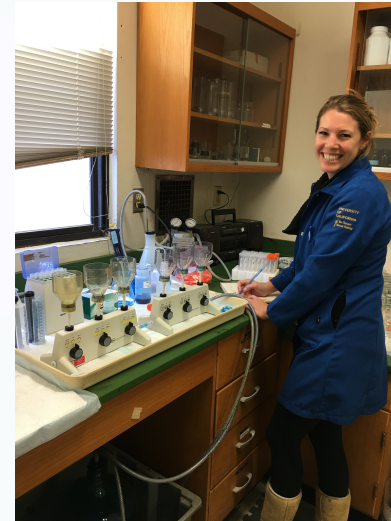


TEP Precursor Measurement Method Studies



Uta Passow



PASSOW LAB

Julia Sweet

Jonathan Jones

Simone Francis

TJ Jenarewong

Johnson Lin

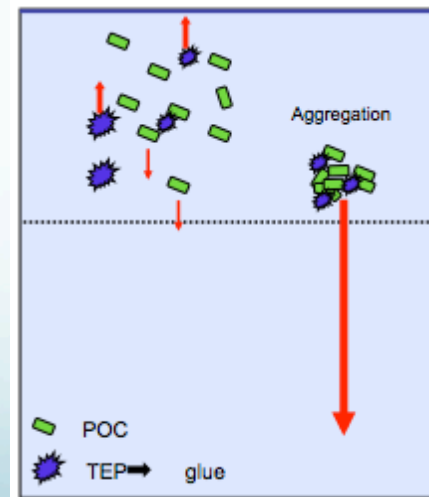
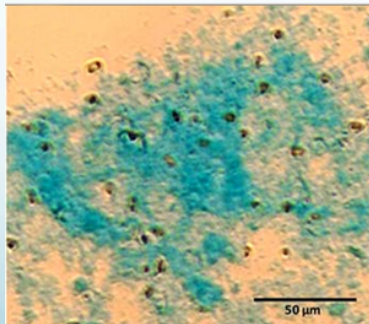
Margarita McInnis

Suzanne Squires



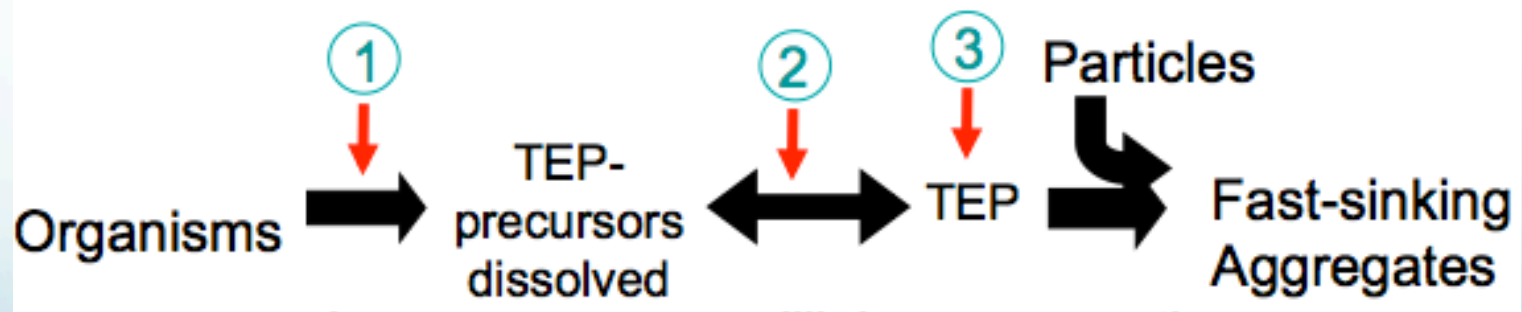
TEP (Transparent exopolymer particles)

- A natural/biological phenomena in the ocean that moves carbon down to the bottom of the ocean (biological pump)
- The critical “glue” that holds biological debris as they aggregate and sink through the water column
- These larger aggregates sink down to the bottom of the ocean thereby removing carbon from the atmosphere
- $\frac{1}{4}$ of all carbon that is released by fossil fuel is pulled out of the atmosphere with this process
- Can be stained and measured



