

A mass spectrum plot with a blue-tinted background. The x-axis is labeled 'm/z' and has major tick marks at 0, 400, 600, 800, 1000, 1200, and 1400. The y-axis represents relative intensity. The spectrum shows a base peak at approximately m/z 750 and several other significant peaks at lower and higher m/z values.

THE FLYING IONS

A UAB Mass Spec Interest Group

**“Pretty pictures and more –
turning a mass spec into a
(chemical) microscope.”**

Eric B. Monroe, PhD

Thursday, April 30, 2009

some see these:



I see like this:



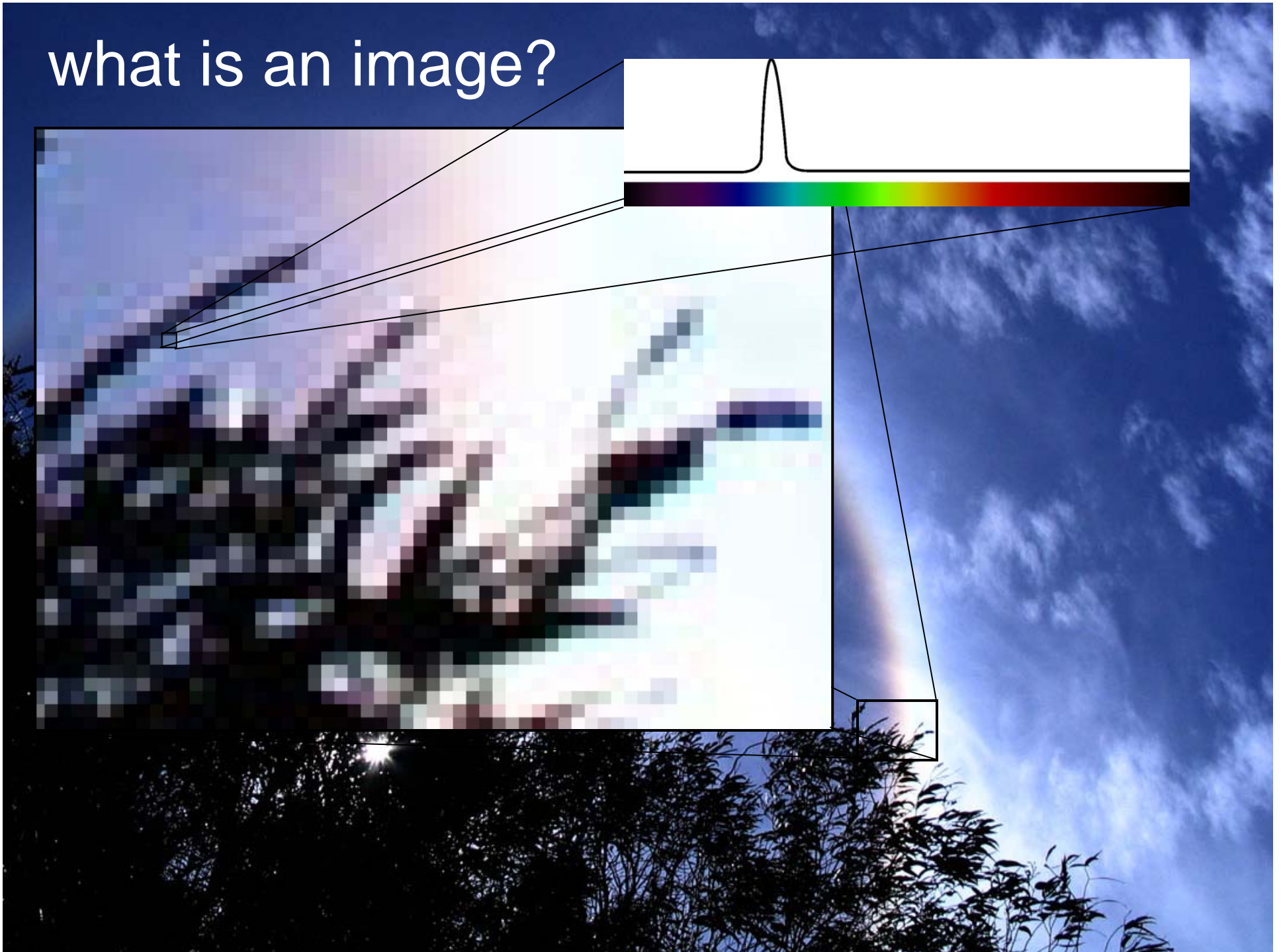
what is an image?



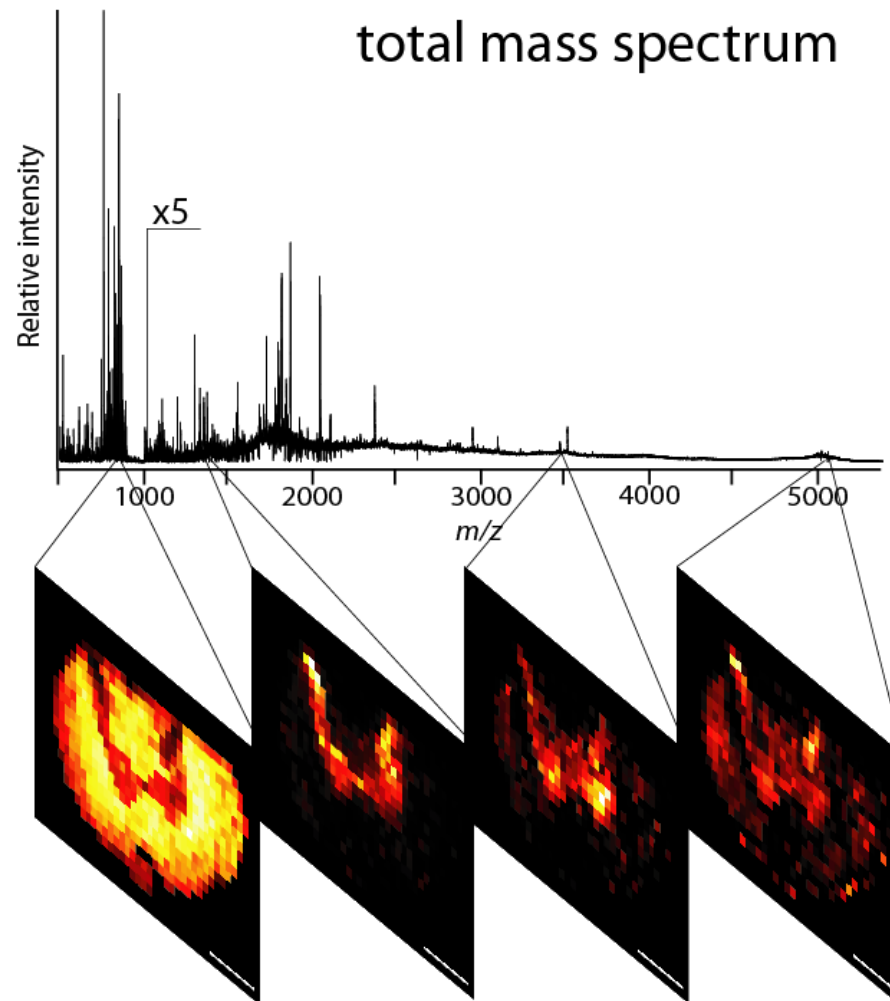
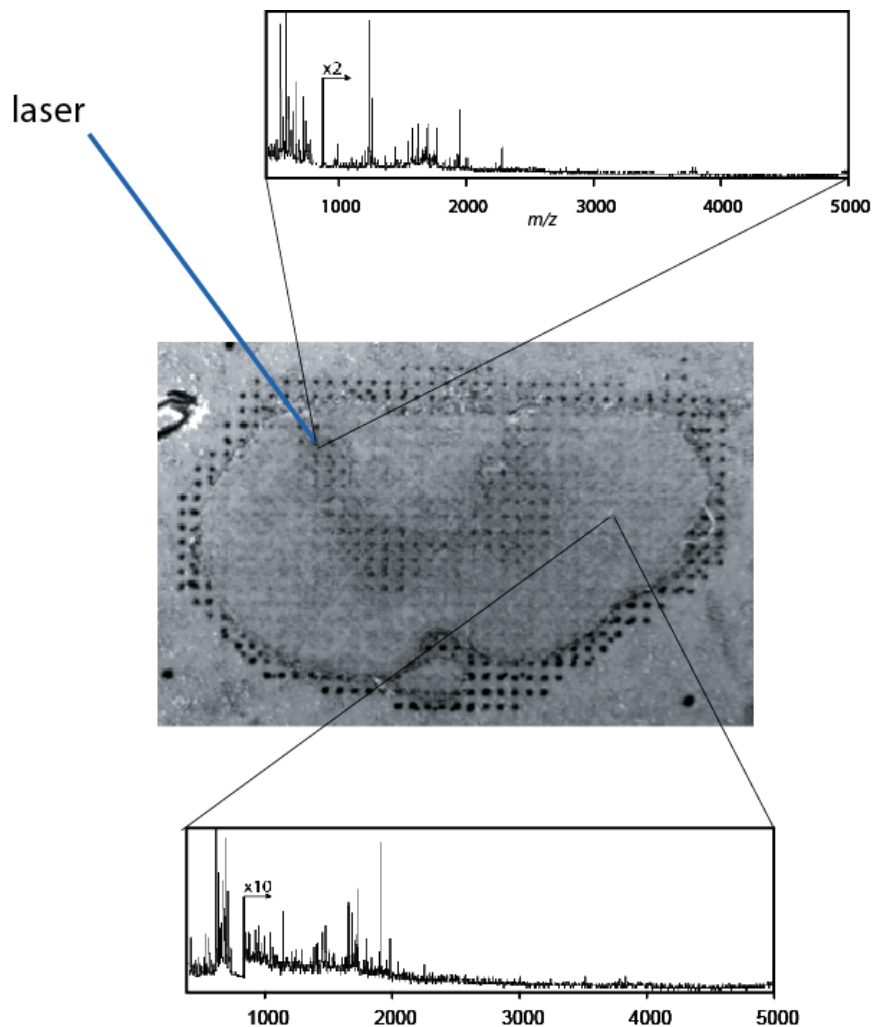
what is an image?



