

# Anniversaries

Darwin published 180 years ago



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## CHARLES DARWIN'S VOLCANIC ISLANDS (1844): A VIEW FROM 180 YEARS AFTER PUBLICATION

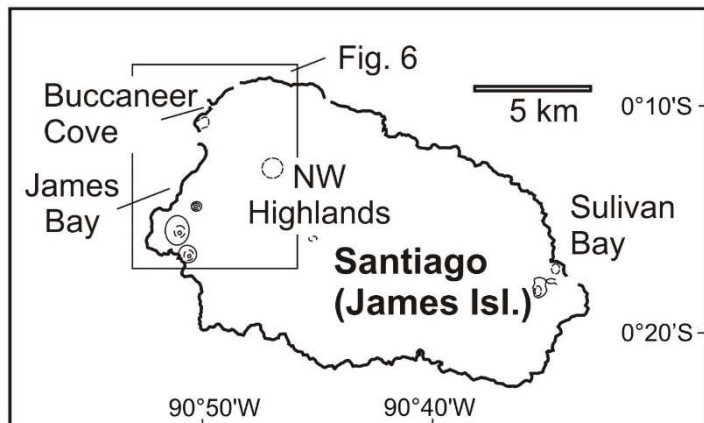
Sandra Herbert (USA)

Marking anniversaries provides an invitation to scholars to go deeper into the legacy of a scientific author. Charles Darwin is one such author who has, deservedly, received periodic attention from scholars on the anniversaries of his birth (1809), death (1882), and major publication — *On the Origin of Species* (1859). In addition, anniversaries have provided the occasion for preservation of the working sites of the scientist. Thus, for example, the Charles Darwin Foundation was founded in 1959. From it came the Charles Darwin Research Station (CDRS) on Santa Cruz Island, Galápagos, which was built between 1960 and 1963 and inaugurated in 1964.

Now in 2024 we mark the 180<sup>th</sup> anniversary of his book *Geological Observations on the Volcanic Islands, Visited During the Voyage of H.M.S. Beagle*.<sup>1</sup> Chapter 6 of that book is highly theoretical in nature since it treats the genetic relationship between trachyte and basalt, or, in the words of Darwin's book, "On the separation of the constituent minerals of lava, according to their specific gravities." Darwin's claim was that trachyte and basalt might be produced from the same volcanic vent. The locus for Darwin's original observations was his geological work on Isla Santiago (James Island) in the Galápagos Archipelago. Darwin explored the island in October 1835. He collected specimens, which survive and are stored at the Sedgwick Museum of Earth Sciences at the University of Cambridge. Justification for a further look at Darwin's work on Isla Santiago stems from the claim of two later researchers who had been trying to duplicate his findings on the island and had failed to do so. The two researchers were Alexander R. McBirney and Howel Williams who wrote in 1969 that "...until the presence of trachyte on James Island is confirmed, we cannot exclude the possibility that the specimen ...was erroneously included in Darwin's collection."<sup>2</sup> In Darwin's specimen list the key trachyte is numbered 3268, which he recorded as collecting in 1835 on James Island.<sup>3</sup> Does such a rock exist on James Island? Or was Darwin mistaken in his interpretation?

In 2007 a team was formed to redo McBirney and William's survey of the island as it related to Darwin's prior work there. The team consisted of several researchers operating from the University of Cambridge and several researchers with expertise in the geology and natural history of the Galápagos Islands. From Cambridge there were David Norman, then Director of the Sedgwick Museum [1991-2011] where Darwin's rock collection resides, and also a Fellow at Darwin's undergraduate college in Cambridge, Christ's; Sally Gibson, an igneous petrologist; Andrew Miles a final year Earth Sciences student at the University (and now an igneous petrologist at the University of Leicester); and myself, an historian of science then spending the year as a Distinguished Visiting Scholar at Christ's College,

