

Analyze Particles

Image Processing & Analysis for Life Scientists

Olivier Burri, Romain Guiet & Arne Seitz

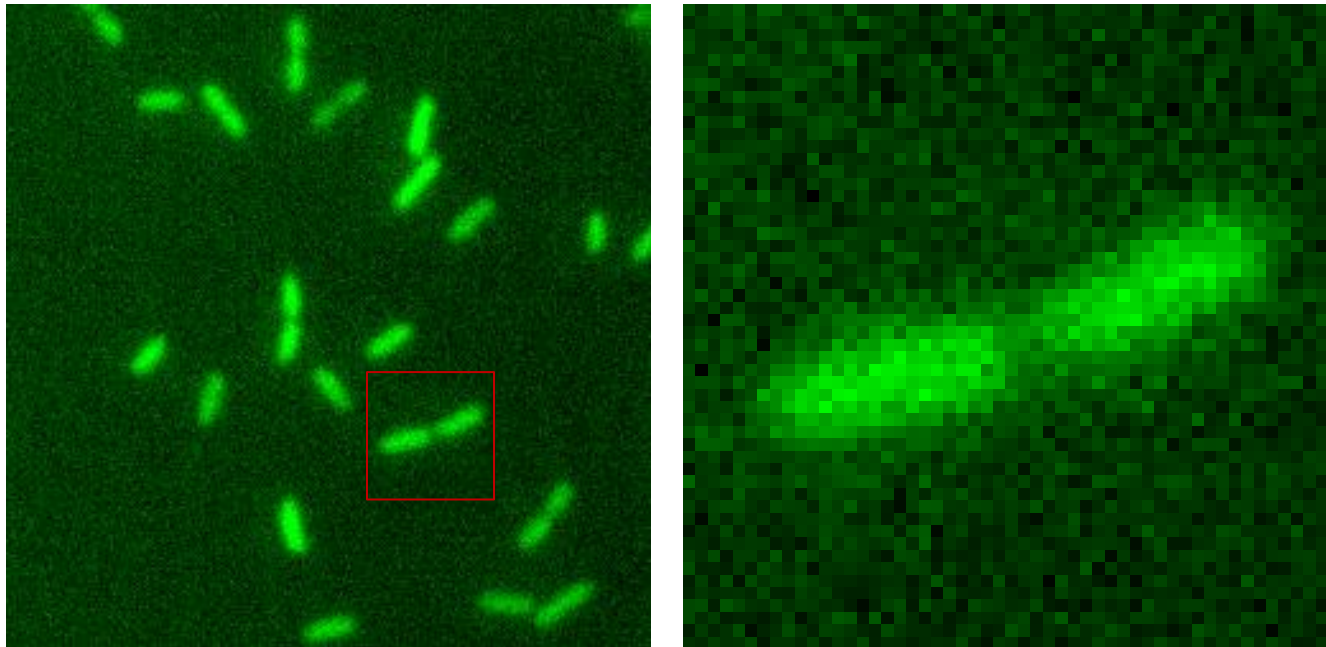
Analyze Particles



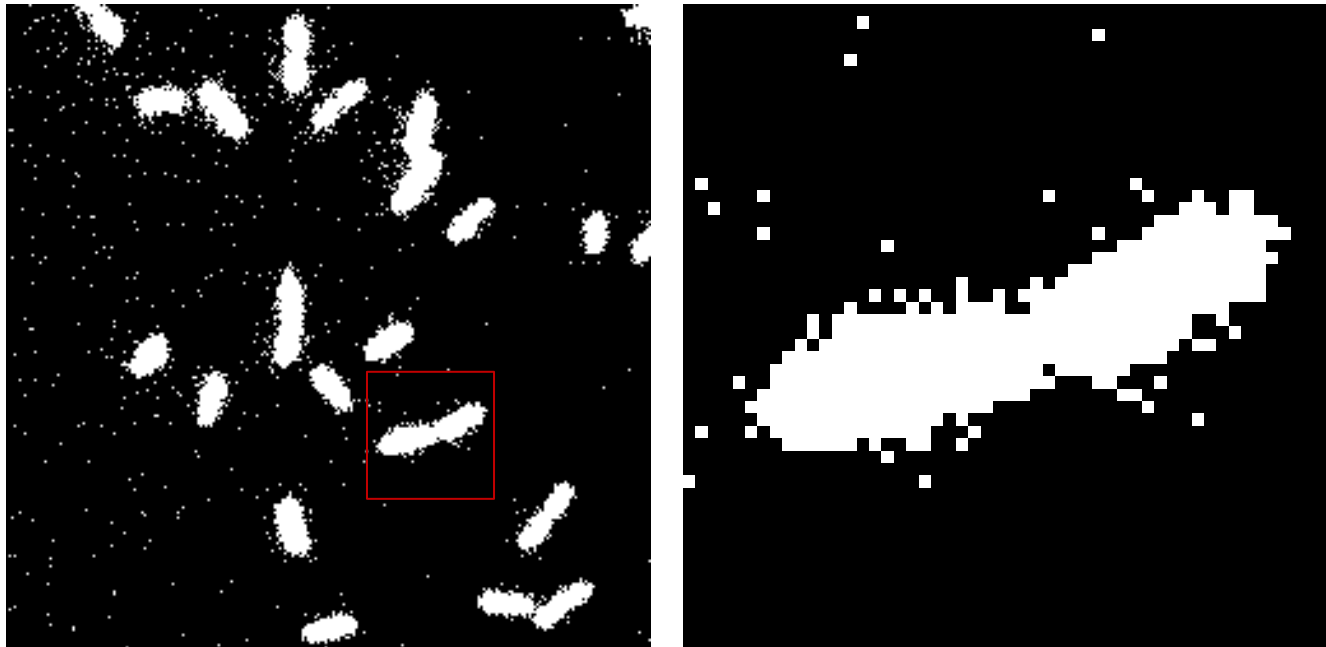
- Using Analyze Particles
- Displaying Results
- Output to Roi Manager

Analyze Particles

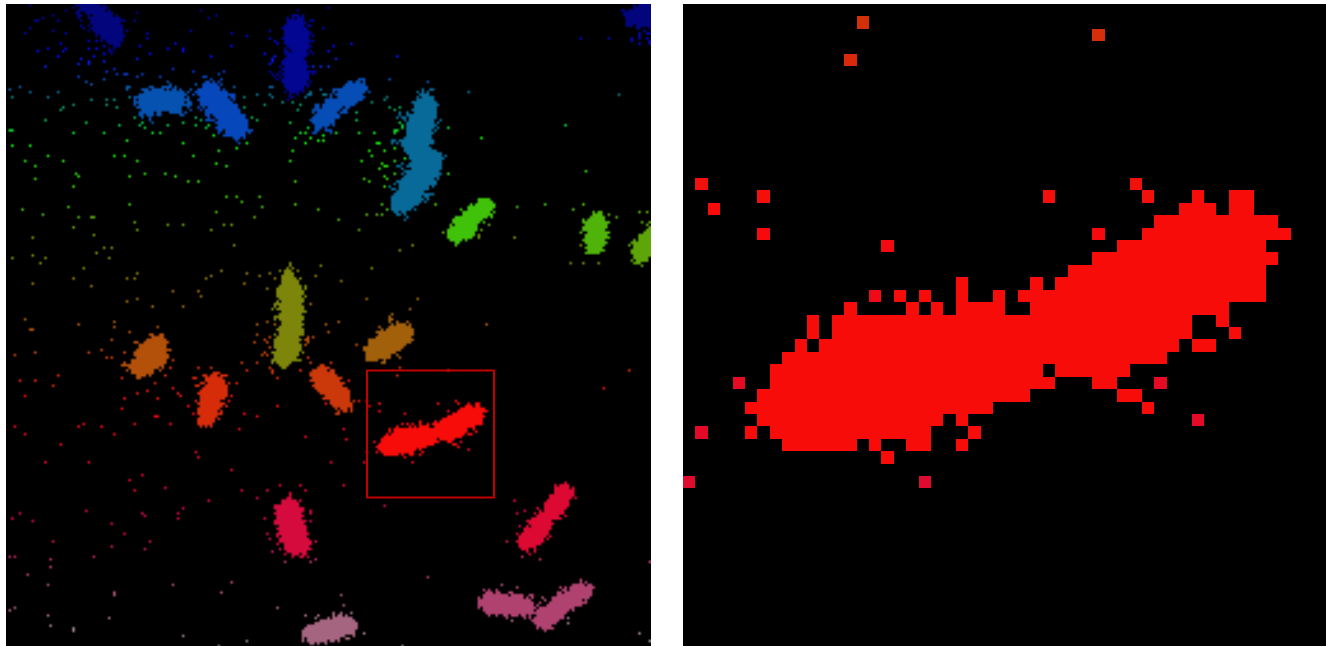
Image



Mask

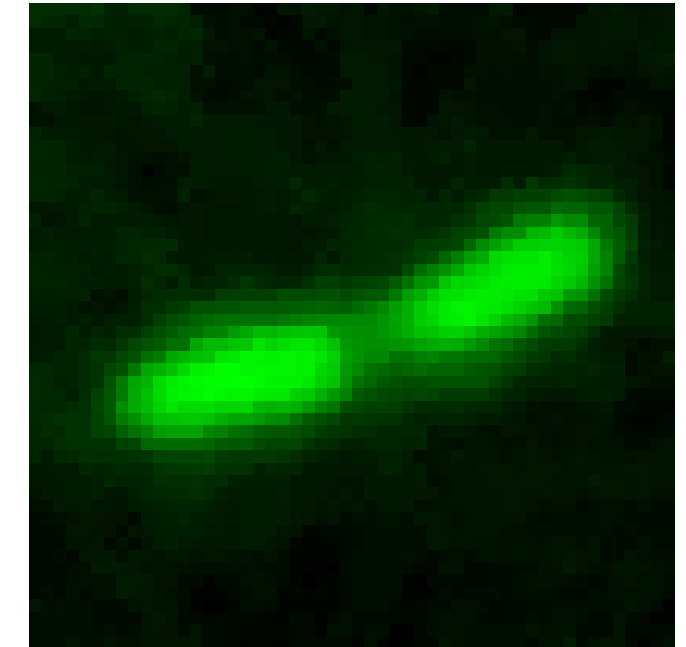
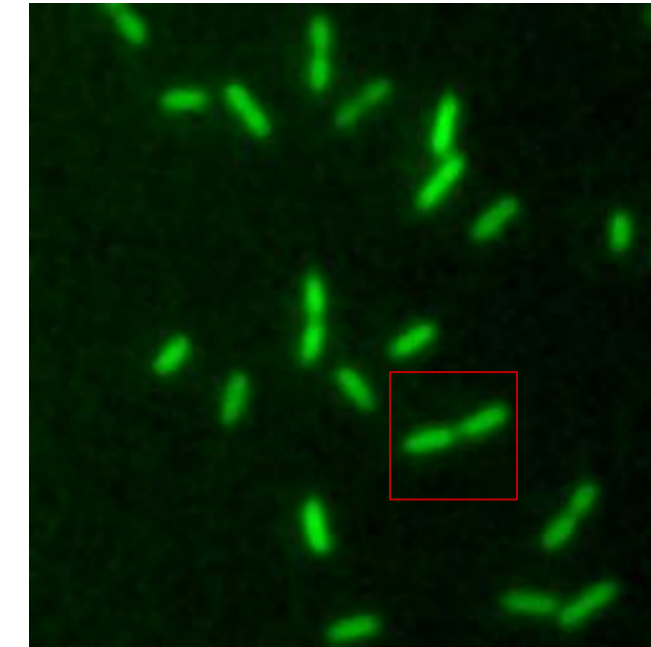


