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150 years of managing national geological assets: celebrating the sesquicentennial of the first Official Geological Survey in Jamaica – a comment

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I was delighted to read Bhalai's (2010) timely account of geological surveys and surveying in Jamaica. I have been working on a parallel project (Donovan, 2010), relying heavily on earlier papers by Lawrence Chubb and John Williams, and it was delightful to read this parallel blooming of interest after 150 years of official surveying. I use official, because De la Beche had undertaken an earlier, one-man, but private geological survey in eastern Jamaica that was graced with an accurate map and detailed descriptive memoir (De la Beche, 1827).

The purpose of my comment is not to criticise any of Bhalai's chronology and observations. Rather, I seek to add to this original paper by giving more flesh to some of the brief portraits of notable characters that I consider deserve greater recognition, particularly those who worked in Jamaica before the Second World War. I am also not shy in demonstrating where ideas by official surveyors were criticised and disproved by other geologists, perhaps one small failing of Bhalai's contribution.

1. HENRY THOMAS DE LA BECHE (1796-1855)

Of all 19th Century geologists who worked in Jamaica, De la Beche is the most notable historical figure and, in consequence, the best served by published biographical material, so it was disappointing to see the only reference given by Bhalai (2010) in support of the text is Sharpe (1997). The obvious starting point from the Jamaican viewpoint is Chubb (1958; reprinted in Donovan, 2010) and Donovan (1996). McCartney (1977) wrote a readable and well illustrated biography, and Sharpe and McCartney (1998) published a comprehensive catalogue of the De la Beche archive of the National Museum of Wales in Cardiff. Rudwick (1985) is one of the most important contributions to the history of geology for the past 50 years and, in the centre of *The Great Devonian Controversy*, we find one H. T. De la Beche. The entry in the *Oxford Dictionary of*

National Biography is by Secord (2004). See these papers and monographs, and the numerous relevant references therein, for a fuller appreciation of this significant figure.

The painting of De la Beche in Bhalai (2010, fig. 1; rather obviously not a photograph as stated in the caption) is after H.P. Bone's portrait of 1848 (Sharpe and McCartney, 1998, entry 415 on p. 40, fig. 53). This was reproduced in Flett (1937, pl. 1 and explanation on p. 9) and is identical apart from the mountainous background being deleted therein. But rare photographs of De la Beche do exist (for example, McCartney, 1977, p. 40; Sharpe and McCartney, 1998, figs 54, 55, 57).

2. ROBERT T. HILL (1858-1951)

Bhalai (2010, p. 18) is dismissive of the achievements of R. T. Hill in Jamaica and emphasises some minor errors in his work. However, Robert Thomas Hill, Junior, was called both the 'Father of Texas Geology' and the 'Father of Antillean and Isthmian Geology' in his own lifetime, and has been the subject of a major biography (Alexander, 1976). Hill was the preeminent field geologist of his day and the first American to play a prominent role in Caribbean crustal studies. He was probably the most accomplished geological surveyor to have worked in Jamaica, yet has received relatively little credit for his seminal contributions (but see Donovan, 2010, pp. 47-57).

Hill's Antillean research spanned a brief period, from the mid 1890s to about 1900, during which period he was employed by the United States Geological Survey. He was not employed by Harvard College *per se*, as stated by Bhalai (2010, p. 18), but, rather, was supported by the fortune of Alexander Agassiz of that institution, who commissioned Hill to search for evidence of founded continental connections and changes of sea level. Hill's major Caribbean surveys included

the Isthmus of Panama and the principal islands of the Greater Antilles, and major reports were published on these areas (Hill, 1895, 1898, 1899).

