comparePhycoChla2014

Bryan Milstead

December 1 2015

To Do List

- everything

Introduction

The goal is to compare the values of chla and phycocyanin. The expectation is that there should be a strong linear relationship (log log) between the two.

Data

- get data from cyanoMon2014.mdb
- see CyanoMonDocumentation.Rmd

Build Dataset

- Get means for fluorometry readings to eliminate reps and duplicate; aggregate by c('analysisID','parameter','units','fluorom
- replace any values less than .1 with .1 to avoid zeros.
- merge Chla and Phycocyanin readings by c('analysisID','units','fluorometerType')
- merge back to main dataset

Analysis

- Based on Kasinak et al 2015 (Benchtop fluorometry of phycocyanin as a rapid approach for estimating cyanobacterial biovolume. Journal of Plankton Research 37(1): 248-257) We expect a strong log log relationship between Phycocyanin and Chlorophyll. Below is figure from their paper that demonstrates this

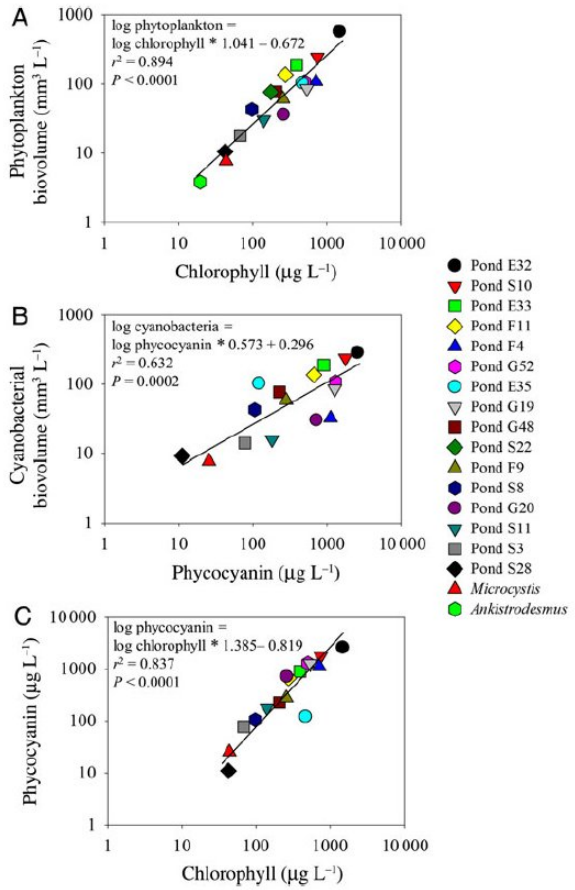


Fig. 3. General patterns between (**A**) chlorophyll *a* concentration (µg L^{-1}) and phytoplankton biovolume (µm^3 mL^{-1}), (**B**) phycocyanin concentration (µg L^{-1}) and cyanobacterial biovolume (µm^3 mL^{-1}) or (**C**) chlorophyll *a* concentration (µg L^{-1}) and phycocyanin concentration (µg L^{-1}) of two cultures [the chlorophyte, *Ankistrodesmus* and the cyanobacterium, *Microcystis aeruginosa* (UTEX 2667)] and 16 ponds at the Auburn University E. W. Shell Fisheries Research Center (ponds G19, G20, G48, G52, S11, S22, S28, S3, S8, F9, F11, E33, F4, S10, E32 and E35).