Object

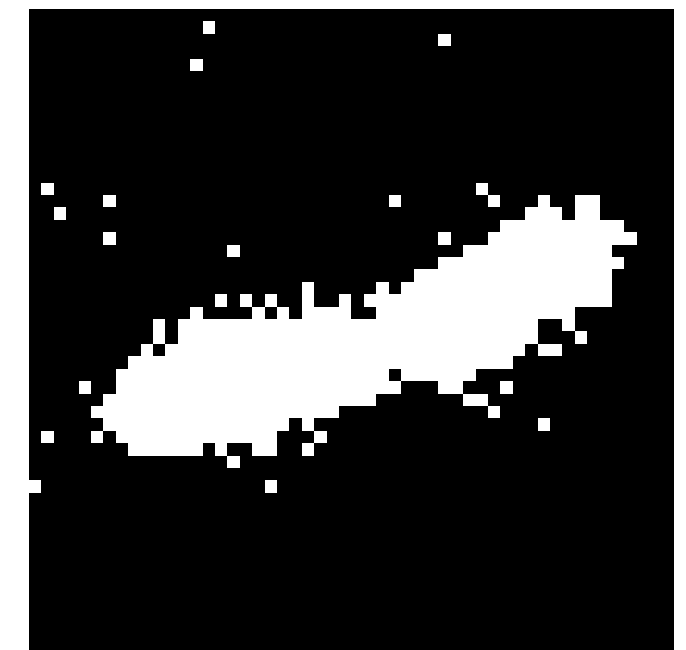
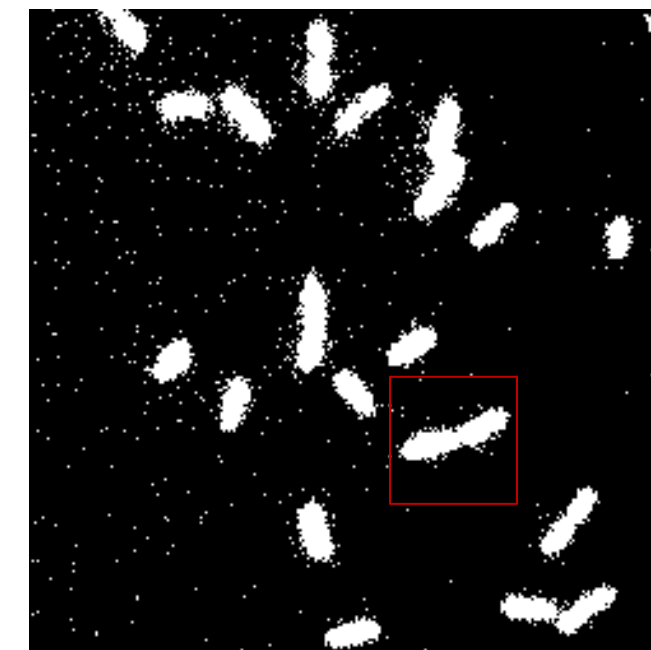


Analyze Particles

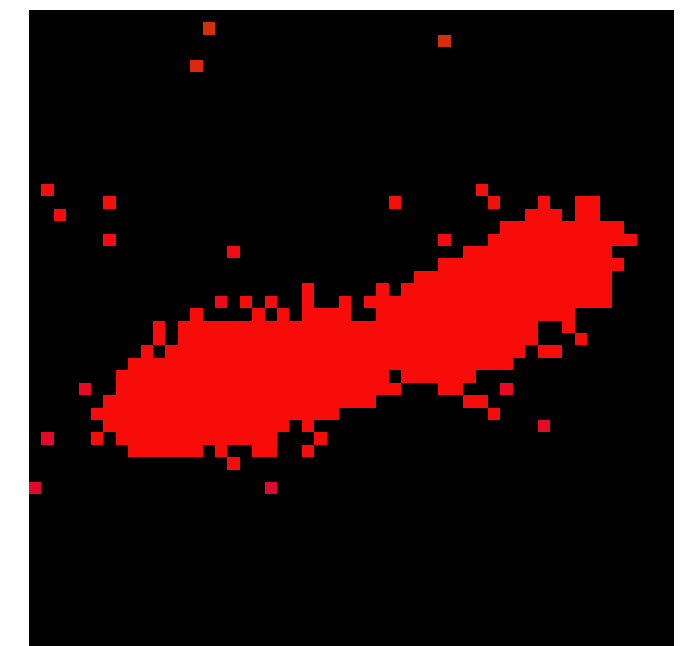
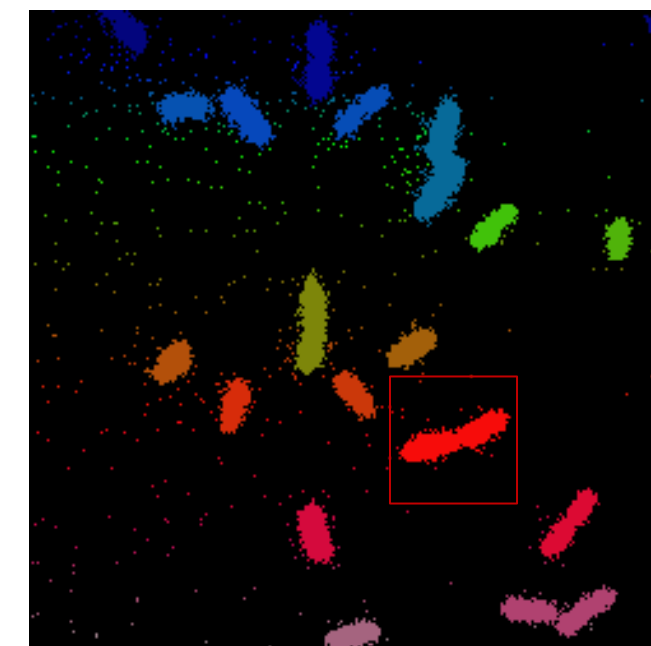
Image
Filtered



Mask

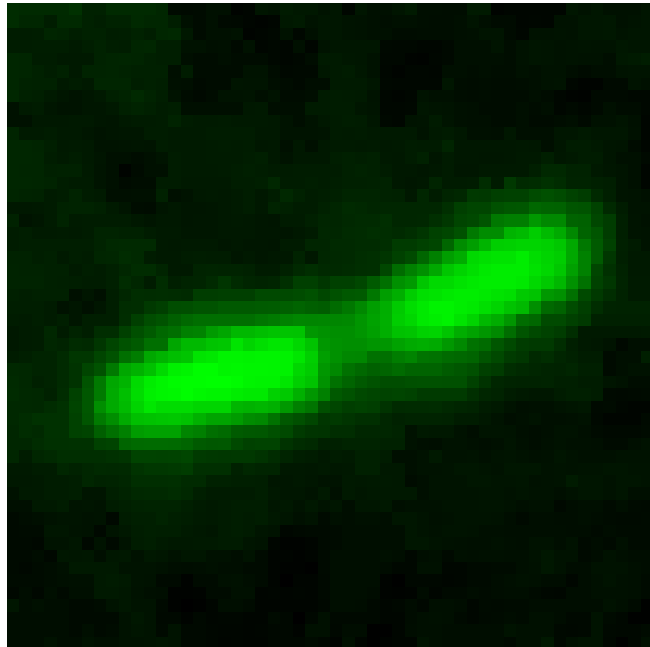
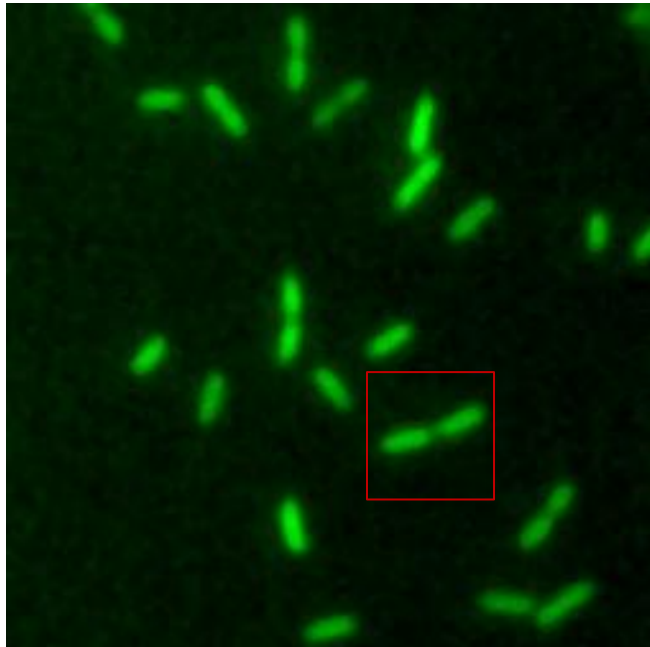