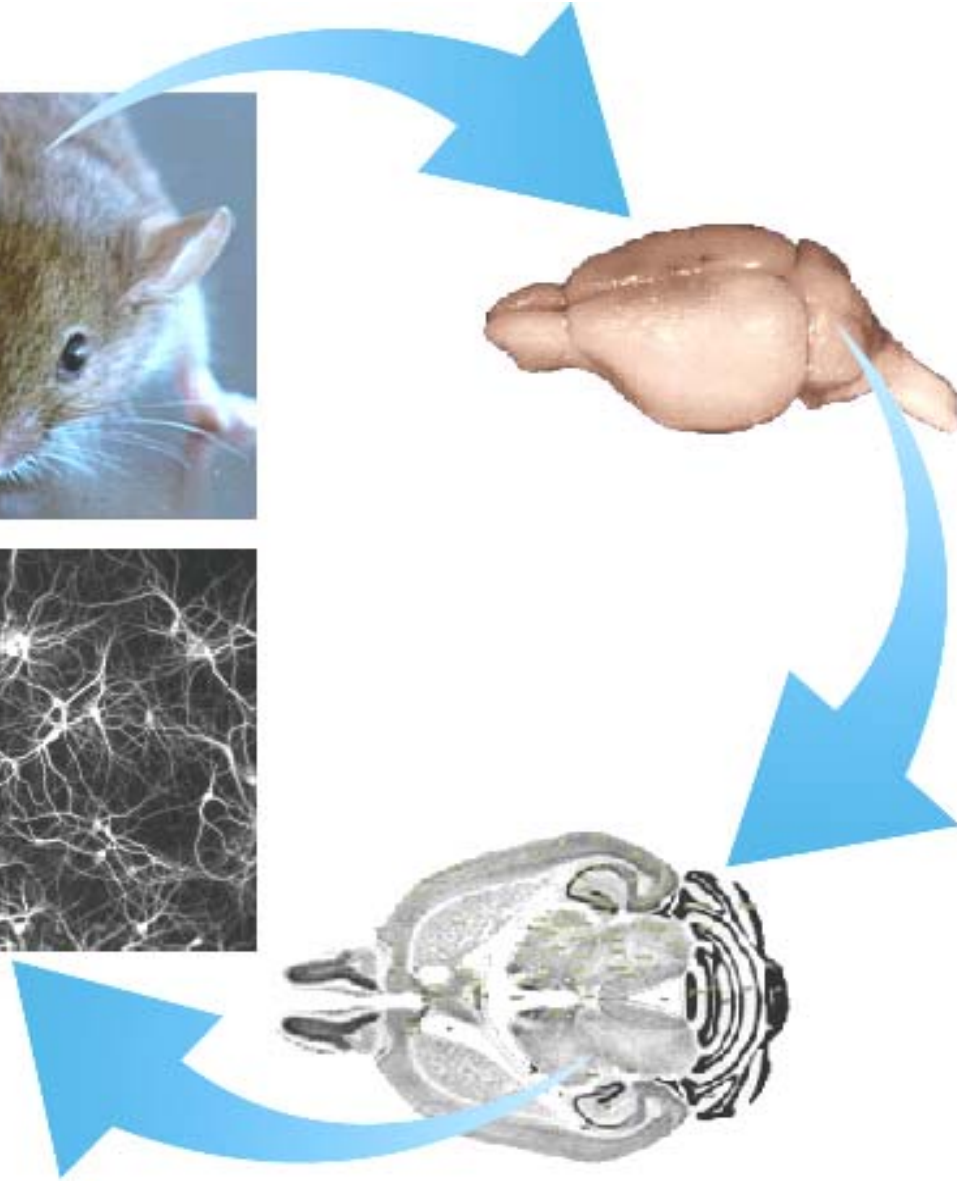
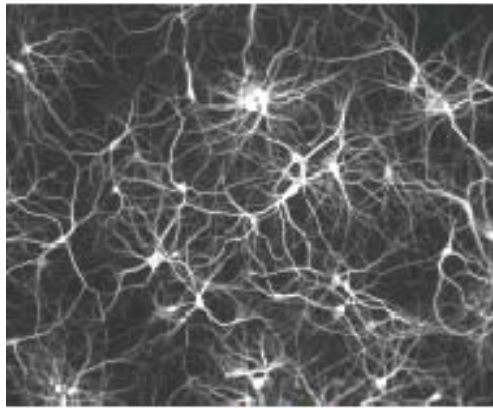
what is an image?



from ions come images



simplify with spatial resolution



simplify with spatial resolution



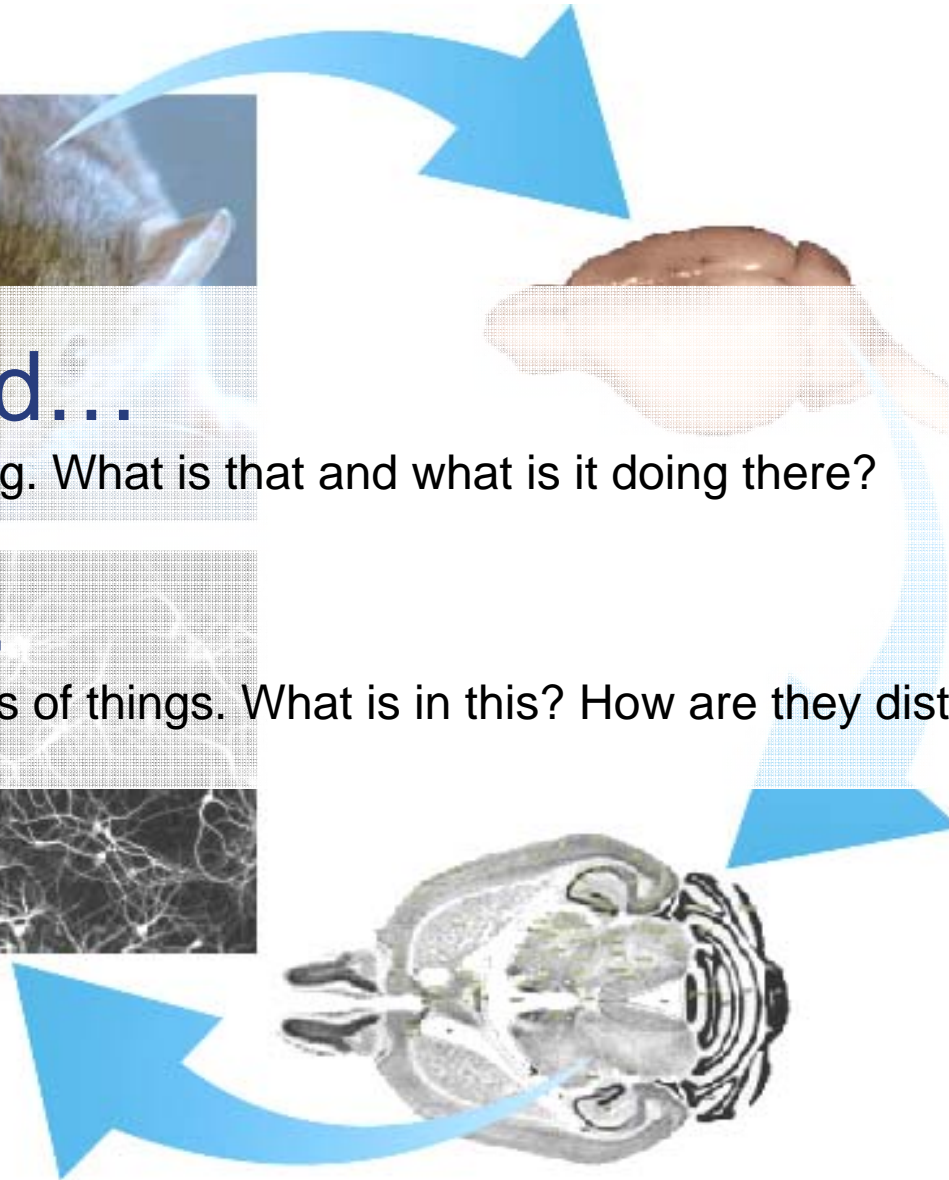
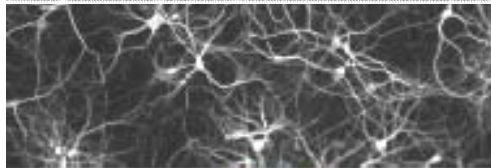
Targeted...

That's interesting. What is that and what is it doing there?

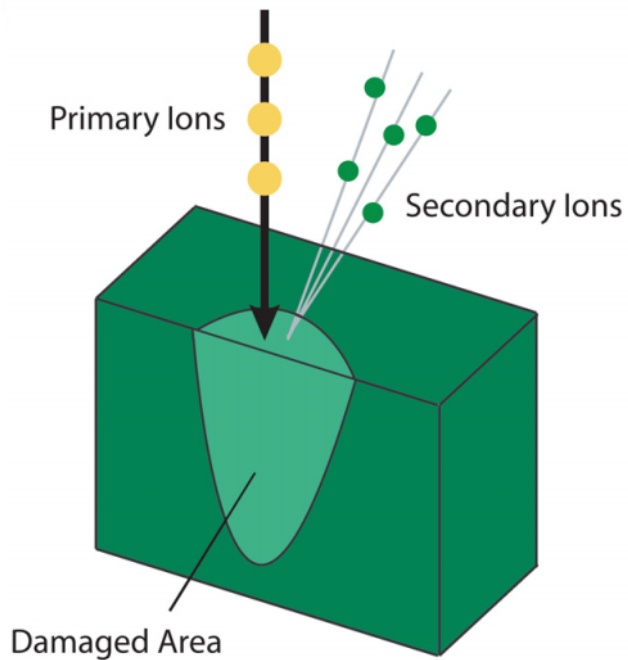
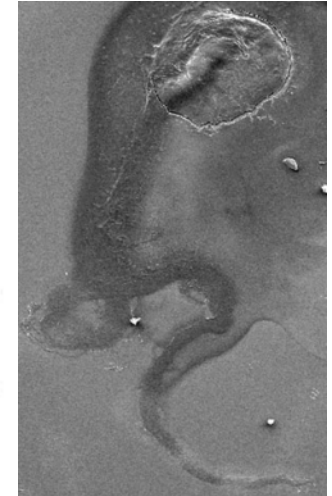
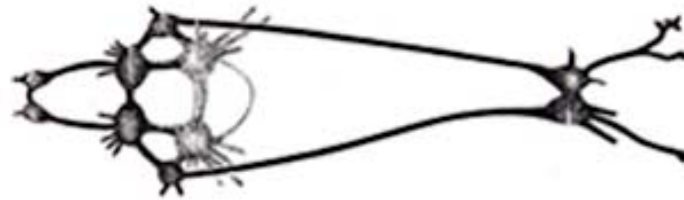


Broad...

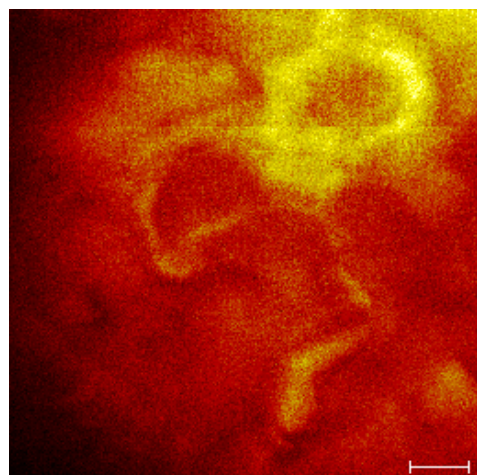
I want to see lots of things. What is in this? How are they distributed?