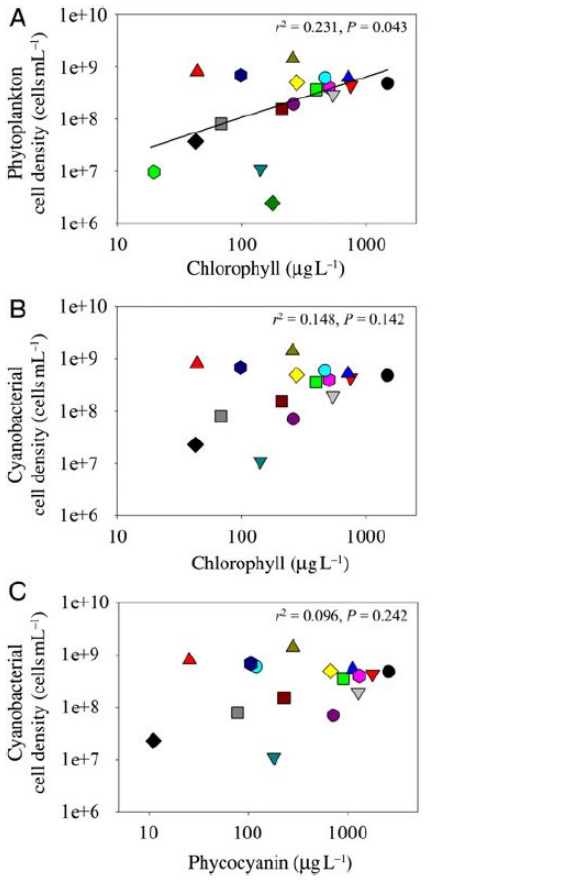
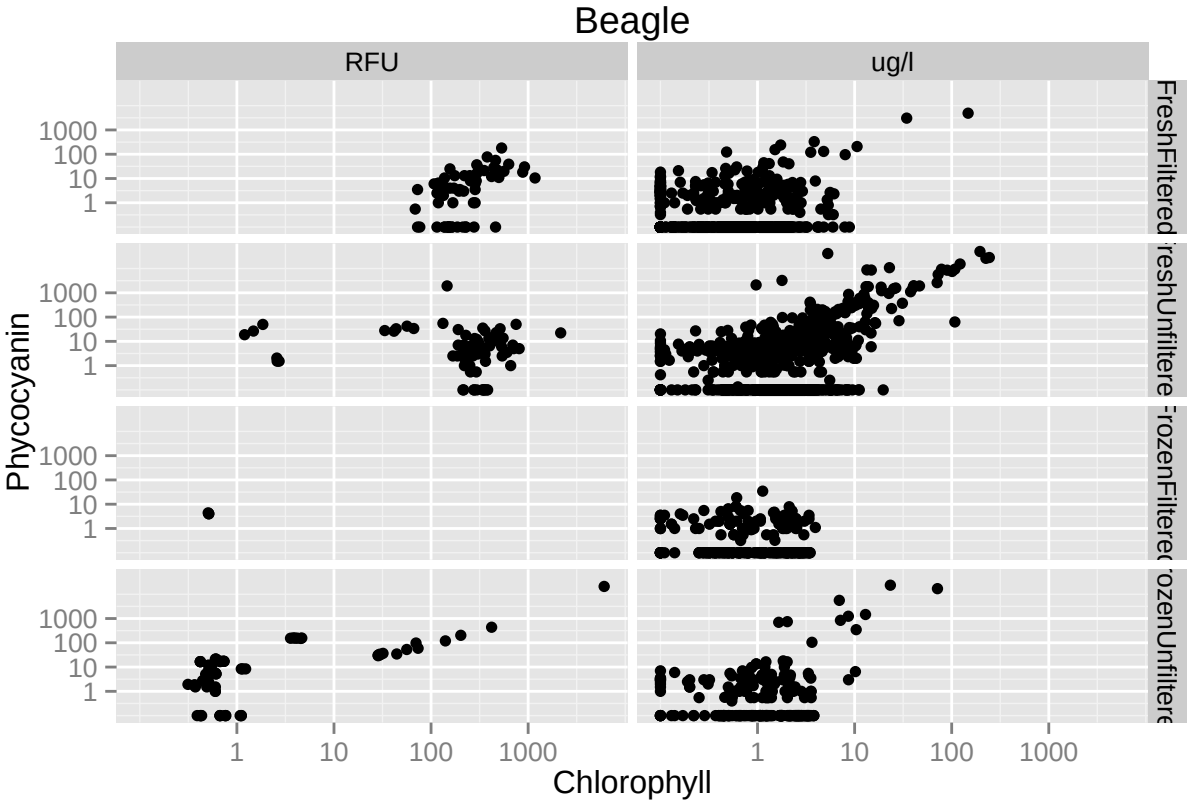