Object

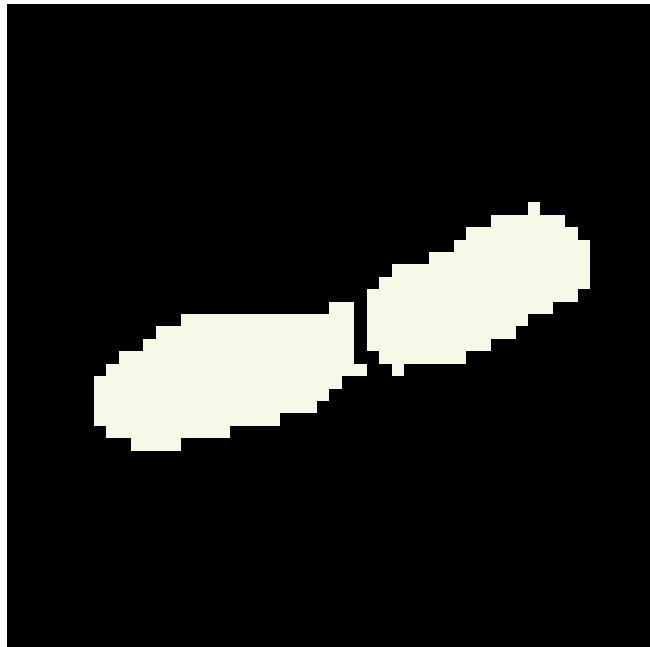


Analyze Particles

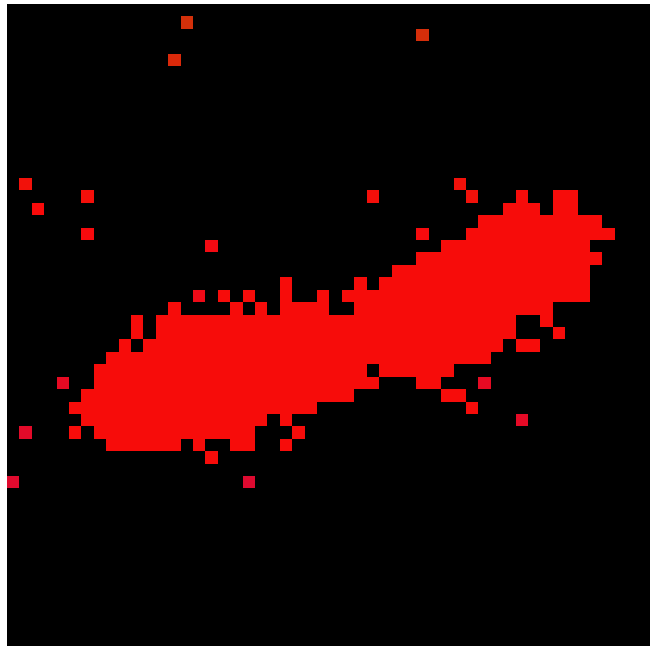
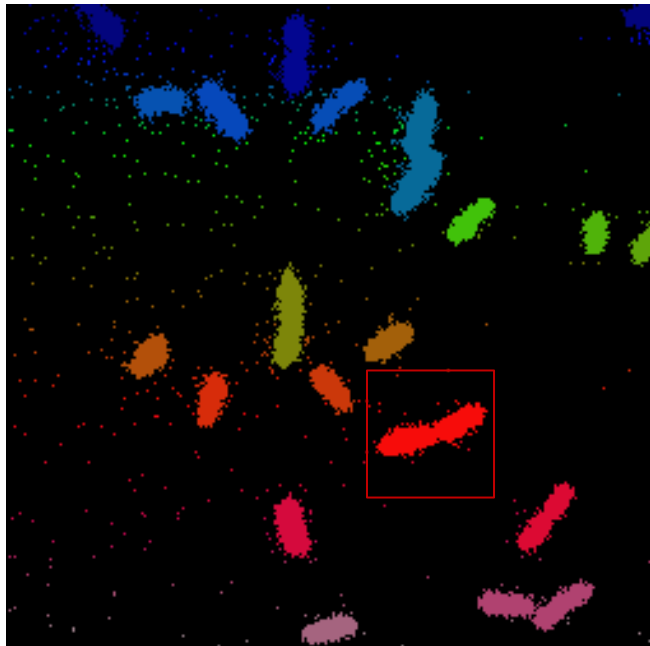
Image
Filtered



Mask
Watershed

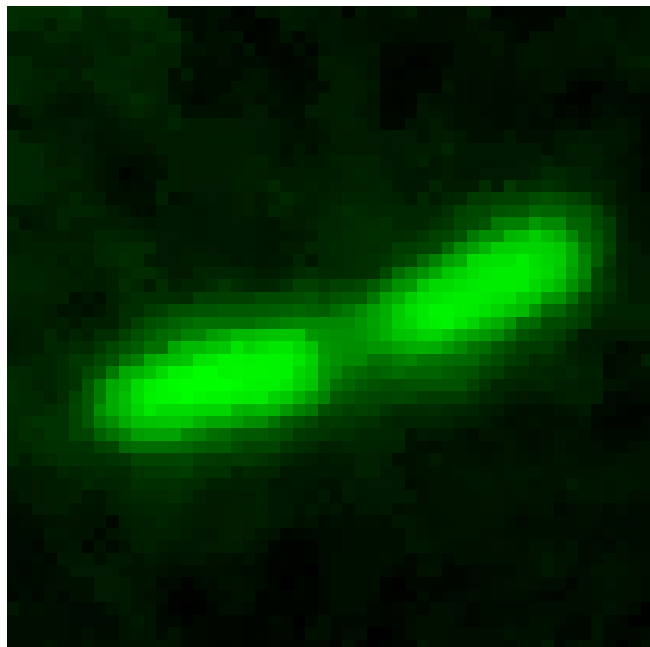
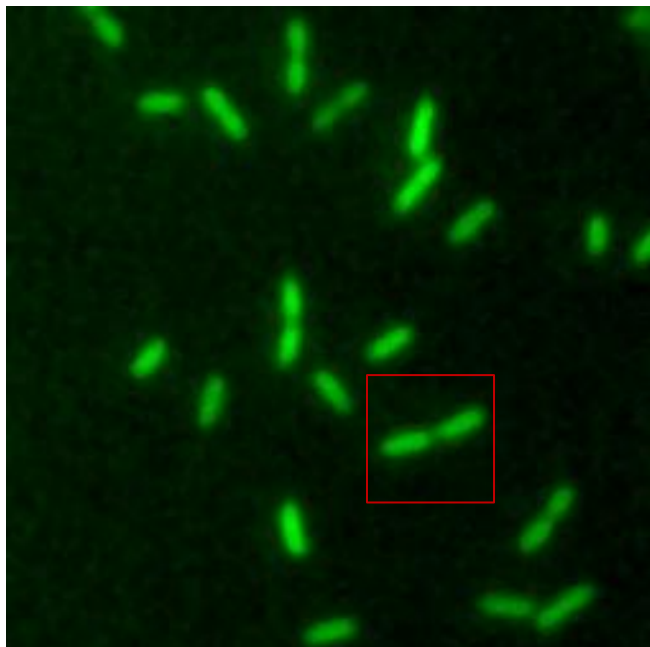


Object

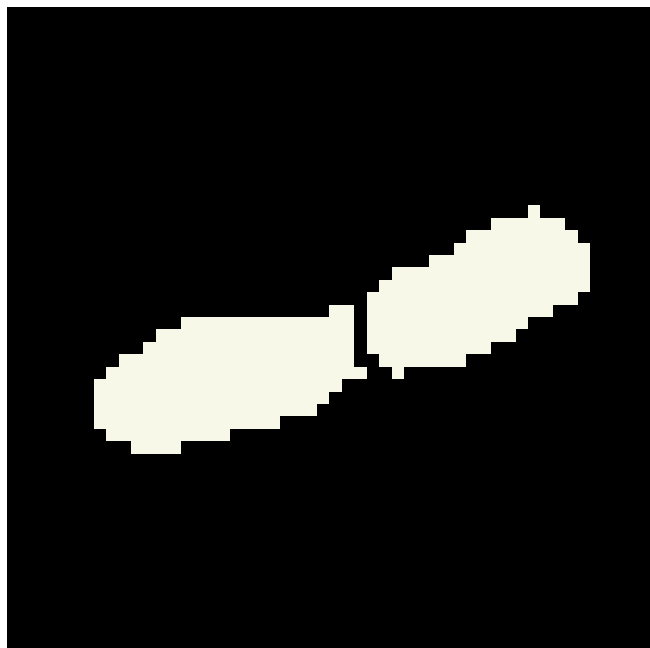
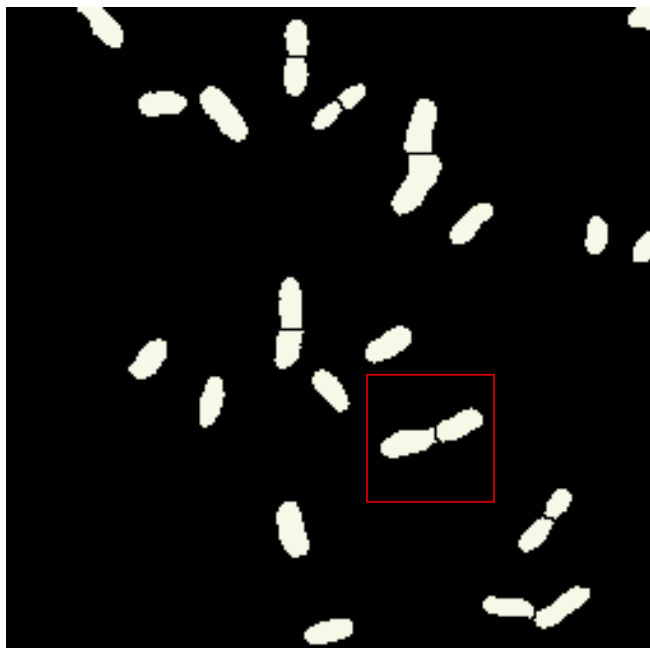


Analyze Particles

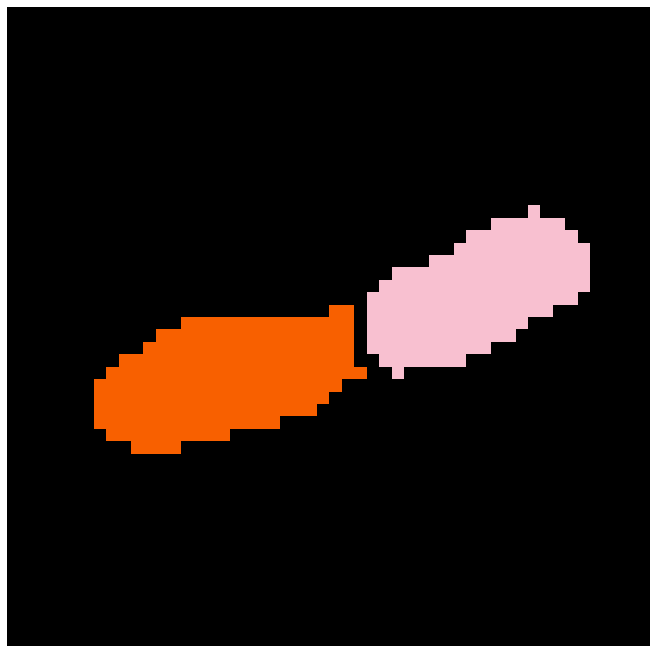
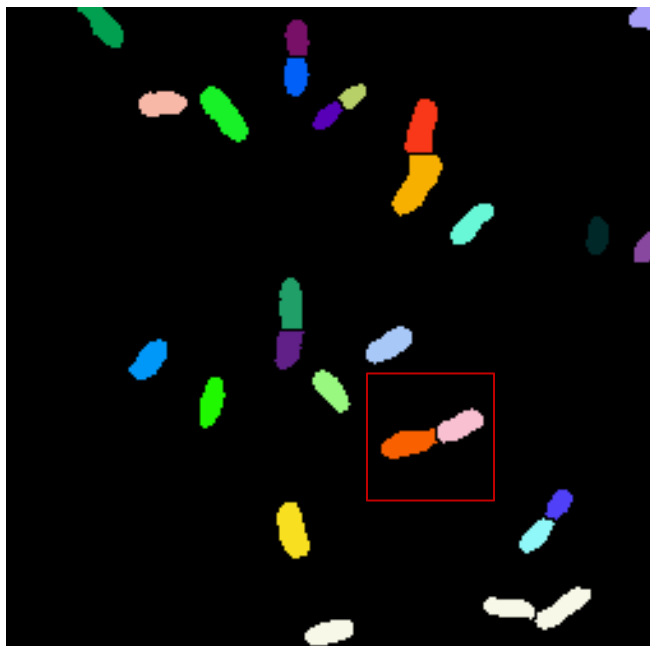
Image
Filtered