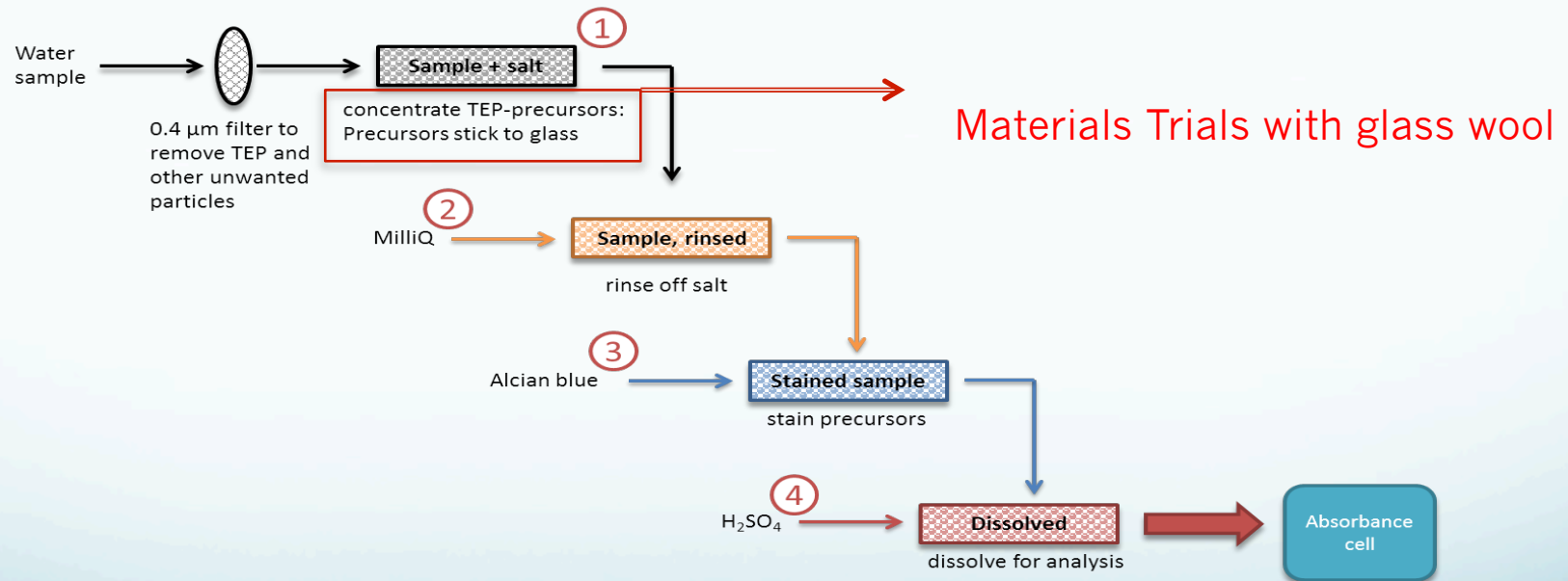
TEP-Precursors

- Released by marine phytoplankton, bacteria and many other organisms
- Scientists think that these precursors are more abundant than TEP
- No current method to stain or measure



PROBLEM

Develop a method to measure the precursors of TEP (transparent exopolymer particles)
(might take several years to complete OR not work)



BEFORE the trials Calibrated Alcian Blue solution

Assign a value (F-factor) that measures the strength of the stain.
F-factor is the inverse of the slope of the mg of Gum Xanthan vs. absorption

7/7/2017 Begin pre-weighing filters for
AB calibration

* Calibrate Balance * (middle range)
* Tare *
* Place filter over static eliminator *