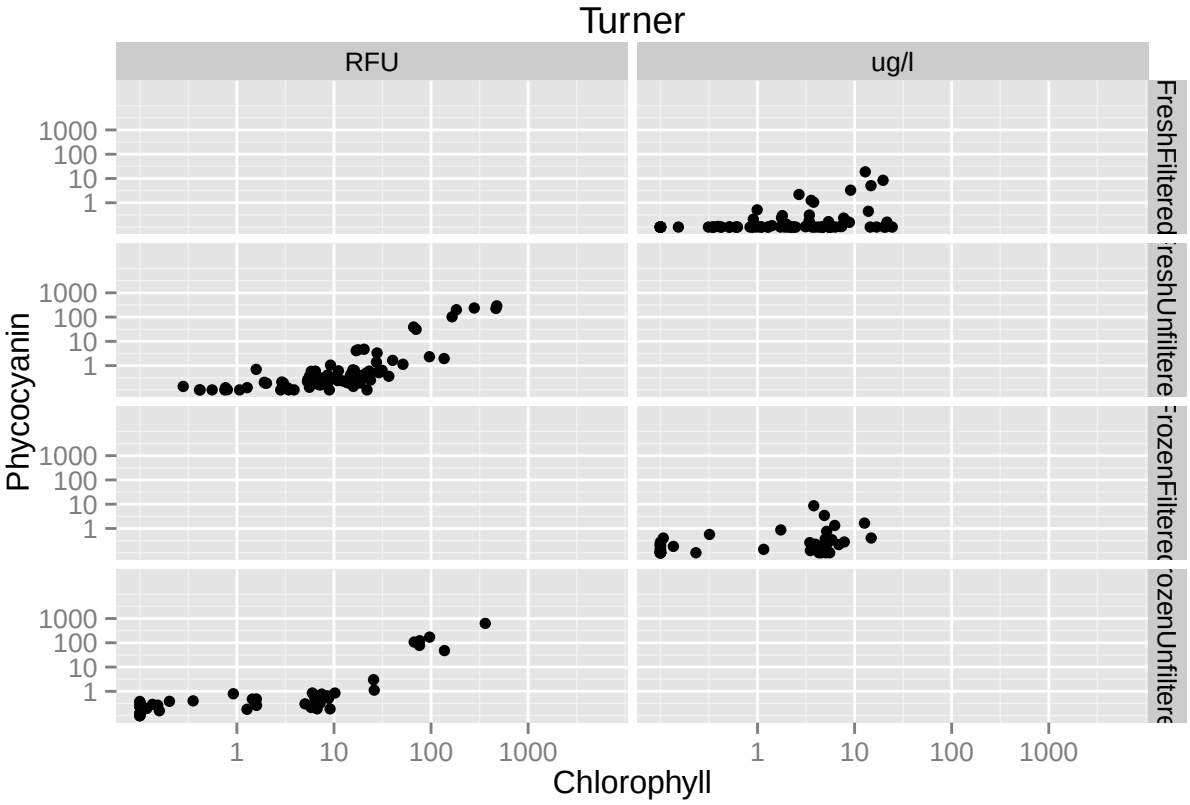


