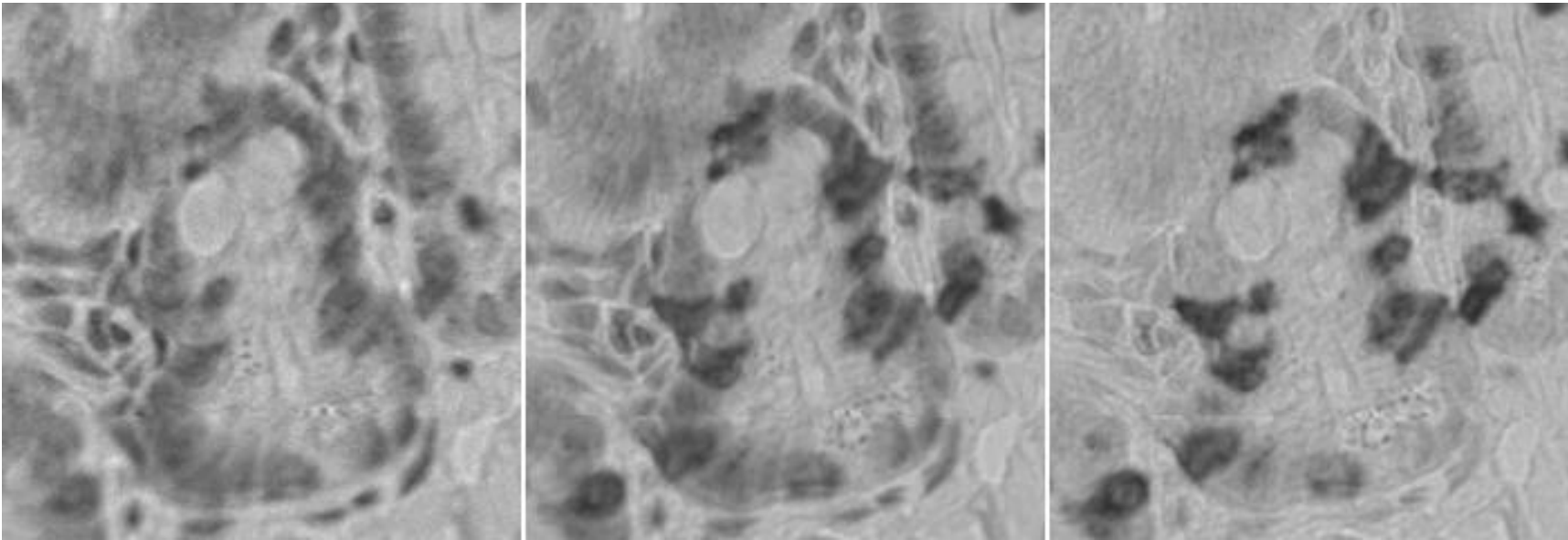
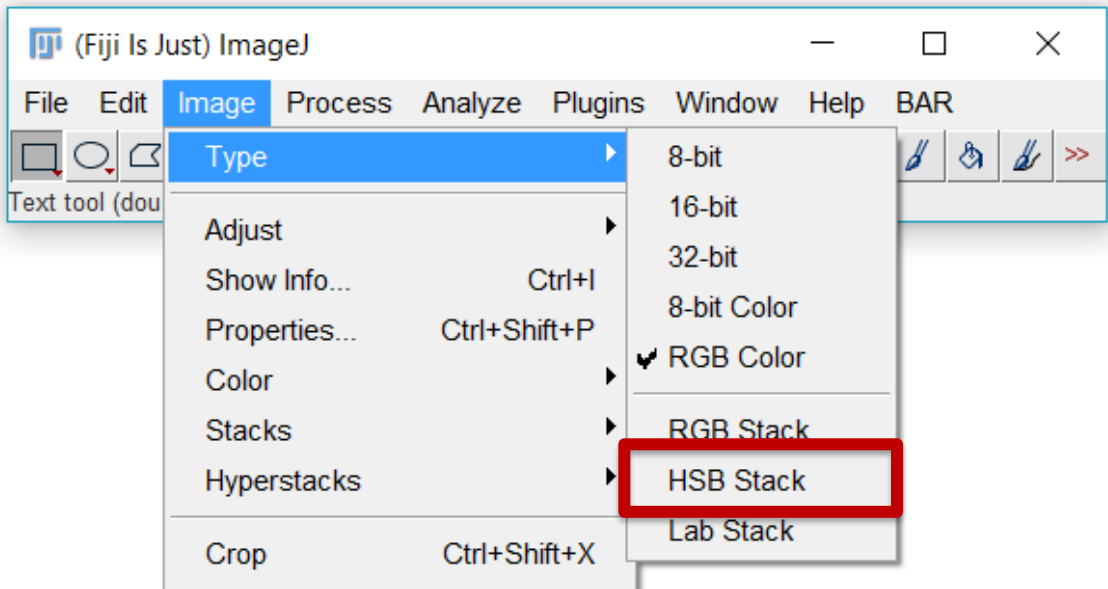
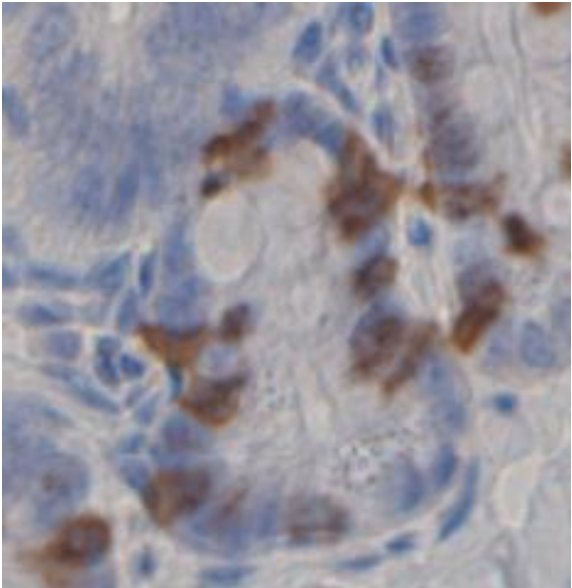