Mask
Watershed

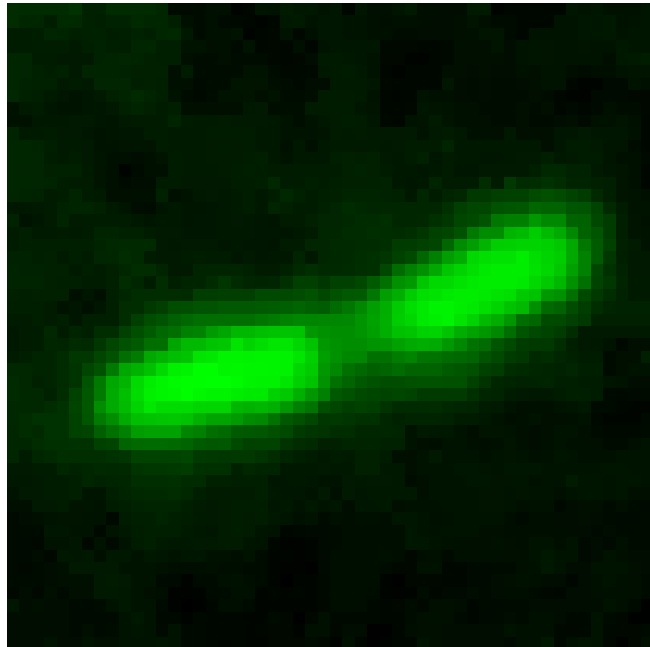
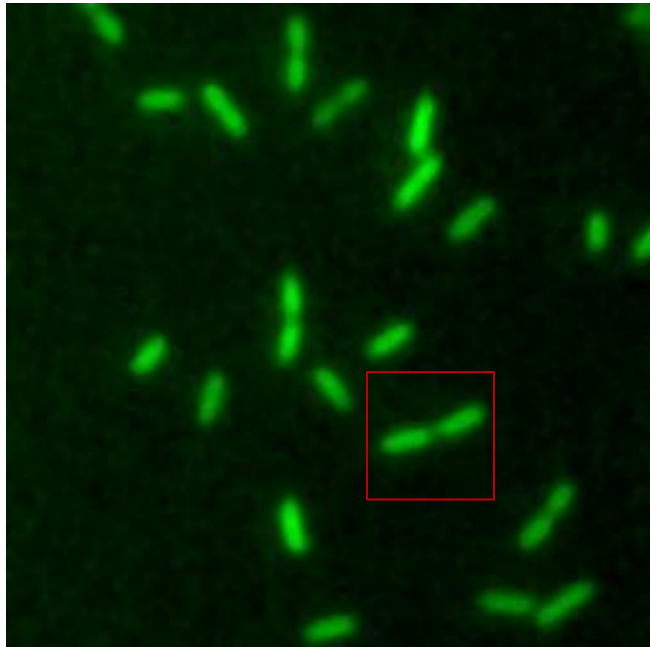


Object

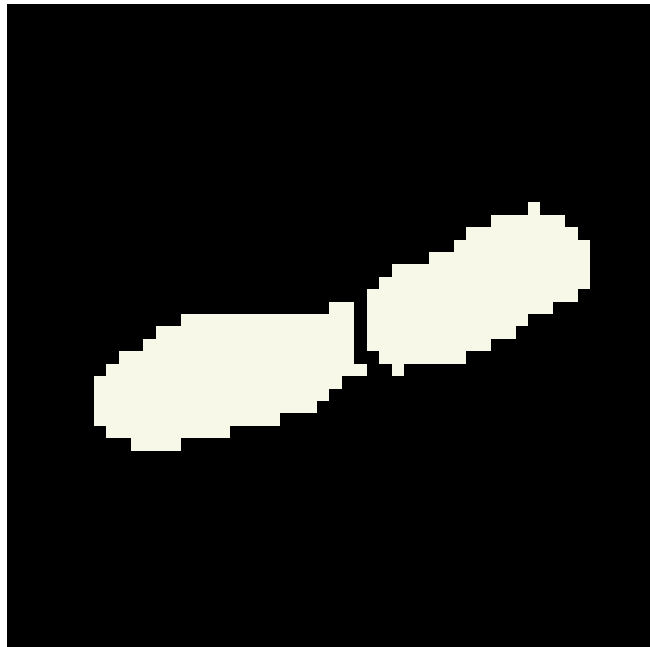
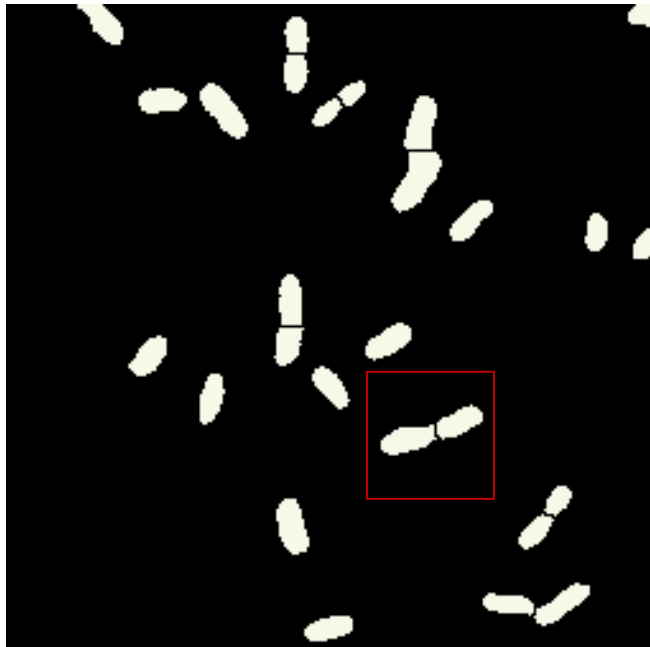


Analyze Particles

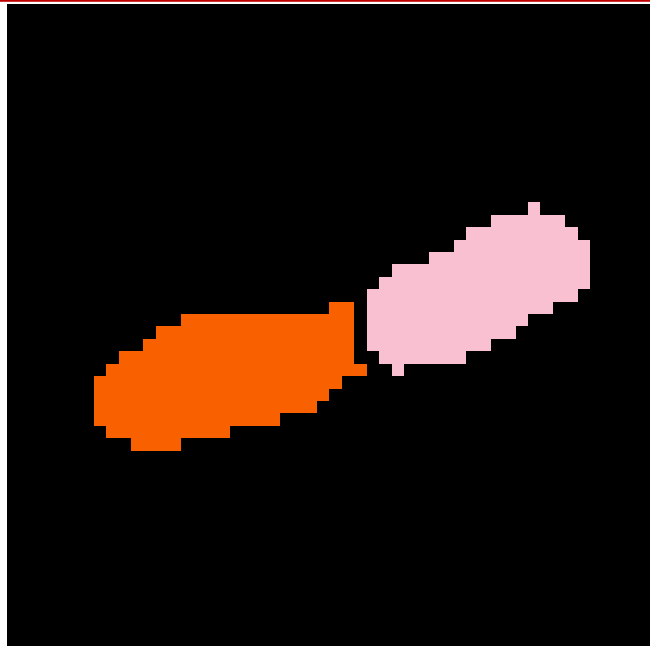
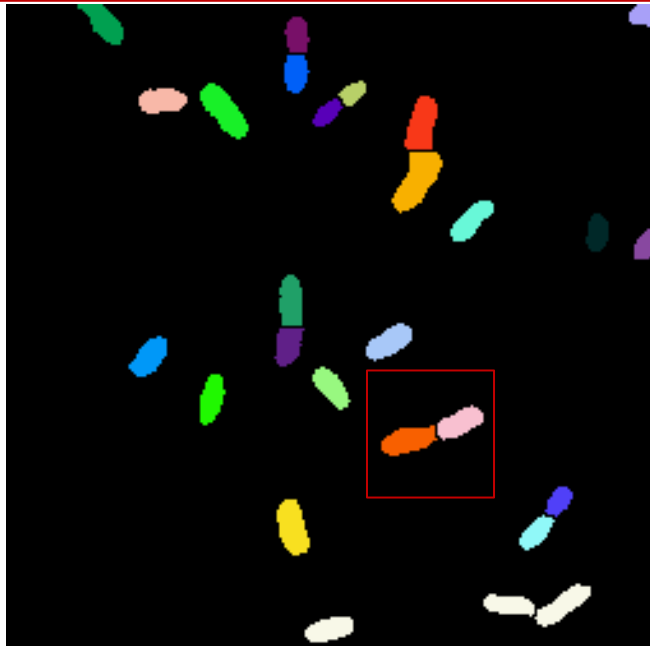
Image
Filtered