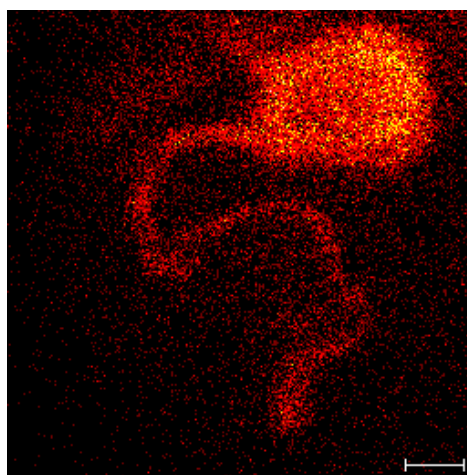
targeted - SIMS meets *Aplysia*



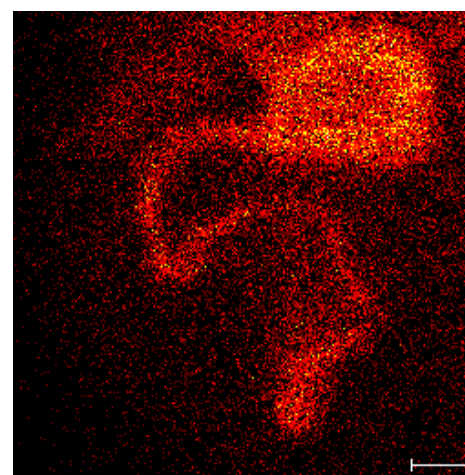
single neuron chemical imaging



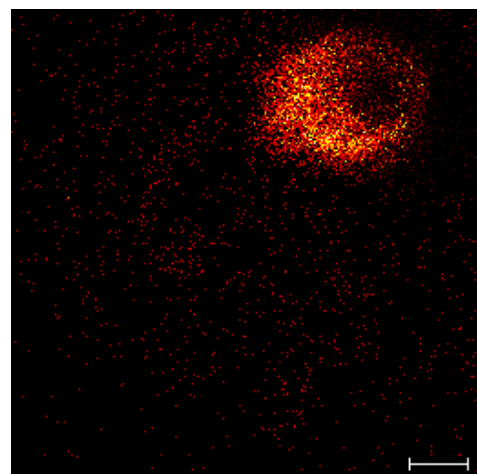
Total Ion



Choline (m/z 86⁺)

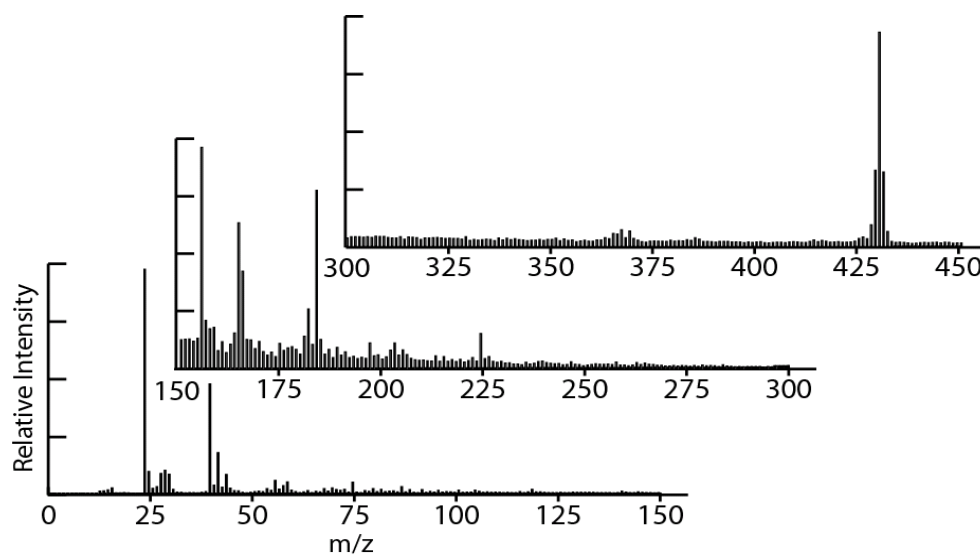


Acyl Fragment (m/z 69⁺)

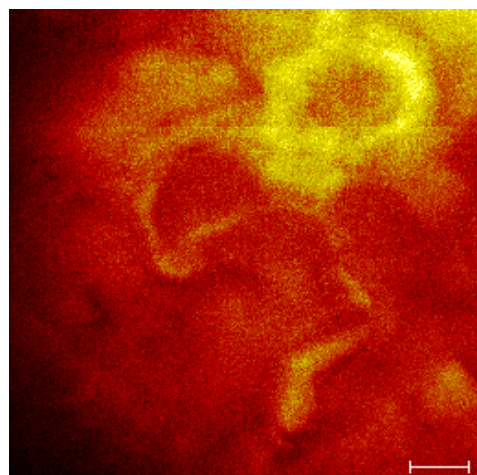


Vitamin E (m/z 430⁺)

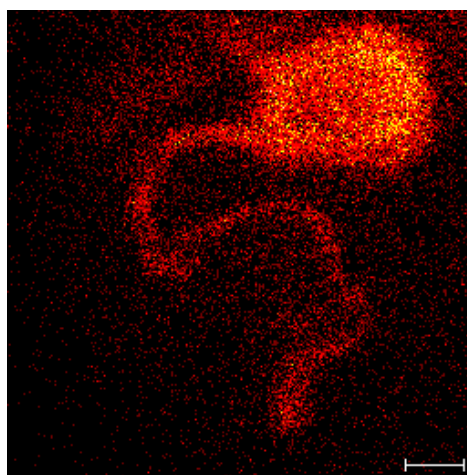
100 μ m



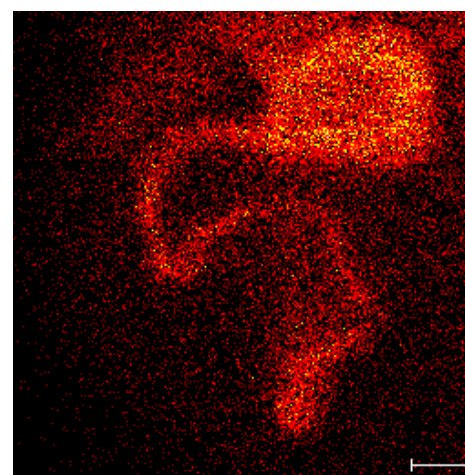
single neuron chemical imaging



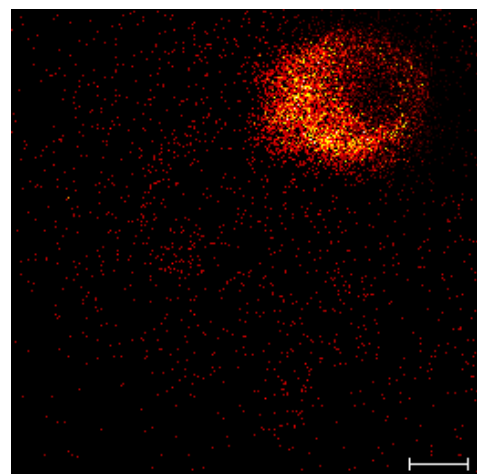
Total Ion



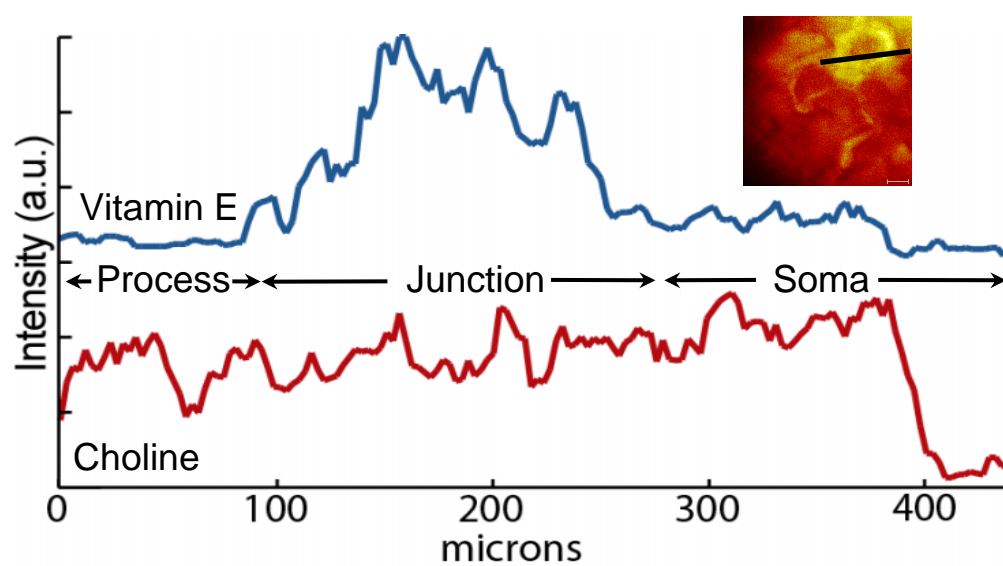
Choline (m/z 86⁺)



Acyl Fragment (m/z 69⁺)

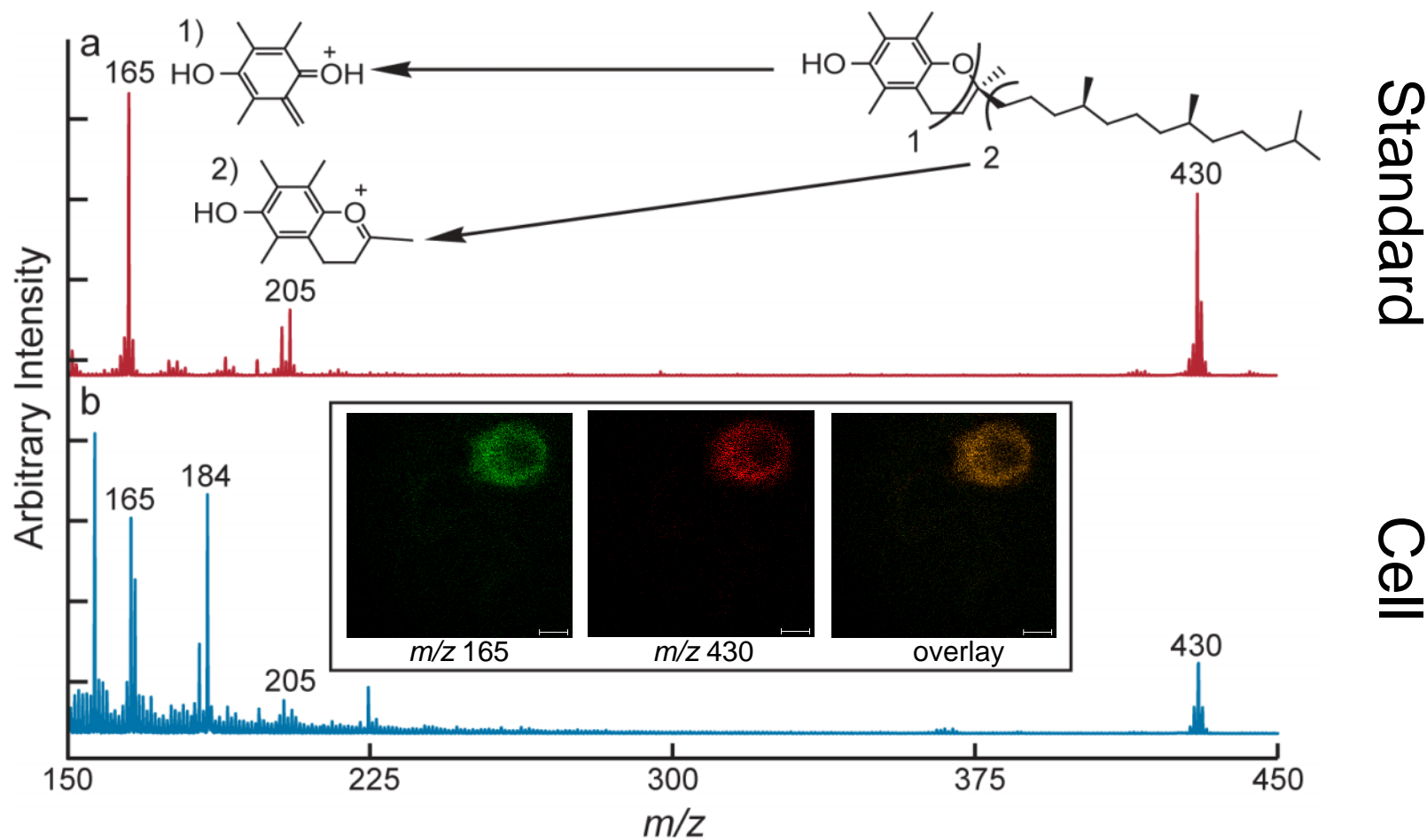


Vitamin E (m/z 430⁺)