#	mass (g)	mass (g)
47746	4.9356	4.9356
48354	4.9354	4.9354
48355	4.9355	4.9355
48356	4.9356	4.9356
48357	4.9357	4.9357
48358	4.9358	4.9358
48359	4.9359	4.9359
48360	4.9360	4.9360
48361	4.9361	4.9361
48362	4.9362	4.9362
48363	4.9363	4.9363
48364	4.9364	4.9364
48365	4.9365	4.9365
48366	4.9366	4.9366
48367	4.9367	4.9367
48368	4.9368	4.9368
48369	4.9369	4.9369
48370	4.9370	4.9370
48371	4.9371	4.9371
48372	4.9372	4.9372
48373	4.9373	4.9373
48374	4.9374	4.9374
48375	4.9375	4.9375
48376	4.9376	4.9376
48377	4.9377	4.9377
48378	4.9378	4.9378
48379	4.9379	4.9379
48380	4.9380	4.9380
48381	4.9381	4.9381
48382	4.9382	4.9382
48383	4.9383	4.9383
48384	4.9384	4.9384
48385	4.9385	4.9385
48386	4.9386	4.9386
48387	4.9387	4.9387
48388	4.9388	4.9388
48389	4.9389	4.9389
48390	4.9390	4.9390
48391	4.9391	4.9391
48392	4.9392	4.9392
48393	4.9393	4.9393
48394	4.9394	4.9394
48395	4.9395	4.9395
48396	4.9396	4.9396
48397	4.9397	4.9397
48398	4.9398	4.9398
48399	4.9399	4.9399
48400	4.9400	4.9400
48401	4.9401	4.9401
48402	4.9402	4.9402
48403	4.9403	4.9403
48404	4.9404	4.9404
48405	4.9405	4.9405
48406	4.9406	4.9406
48407	4.9407	4.9407
48408	4.9408	4.9408
48409	4.9409	4.9409
48410	4.9410	4.9410
48411	4.9411	4.9411
48412	4.9412	4.9412
48413	4.9413	4.9413
48414	4.9414	4.9414
48415	4.9415	4.9415
48416	4.9416	4.9416
48417	4.9417	4.9417
48418	4.9418	4.9418
48419	4.9419	4.9419
48420	4.9420	4.9420
48421	4.9421	4.9421
48422	4.9422	4.9422
48423	4.9423	4.9423
48424	4.9424	4.9424
48425	4.9425	4.9425
48426	4.9426	4.9426
48427	4.9427	4.9427
48428	4.9428	4.9428
48429	4.9429	4.9429
48430	4.9430	4.9430
48431	4.9431	4.9431
48432	4.9432	4.9432
48433	4.9433	4.9433
48434	4.9434	4.9434
48435	4.9435	4.9435
48436	4.9436	4.9436
48437	4.9437	4.9437
48438	4.9438	4.9438
48439	4.9439	4.9439
48440	4.9440	4.9440
48441	4.9441	4.9441
48442	4.9442	4.9442
48443	4.9443	4.9443
48444	4.9444	4.9444
48445	4.9445	4.9445
48446	4.9446	4.9446
48447	4.9447	4.9447
48448	4.9448	4.9448
48449	4.9449	4.9449
48450	4.9450	4.9450
48451	4.9451	4.9451
48452	4.9452	4.9452
48453	4.9453	4.9453
48454	4.9454	4.9454
48455	4.9455	4.9455
48456	4.9456	4.9456



Mass of Gum Xanthan = Pre-weigh, add solution, filter, weigh

78 7/17
Calibrate W&I/17 AB Soln

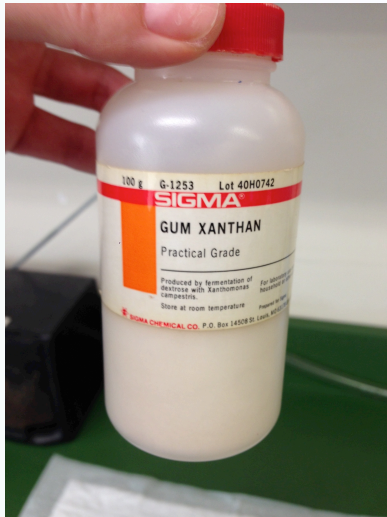
#	mass Filtered	absorbance	#	Pre-weighed
1	4.9383	0.153	21	4.9383
2	4.9384	0.153	22	4.9384
3	4.9385	0.153	23	4.9385
4	4.9386	0.153	24	4.9386
5	4.9387	0.153	25	4.9387
6	4.9388	0.153	26	4.9388
7	4.9389	0.153	27	4.9389
8	4.9390	0.153	28	4.9390
9	4.9391	0.153	29	4.9391
10	4.9392	0.153	30	4.9392
11	4.9393	0.153	31	4.9393
12	4.9394	0.153	32	4.9394
13	4.9395	0.153	33	4.9395
14	4.9396	0.153	34	4.9396
15	4.9397	0.153	35	4.9397
16	4.9398	0.153	36	4.9398
17	4.9399	0.153	37	4.9399
18	4.9400	0.153	38	4.9400
19	4.9401	0.153	39	4.9401
20	4.9402	0.153	40	4.9402
Blank	4.9403	0.153	41	4.9403
Blank	4.9404	0.153	42	4.9404
Blank	4.9405	0.153	43	4.9405
Blank	4.9406	0.153	44	4.9406
Blank	4.9407	0.153	45	4.9407