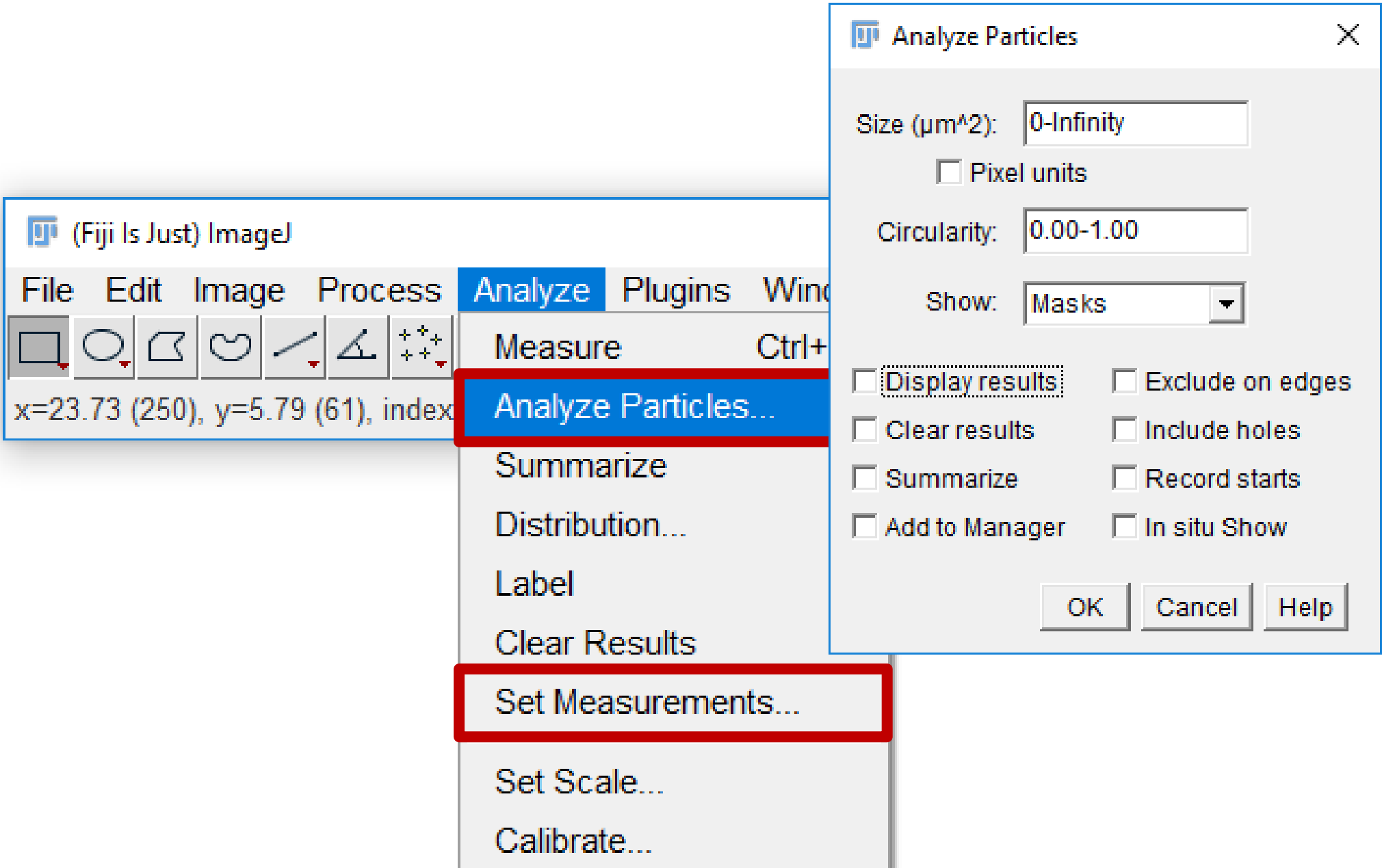


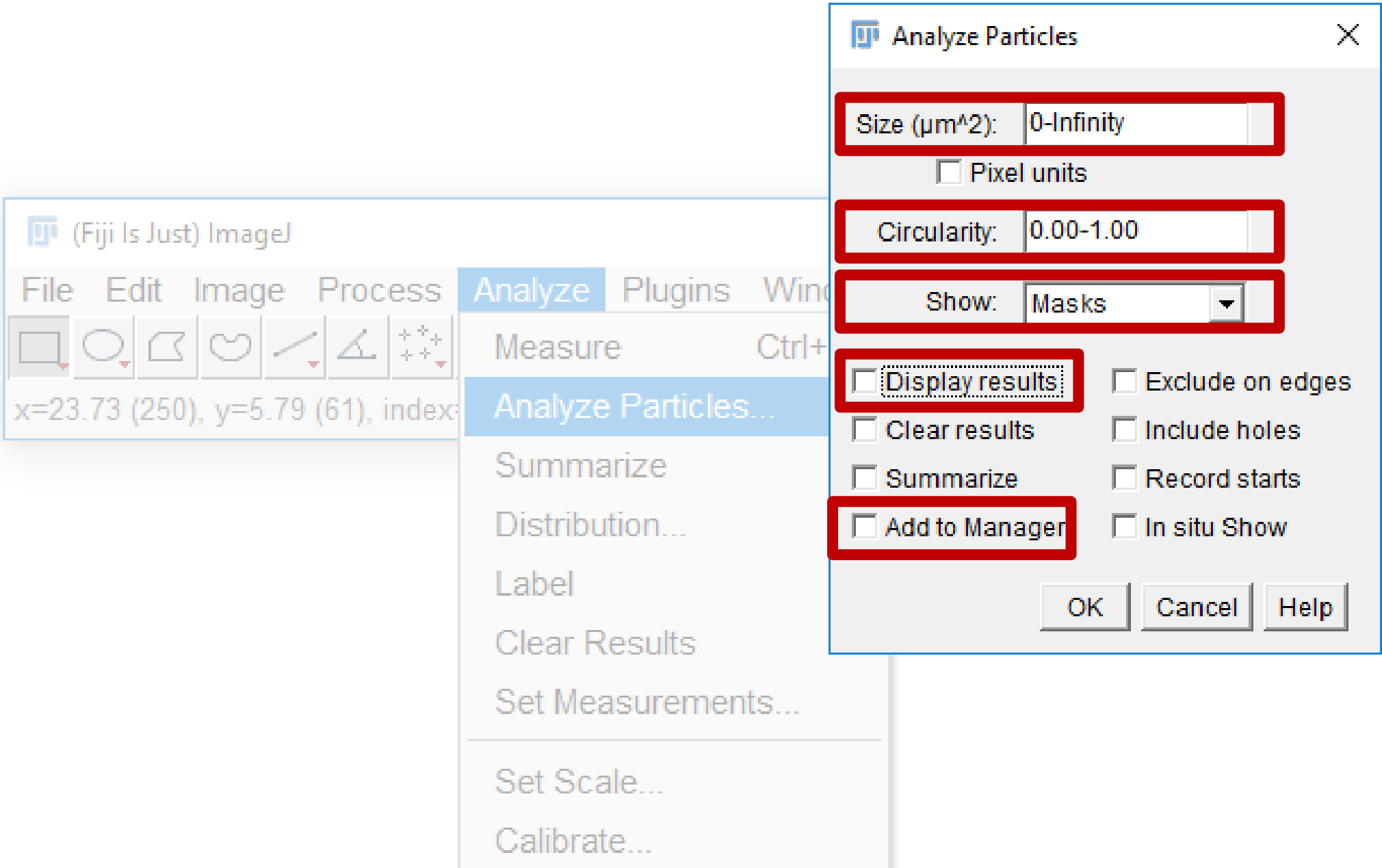
Mask
Watershed



Object







Analyze Particles: Filtering

Input



Analyze Particles

Size (μm^2): 1.0-Infinity

☐ Pixel units

Circularity: 0.00-1.00

Show: Masks

☐ Display results ☐ Exclude on edges

☐ Clear results ☐ Include holes

☐ Summarize ☐ Record starts

☐ Add to Manager ☐ In situ Show

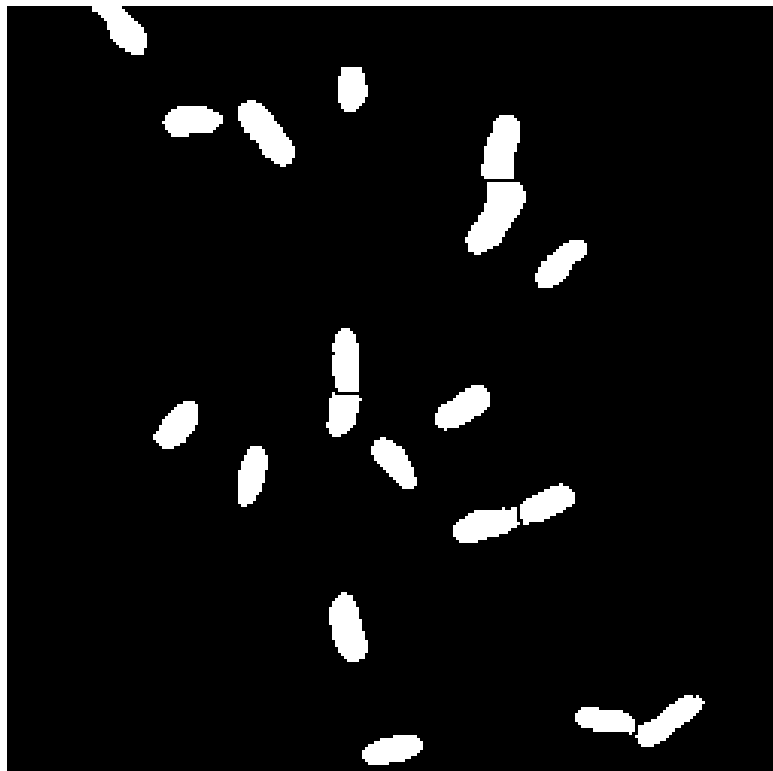
OK Cancel Help

Analyze Particles: Filtering

Input



Output



Analyze Particles

Size (μm^2): 1.0-Infinity

☐ Pixel units

Circularity: 0.00-1.00

Show: Masks

☐ Display results

☐ Exclude on edges

☐ Clear results

☐ Include holes

☐ Summarize

☐ Record starts

☐ Add to Manager

☐ In situ Show

OK

Cancel

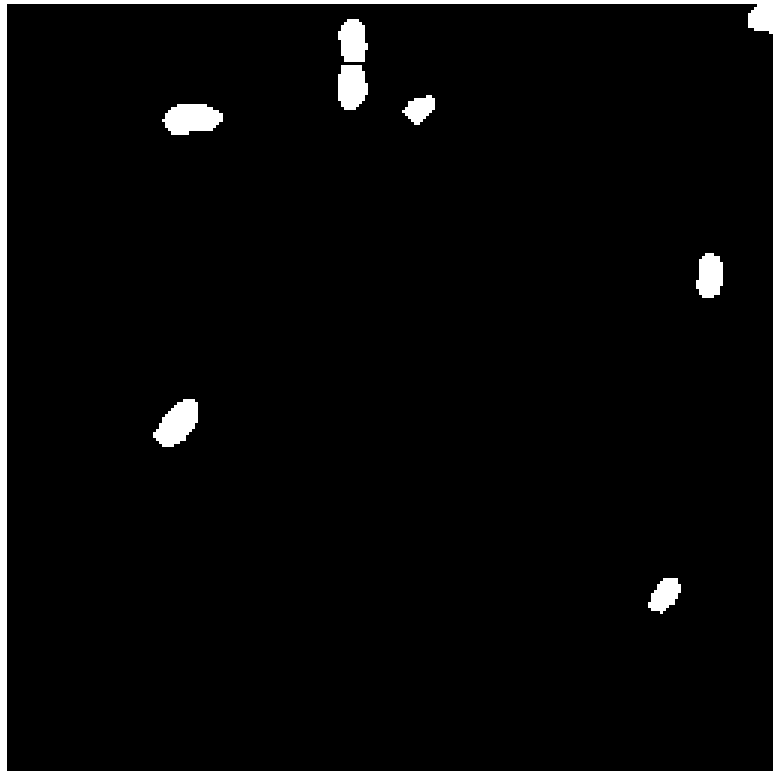
Help

Analyze Particles: Filtering

Input



Output



Analyze Particles

Size (μm^2): 0-Infinity

☐ Pixel units

Circularity: 0.80-1.00

Show: Masks

☐ Display results

☐ Exclude on edges

☐ Clear results

☐ Include holes

☐ Summarize

☐ Record starts

☐ Add to Manager

☐ In situ Show

OK

Cancel

Help

Analyze Particles: Filtering

Input



Output
Glasbey Inverted
LUT



Analyze Particles

Size (µm²): 0-Infinity

☐ Pixel units

Circularity: 0.00-1.00

Show: Count Masks

☐ Display results

☐ Exclude on edges

☐ Clear results

☐ Include holes

☐ Summarize

☐ Record starts

☐ Add to Manager

☐ In situ Show

OK

Cancel

Help

Analyze Particles: Results

Input



Analyze Particles

Size (μm^2): 0-Infinity

☐ Pixel units

Circularity: 0.00-1.00

Show: Count Masks

☒ Display results ☐ Exclude on edges

☐ Clear results ☐ Include holes

☐ Summarize ☐ Record starts

☐ Add to Manager ☐ In situ Show

OK Cancel Help

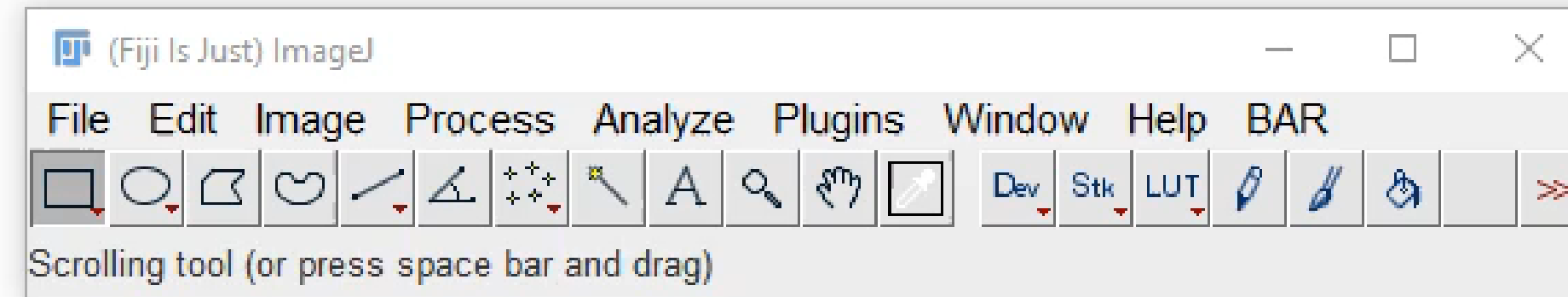
Output
Glasbey Inverted
LUT



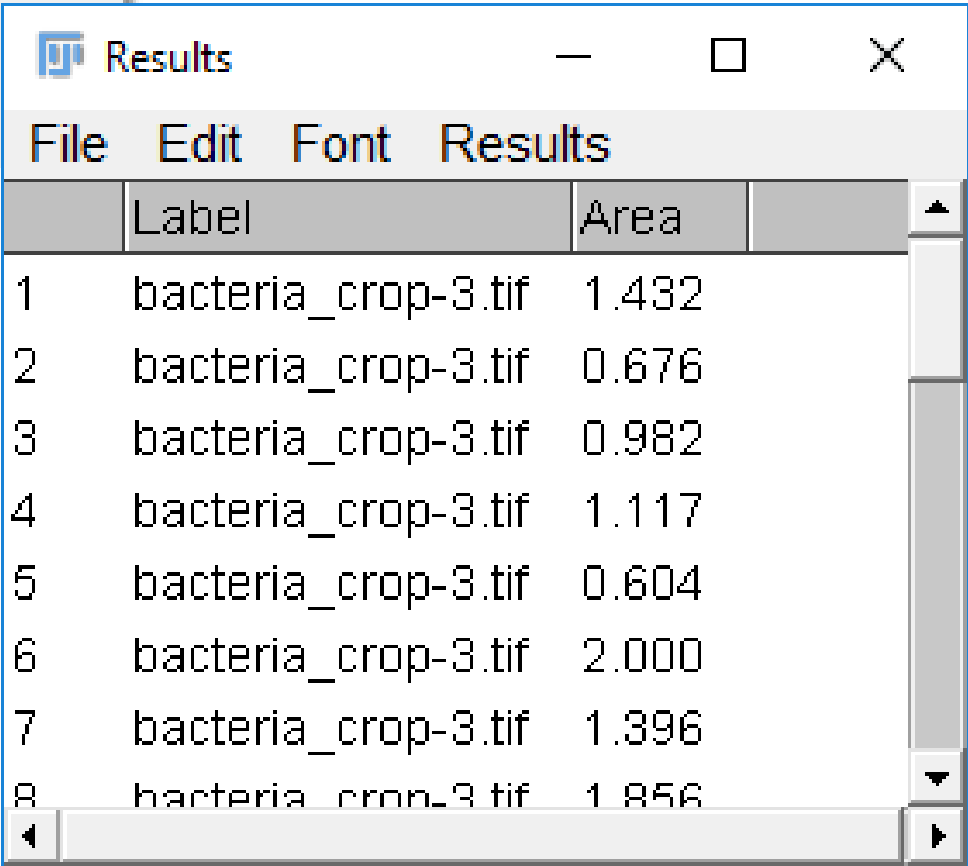
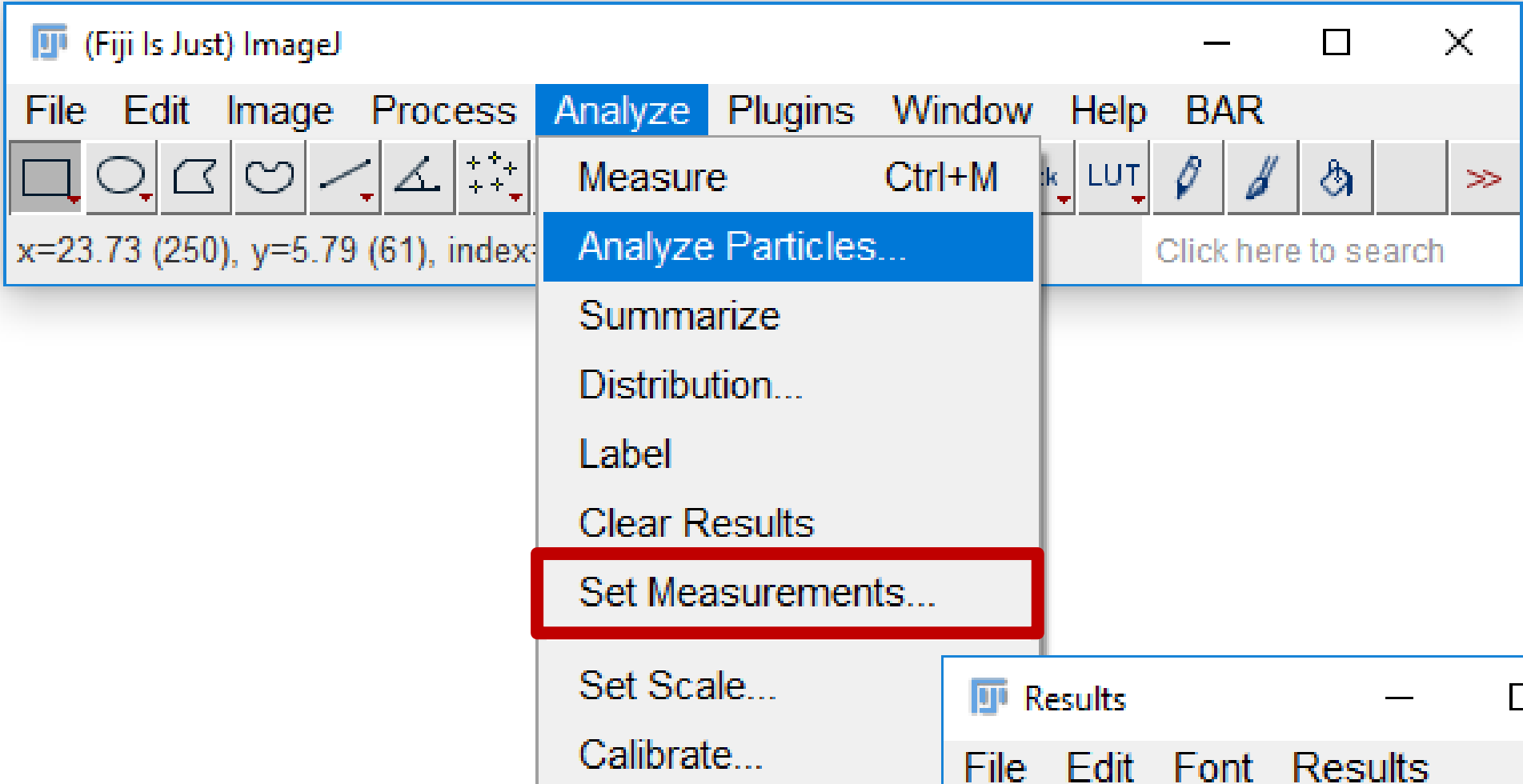
Results

	Label	Area
1	bacteria_crop-3.tif	1.432
2	bacteria_crop-3.tif	0.676
3	bacteria_crop-3.tif	0.982
4	bacteria_crop-3.tif	1.117
5	bacteria_crop-3.tif	0.604
6	bacteria_crop-3.tif	2.000
7	bacteria_crop-3.tif	1.396
8	bacteria_crop-3.tif	1.856