R, G, B

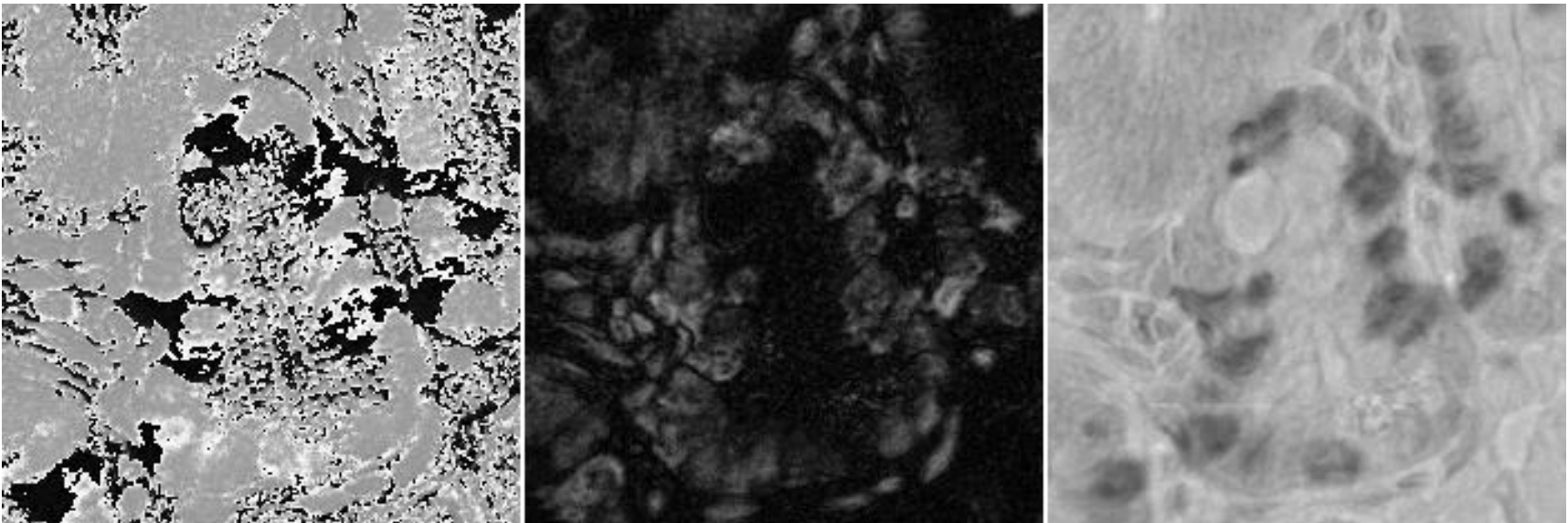


H, S, B





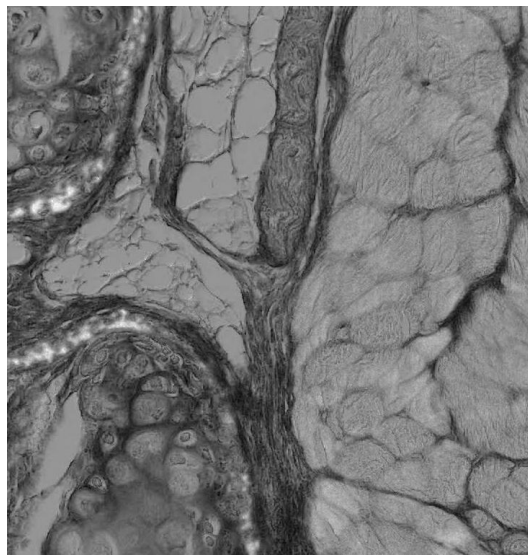
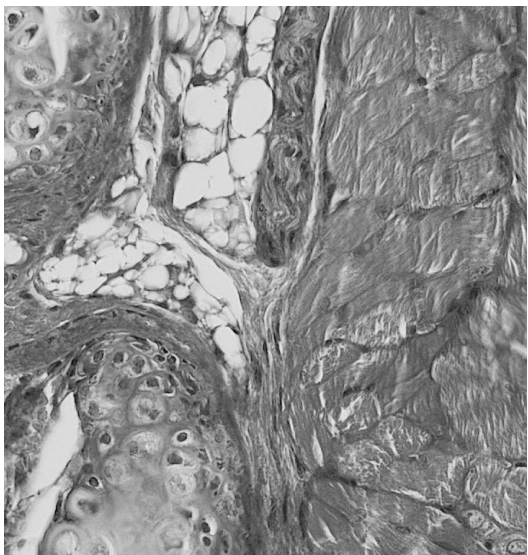
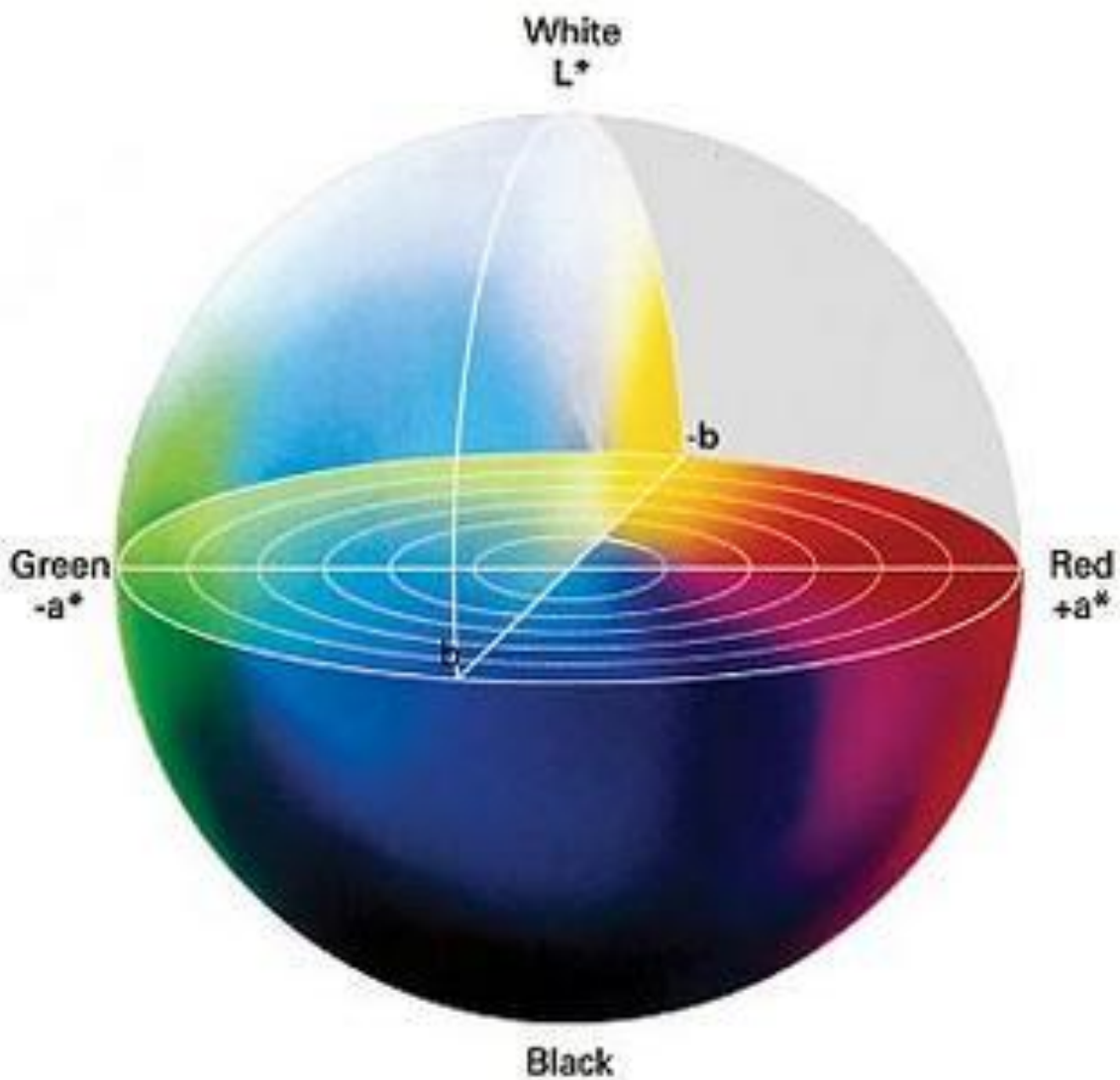
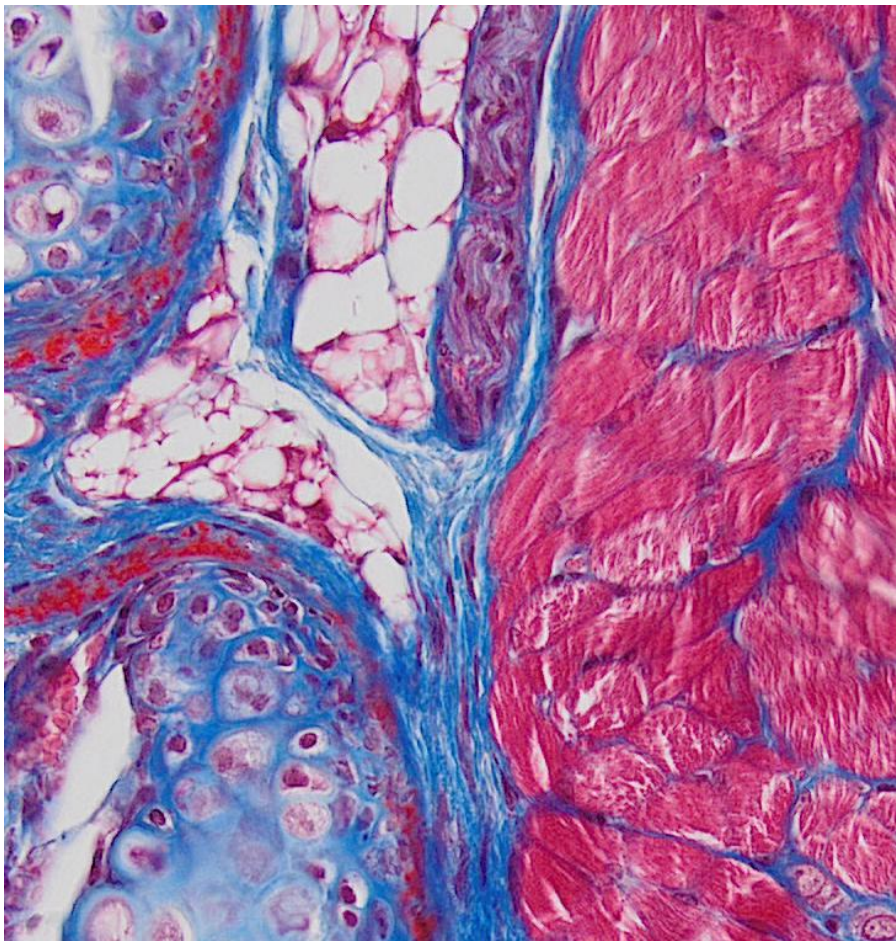
R, G, B