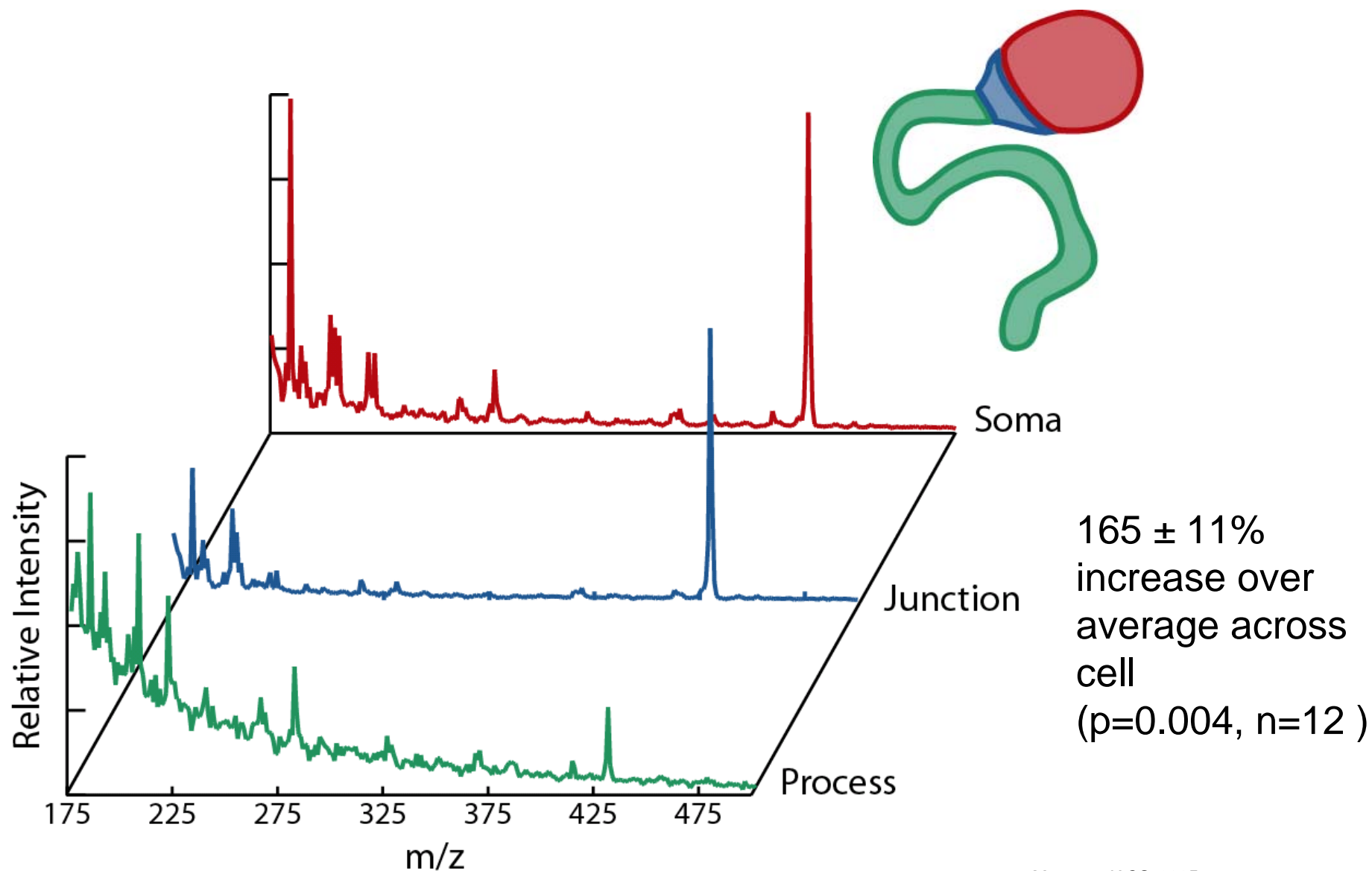


100 μ m

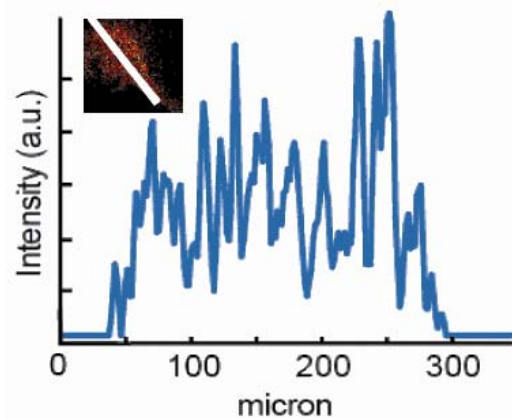
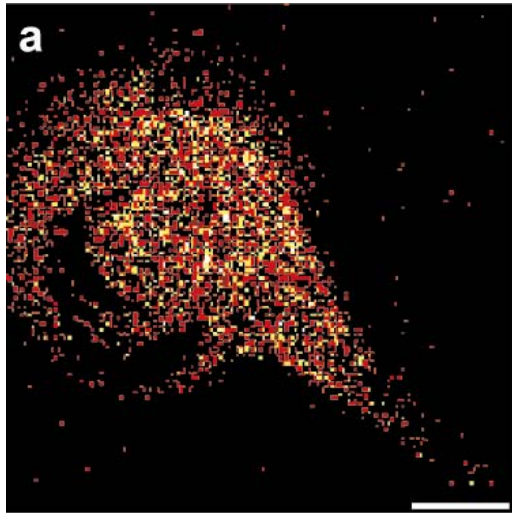
identifying vitamin E



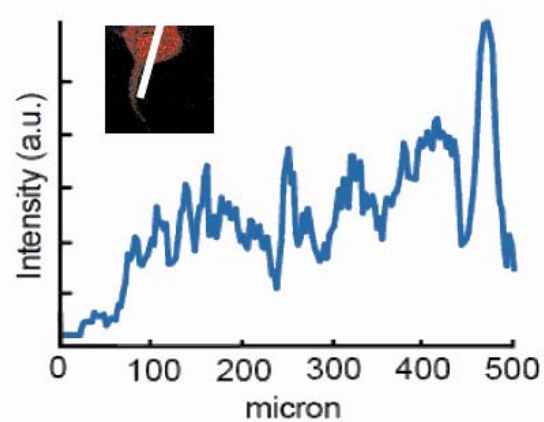
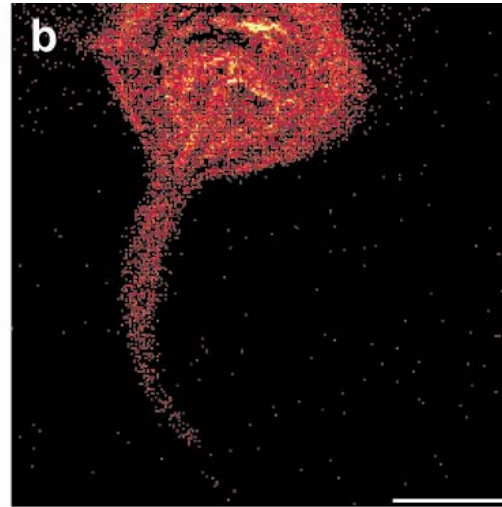
vitamin E is present throughout



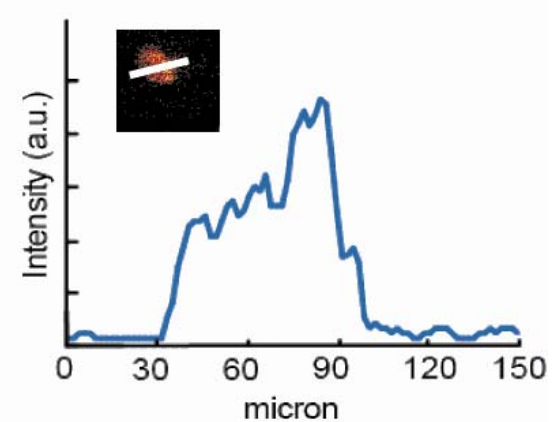
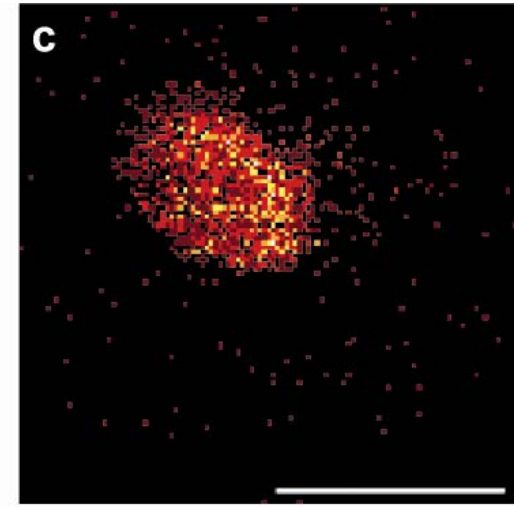
vitamin E actively localized



Dead (4 days @ -20 °C)

