

Searching for the Source
of the
Titanic Headstones in Halifax
T+61 Update
June 15, 2012

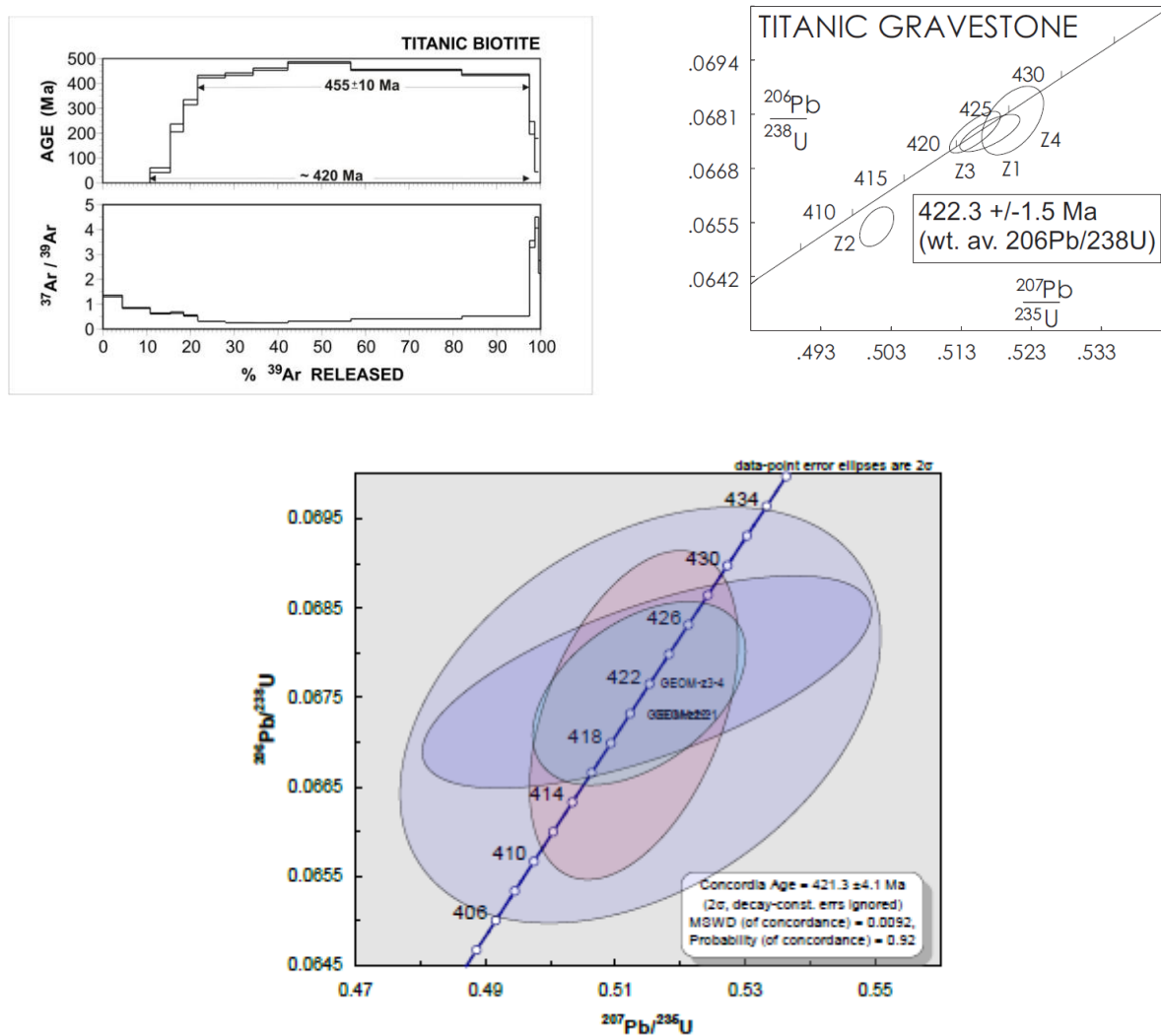


D. Barrie Clarke
Department of Earth Sciences
Dalhousie University
Halifax, Nova Scotia B3H 4R2
clarke@dal.ca

THE APRIL 15 UPDATE IS PRE-REQUISITE READING. ASK ME FOR A COPY IF YOU HAVE NOT SEEN IT.