H, S, B



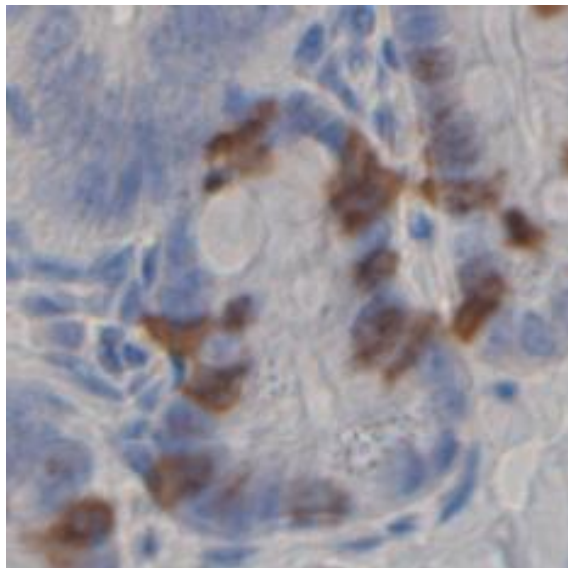
# LAB (Luminance, A, B)



L, A, B

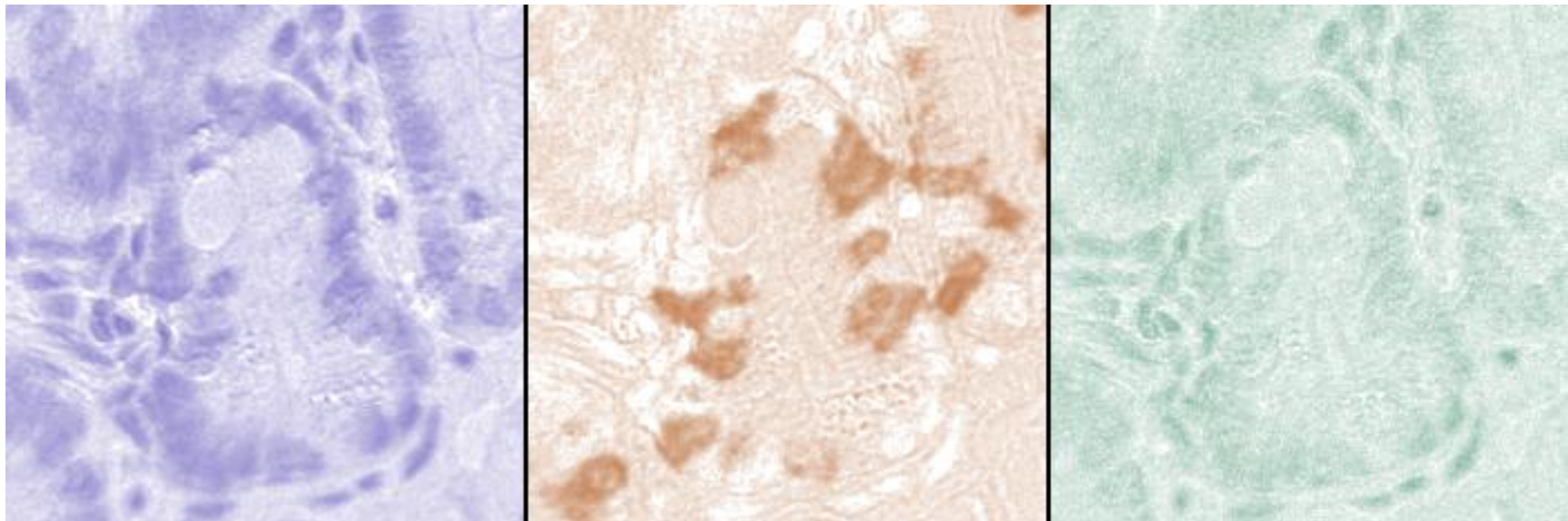


# Colour Deconvolution

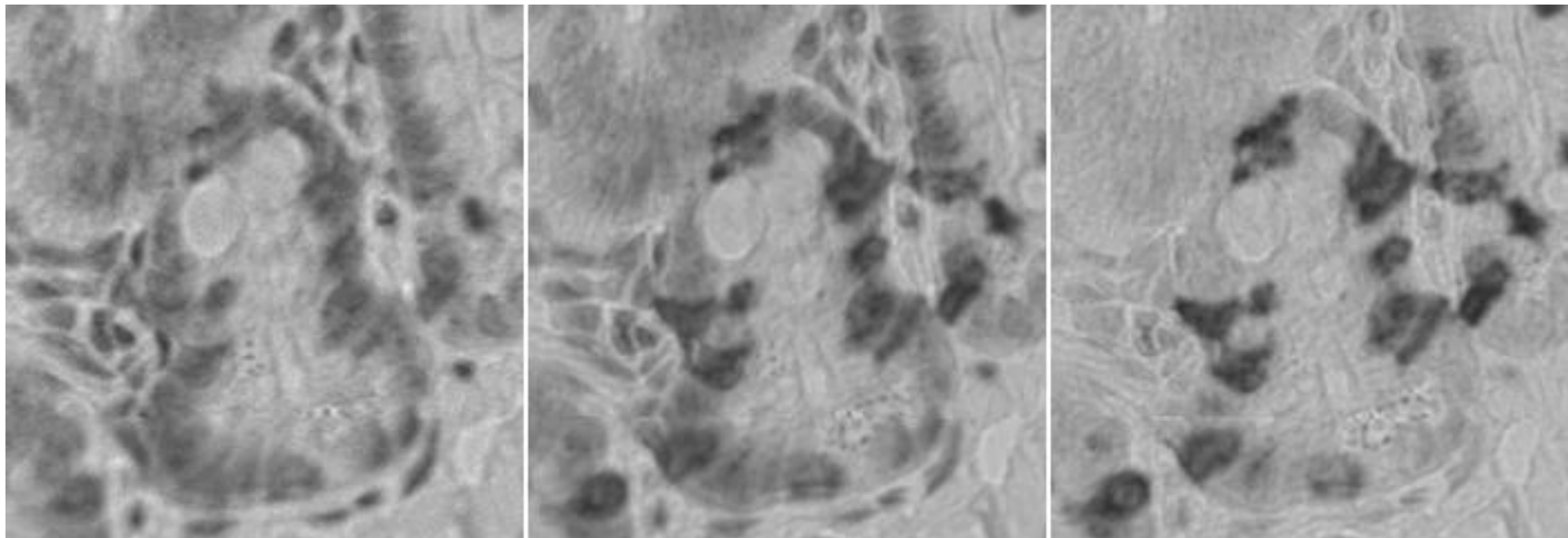


Colour deconvolution: H DAB

■ Couleur\_1 R:0.6500286, G:0.704031, B:0.2860126  
■ Couleur\_2 R:0.26814753, G:0.57031375, B:0.77642715  
■ Couleur\_3 R:0.7110272, G:0.42318153, B:0.5615672