Analyze Particles: Overlay



Analyze Particles: Results



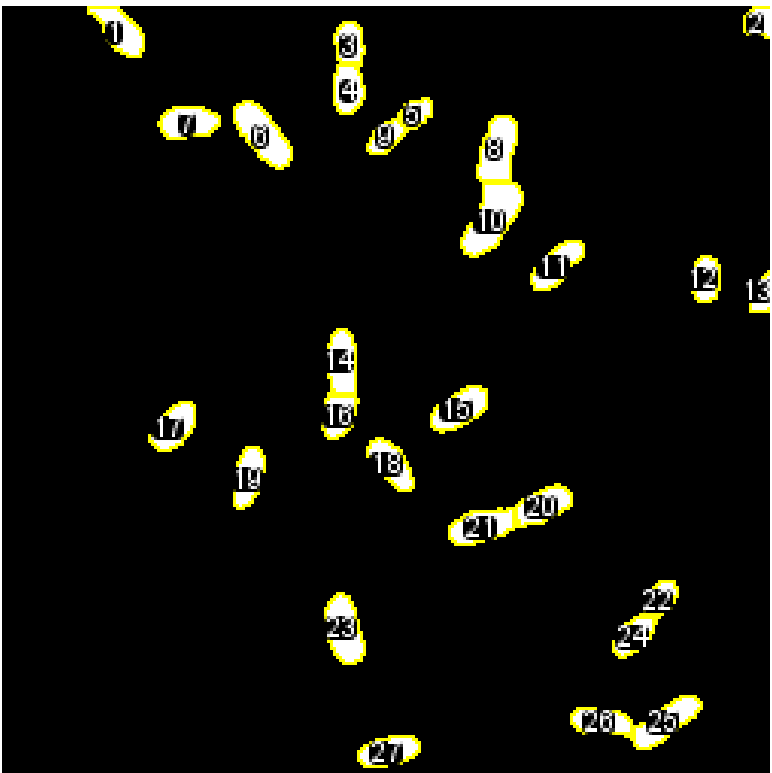
	Label	Area
1	bacteria_crop-3.tif	1.432
2	bacteria_crop-3.tif	0.676
3	bacteria_crop-3.tif	0.982
4	bacteria_crop-3.tif	1.117
5	bacteria_crop-3.tif	0.604
6	bacteria_crop-3.tif	2.000
7	bacteria_crop-3.tif	1.396
8	bacteria_crop-3.tif	1.856

Analyze Particles: ROI Manager

Input



Output
On Same Image



Analyze Particles

Size (μm^2): 0-Infinity

☐ Pixel units

Circularity: 0.00-1.00

Show: Nothing

☐ Display results ☐ Exclude on edges

☐ Clear results ☐ Include holes

☐ Summarize ☐ Record starts

☒ Add to Manager ☐ In situ Show

OK Cancel Help



+

RO...

0001-0008	▲	Add [t]
0002-0005		Update
0003-0012		Delete
0004-0027		Rename...
0005-0035		Measure
0006-0042		Deselect
0007-0038		Properties...
0008-0046		Flatten [F]
0009-0042		More »
0010-0070		<input checked="" type="checkbox"/> Show All
0011-0085		<input checked="" type="checkbox"/> Labels
0012-0089		
0013-0093		
0014-0116		

- Using Analyze Particles
- Displaying Results
- Output to ROI Manager

Analyze Particles: Results

 Set Measurements 

☒ Area

☒ Standard deviation

☒ Min & max gray value

☒ Center of mass

☐ Bounding rectangle

☐ Shape descriptors

☐ Integrated density

☐ Skewness

☐ Area fraction

☒ Limit to threshold

☒ Mean gray value

☐ Modal gray value

☐ Centroid

☐ Perimeter

☒ Fit ellipse


☐ Feret's diameter

☐ Median



☐ Kurtosis

☐ Stack position

☒ Display label

Results 												
File Edit Font Results												
	Label	Area	Mean	StdDev	Min	Max	XM	YM	Major	Minor	Angle	
21	bacteria_crop-1.tif	1.577	255	0	255	255	14.957	16.226	2.164	0.928	14.790	
22	bacteria_crop-1.tif	0.739	255	0	255	255	20.567	18.479	1.242	0.757	53.552	
23	bacteria_crop-1.tif	1.811	255	0	255	255	10.658	19.467	2.203	1.047	104.009	
24	bacteria_crop-1.tif	0.946	255	0	255	255	19.712	19.655	1.589	0.758	45.714	
25	bacteria_crop-1.tif	1.532	255	0	255	255	20.710	22.350	2.458	0.793	34.745	
26	bacteria_crop-1.tif	1.144	255	0	255	255	18.705	22.345	2.030	0.717	172.989	
27	bacteria_crop-1.tif	1.288	255	0	255	255	12.034	23.252	1.928	0.851	14.055	

