Jane Wynne
Geology at the Edge,
Residency August 16 – September 16, 2016

This is a concatenation of three documents: Activities and Suggestions, Fogo Island Geology w Sponges, and Some Geological Observations with Photos. The latter includes observations from my time on Fogo Island in 2014 as well as 2016.

My thanks to the Geology at the Edge program and the Shorefast Foundation for this marvelous opportunity to drink in the wonders of Fogo Island – the geology, the people and the sea. I fully intend to reapply.

Activities and Suggestions

I few into Gander on August 16 and Paul Dean was there to pick me up. We drove to Fogo Island and spent the next day with Marina Schofield and Patrice Mathieu. She showed us the geological mapping she had completed on the Joe Batt's Arm trail to the Great Auk. It was really good to meet her and learn about her work. At the end of my term I spent an afternoon with Jack Botsford, who was to follow me as GATE Geologist in Residence, and was able to share local contacts (including teachers) and classroom resources with him.
Suggestion – encourage overlap between resident geologists whenever possible – we can learn from each other.

In my month on the island I gave geological tours to 111 people (see Table 1 for details). There were 71 guests from the Inn, one of the artists in residence (Abbas) and 31 Fogo Island residents (the community hikes). Geology hikes were regularly scheduled on Tuesday, Thursday and Saturday at 10 am, however if there were guests at the Inn who wanted to go on a geology hike on other days we went in the afternoon, so we did not compete with the botany walks.
I spent a day on Change Island, and with David McConkey, and three students from Cambridge University, led a group of 8 residents on a short hike along the northeast shore to a spectacular outcrop of volcanic breccia exposed on a wave-cut terrace near Puncheon Cove.
Suggestion – Walks to the Great Auk and Lion's Den take over 2.5 hours, which means guests at the Inn get back for a very late lunch. Perhaps we should consider taking a picnic lunch. It would keep people cheerful and prevent the end of the hike becoming a forced march.

The community hikes were very well attended – whole families came out. People were interested in learning about "their" geology and their local knowledge of settlement and land-use added a great deal to the event. ***Suggestion*** – over the course of the summer host a hike in each community, perhaps w each geologist doing one or two during their tenure.

I gave 4 public lectures – two evening talks in the Cinema at the Inn ("Canoeing the Nahanni River – mis-adventure below the falls" and "Fogo Island Granites – the Envy of Henry Moore"). I stayed overnight on Change Island (billeted by David McConkey) and delivered the Nahanni talk. The fourth lecture was on a morning when guests at the Inn did not want to go for a hike in the cold nasty wind, but were interested in hearing the granite/Henry Moore talk.

Suggestion – Let's explore the possibility of delivering the geology lectures in the communities – the Fisherman's Union Museum has two rooms that would be good for this purpose. By working with the Town of Fogo Island, who own many of the venues, perhaps the talks in individual communities could be coupled with the Community Geology Walks.

I spoke to three classes at the Fogo Island Central Academy, a total of about 52 students - Kindergarten (12 children, teacher Madonna Dwyer), Grade 4 (20 students, Maxine Greene), Grade 6 (20 students, Sean Clare). With the Kindergarten children I had them bring in one rock each and then talked about the geology of their rocks. The Grade 4 and Grade 6 classes were given a presentation about elements, minerals and rocks. This is close to the same talk I gave to the Grade 4 class in 2014 – much to my chagrin it was not until I was in front of the Grade 6 class this year that I realized that these were the same students I'd spoken to in 2014 (when they were in Grade 4). They did not call me out on this faux pas, but it is not a mistake I will make again! ***Suggestion*** – let's try to get some of the students out for a hike (field trip) – even a beach walk would provide an opportunity for exploration and discovery.

On Friday, September 2, I hired Lloyd Bixby (Stage Harbour) to take me and my friend Bev Tracey to Cann Island. I was looking for the magnificent pothole seen in a photo of David Baird's. His caption read "David M. Baird, in pothole at high-tide level, on the east side of Cann Island. 1946". We did a traverse that circumnavigated the island (clockwise) over the course of 5 hours but did not find the illusive pothole. The geology is the same as the geology of Change Island. I concur with the correlations made by Currie 1997. The rock in Baird's photo appear to be relatively unfractured and homogeneous – possibly granitic? This suggests that the photo may be misplaced, geographically. Mr. Bixby, who has traipsed all over Cann Island, has not seen such a feature.

I made some hand-written additions to the notes in the Geology Binder (The potato beds on the Great Auk Trail; the ditch outcrop that shows the contorted folds in the sedimentary rocks in Island Harbour).