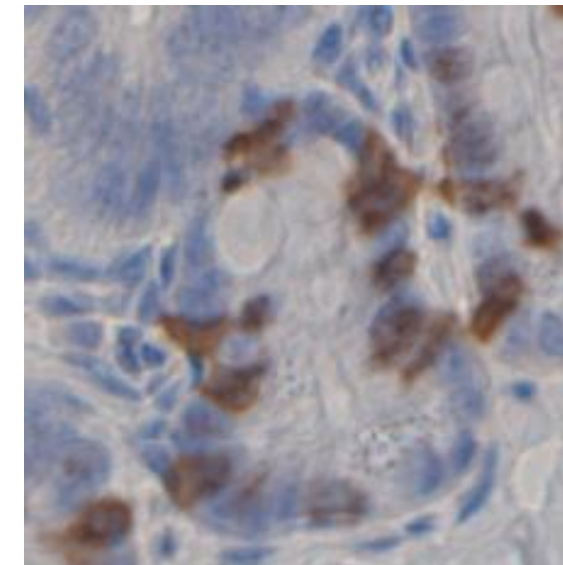
Color1,  
Color2,  
Color3



R, G, B

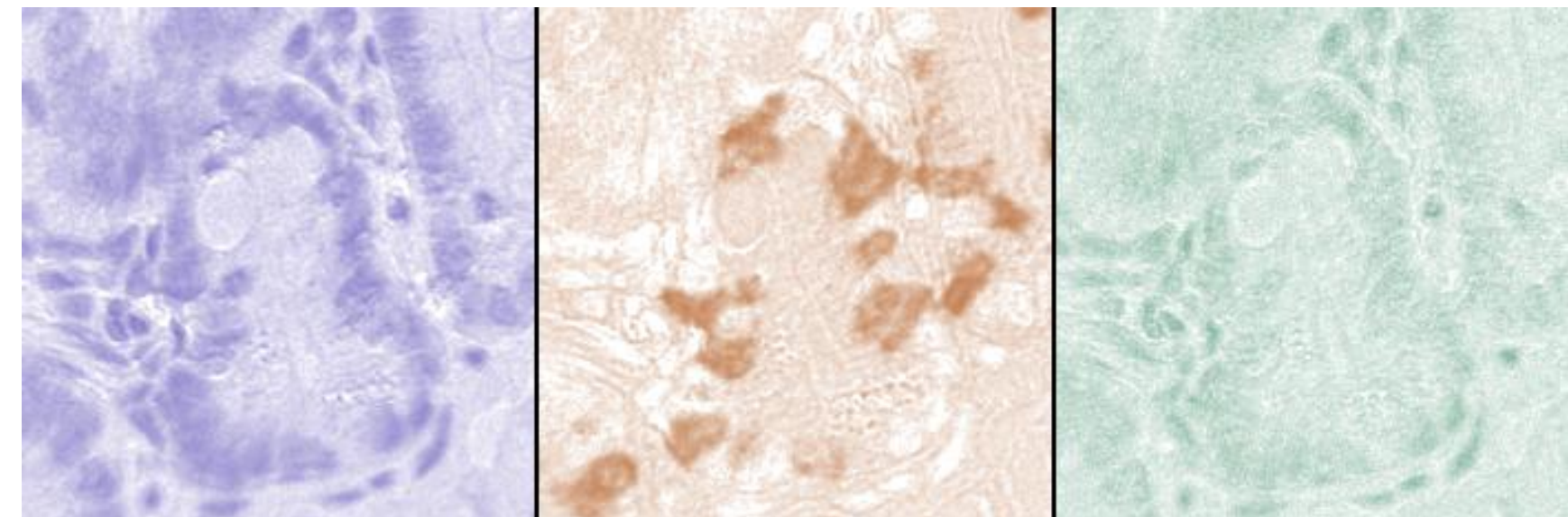


# Colour Deconvolution



Colour deconvolution: H DAB

■ Couleur\_1 R:0.6500286, G:0.704031, B:0.2860126  
■ Couleur\_2 R:0.26814753, G:0.57031375, B:0.77642715  
■ Couleur\_3 R:0.7110272, G:0.42318153, B:0.5615672