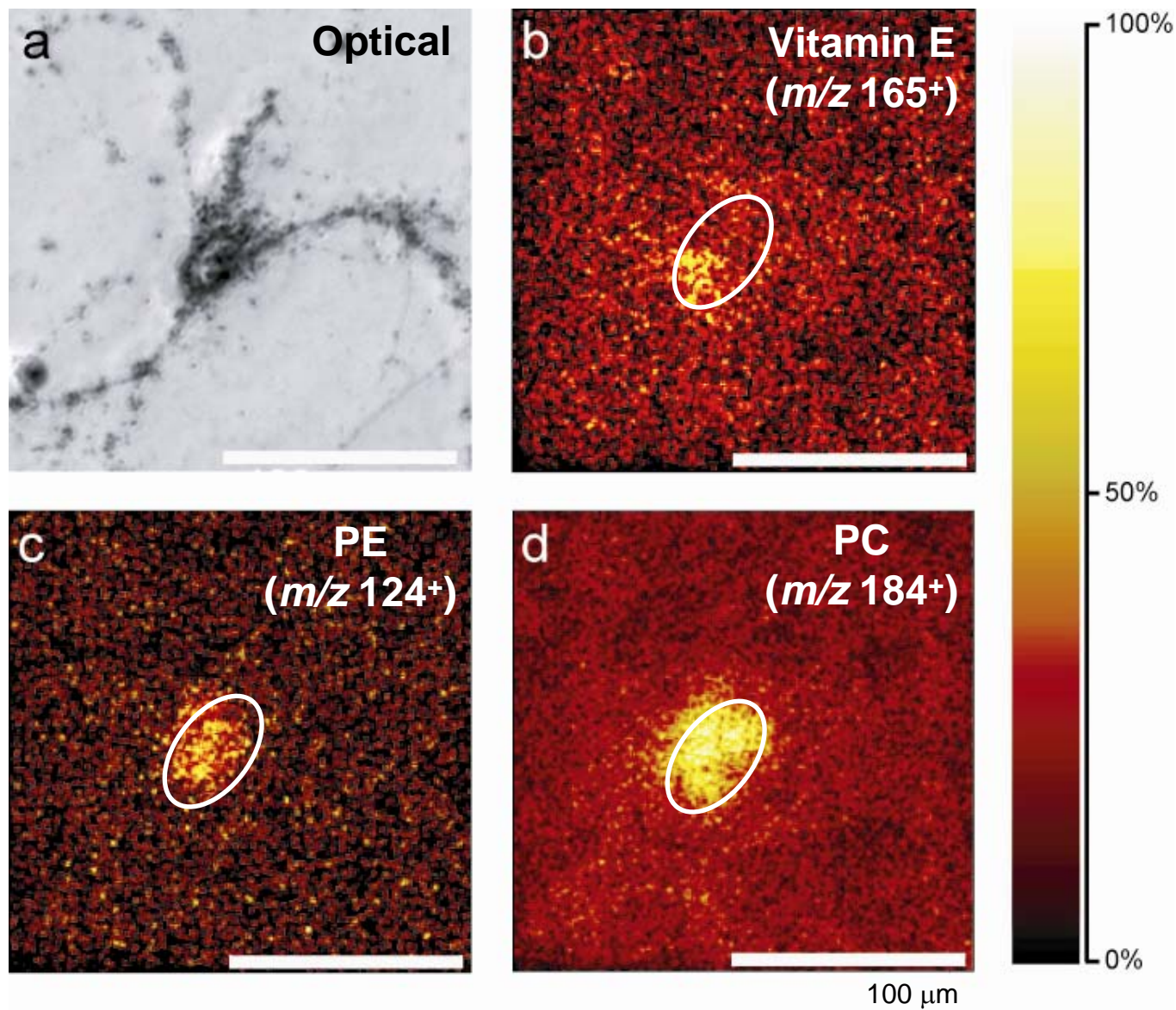


Cultured with Vitamin E

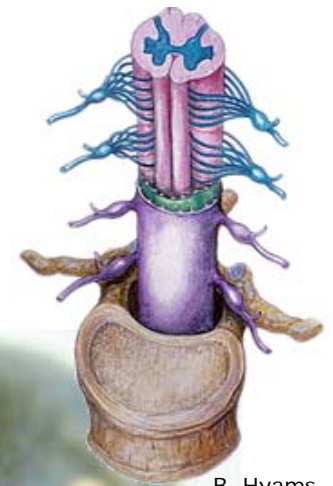
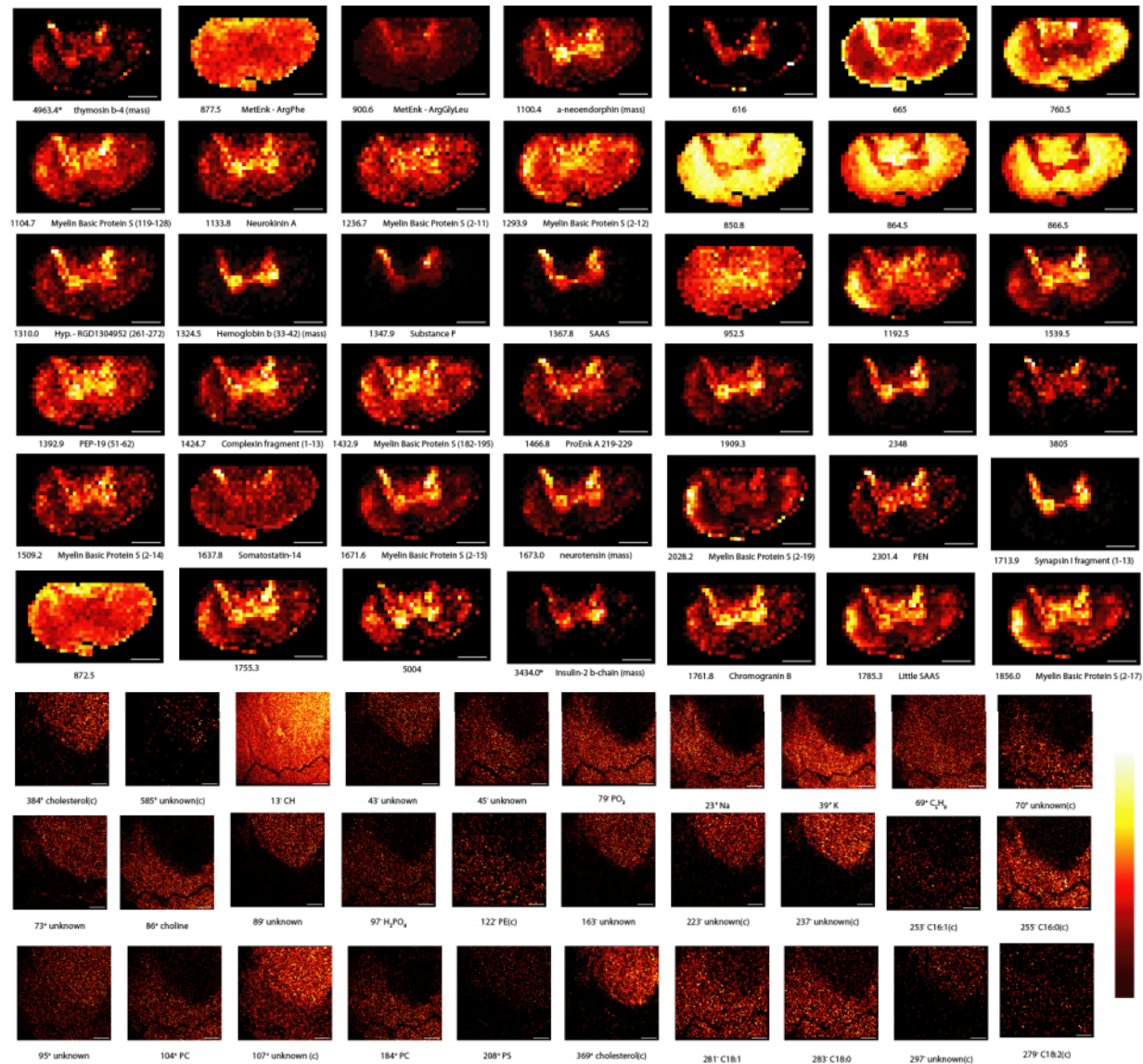


4 hours in fresh media

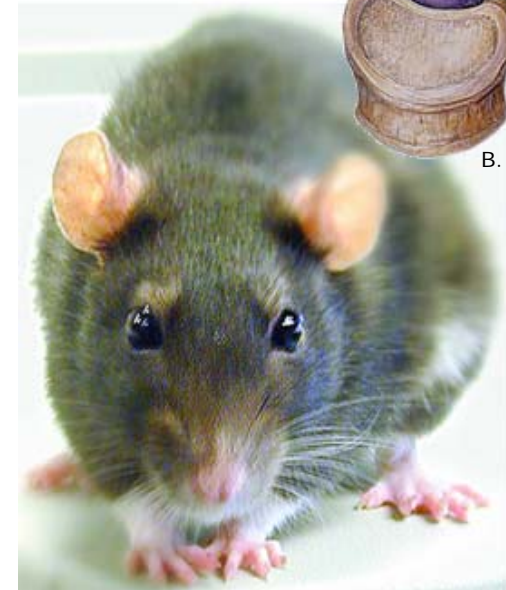
going smaller – a single rat neuron



so what else can it do? broad scale...



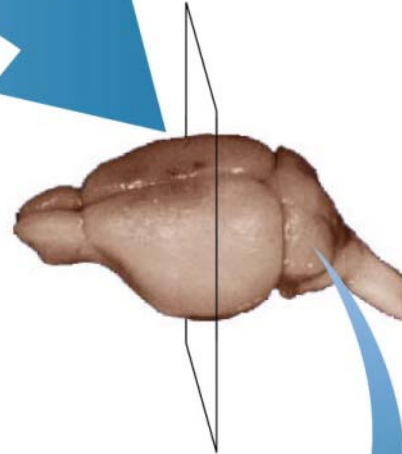
B. Hyams



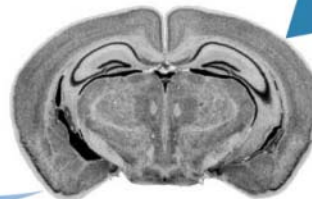
Martin Krzywinski

prep for MALDI MS imaging

sacrifice, rapid dissection,
flash freezing



sectioning on
cryomicrotome
(typically not embedded)

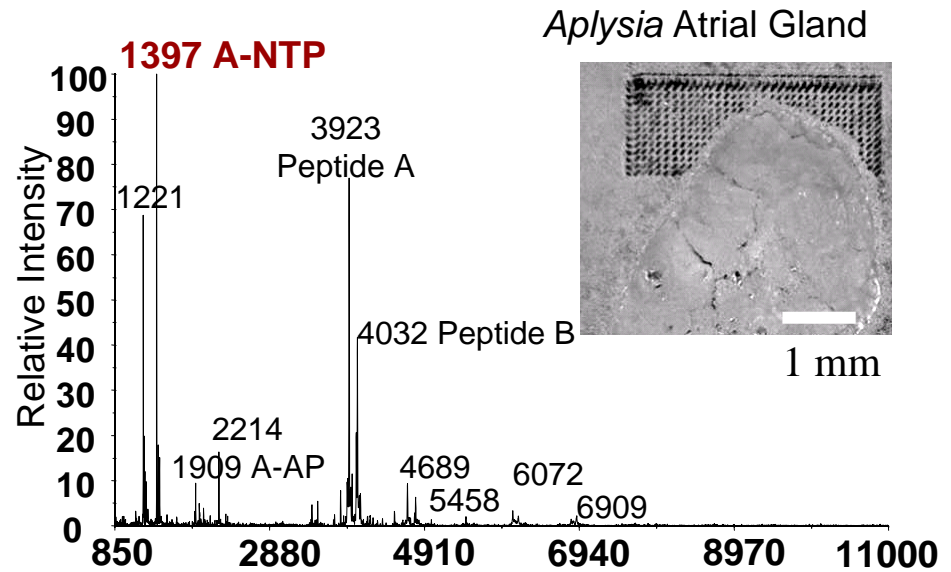
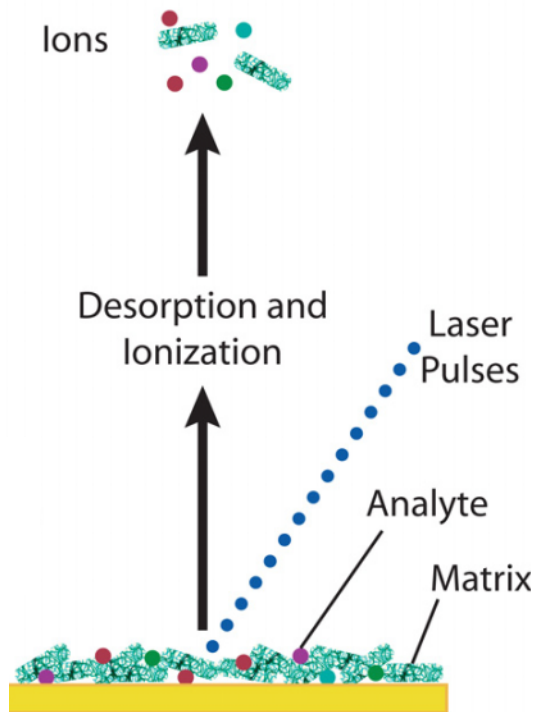