Absorption value = Add solution, filter, stain, rinse, filter - sulfuric acid – measure absorption

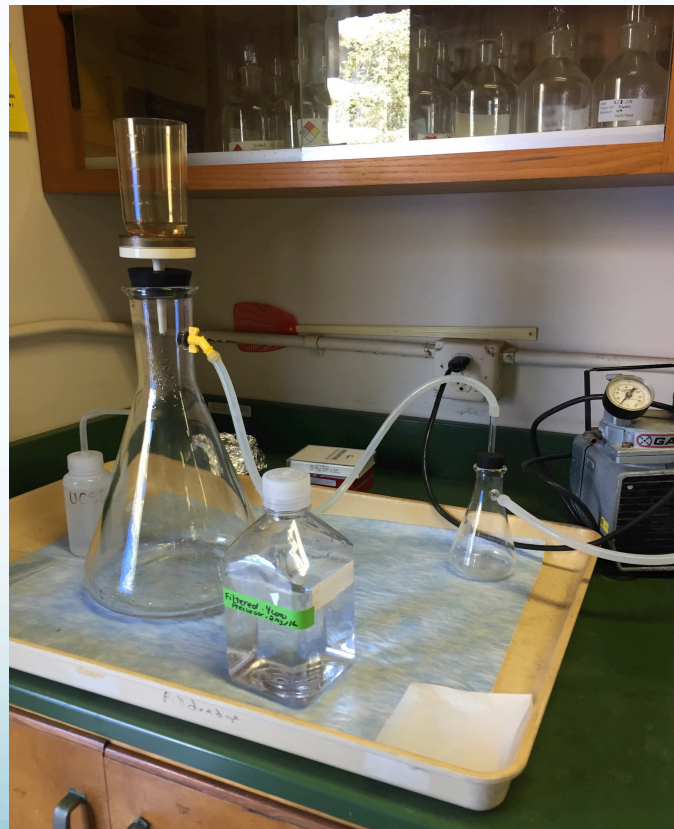
Before the trials

“Artificial TEP-Precursor” Solution



Gum Xanthan:
.0002 grams

Filtering Apparatus
filter through the .4 um filter



Homogenize

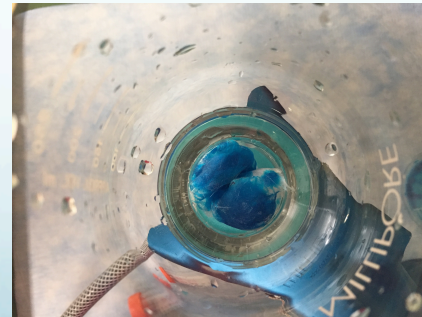
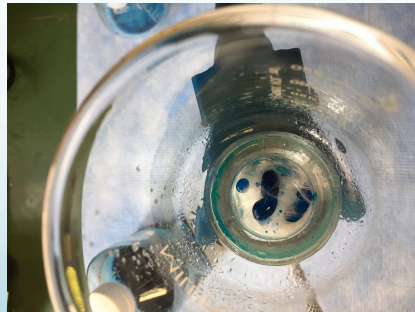
Step 1 of Hypothesized Precursor Method
Testing Materials To Extract TEP-Precursors
Glass Wool Trials



Filter
Apparatus



Silanized Glass
Wool – chemically
treated

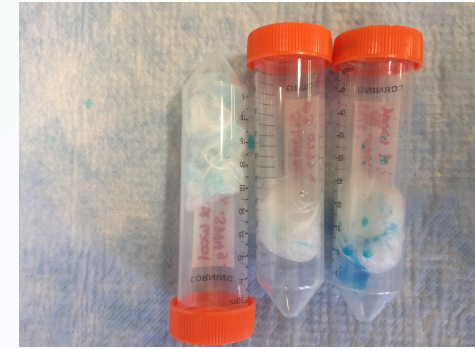


Glass Wool



Glass Wool

Sample	Absorbance
Glass Wool Blank	0.1506
Glass Wool	0.1423
Silanized Glass Wool Blank	0.0933
Silanized Glass Wool	0.078