Color1,  
Color2,  
Color3

- Sensitive to :
  - Defined Vectors
  - White balance

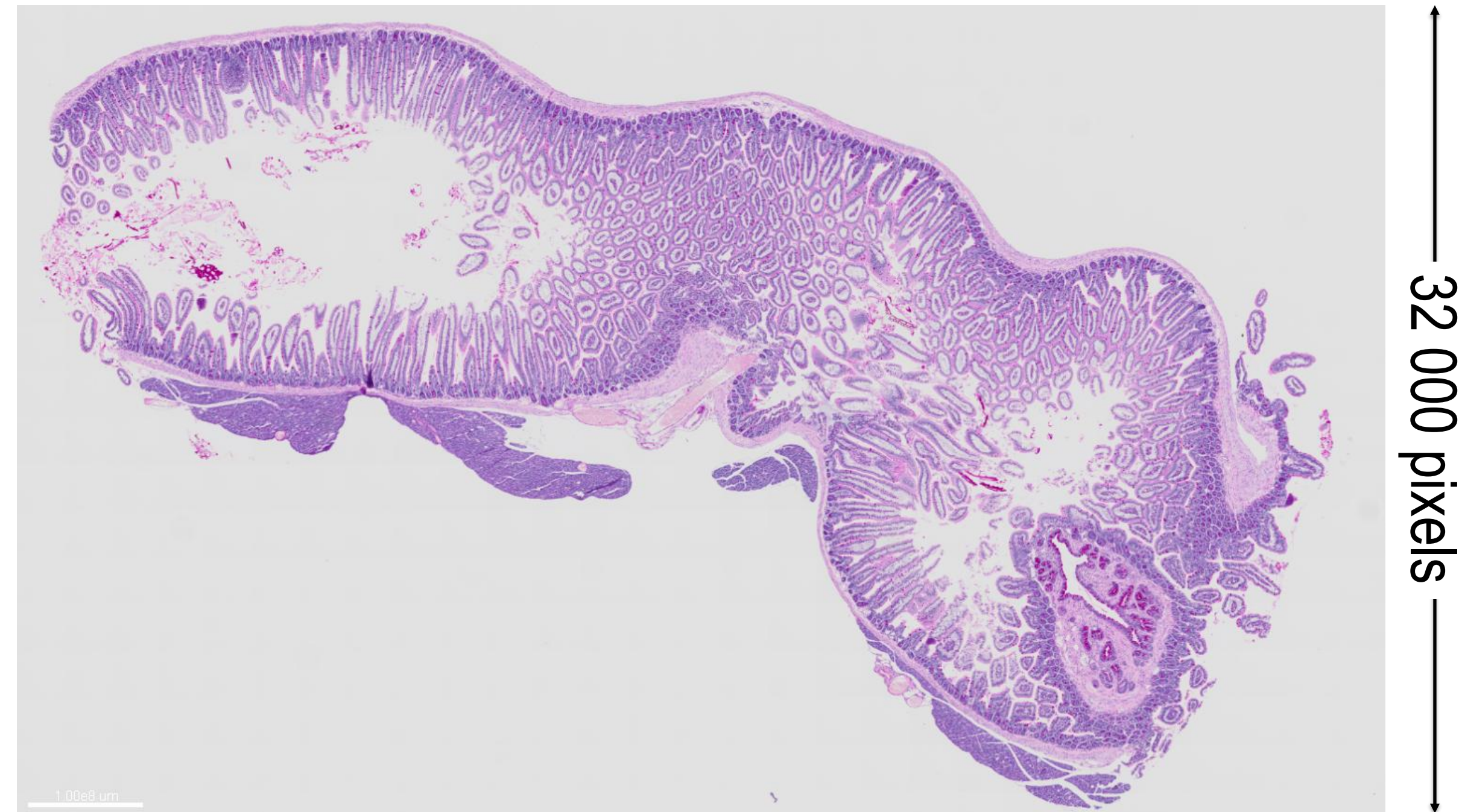
# Whole Slide Images

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# Whole