EtOH wash (remove lipids, salts)
Coat with MALDI matrix

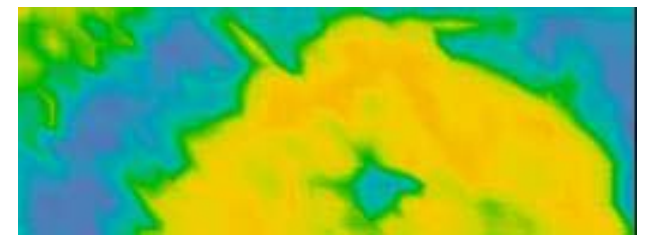
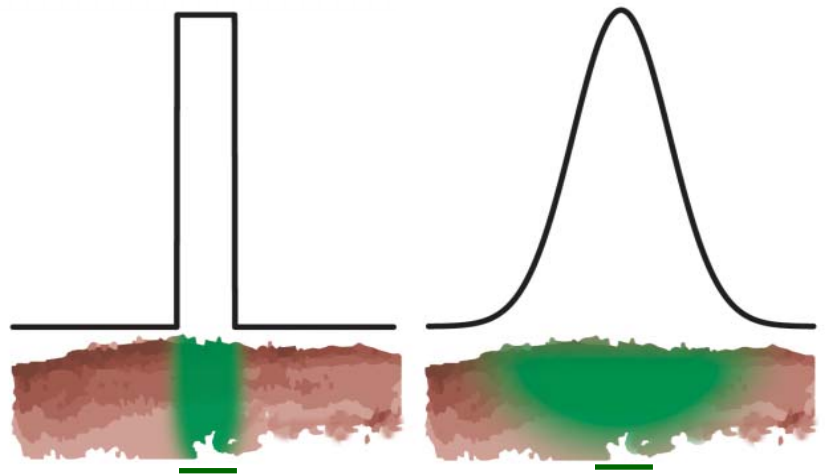
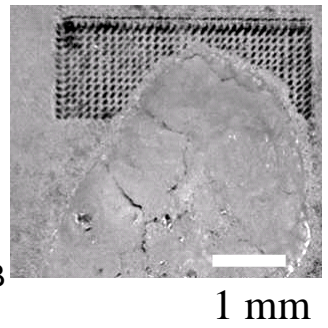