Geochronological Convergence

Mineral assemblage, texture, and bulk chemical compositions may vary somewhat from place to place in the source pluton, but more than any other parameter, the age of the Titanic headstones is the one with the least inherent variability and so is crucial in the search for that source pluton. After considerable debate, our geochronologists have agreed on an age for the Titanic headstones of **~420-425 Ma**. This agreement involves three different analytical methods: Peter Reynolds' total gas Ar-Ar age on separated biotites of 420 Ma, Greg Dunning's TIMS age on separated zircons of 422.3 ± 1.5 Ma, and Chris McFarlane's LA-ICP-MS age on *in situ* zircons of 421.3 ± 4.1 Ma.



This age of 420-425 Ma is the same as that of a mafic-felsic plutonic suite in coastal Maine and southern New Brunswick, as well as some predominantly felsic plutonic rocks in Scotland.

Attempts to find a match in Maine

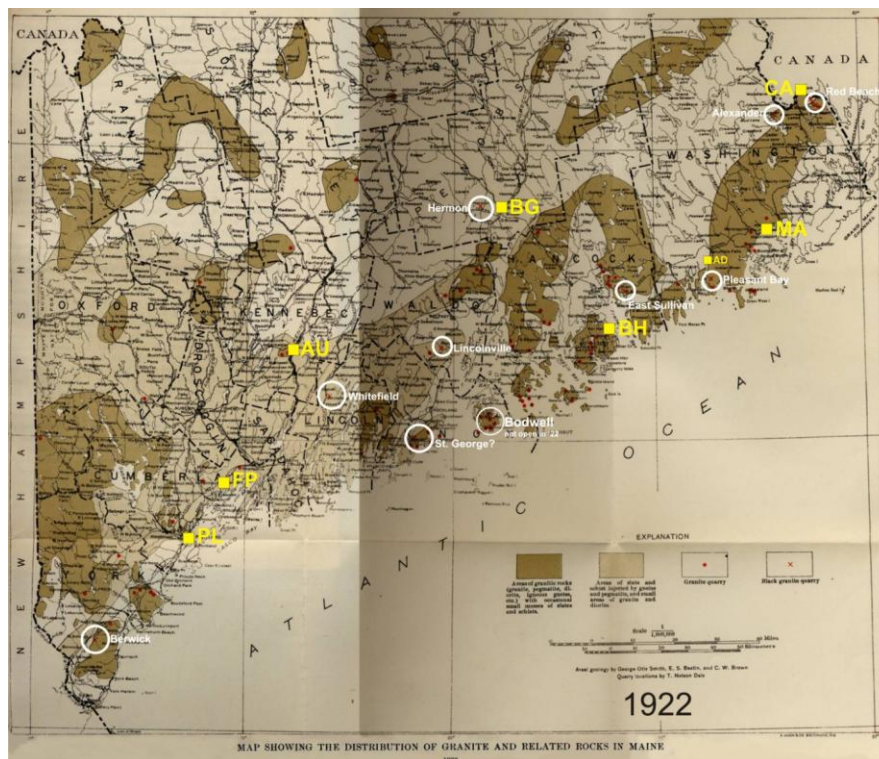
In an extremely timely series of publications, T. Nelson Dale of the USGS conducted a comprehensive and detailed examination of hundreds of granite quarries operating in New England in the early part of the 20th Century. Some parts of his reports are available on-line at:

http://quarriesandbeyond.org/states/me/me-maine_granite_quarry_list.html

USGS Bulletin #	Year	Topic	Mention of Gabbro
313	1907	Maine	18 of 115 quarries
354	1908	Mass, NH, RI	one reference to diabase porphyry
404	1909	Vermont	none
484	1911	Connecticut	none
738	1923	New England	repeat of above with some updates

Dale describes the lithology of each quarry, and in many cases notes buildings or monuments where the stone has been used. Significantly, in the 1923 volume, he makes no mention of the Titanic gravestones in Halifax, even though he mentions lower profile uses such as the “soldiers and sailors’ monument in Whitinsville, Mass.”, and the mantelpiece over the fireplace in the public library in Machias, Maine.