Suggestion – the description of Fogo Island Geology and Sponges that follows be included at the front of the Geology Binder.

Advertising

For the lectures in the Cinema and the Community Walks I put page-sized posters up in many of the businesses on Fogo Island, on the ferry (asking people in the ferry line-up to put them up on the bulletin board on the ferry for me), in the ferry lounge at Stag Harbour, in the tourist info centre near Stag Harbour, at the Fisherman's Union Museum in Seldom and on the community channel (through This n That in Fogo) and the Fogo Island Buy and Save Facebook page. Paul Dean put the notices up on the Geology at the Edge Facebook page.

Geology Walks and Talks - P.J. Wynne 2016

Date	Hikes # people	Where/What	Talks # people
Aug. 18	2	Oliver's Cove	
19	1	Abbas, in front of the Inn	
20	2	Turpin's/ Squish	
Sun. 21		worked on talk	
22		worked on talk	
23	4	Lion's Den	
24		Day off	
25	14	Robinson and Blyth tour - Great Auk	
26		talk at the Inn Nahanni mis-adventure	14
27	2	Turpins Trail, rain	
Sun.28	13	Community Hike - Lion's Den	
29		office day	
30	8	Island Harbour - gale force winds	
31	8	Change Is. / Nahanni talk	10
Sept.1	2	JBA - Great Auk	
2		Cann Is w Lloyd Bixby (boatman) and Bev Tracey (friend)	
3	9	JBA - Great Auk	
Sun. 4	2	Island Harbour	
5		office day	
6	5	Oliver's Cove	
7		Change Is. Picnic	
8		no walkers, rain, visited Anthony Tobin (had a dark heavy rock = gabbro), Madonna and Gail; gave Henry Moore talk	18
9	2	In front of Inn	
10	8	Island Harbour/ Bridge Studio	
Sun. 11	18	Community Hike - Oliver's Cove	
12		Day off w Kris and Katie	
13	11	Turpin's Trail	
14		Geology presentation to 3 classes; Kindergarten (12 children, Madonna Dwyer), Grade 4 (20 students, Maxine Greene), grade 6 (20 students, Sean Clare)	
15		blowing a gale - gave Henry Moore talk	6
Fri. 16		walk on shore on w side of Shoal Harbour - a day in the sun on the rocks, lovely	
17		drive Fogo to Gander	
18		Gander to Victoria	
Total	**111**		**48**

P. Jane Wynne 2016

Fogo Island Geology w Sponges

I start each walk, in the Library at the Inn, with this sponge demo of Fogo Island Geology.

1. Sedimentary rocks are laid down, layer by layer. (photos follow)

2. Igneous rocks (yellow sponge = granites, blue sponge = gabbro) are intruded (squeezed) into the sedimentary rocks "like jelly into a donut", ~ 420 Mya. (OK 418 Mya) at a depth of 2 – 10 km.

3. The volcanic rocks – quartz-rich, very resistant to erosion (forming the high-standing protective caps of Fogo and Brimstone Heads), chemically similar to the granites.

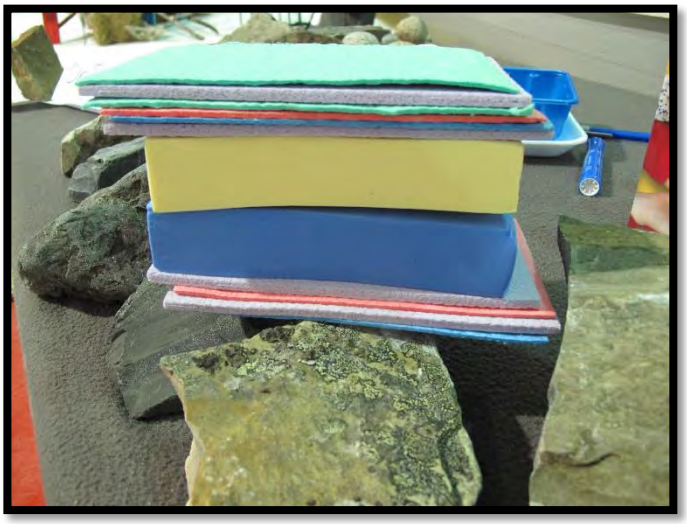
4. The whole package was tilted/deformed.
   The tilting and deformation, and possibly the igneous rocks themselves are the product of being caught in the bumper zone between two colliding continents where an older ocean closed. The resulting mountain range had a deep root which melts and produces the melt that forms the igneous rocks (it is less dense than the surrounding rock so the melt rises, buoyantly through the crust). We are able to walk across the magma chamber on Fogo Island because there has been 400 M years if erosion of the mountain belt down to the nub exposed today.