Goal: maximal MS signals with
minimal analyte redistribution

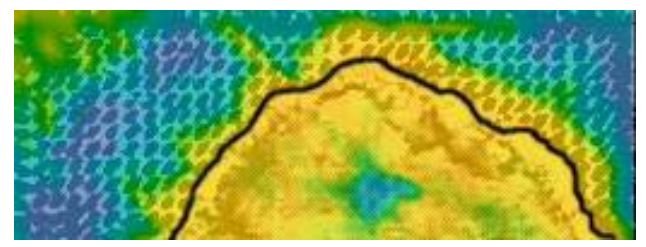
prep for MALDI MS imaging



Aplysia Atrial Gland

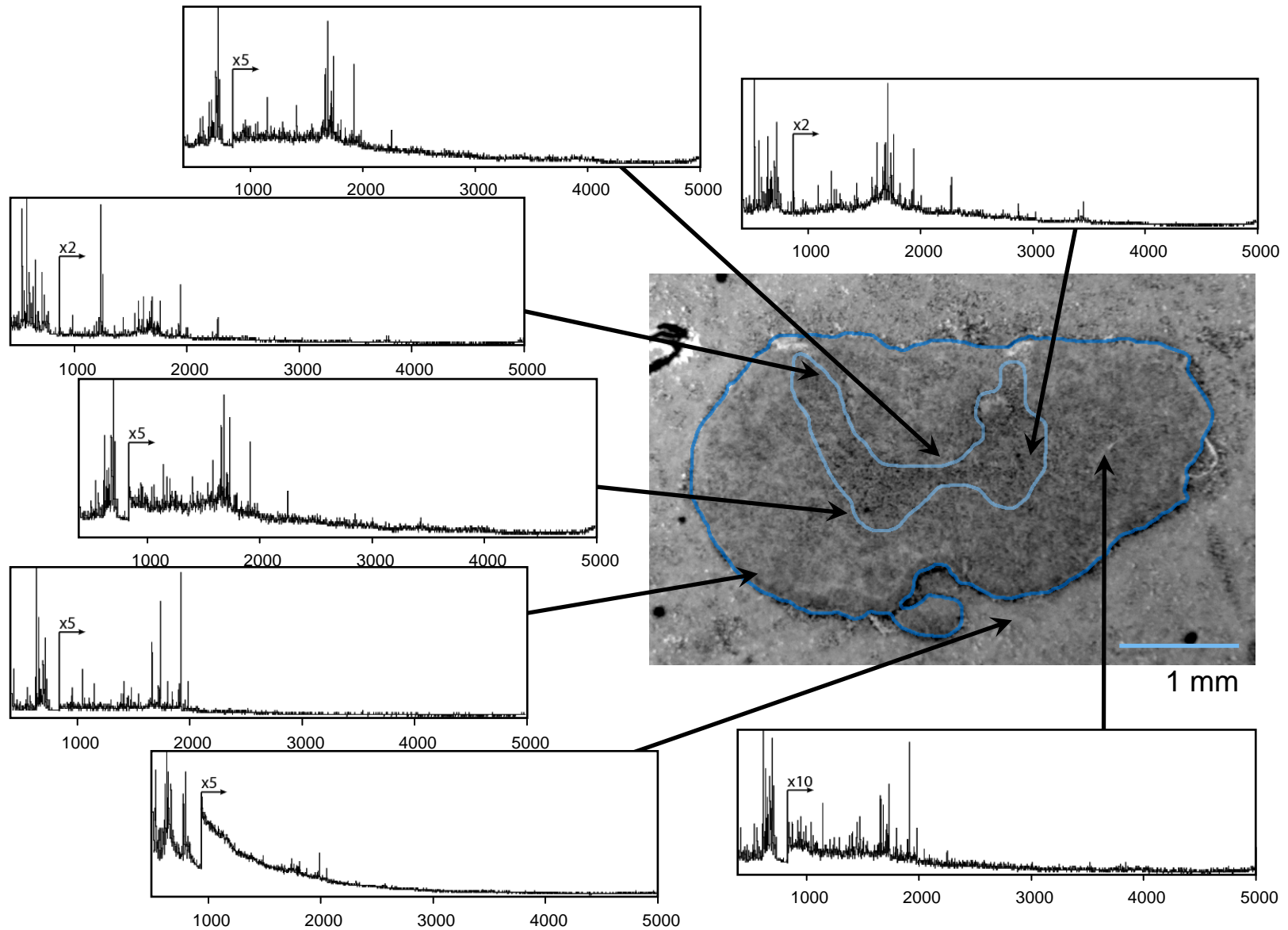


A-NTP 0-25000

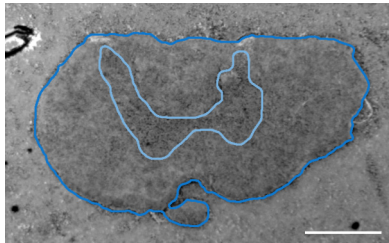


Overlay

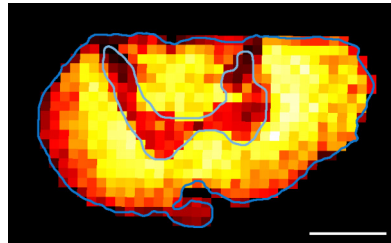
profiling a tissue section



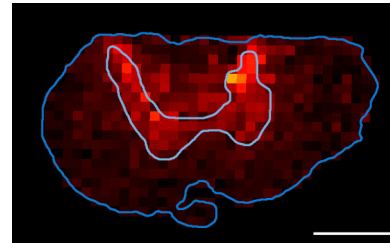
high resolution profiling - imaging



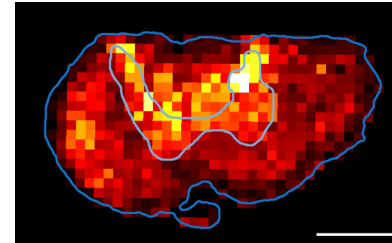
Optical
Image



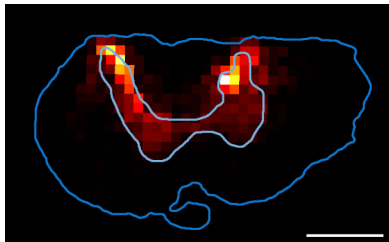
Unknown
866.5



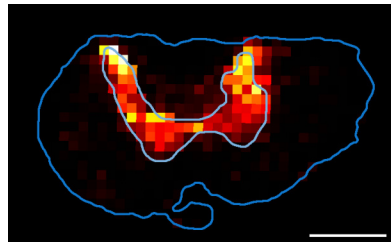
MetEnk-ArgGlyLeu
900.4



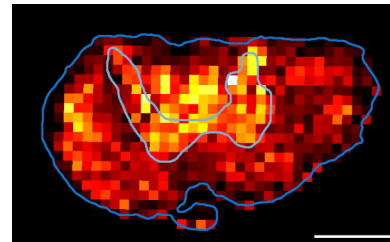
Myelin (119-128)
1104.7



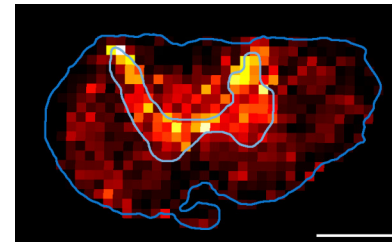
Substance P
1347.7



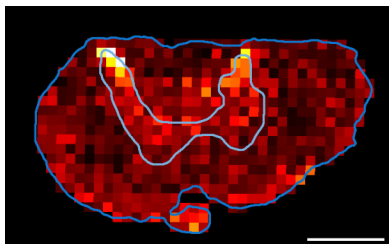
SAAS
1367.8



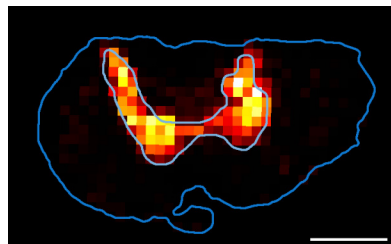
Myelin (182-195)
1432.8



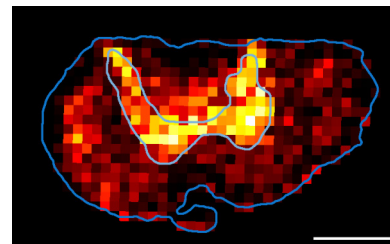
ProEnk A (219-229)
1466.8



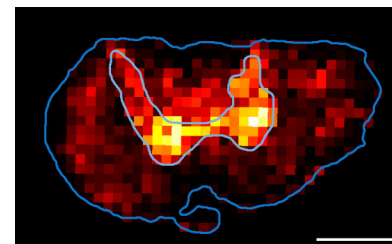
Somatostatin-14
1637.8



Synapsin I fragment (1-13)
1713.8



Secretogranin I
1761.8

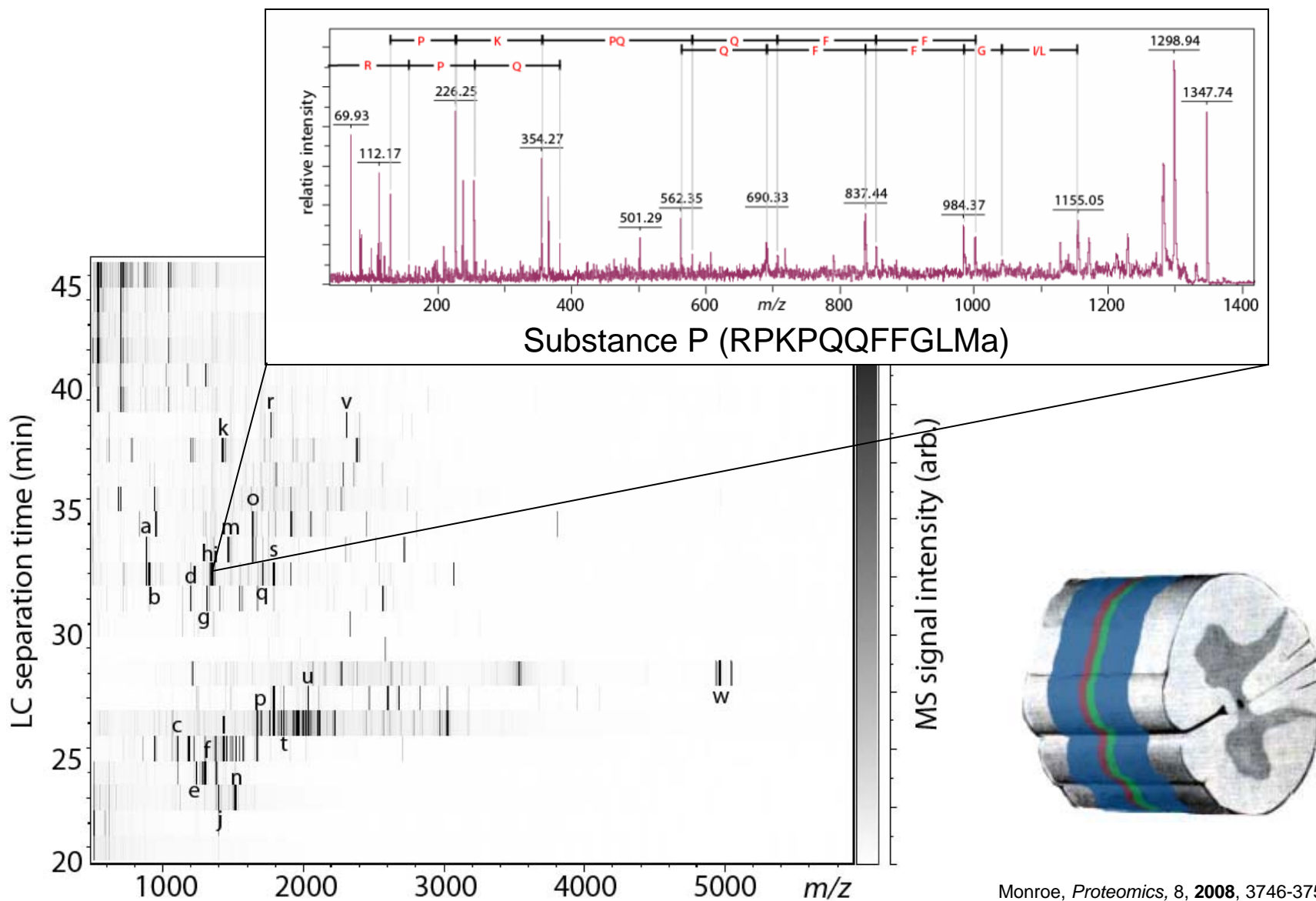


Unknown
1909.3

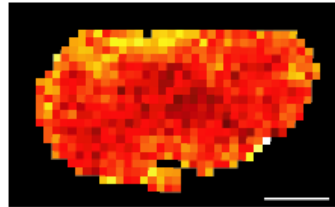


Scale bar = 1 mm

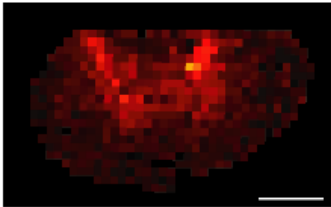
identifying signals



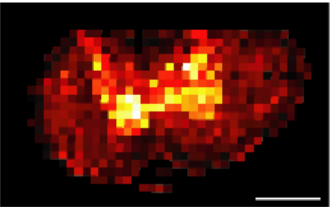
ion images – identified by MS/MS



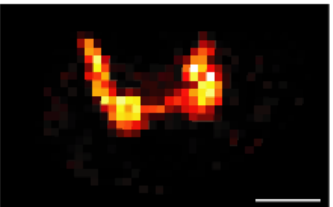
877.5 MetEnk - ArgPhe



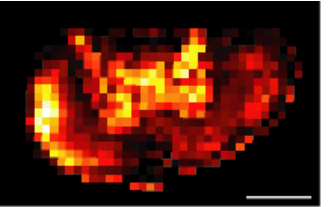
900.6 MetEnk - ArgGlyLeu



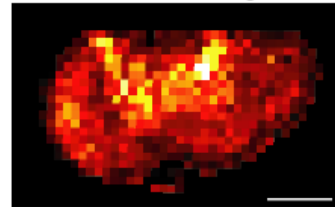
1100.4 a-neoendorphin



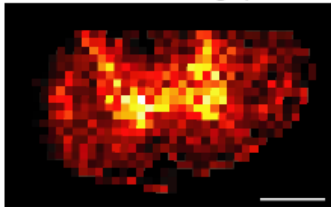
1713.9 Synapsin I fragment (1-13)



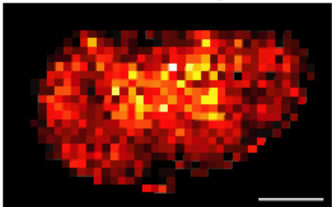
1856.0 Myelin Basic Protein S (2-17)



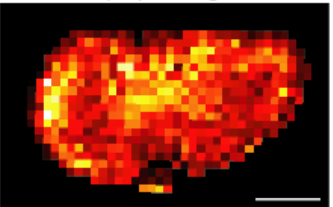
1104.7 Myelin Basic Protein S (119-128)



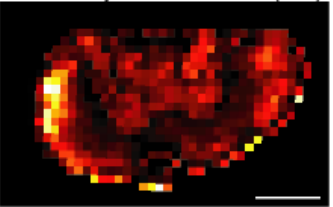
1133.8 Neurokinin A



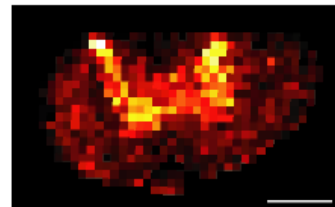
1236.7 Myelin Basic Protein S (2-11)



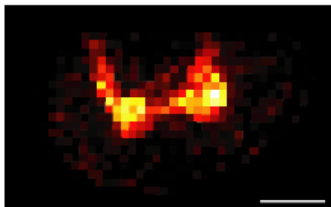
1293.9 Myelin Basic Protein S (2-12)



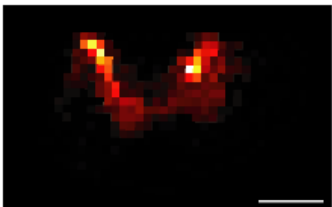
2028.2 Myelin Basic Protein S (2-19)



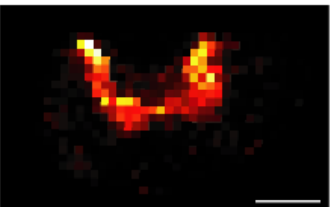
1310.0 Hyp.- RGD1304952 (261-272)



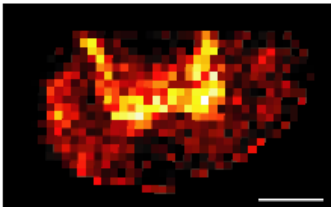
1324.5 Hemoglobin b (33-42)



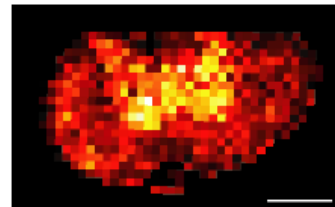
1347.9 Substance P



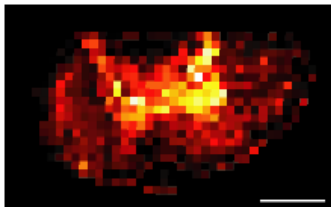
1367.8 SAAS



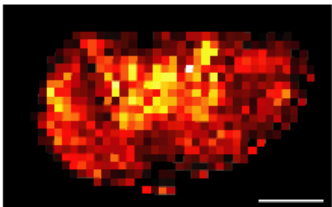
1761.8 Chromogranin B



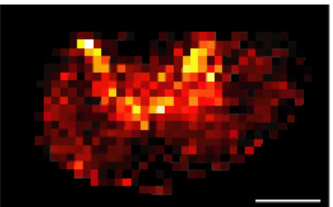
1392.9 PEP-19 (51-62)



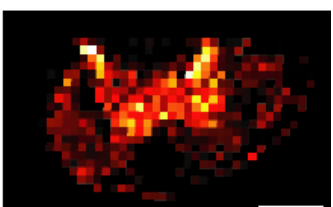
1424.7 Complexin fragment (1-13)



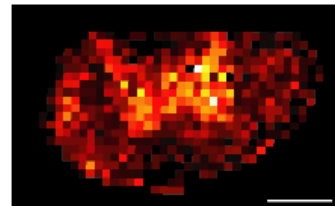
1432.9 Myelin Basic Protein S (182-195)



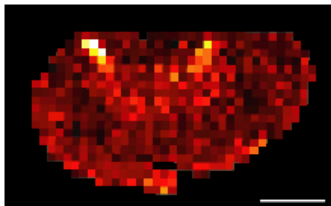
1466.8 ProEnk A 219-229



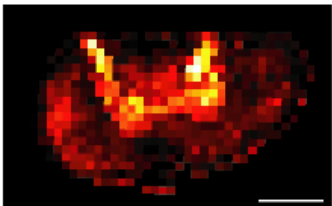
2301.4 PEN



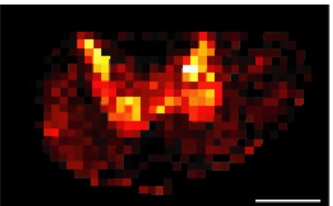
1509.2 Myelin Basic Protein S (2-14)