The most useful part of Bulletin 313 is the map of quarries in Maine, reproduced below with the “black granites” or gabbros highlighted. Of the 18 black granites, only three contain olivine (Bodwell Quarry at Vinalhaven, Heal Quarry at Lincolnville, and Pleasant River Quarry at Addison). Another useful part of Bulletin 738 is “Table 1 Economic classification of New England granites” (pp. 421-432).



T. Nelson Dale's map with areas of “black granite” quarries marked by white circles.

My focus in Maine was on those quarries that contained olivine, as do the Titanic headstones, and/or had monument-processing facilities and were situated at tidewater for easy export. One part of my search strategy was to visit cemeteries near the black granite quarries in the hope of seeing a high proportion of local stone. This strategy was validated in the vicinity of Red Beach, near Calais, and in the vicinity of Pleasant River, near Addison. The other part of my search strategy was to see the collections in the Maine Granite Industry Historical Society Museum on Mt. Desert Island (MDI), and the State Museum in Augusta. **As a result, I have seen hundreds if not thousands of black granite headstones from the early part of the 20th Century, and all of Dale's black granites of Maine, except for those from the Bodwell Quarry at Vinalhaven and the Thornburg Quarry near Addison, *without seeing even a remotely close textural match with the Titanic headstones in Halifax.***

I have discussed the Titanic headstones with Prof. Bob "Mr. Vinalhaven Himself" Wiebe, but he does not recognize them. Still, because it is one of only three olivine-bearing gabbros in Maine, because the quarry operators had monument-making equipment there, and because the quarry was at tidewater, the Bodwell black granite should still be very much under consideration. A close inspection of local cemeteries and the old quarry site is still a priority for future investigations. Leave no stone unturned!



The locations of the three olivine-bearing gabbros in Dale's compilation. I have seen the Pleasant River gabbro in several places, including in the library in Machias and in the "Spirit of the Marsh" sculpture in Addison, as well as the Heal gabbro in the collection at MDI, but not the Bodwell gabbro on Vinalhaven.



The Pleasant River gabbro over the fireplace in the library in Machias, precisely where Dale in 1907 said it would be, and the Pleasant River gabbro sculpted in 2011 into “The Spirit of the Marsh” in Addison.

According to Dale, black granites from the Thornburg and Black Diamond quarries near Addison do not typically contain olivine. I have not knowingly seen any material from Thornburg, unless of course it was among the many black granite headstones in cemeteries in the Addison area. Dale does not even give a sample number for Thornburg material among his extensive collection lodged in the Smithsonian. Rock from the Black Diamond Quarry is apparently a quartz-bearing hypersthene gabbro.

One of the “black granite” quarries is located in Berwick in the southernmost part of the state of Maine. I spent an interesting couple of hours in the Western Cemetery in nearby Portland, and saw a lot of chisel-shaped headstones like the Titanic ones in Halifax, both of gabbro and granite, all with dates of A.D. 1905±15, and many with the style of lettering used on the Titanic headstones. The headstone in the Western Cemetery that superficially looks most like the Titanic headstones is that of Eben H. Small (1821-1896), shown on the next page. I deduce that there was a certain (North American?) fashion of tombstone shape and type of inscription that characterized that period of time, but have no idea how geographically widespread this fashion was. Just as the symbology on the Lewis chessmen was used to locate their age and origin, perhaps the shape and lettering on the Titanic headstones is a clue to their source (although their lettering was done in Halifax by Frederick Bishop, but he may have copied a style originating elsewhere).



Typical chisel-shaped Titanic headstones.

So, in addition to the petrological features (mineral assemblage, texture, chemical composition, and age) which **must** match, perhaps we can add monument-makers' features (length, width, height, chisel angle, number of surfaces polished, font style, font size, blackening around the letters) which **may** also match. To this end, I have measured a few of the Titanic headstones and was surprised to see how variable they are: length 32.9 – 35.1 cm; width 18.5 – 20.7 cm; chisel angle 16 – 25°. Although superficially they all look the same, they were certainly not standardized cookie-cutter headstones! For the record, the Eben Small headstone is: length 43.8 cm; width 33.5 cm; chisel angle 25°.