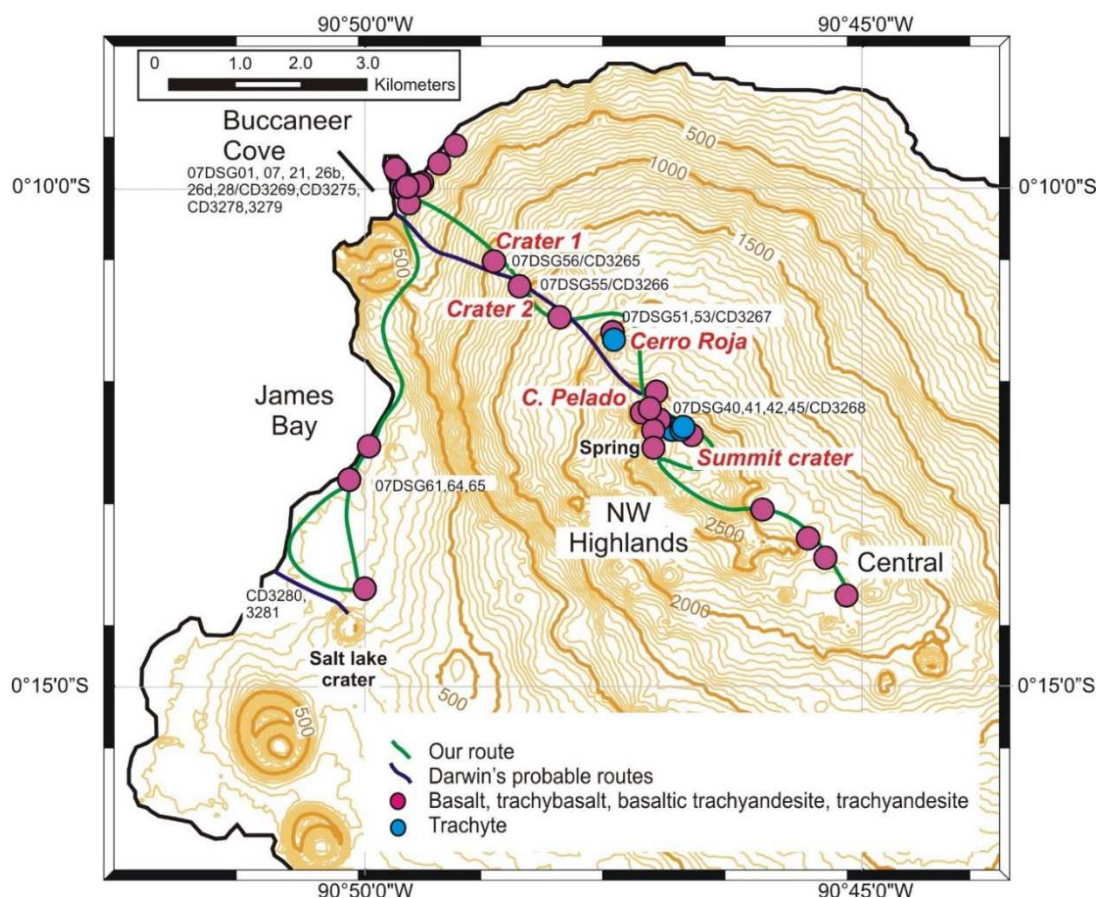
on the invitation of Norman. On the Galápagos side were Dennis Geist, a volcanologist based at the University of Idaho, and two long-time experts in all aspects of the islands —



Thalia Grant and Greg Estes, who had retraced Darwin's routes on an earlier expedition.<sup>4</sup>

As the team assembled, several members were added.<sup>5</sup> The 2007 team set out with four main advantages. First, we had a complete set of Darwin's research notes from his days on the island, which enabled us to estimate where on the island specimens similar to those collected might be found. Second, we knew that H.W. Baitis, one of

McBirney's students, had found trachyte on Isla Santiago, though without identifying the location where Darwin had collected.<sup>6</sup> Third, immediately prior to the expedition Greg Estes and Thalia Grant had marked out Darwin's likely route using GPS and flagging tape. Fourth, we had the full cooperation of the Parque Nacional Galápagos, Ecuador. We were granted permission by the park authorities to collect specimens from the island in order to have them studied in Cambridge and compared to those collected by Darwin.



Figures 1- top left. Contour Map of Isla Santiago (James Island); Figure 2 – above. Darwin's probable route and that of 2007 by the team of researchers. Source: Article ESH 2009 – refer to footnote 7 below.

Once they arrived on Isla Santiago members of our team duplicated as near as possible Darwin's route, as identified in Estes and Grant's expedition. The first map shows the contour of

Isla Santiago (James Island). The second map indicates Darwin's probable route in 1835 and also the route following by the team in 2007.

Both of these maps are included in the published report of the 2007 fieldwork, which is cited.<sup>7</sup> I also include here a photograph taken of Buccaneer Cove by Andrew Thurman during the 2007 trip.



Figure 3. Buccaneer Cove, Isla Santiago (James Island). Source: Article ESH 2009 – refer to footnote 7 below.

The re-examination of Darwin's route on Isla Santiago (James Island) was a success and sample sites were found that closely matched Darwin's descriptions and rock samples. In a field science like geology, it is more difficult to reproduce research results than it is in a laboratory science. However, this narrowly focused re-examination did just that.

For those wishing to explore Darwin's work as a geologist the Sedgwick Museum of Earth Sciences (Cambridge, U.K.) has a permanent display. Shown here is an overview of the exhibit with an additional photo of some specimens he collected and his hammer.



Figures 4 and 5. Darwin Exhibit. Sedgwick Museum of Earth Sciences, Cambridge (U.K.).



Figure 6. Specimens collected on Isla Santiago.