Slide Images

40x Objective

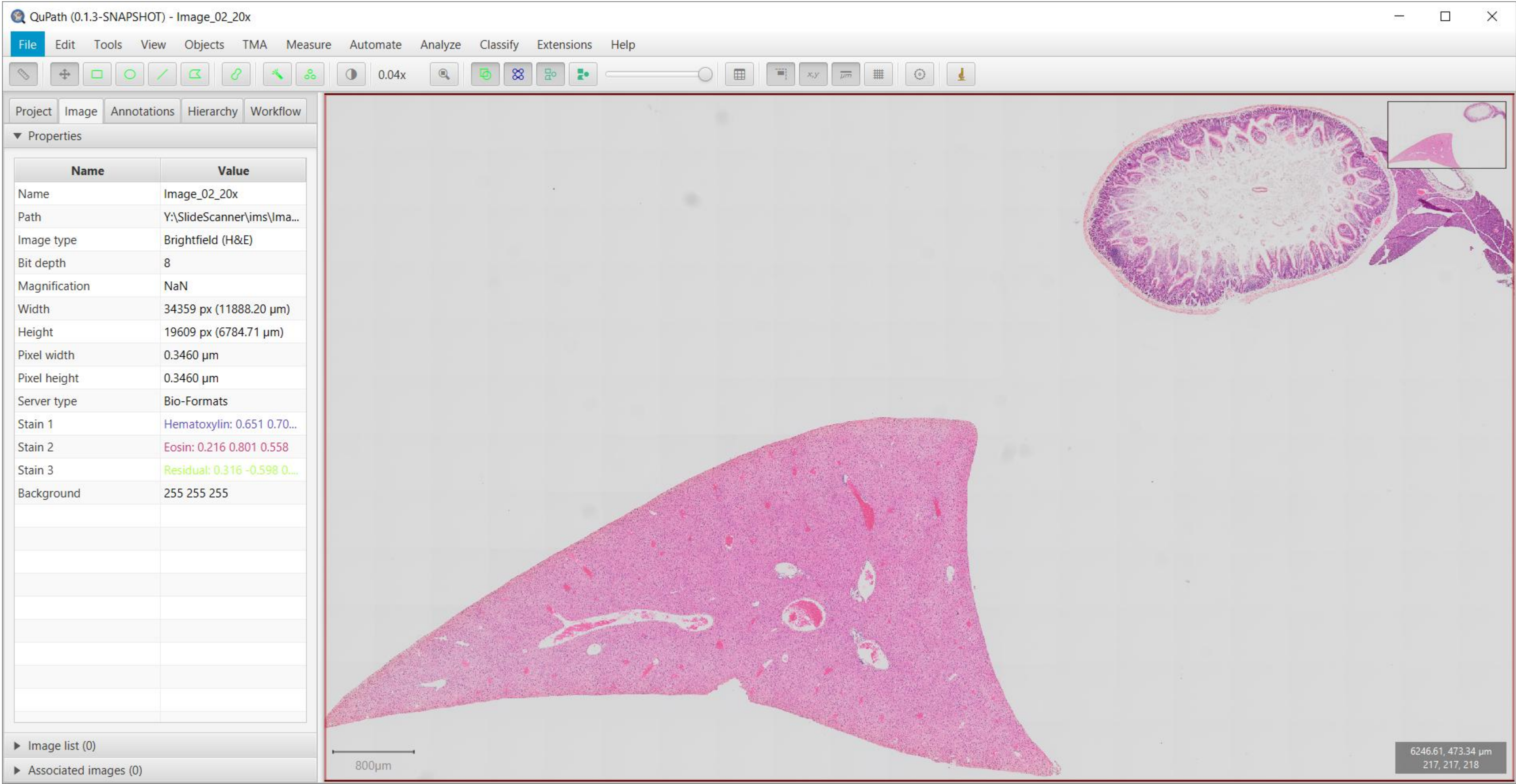


32 000 pixels

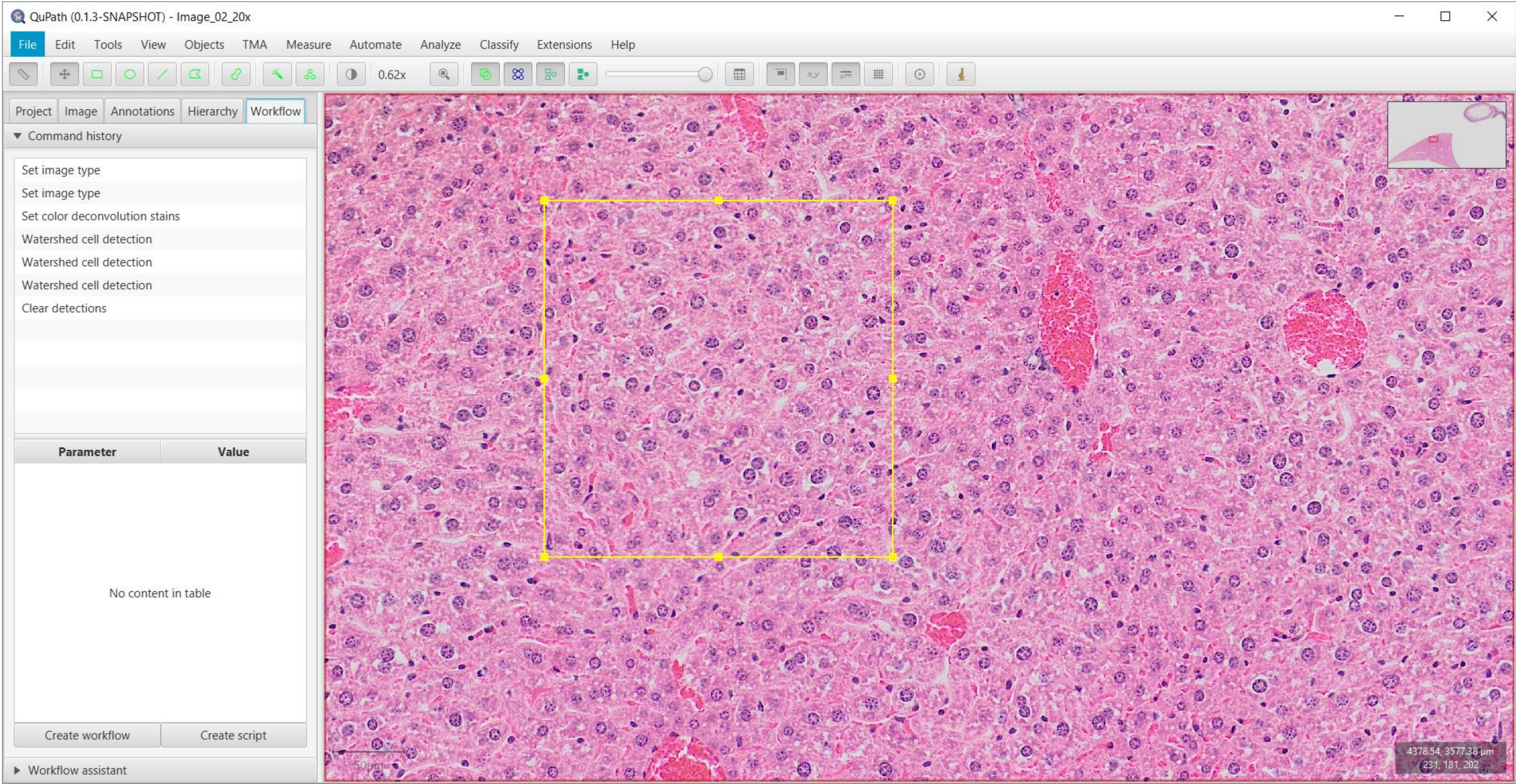
50 000 pixels

$1.6 \times 10^9$  pixels