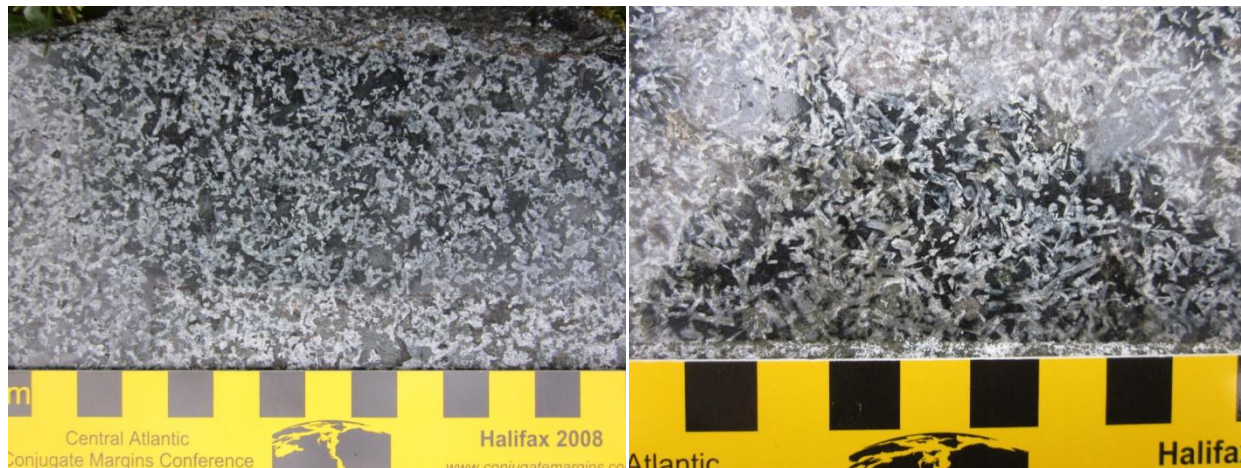


The headstone of Eben H. Small is typical of many other headstones in the Western Cemetery in Portland, Maine, and similar in several respects to the Titanic headstones.

Attempts to find a match in Southern New Brunswick

I stopped in St. Stephen to visit the two large cemeteries there, and the Smet Monument Works. Unusual in the Rural Cemetery of St. Stephen was the large number of generic “Mother” and “Father” small, ground-level, gabbroic markers in family plots. Of all the material I saw in St. Stephen, these generic markers were the closest match to the Titanic texture. I have not seen such prolific use of these low-lying markers anywhere else, and deduce that the custom, the source, and the production may have been local. Steve Spires at the Smet Monument Works did not know the source of this material. I have

also looked at Sandra Barr's collection of gabbros from St. George without seeing a match, but admittedly they were hand samples as opposed to polished slabs.



Gabbros from two of the generic "Mother" and "Father" markers in the St. Stephen Rural Cemetery are among the best textural matches so far for the Titanic headstones in Halifax (below). Some of the generic markers in this cemetery appear to contain olivine.



A Titanic headstone for comparison.

Furthermore, St. George, NB, has been known for more than a century as the "Granite Town". The following two on-line documents make interesting reading:

<http://www.town.stgeorge.nb.ca/granite.html?aLink=http%3A%2F%2Fwww%2Etown%2Estgeorge%2Enb%2Eca%2Fgranite%2Ehtml&embedFonts=true&onRelease=%5Btype+Function%5D&onRollOver=%5Btype+Function%5D&onRollOut=%5Btype+Function%5D>

O'Halloran, E. (1968) Contribution from Charlotte County Historical Society, No. 46, The Granite Industry of St. George and Recollections of its People:

<http://www.rootsweb.ancestry.com/~nbpstgeo/stge5a35a.htm>

Publications by Wm. A. Parks (1914, *Building and Ornamental Stones of Canada*, Vol. II, Maritime Provinces, Canada Dept. of Mines, 264 pp.) and Gwen L. Martin (1990, *For love of stone*, Volume I: The story of New Brunswick's building stone industry, Miscellaneous Report No. 8. Fredericton, NB: New Brunswick Department of Natural Resources and Energy, Mineral Resources Division, 176 pp.) detail the black granite quarries in NB in the early 20th Century. One area was centred around St. Stephen and the other in Bocabec Village half way to St. George. The table below summarizes Martin's report.