5. 14,000 years ago there was a kilometre of ice over Fogo Island and much of North America. This period of glaciation provided the final polish grinding down the landscape – it left behind isolated boulder that stand out on the skyline of the hills here.

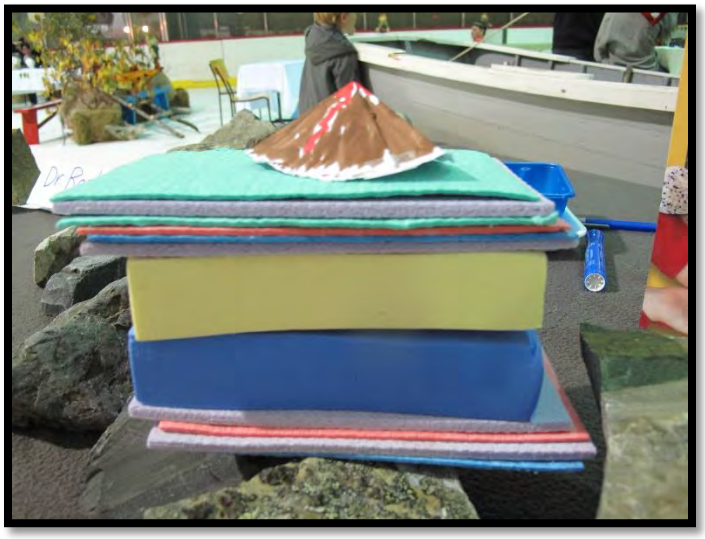
Then I show them the geological map and describe what we are going to see on our walk.

1. Deposition of sedimentary rocks

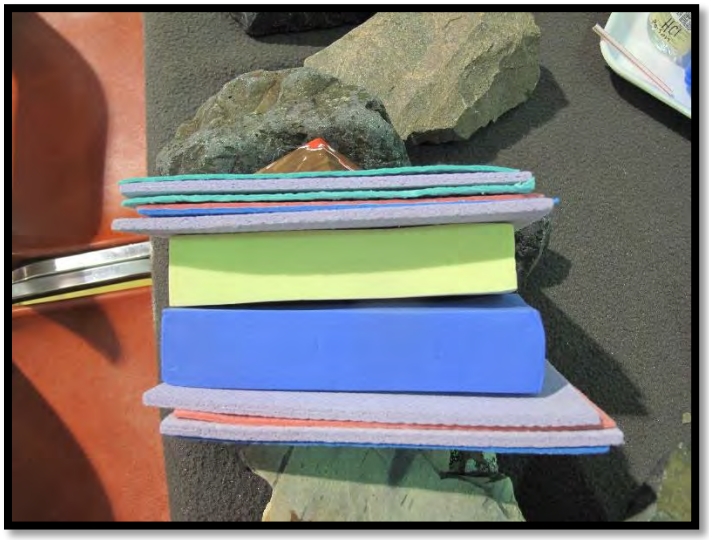
2. Intrusion of granites (yellow sponge) and gabbro (blue sponge)



3. Extrusion of volcanic rocks



4. Tilting (deformation) of the whole package



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Some Geological Observations with Photos

1. Pillows? on Change Island (Photos 1 – 8)
2. Witch's Eye, Change Island (Photo 9)
3. Hyaloclastic? alteration, Lion's Den (Photos 10 – 13)
4. Amphibole rims, Wild Cove south (Photos 14 & 15)
5. Cann Island geology (Photos 16 – 22)

1. I think these are pillows. This exposure is about 20m north of the Favosites coral inclusions in the volcanics, on the west coast of Change Island. The corals suggest submarine deposition, so pillows are plausible. Photos are from 2016.

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

2. Photo 9 This is a weird concentric feature in the volcanics found on Black Long Point, Change Island by the Cambridge students (2016). See P. 29 of "Textures in Volcanic Rocks. Jocelyn **McPhie**, Mark Doyle, Rodney Leslie Allen, Rodney Allen." http://www.geokniga.org/bookfiles/geokniga-volcanic-textures-guide.pdf

Could it be an armoured mud ball?

Thomas Eastler (Maine) in an email to David McConkey
" ….the concentric features are more like liesagang (false color banding) in pillow lavas, rather than ejecta. The color banding does not relate to mineralogically distinct layers."

I do not support this suggestion – any liesagang rings I have seen (in Athabasca Fmn. sandstone, Sask.) are not so regular/ annular. I have titled this "The Witch's Eye" – in keeping with the Devil's Footprint on The Auk Walk.