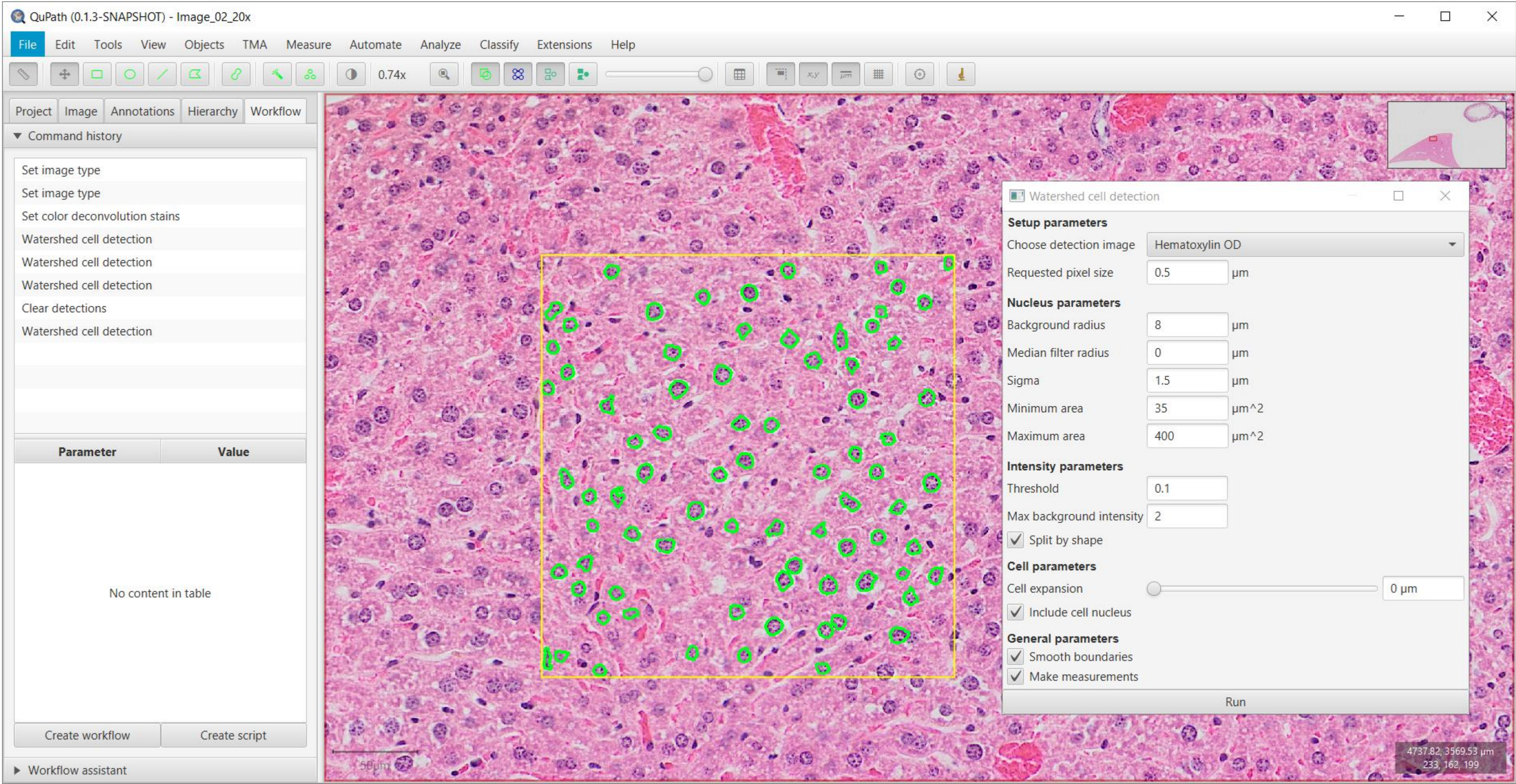




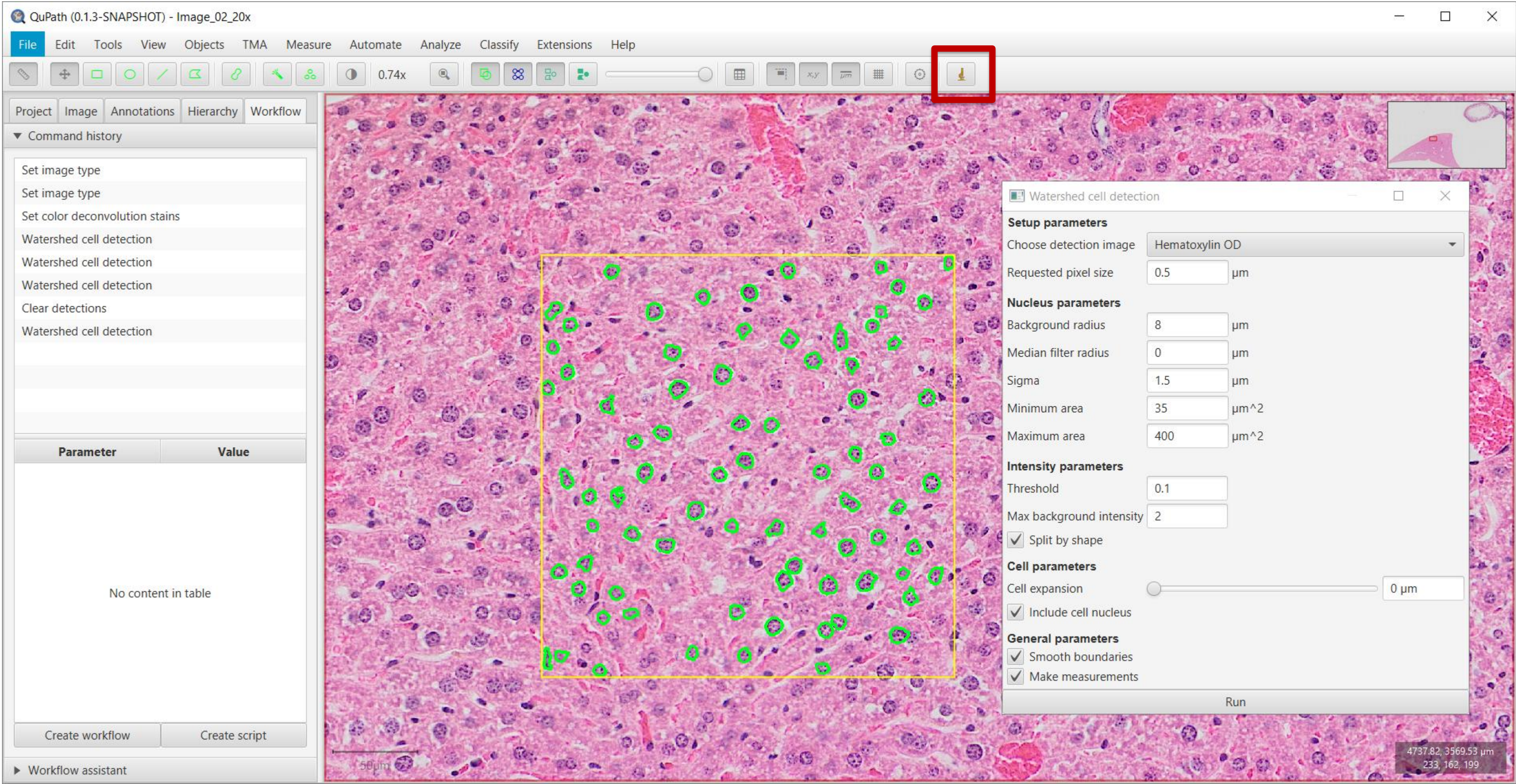






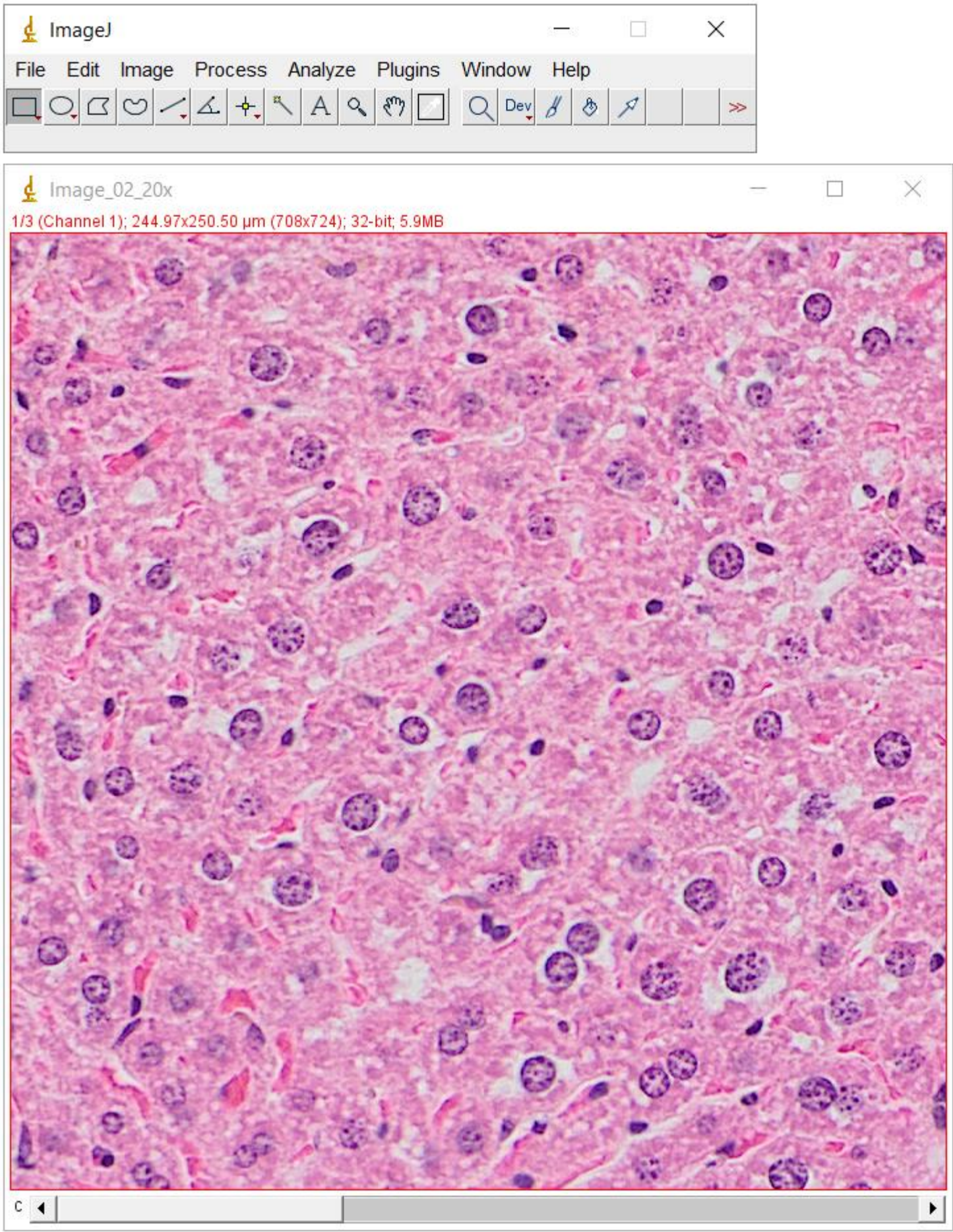
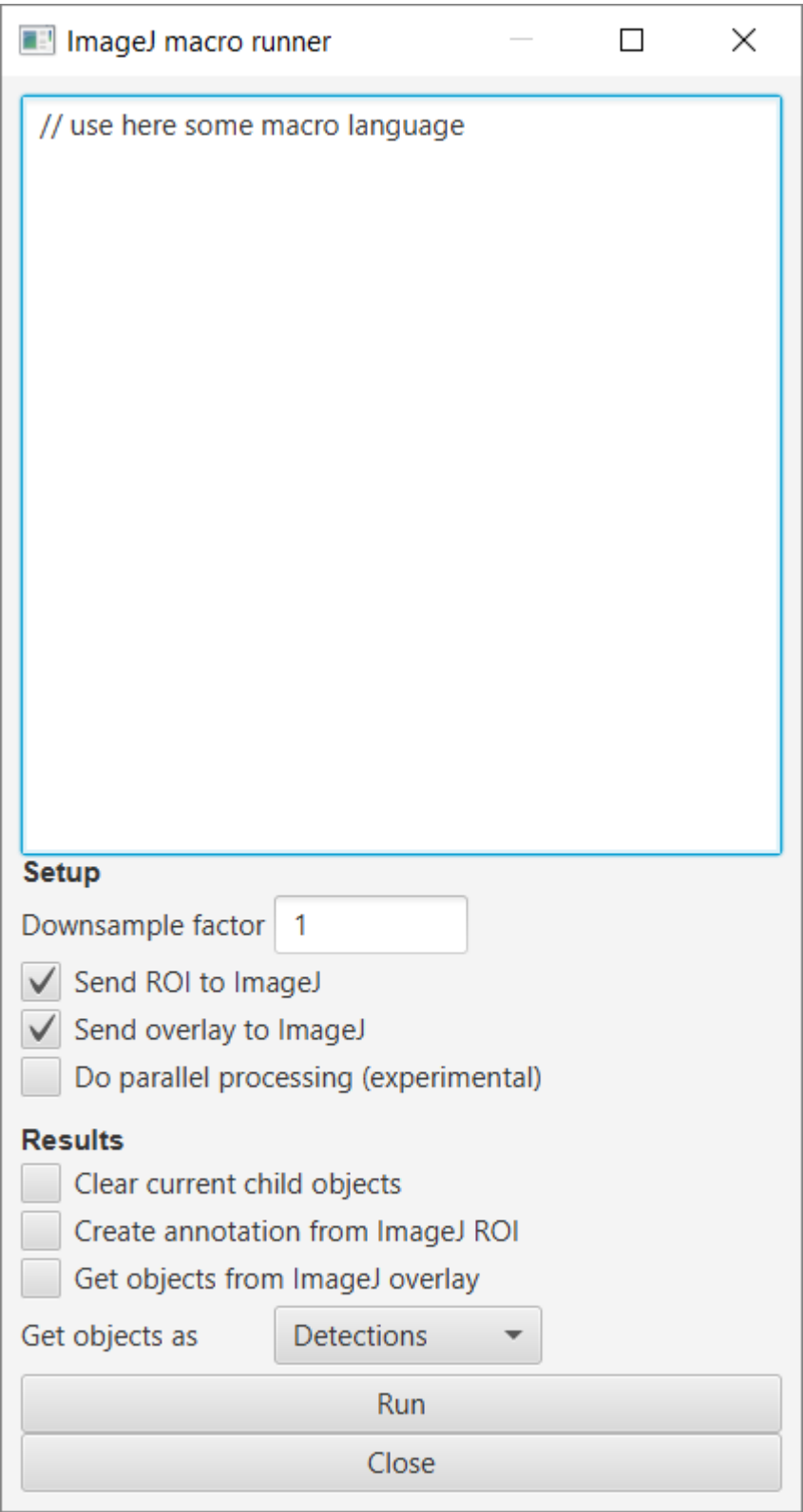