Quarry Name	Location	Dates of Operation	Comments
Stuart Glenley Mtn.	Bocabec	1898	little activity after 1898 used on New River #1 and Dennis Stream # 5 bridges
Epps/Dodds Glenley Mtn.	Bocabec	early 1900s	
McGrattan Glenley Mtn.	Bocabec	1911	stone called Egyptian Black
Bayside	Bocabec	1917-1937	stone called Irish Black or Bayside Black
Spinney	Bocabec	1932-late 1930s 1962-1968	stone called Atlantic Black Granite – used on Govt. of Canada Bldg in St. John, Centennial Bldg. in Fredericton – also check Beaverbrook Art Gallery and BMO in Fredericton
The Ledge Bald/Brown's Mtn.	St. Stephen	1890-1940	four miles SE of St. Stephen - small stone finishing mill in St. Stephen at the corner of Rose and Queen Sts. – became the St. Stephen Granite Works which turned black granite into curbstones, monuments, monument bases, and some building stone for the local market
Little Ridge	St. Stephen	1909-1913	two miles NW of town at Little Ridge
*	*	*	NOTE: check bridges at Moores Mills, New River, and Lepreau Station for more uses of local black granite

Gabbroic rocks of St. Stephen and Staples Mountain have an age of 421 Ma (McLaughlin et al., 2006, *The Moosehorn Plutonic Suite, southeastern Maine and southwestern New Brunswick: age, petrochemistry, and tectonic setting*, *Atlantic Geology* 39, 123-146), similar to the Pocomoonshine gabbro on the American side of the border (West et al., 1992, *Silurian age for the Pocomoonshine gabbro-diorite, southeastern Maine, and its regional tectonic implications*, *American Journal of Science* 292, 253-273).

On June 12th, I visited the Halifax Titanic headstones with the 90-year-old Burton Coutts, grandson of William Coutts of Milne, Coutts & Co. granite works in St. George, and Burton had never heard stories passed down of any large shipment to Halifax in 1912 for the victims of the Titanic. On the other hand, on June 14th, at the suggestion of Susan Johnson of NB Natural Resources, I contacted Randy Miller of the New Brunswick Museum in St. John, NB, to see if it held a collection of granite samples from the early 20th Century heyday of St. George being the "Granite Town", to learn that he had precisely one sample of black granite, **but what a sample it is (next page)!**



Photo courtesy of Randy Miller, New Brunswick Museum, St. John

Except for knowing that McGrattan & Sons of St. George processed this stone, we still don't know what its geographic origin is. McGrattan had its own quarry on the east side of Digdeguash Lake, but according to Martin (1990), that quarry was most active in the period 1916-1926, too late for Titanic. Other black granite quarries operating in 1912 were in Bocabec, but the sample belonging to Burton Coutts is the only one I have seen from Bocabec, and it is texturally unlike the Titanic headstones (below), and also Parks (1914) does not mention olivine from any of the Bocabec samples he describes. The Ledge and Little Ridge quarries near St. Stephen remain among several possibilities.



Burton Coutts' Bocabec sample resting on a Titanic headstone. Clearly no match.

Given the location within Canada, the relative proximity of St. George - Bocabec - St. Stephen to Halifax, the widely known reputation of St. George as the "Granite Town", the right geological age of the plutonic rocks (~421 Ma), and some interesting textural similarity to the Titanic headstones, the SW corner of New Brunswick is becoming a prime candidate for a source for the Titanic headstones.

Attempts to find a match in Nova Scotia

The gabbro at West Erinville keeps being raised as a possible source for the Titanic headstones. Parks (1914) contains no clues about West Erinville, however the most recent dimension-stone publication (1989):

<http://www.gov.ns.ca/natr/meb/pdf/is19.asp>

shows the so-called “Dawn Black Granite” from Erinville, looking quite unlike the Titanic headstones. Greg Dunning has dated zircons from this pluton and obtained an age of 389 Ma. In addition, I have examined samples belonging to Chris White at NSDNR and belonging to Sandra Barr at Acadia University without finding any textural similarity. I will soon take a day trip out to West Erinville just to see if anything else can be learned, but for many reasons this pluton is not a high-ranking candidate for the source of the Titanic headstones.