Photo 9 – photo is from the Cambridge students

3. Photos 10 & 11 (taken in 2014) Interesting volcanic breccia and hyaloclastic? alteration texture in rhyolite (or is it sandstone?) close to the sedimentary / volcanic contact on the NE arm of Lion's Den Cove. This is the sequence described as overturned by _____ (2015). See images on p 170 and 172 of Textures in Volcanic Rocks. Front Cover. Jocelyn **McPhie**, Mark Doyle, Rodney Leslie Allen, Rodney Allen. http://www.geokniga.org/bookfiles/geokniga-volcanic-textures-guide.pdf

Photo 10

Photo 11

Photo 12 & 13: Volcanic breccia, close to the sedimentary / volcanic contact on the NE arm of Lion's Den Cove.

Photo 13

4. Thick amphibole rim around rafts of sedimentary xenoliths in gabbroic rocks in Wild Cove south. Suggestive of water contained in the sedimentary rock being used in the amphibole crystallization. Photos are from 2014.

Photo 14: Sedimentary xenolith above, gabbro below. Tip of a rock hammer for scale.

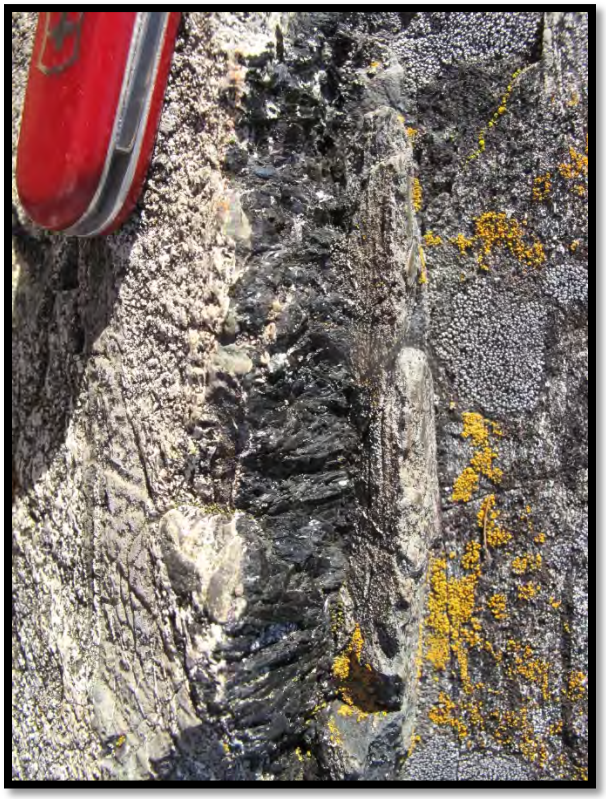

Photo 15: Amphibole rim between gabbro on the left, and sedimentary rock on the right. Amphiboles appear to be nucleating on the sedimentary rock and growing into the gabbro. Rim is close to a cm thick.

5. Photos from Cann Island
   On Friday, September 2, 2016 I hired Lloyd Bixby (Stage Harbour) to take me and my friend Bev Tracey to Cann Island. I was looking for the magnificent pothole seen in a photo of David Baird's. His caption read "David M. Baird, in pothole at high-tide level, on the east side of Cann Island. 1946". We circumnavigated the island (clockwise) over the course of 5 hours but did not find the illusive pothole. The geology is the same as the geology of Change Island. I concur with the correlations made by Currie 1997. The rock in Baird's photo appear to be relatively unfractured and homogeneous – possibly granitic? This suggests that the photo may be misplaced, geographically. Mr. Bixby, who has traipsed all over Cann Island, has not seen such a feature. I include my photos for your interest.

Photo 16

Photo 17

Photos 16 &17: Basalt flow w flattened amygdules; assigned to the Lawrenceton Formation by Currie (1997).

Photo 18: Volcanic agglomerate with mudstone matrix – lapilli and bombs look like they were hot/plastic when enveloped by the mud; assigned to the Lawrenceton Formation by Currie (1997).

Photo 19

Photo 20

Photos 19 & 20: Folding, interpreted as synvolcanic, in volcaniclastic rocks; assigned to the Lawrenceton Formation by Currie (1997).

Photo 21: Lapilli tuff – assigned to the Lawrenceton Formation by Currie (1997).

Photo 22: Deformation in tubidite sequence (interpreted to be syndepositional) on the southeast coast of the Island. The rocks have a penetrative foliation/cleavage similar to that observed on the west coast of Change Island. These rocks are assigned to the Badger Group by Currie (1997).