Analyze Particles: Results

 Set Measurements 

☒ Area

☒ Standard deviation

☒ Min & max gray value

☒ Center of mass

☐ Bounding rectangle

☐ Shape descriptors

☐ Integrated density

☐ Skewness

☐ Area fraction

☒ Limit to threshold

☒ Mean gray value

☐ Modal gray value

☐ Centroid

☐ Perimeter

☒ Fit ellipse


☐ Feret's diameter

☐ Median


☐ Kurtosis

☐ Stack position

☒ Display label

Results 												
File Edit Font Results												
	Label	Area	Mean	StdDev	Min	Max	XM	YM	Major	Minor	Angle	
21	bacteria_crop-1.tif	1.577	255	0	255	255	14.957	16.226	2.164	0.928	14.790	
22	bacteria_crop-1.tif	0.739	255	0	255	255	20.567	18.479	1.242	0.757	53.552	
23	bacteria_crop-1.tif	1.811	255	0	255	255	10.658	19.467	2.203	1.047	104.009	
24	bacteria_crop-1.tif	0.946	255	0	255	255	19.712	19.655	1.589	0.758	45.714	
25	bacteria_crop-1.tif	1.532	255	0	255	255	20.710	22.350	2.458	0.793	34.745	
26	bacteria_crop-1.tif	1.144	255	0	255	255	18.705	22.345	2.030	0.717	172.989	
27	bacteria_crop-1.tif	1.288	255	0	255	255	12.034	23.252	1.928	0.851	14.055	

Analyze Particles: Results

 Set Measurements ✕

<input checked="" type="checkbox"/> Area	<input checked="" type="checkbox"/> Mean gray value
<input checked="" type="checkbox"/> Standard deviation	<input type="checkbox"/> Modal gray value
<input checked="" type="checkbox"/> Min & max gray value	<input type="checkbox"/> Centroid
<input checked="" type="checkbox"/> Center of mass	<input type="checkbox"/> Perimeter
<input type="checkbox"/> Bounding rectangle	<input checked="" type="checkbox"/> Fit ellipse
<input type="checkbox"/> Shape descriptors	<input type="checkbox"/> Feret's diameter
<input type="checkbox"/> Integrated density	<input type="checkbox"/> Median
<input type="checkbox"/> Skewness	<input type="checkbox"/> Kurtosis
<input type="checkbox"/> Area fraction	<input type="checkbox"/> Stack position
<input checked="" type="checkbox"/> Limit to threshold	<input checked="" type="checkbox"/> Display label
<input type="checkbox"/> Invert Y coordinates	<input type="checkbox"/> Scientific notation
<input type="checkbox"/> Add to overlay	<input type="checkbox"/> NaN empty cells

Redirect to: None

Decimal places (0-9): 3

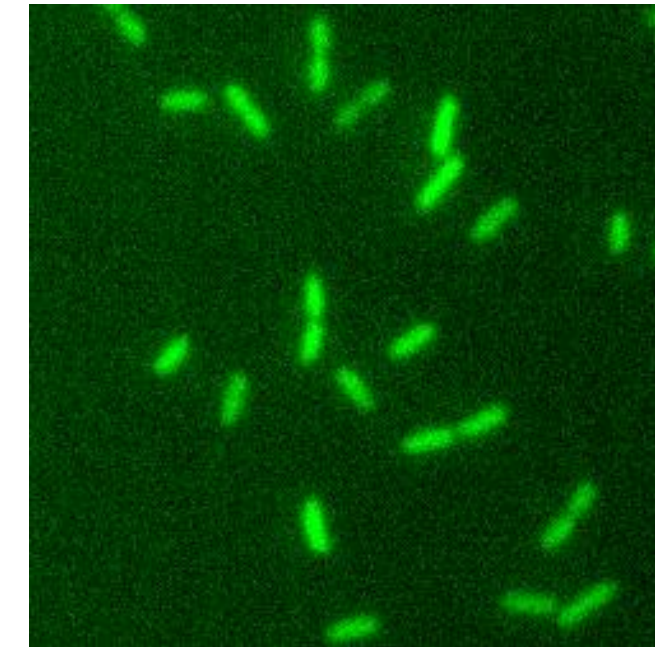
OK

Cancel

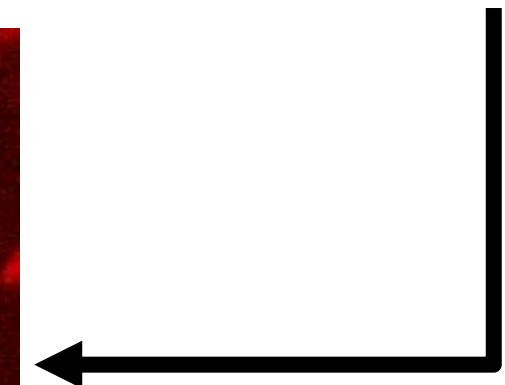
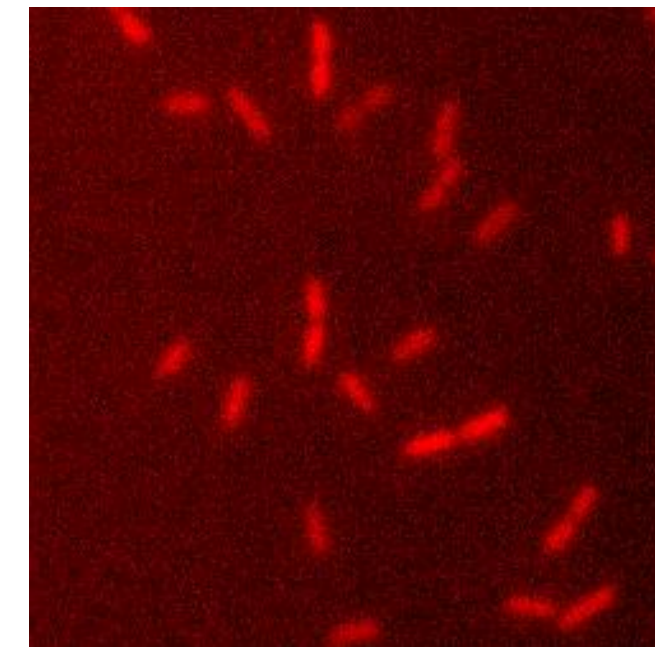
Help

Redirecting Results

Detection
Channel

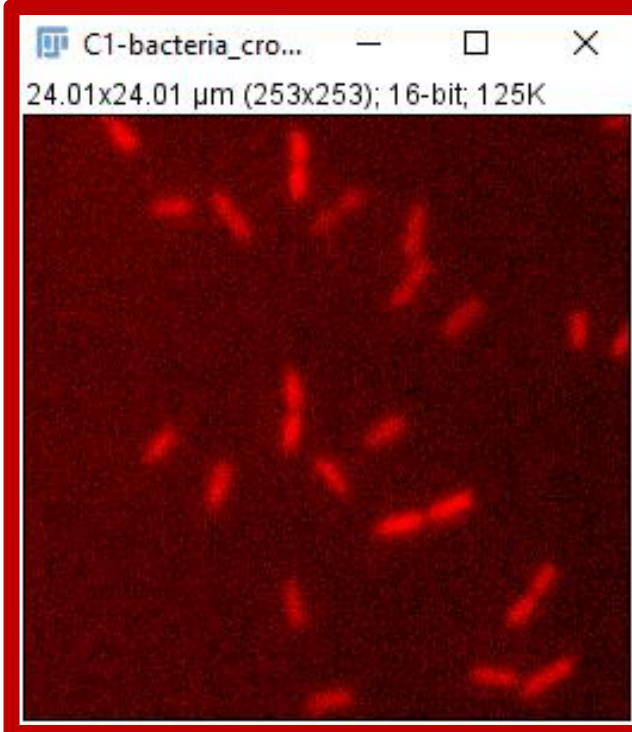
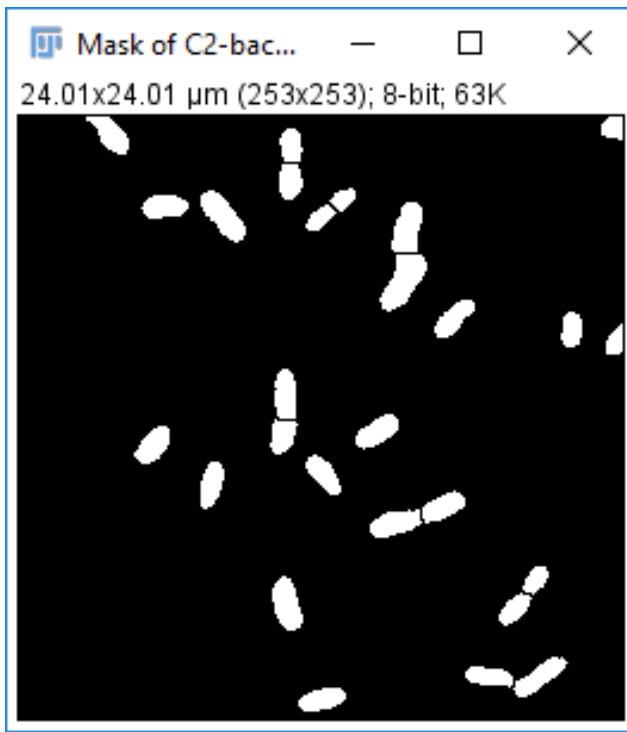
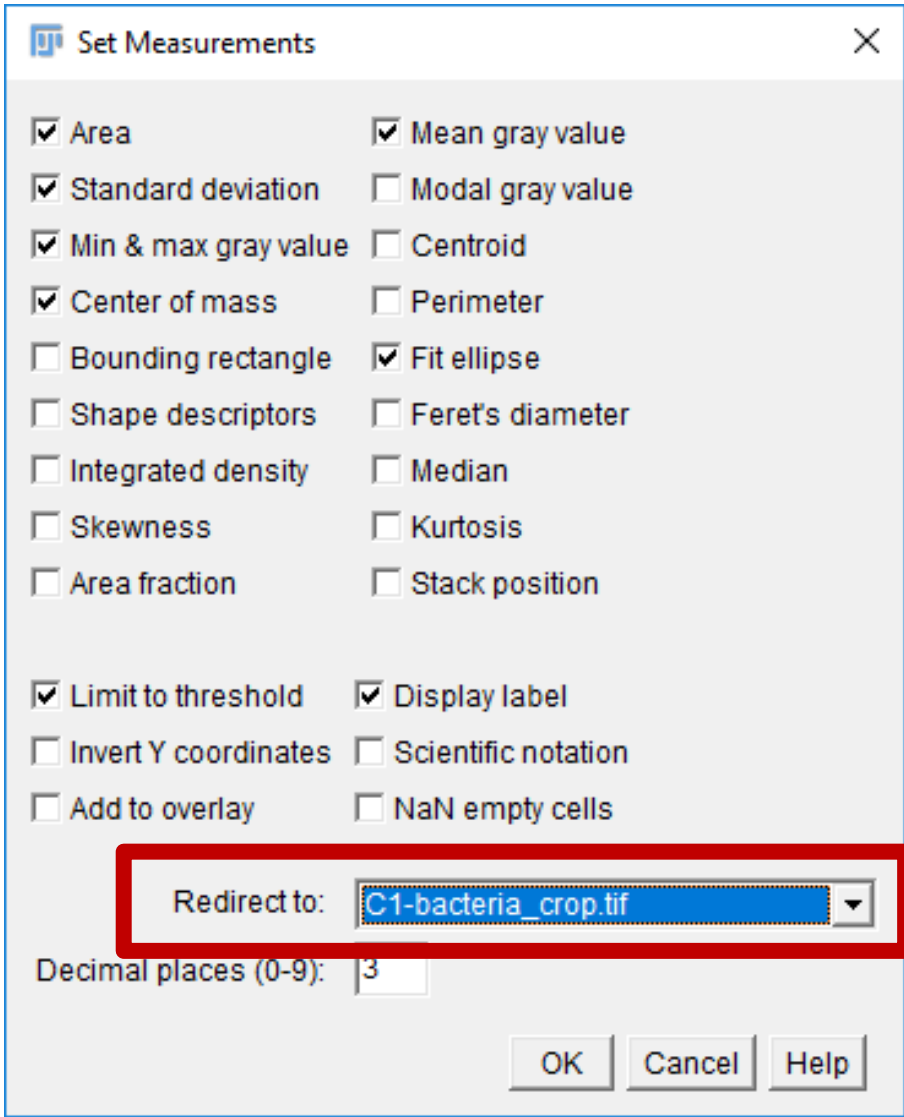