Fig. 4. General patterns between (**A**) chlorophyll a concentration (µg L^{-1}) and phytoplankton cell density (cells mL^{-1}), (**B**) chlorophyll a concentration (µg L^{-1}) and cyanobacterial cell density (cells mL^{-1}) or (**C**) phycocyanin a concentration (µg L^{-1}) and cyanobacterial cell density (cells mL^{-1}) of two cultures [the chlorophyte, Ankistrodesmus and the cyanobacterium, Microcystis aeruginosa (UTEX 2667)] and 16 ponds at the Auburn University E. W. Shell Fisheries Research Center (ponds G19, G20, G48, G52, S11, S22, S28, S3, S8, F9, F11, E33, F4, S10, E32 and E35; Fig. 3).

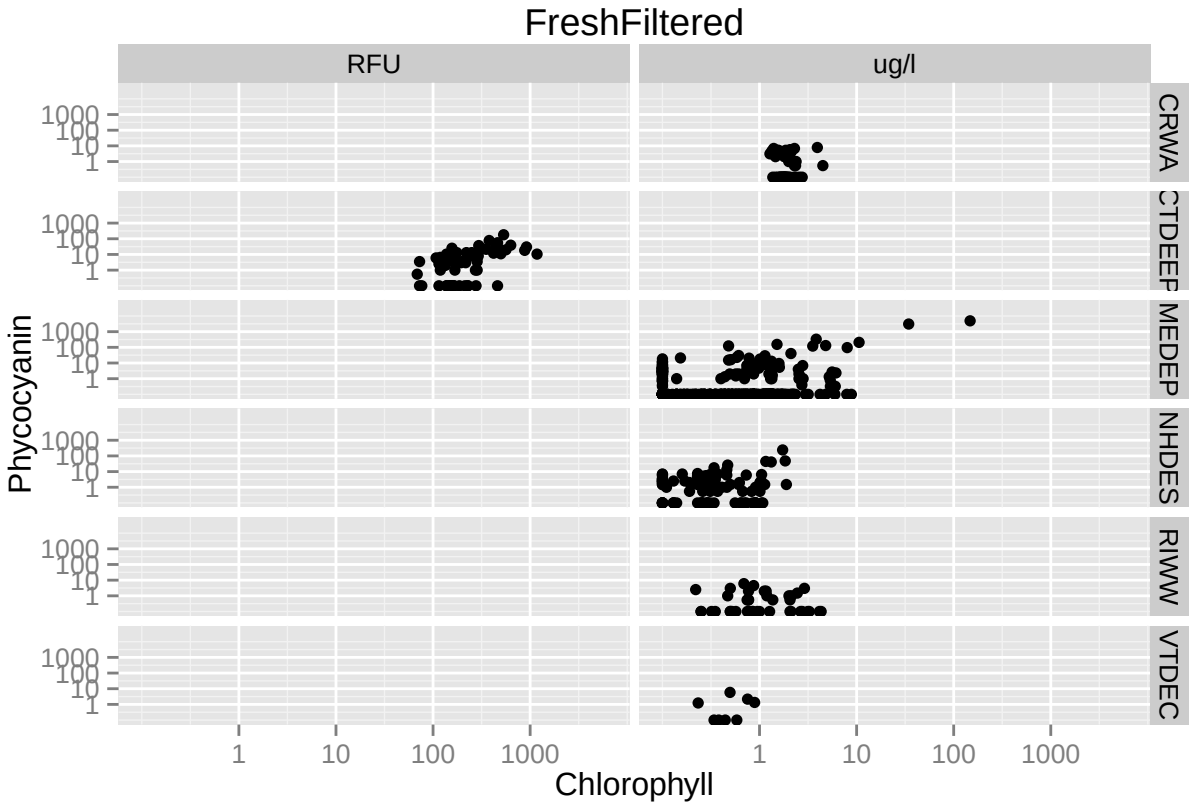
- Let's plot Phycocyanin and Chlorophyll by sample condition and the Units that were reported
- First for the Beagle