Hill visited Jamaica in 1896 and 1897, and made over 800 miles of geological traverses. His geological base map was that of Sawkins, as recognised by Bhalai. But Hill criticized the survey led by Sawkins for its failure to determine the correct geological succession of the island. To quote from my earlier account (Donovan, 2010, p. 52):

"Hill's criticism of Sawkins et al., coming from such a consummate field geologist, is all the more damning: "... the reader is constantly impressed with the fact that these researches failed to solve the essential problems of the succession and age of the strata ... The literature of no other region, especially that relating to paleontology, presents so many erroneous conclusions" (Hill, 1899, p. 8); "... the descriptive portions of the report are fair, but its conclusions concerning the classification, sequence, and age of the rocks leave the reader in a state of confusion" (p. 9). Hill correctly identified the reason for the problem, the death of the Director and palaeontologist, Lucas Barrett, so early in the survey (Chubb, 1962 [reprinted in Donovan, 2010]). Without Barrett to correlate the succession, Sawkins et al. struggled to understand the stratigraphy. Hill was the first to recognize what is now the infamous "fantastic blunder" berated by Chubb (1962, p. 29), the miscorrelation of the Eocene Yellow Limestone Group with the Pliocene Bowden Formation. This was on the basis, not of an accurate comparison of their palaeontological content, but merely because they are both highly fossiliferous; "... this error has had far reaching importance in obscuring Antillean geology ..." (Hill, 1899, p. 10).

Based on this research, Hill was the first surveyor to determine the geological history of Jamaica, an interpretation that remains modern in concept. I summarised this research elsewhere (Donovan, 2010, pp. 52–56) and compared it favourably with more modern ideas on the island's evolution (such as Draper, 1987), but, better still, the reader is referred to Hill's exemplary original memoir (1899).

Bhalai (2010, p. 18) refers to Hill's report that Cretaceous and Eocene fossils were found in the same formation. This was, of course, re-examined by the amateur C. T. Trechmann, who disproved the assertion that autochthonous rudists were to be found in the Yellow Limestone Group, believing Hill's error was due to the close lithological similarity of Eocene and Upper Cretaceous limestones in the section of the Cambridge and Catadupa railway (Trechmann, 1922, p. 426). But

Hill's samples have never been re-examined, assuming that they still exist; could the rudists have been reworked, a phenomenon well known from the Paleogene Richmond Formation (compare with Chubb, 1971, p. 195, pl. 40, fig. 13; Pickerill *et al.*, 1995, pp. 194, 197)?

3. CHARLES A. MATLEY (1866-1947)

The unusual scientific career of Charles Matley is worthy of further comment. Matley was an amateur geologist with a strong interest in the Precambrian and Lower Palaeozoic of North Wales (Anon, 2006), for which he received the degree of D.Sc. (Robinson, 1996, p. 20). He was a career Civil Servant in the time of the British Empire and took an active interest in the geology of areas to which he was transferred, such as Ireland and India.

Matley retired from the Civil Service in 1921 and was subsequently appointed by the Colonial Office to direct the second geological survey of Jamaica at the age of 55. Matley had no previous experience of Antillean geology and this was his first professional appointment as a geologist.

Bhalai (2010, p. 19) omitted to mention Matley's other major contribution to Jamaican geology, apart from the Kingston map and memoir (Matley, 1946, 1951). This is the Basal Complex hypothesis (Matley, 1929). Essentially, Matley transposed the ancient geology of North Wales onto Jamaica and proposed that the island rested on an ancient crystalline basement; that is, Jamaica and the Antilles were thought to have grown on a founded continent. Hill (1899) had already demonstrated the implausibility of such an idea, although Matley wouldn't be the last to voice it. That the Basal Complex hypothesis failed to be generally accepted and engendered C. T. Trechmann's Mountain Uplift Theory have been demonstrated elsewhere (Donovan, 2008, 2010).

4. POST-SECOND WORLD WAR DEVELOPMENTS

In Bhalai's account, one prominent aspect of Jamaica's economic geology is described as if the officers of the Geological Survey had the last say, which is not actually the case. The residual hypothesis, formulated by Zans, is rightly prominent in the discussion of the genesis of Jamaican bauxite (Bhalai, 2010, p. 21). However, what is not mentioned is that Comer (1974) demonstrated conclusively that Jamaican bauxite has a geochemistry that demonstrates a volcanic, not sedimentary origin (see also Comer and Jackson, 2004).

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