Attempts to find a match in Scotland

The new radiometric age of 420-425 Ma for the Titanic headstones has effectively ruled out the so-called “Younger Gabbros” of Aberdeenshire, which appear to have an age closer to 470 Ma, as a source for the Titanic headstones. The good news is that there is another significant magmatic event in Scotland at ~420 Ma (e.g., Neilson et al., 2009, JGSL 166, 545-561), but the further bad news is that that event is dominated by granite, and there appears to be little or no associated gabbro. Malcolm Hole of Aberdeen University has some further ideas that he is going to pursue this summer field season.

A second piece of bad news from Aberdeenshire is that Bill Allan polled the members of the Aberdeen and North East Scotland Family History Society, of which he himself is a distinguished member, with the following question: “I wonder if I could appeal to members whose forebears worked in the quarrying industry. Do any of you recall your grandfather telling you “I hewed the stones fae the ‘Titanic’ graves”?” He received exactly zero responses.

Summary

Our geochronologists have settled on an age of 420-425 Ma for the Titanic headstones.

At least for the early part of the 20th Century, cemeteries contain high proportions of locally quarried material, making it much easier to search for Titanic look-alikes in cemeteries than trying to find overgrown quarries. My assumption all along has been that, wherever the Titanic material came from, it was also used close to its source quarry, but that assumption is valid only if there were a monument works close to the quarry.

In my searches in the field, I rely heavily on the distinctive textural character of the Titanic headstones, and would be in trouble if it only represents a minor textural variant of the source pluton. But the Titanic headstones are texturally uniform, so there must be more like them somewhere else. Ultimately though, a zircon age match, together with mineral assemblage and chemical matches, will trump a textural mismatch.

T. Nelson Dale's USGS Bulletins of 1907-1911 are an invaluable resource for documenting the granite quarrying industry in New England just prior to the sinking of the Titanic. His summary Bulletin of 1923 makes no mention of any shipment of monuments to Halifax, even though he meticulously records much lower profile uses.

Of all of Dale's "black granites" in Maine, only the olivine-bearing material extracted from the Bodwell Quarry in Vinalhaven has not been seen, and still needs to be investigated. Bodwell is still a potentially strong candidate because of its composition, the existence of monument-processing capabilities, and its location at tidewater. Cemeteries on Vinalhaven are the best place to begin the search.

Something interesting is going on in Portland, Maine, where many gabbroic (and granitic) Titanic-morphologically chisel-shaped look-alike headstones from the early 20th Century exist. Nowhere else through the State of Maine did I see such a strong morphological resemblance. The gabbros don't match but the headstone shapes certainly do.

The best textural matches for the Titanic headstones so far are in the Rural Cemetery in St. Stephen, New Brunswick, and in the one McGrattan sample in the New Brunswick Museum in St. John. If their sources are local, then these geochron-textural matches significantly reduce the search area.

Recent geochronological and historical developments from old and new Scotland are not encouraging.

The search area has narrowed, but continues. More field work in SW New Brunswick is next.

Acknowledgements

- Steven Haynes and Juanita Sprague of Mount Desert Island, Maine
- Paula Work of State Museum in Augusta, Maine
- John and Marie Dudley of Alexander, Maine
- Steve Spires of Smet Monuments in St. Stephen, New Brunswick
- Burton Coutts of Halifax, Nova Scotia
- Susan Johnson of New Brunswick Natural Resources
- Randy Miller of the New Brunswick Museum
- the always friendly, interested, and supportive Bed & Breakfast owners in Fredericton, Lubec, Pleasant Bay, Bar Harbor, and Old Orchard Beach
- and many other helpful people all along coastal Maine and southern New Brunswick



Every report ends the same way. The distinctive texture of the Titanic headstones – randomly oriented spiky white feldspars, interstitial black pyroxene and hornblende, and rusty red olivine . Print this page in colour on heavy stock and plastic laminate it for easy transport in the field. If you ever see a rock like this on a century-old building or in a century-old cemetery, please send a photo to clarke@dal.ca.