Silanized Glass Wool

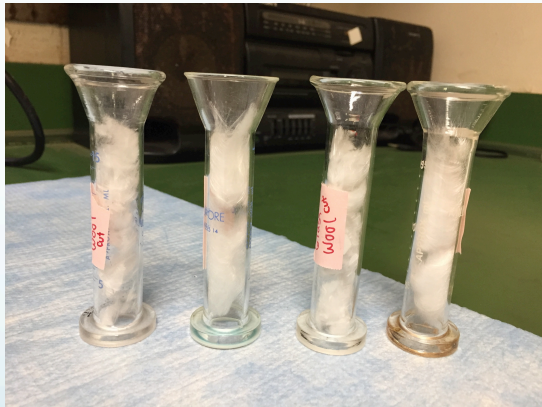
Glass Wool Trials



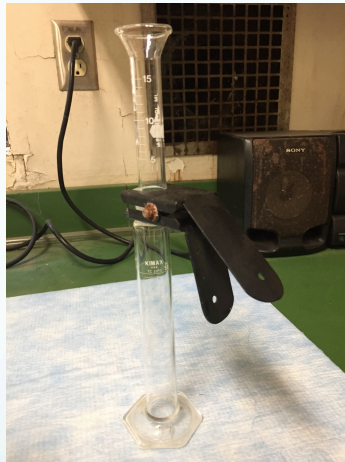
Glass Wool Blank (MilliQ water – stain – rinse)
Glass Wool (Precursor solution – stain – rinse)
Silanized Wool Blank (MilliQ water – stain – rinse)
Silanized Wool (Precursor solution – stain –rinse)

Future Trials

- Sample size adjustment
- Filter through column into graduated cylinder
- Try other materials such as cartridges, glass beads
- Work on rinsing techniques
- Eliminate glass wool sample – too absorbent



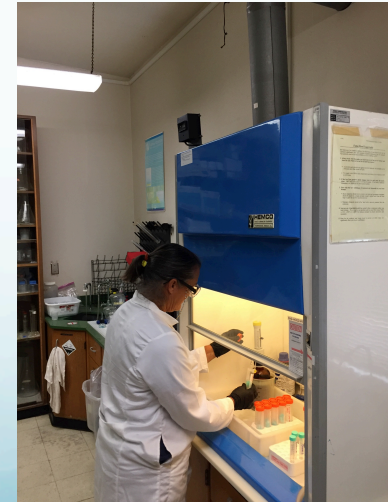
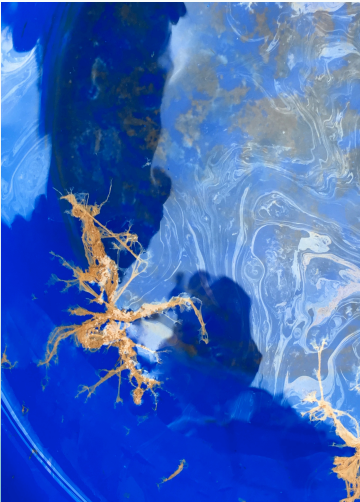
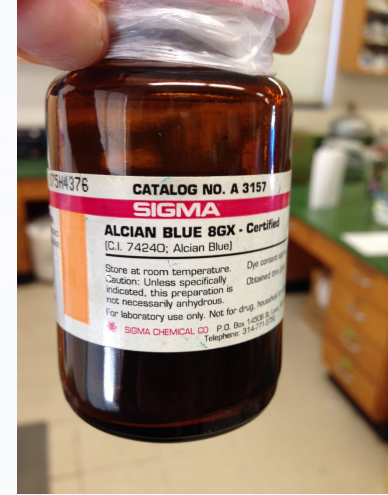
Cylinder filtration



Cartridges

My Experience

- Dynamic interdisciplinary
- Tools in the lab
- Data collection techniques
- Role of student
- Ability to experiment
- Collaborate with colleagues



THANK YOU