Analysis
Channel

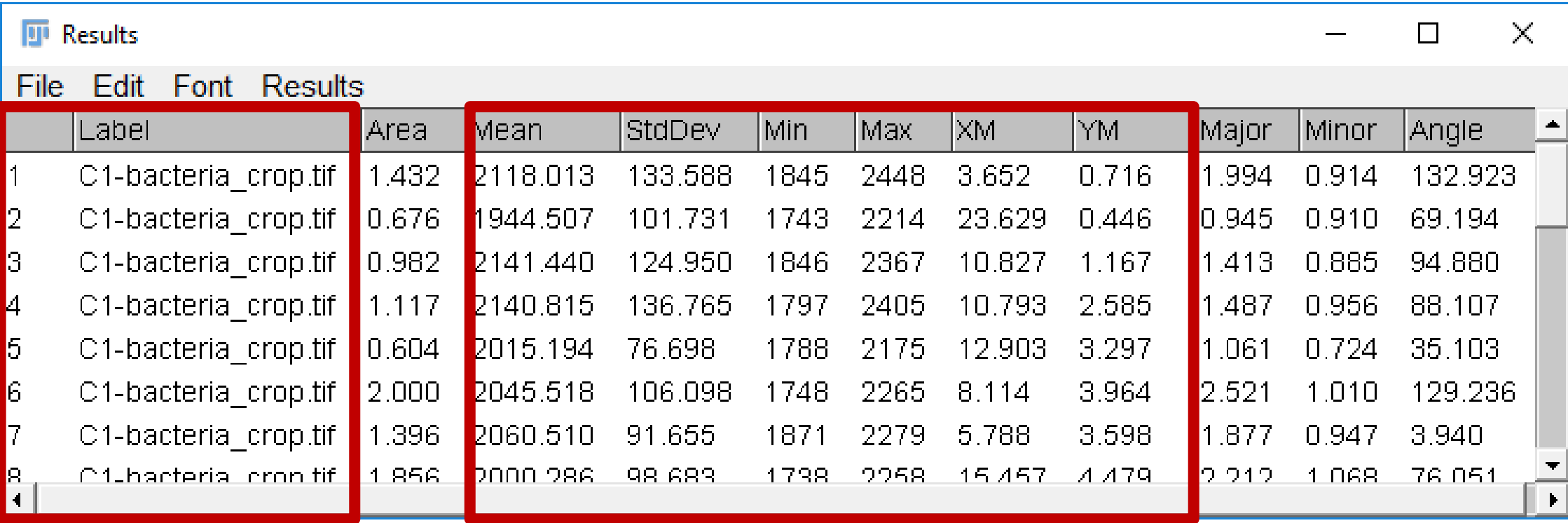
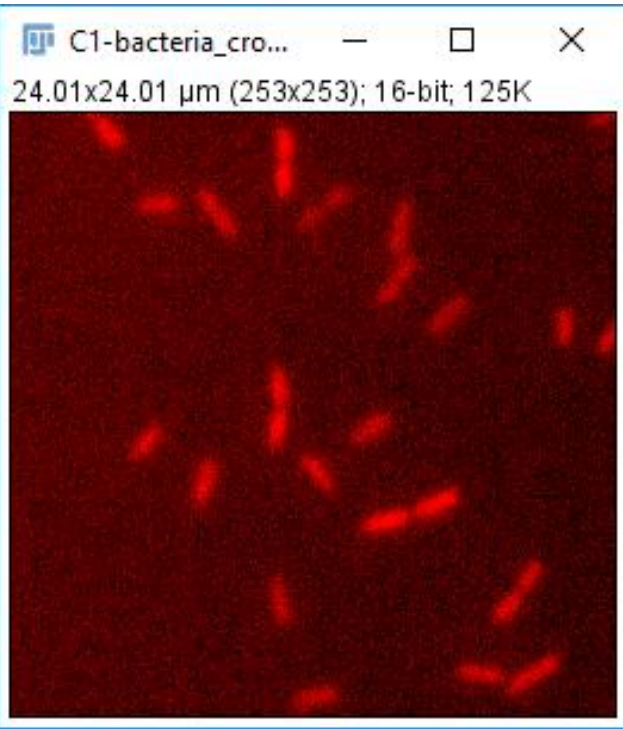
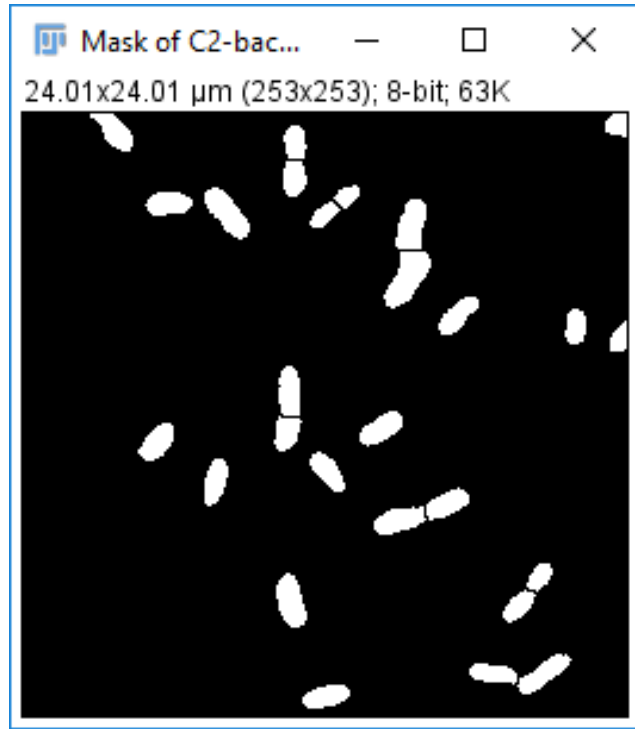
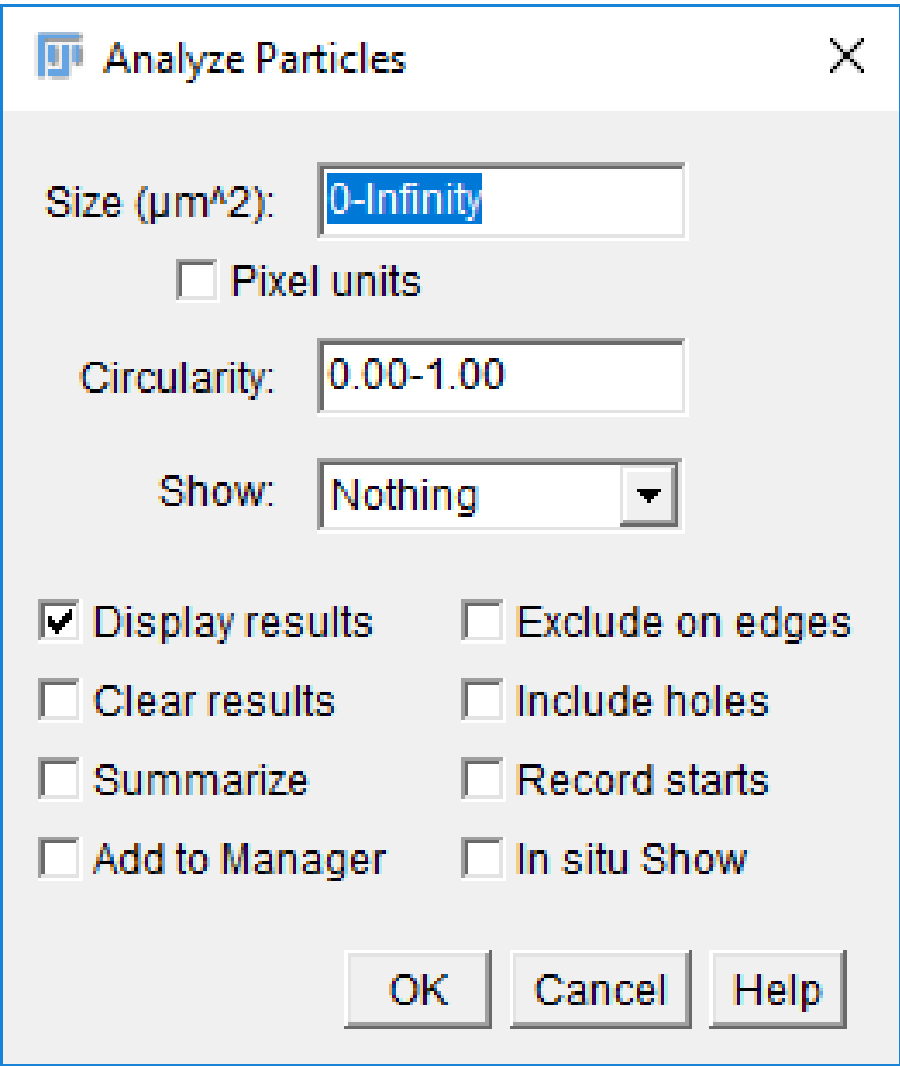


Redirection

Redirecting Results



Redirecting Results



Results

File Edit Font Results

	Label	Area	Mean	StdDev	Min	Max	XM	YM	Major	Minor	Angle
1	C1-bacteria_crop.tif	1.432	2118.013	133.588	1845	2448	3.652	0.716	1.994	0.914	132.923
2	C1-bacteria_crop.tif	0.676	1944.507	101.731	1743	2214	23.629	0.446	0.945	0.910	69.194
3	C1-bacteria_crop.tif	0.982	2141.440	124.950	1846	2367	10.827	1.167	1.413	0.885	94.880
4	C1-bacteria_crop.tif	1.117	2140.815	136.765	1797	2405	10.793	2.585	1.487	0.956	88.107
5	C1-bacteria_crop.tif	0.604	2015.194	76.698	1788	2175	12.903	3.297	1.061	0.724	35.103
6	C1-bacteria_crop.tif	2.000	2045.518	106.098	1748	2265	8.114	3.964	2.521	1.010	129.236
7	C1-bacteria_crop.tif	1.396	2060.510	91.655	1871	2279	5.788	3.598	1.877	0.947	3.940
8	C1-bacteria_crop.tif	1.856	2000.286	98.683	1738	2258	15.457	4.479	2.212	1.068	76.051