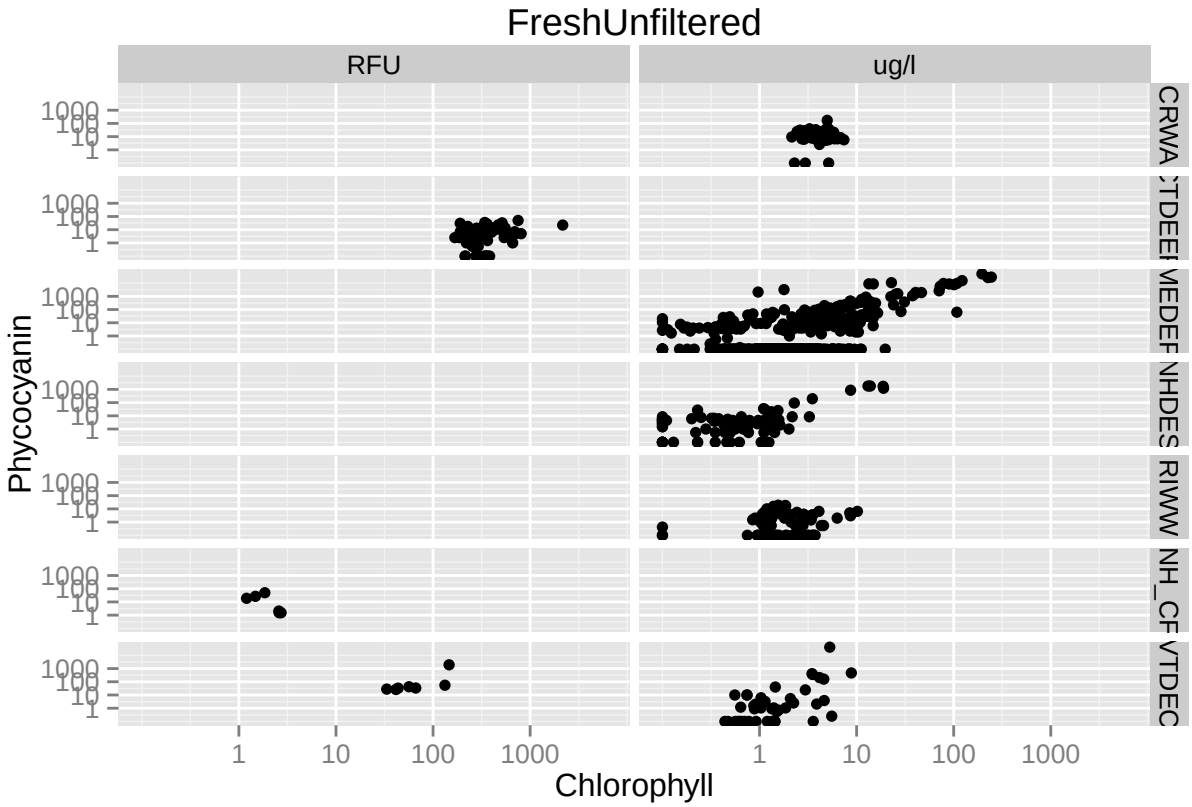


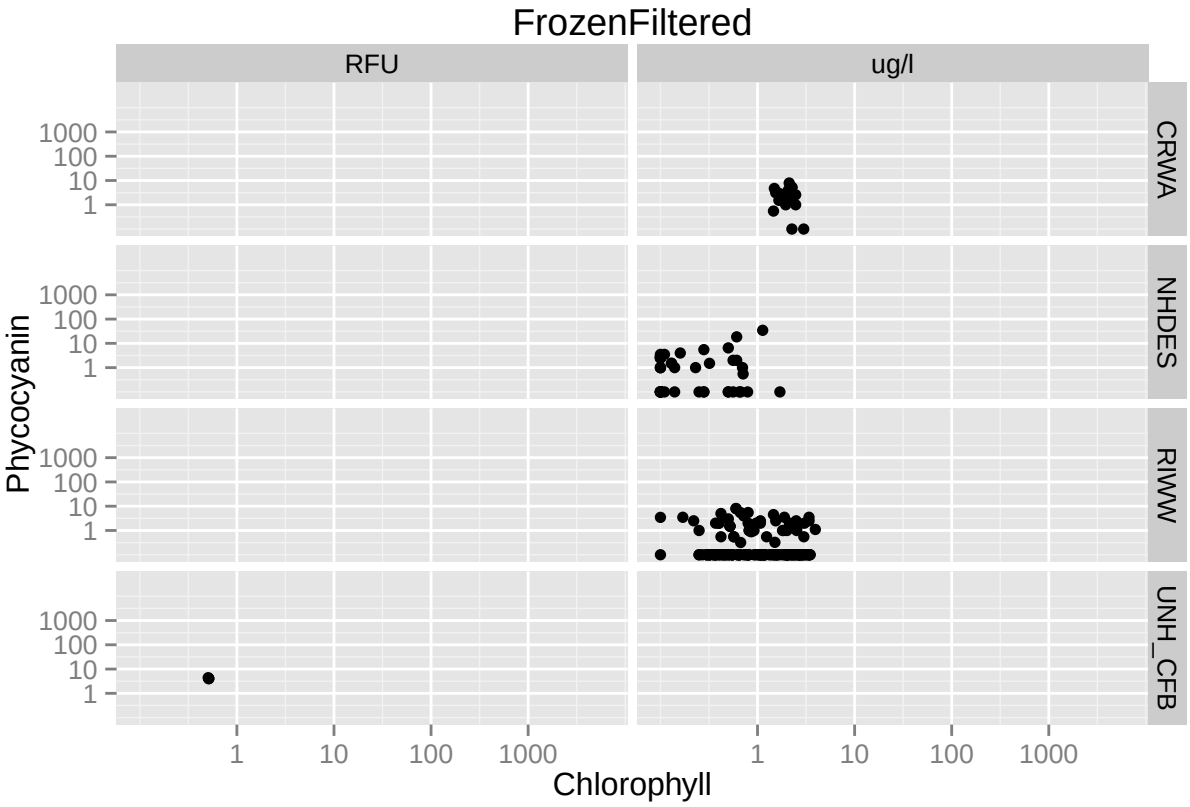
- As you can see the relationship varies by how the sample was processed and the units used for measurement.