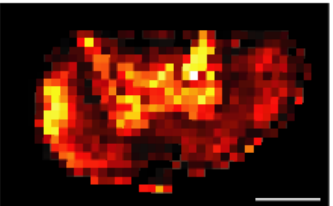
1637.8 Somatostatin-14



1671.6 Myelin Basic Protein S (2-15)

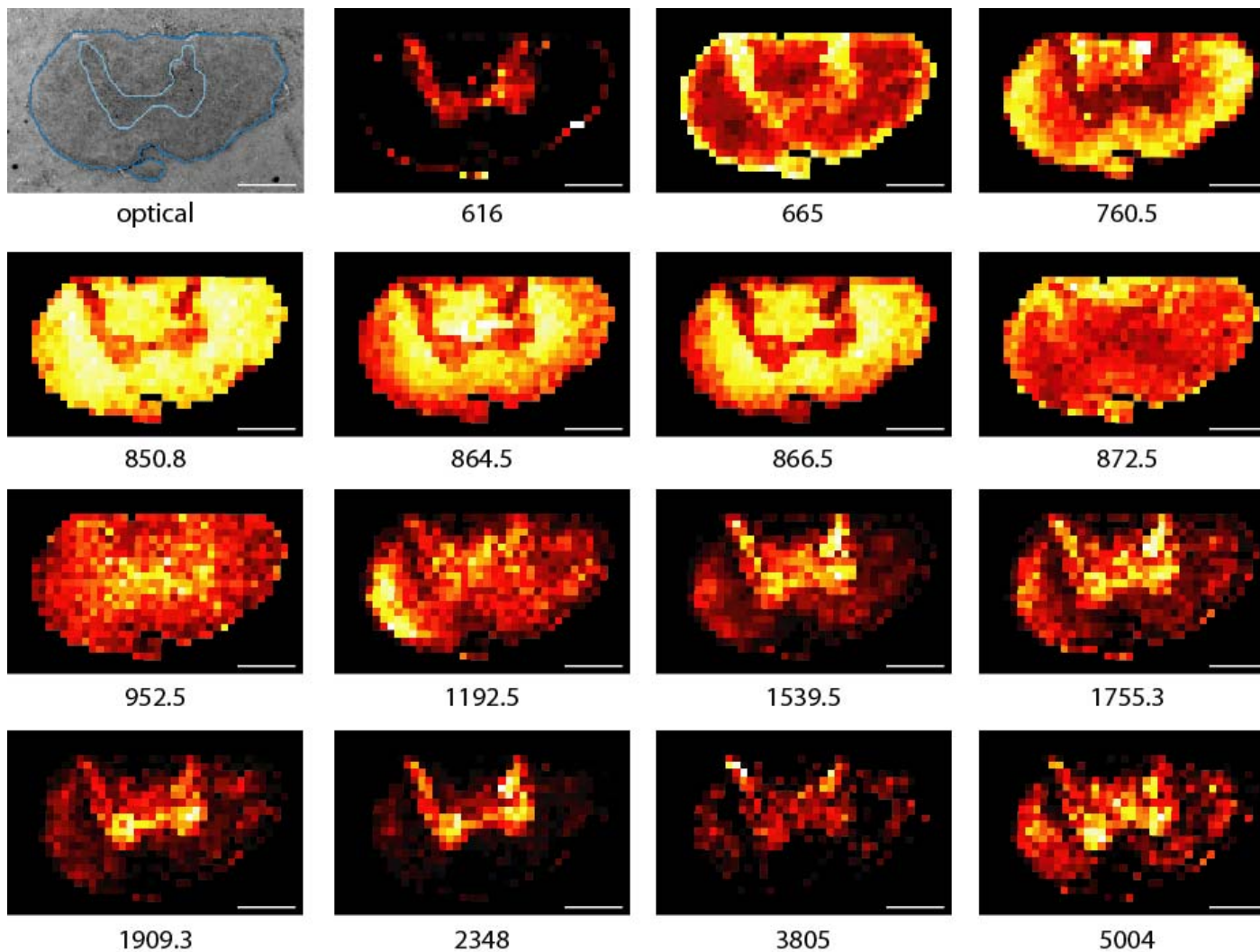


1673.0 neurotensin



1785.3 Little SAAS

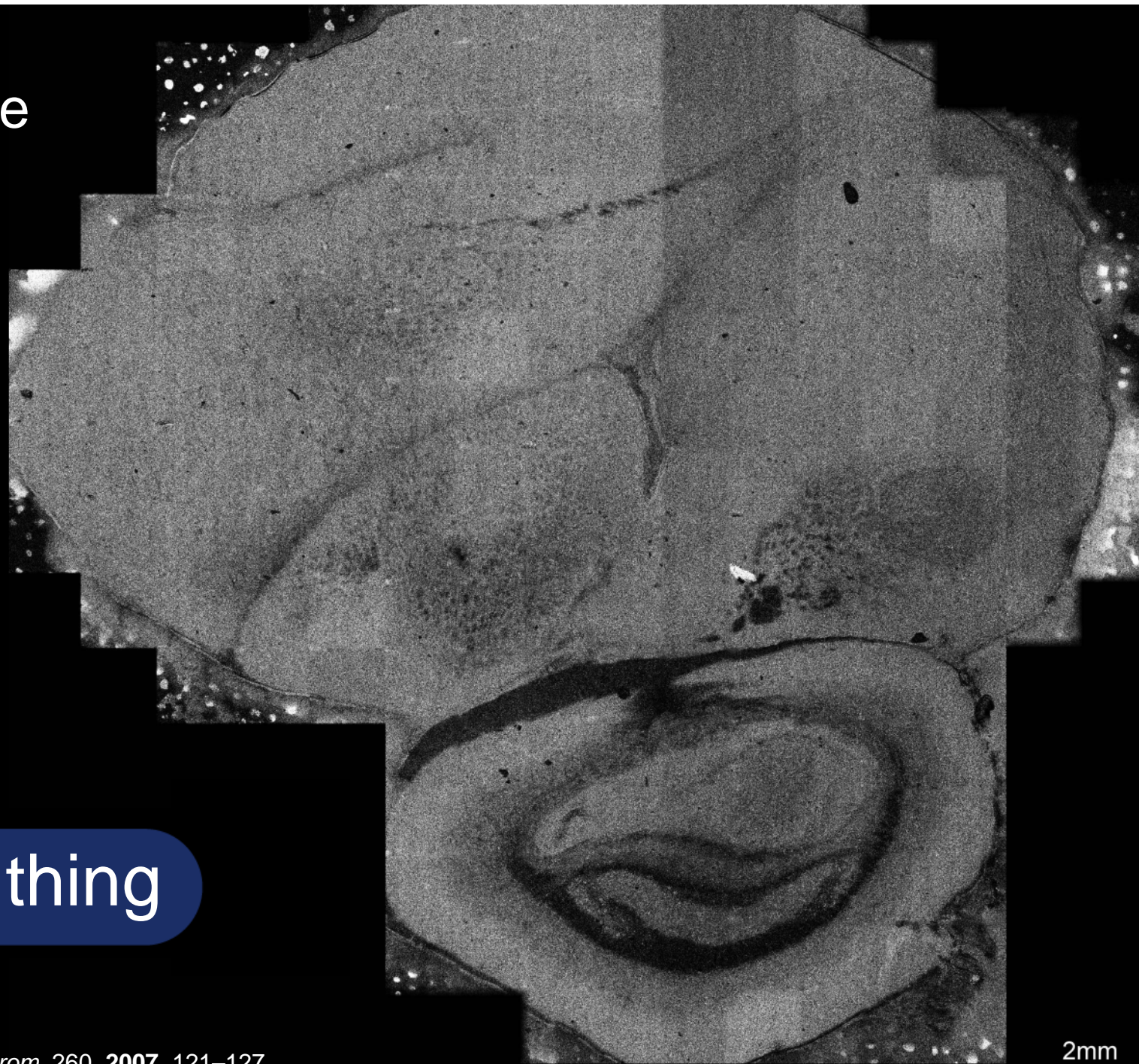
but still some unknowns...



...and many others.

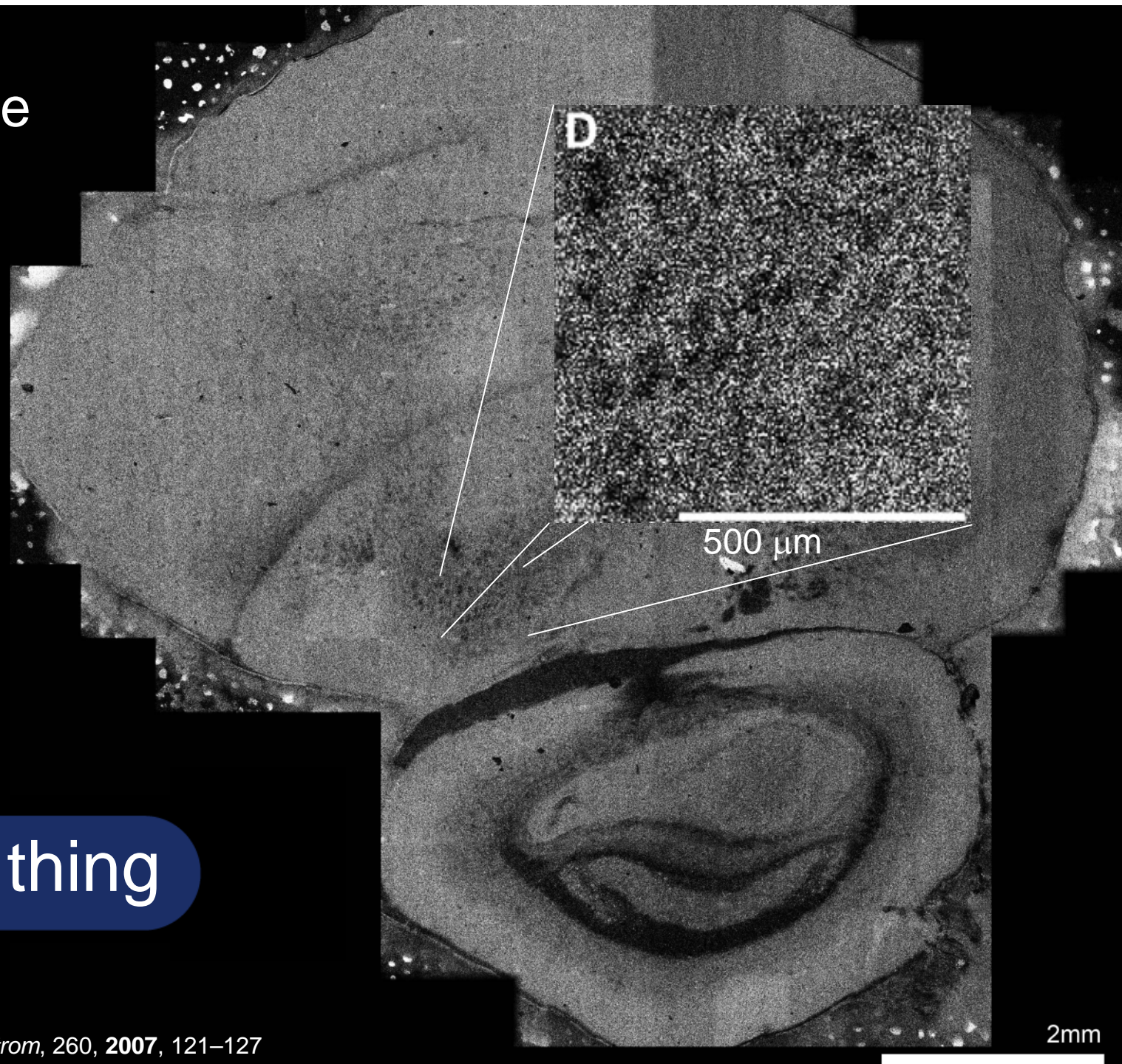


Phosphate
(m/z 79)



one last thing

Phosphate
(m/z 79)



one last thing

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