# QuPath & ImageJ



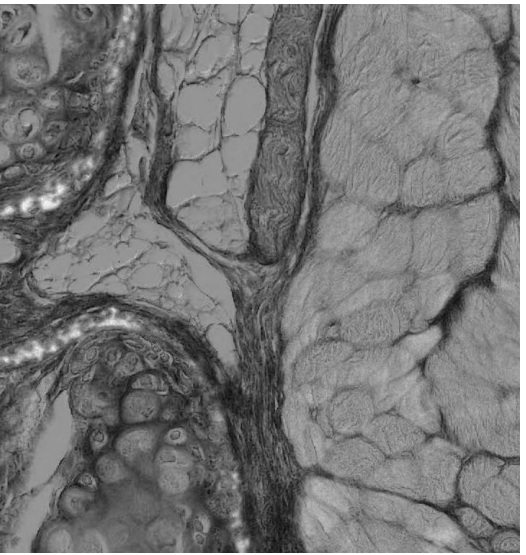
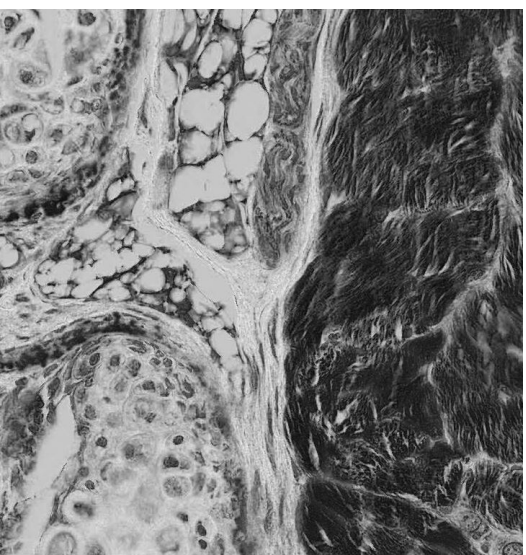
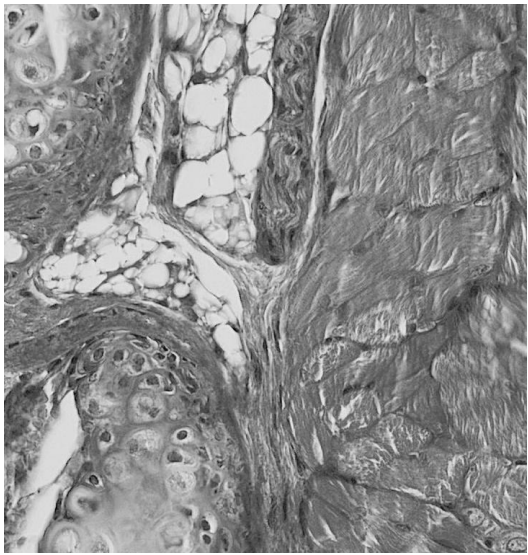
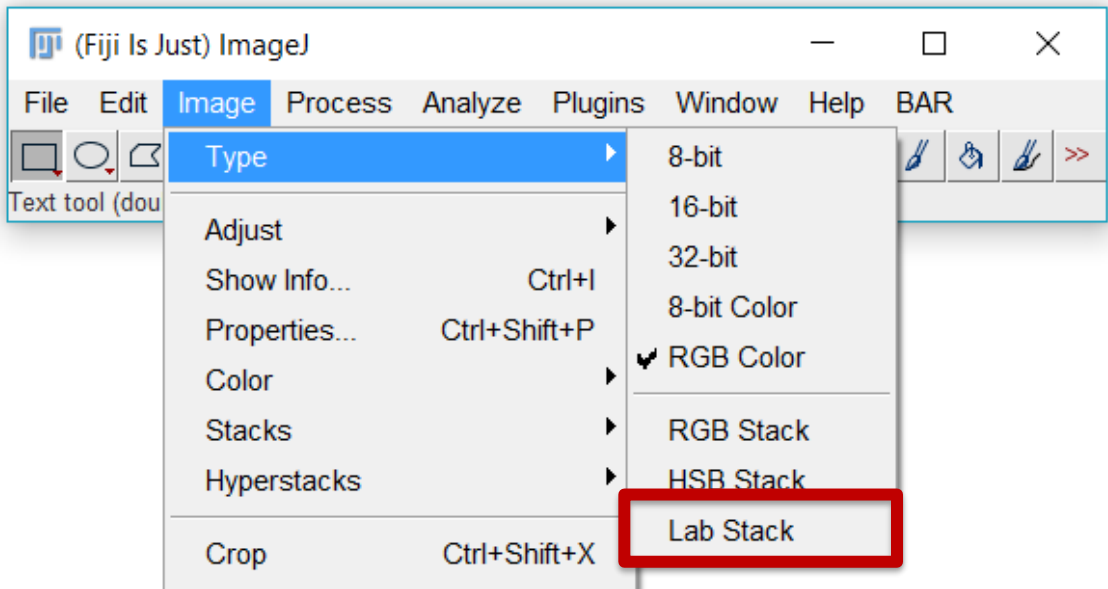
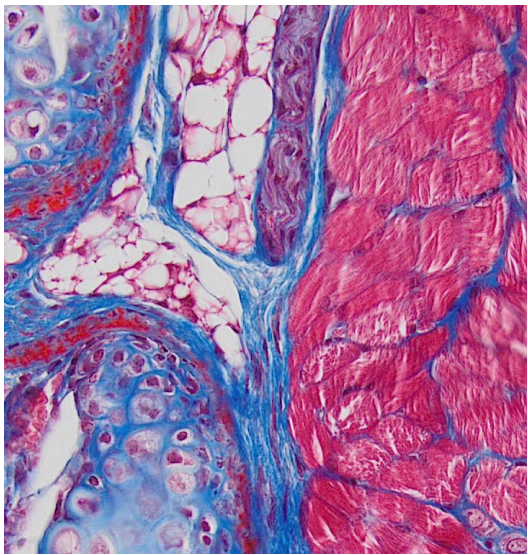


- Color Space
- Color Deconvolution
- Slide Scan QuPath

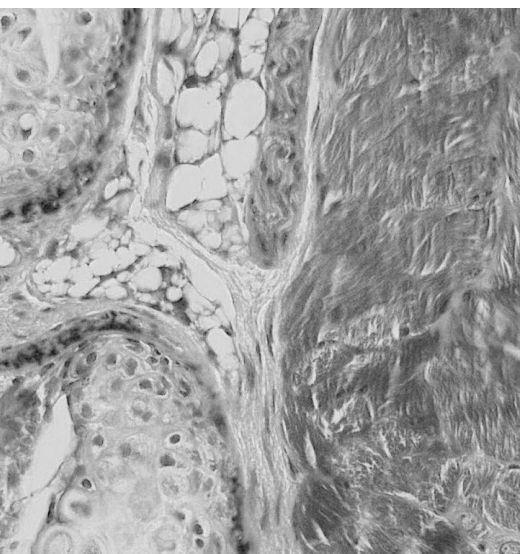
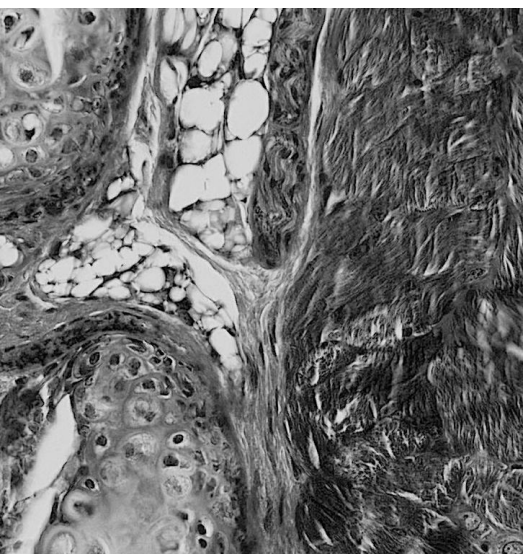
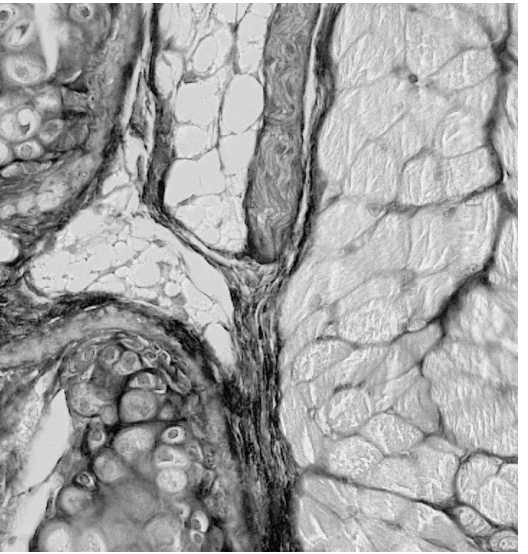




# LAB (Luminance, A, B)



L, A, B



R, G, B