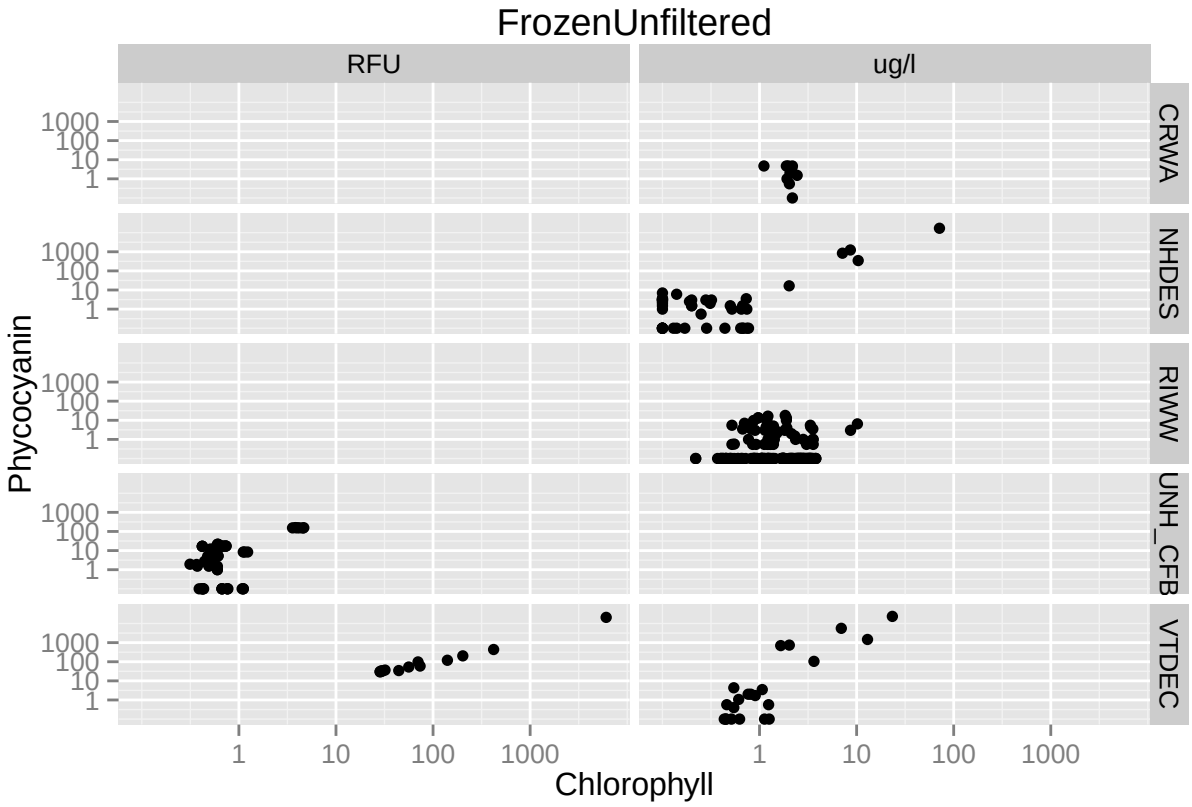


- The Turner data only come from Sonya Carlson and it appears there is a mistake in the units. Two of the plots use RFU and the other two 'ug/l'. Need to check with Sonya about this.
- That said, the data look similar to the Beagle data.
- What if we look at these relationships for the Beagle data by data source.


FreshFiltered
RFU
ug/l
CRWA
CTDEEP
MEDEP
NHDES
RIWW
VTDEC
Phycocyanin
Chlorophyll
1
10
100
1000


FreshUnfiltered
RFU
ug/l
CRWA
MEDEP
NHDES
RIWW
NH_CF
VTDEC
Phycocyanin
Chlorophyll
1
10
100
1000


FrozenFiltered
RFU
ug/l
CRWA
NHDES
RIWW
UNH_CFB
Phycocyanin
1000
100
10
1
Chlorophyll
1
10
100
1000



- Again, not sure how to interpret these. But it looks like we get very different results depending on the sample processing and the organization.