Duplicates of some of the Isla Santiago specimens were on display at a temporary exhibit I curated at the Smithsonian Institution's National Museum of Natural History (Washington, D.C.; USA) in 2009. The light-colored gray rock shown on the lower left is a trachyte from Isla Santiago.

Historically there was a connection between the *Beagle* voyage of 1831-1836 and the U.S. Exploring Expedition of 1838-1842. In November 1836, just home from the *Beagle* voyage, Darwin met in London with Charles Wilkes, the U.S. naval officer who was to lead the U.S. Exploring Expedition. Many of the

specimens on the U.S. expedition eventually ended up in the natural history collections of the Smithsonian Institution.<sup>8</sup>

Results from the 2007 expedition were discussed in a conference held by the California Academy of Sciences on August 14-15, 2009.<sup>9</sup> The Academy had long been involved in scientific work on the Galápagos. Also in 2009, writing in a more comprehensive vein, Thalia Grant and Greg Estes published what is now the standard treatment of the entirety of Darwin's work in the Galápagos Islands.<sup>10</sup>

The 2007 expedition to Galápagos reinvigorated research linked to Darwin's geological material in Cambridge and has generated numerous published works by those involved in the expedition, including Sally Gibson and Dennis Geist. Moreover, the Galápagos continues to yield important information on the connection between volcanism at ocean islands and evolution. Multidisciplinary research projects involving joint teams of US, UK and Ecuadorian scientists are attempting to deliver new insights into the relationships between geology and evolutionary biology.

All continuing work in the Galápagos is premised on maintaining its protected status as a wildlife refuge. Members of the expedition have contributed to fund-raising efforts on behalf of conservation of the islands. In 2009 David Norman organized a fund-raising venture for CDRS at Christ's College. It was attended by, among others, the Duke of Edinburgh (Prince Philip), Sir David Attenborough, Felipe Cruz (a staff member of CDRS and the Fundacion Charles Darwin), and Andrew Marr (then Chairman of the Galápagos Conservation Trust). The event raised a substantial amount of money which has been used to promote the education and training of staff at CDRS and the Parque Nacional through a Masters in conservation leadership scheme in Cambridge. In addition, Dennis Geist is helping to lead a fund-raising effort for the Charles Darwin Foundation in the U.S.

Finally, I wish to note that in the last few years many of Darwin's previously unpublished notes from the voyage of H.M. S. *Beagle* have been published. In 2009 Gordon Chancellor and John Van Wyhe transcribed, edited, and published Darwin's field notebooks from the voyage.<sup>11</sup> In 2000 Richard Keynes, edited, and published the Darwin's zoological notes from the voyage.<sup>12</sup> Darwin's geological notes from the voyage, which far exceed his zoological notes in volume, have not been published in book form. However, they have been made available online by John Van Wyhe and his team.<sup>13</sup> The Darwin online website includes a fresh transcription and analysis of Darwin's geological diary from the Galápagos by Thalia Grant and Greg Estes. A complete edition of Darwin's correspondence has also recently become available online as well as in print.<sup>14</sup> In addition to letters, it contains extended discussion of Darwin's geology. In short, for those who wish to study Darwin's geological work undertaken during the voyage there is now ample material to do so.

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<sup>1</sup> Charles Darwin, *Geological Observations on the Volcanic Islands Visited during the Voyage of H.M.S. Beagle...Being the Second Part of the Geology of the Voyage of the Beagle, under the Command of Capt. FitzRoy, R.N. during the Years 1832-1836.* (London: Smith, Elder and Co., 1844).

<sup>2</sup> A.R. McBirney and Howel Williams, *Geology and Petrology of the Galápagos Islands* (Geological Society of America, 1969, p. 54. I am grateful to the late Graham Chinner (1932-2021) for alerting me to their comment.

<sup>3</sup> See Sandra Herbert, *Charles Darwin Geologist* (Ithaca, New York, 2005), pp. 120-128, and Plate 4, the specimen in the upper left-hand corner of the photograph.

<sup>4</sup> Greg Estes, K. Thalia Grant, and Peter R. Grant, "Darwin in the Galápagos: His Footsteps through the Archipelago" *Notes and Records of the Royal Society of London*, 2000, 54:343-368.

<sup>5</sup> Andrew Thurman served as photographer, J. Luis Villa Fuerte from Ecuador served as field assistant; Melina Fawler from Ecuador came as a student. Jim Herbert aided with logistics. Altogether there was a certain amount of useful redundancy in our group. As it happened, I broke my ankle as we were planning the trip and remained on Santa Cruz Island, pleased in knowing that the members of the team on Isla Santiago had all they needed for success.

<sup>6</sup> H.W. Baitis. *Geology and petrography of Pinon and Santiago Islands Galápagos Archipelgo.* Ph.D. dissertation, 1976, University of Oregon.

<sup>7</sup> Sandra Herbert, Sally Gibson, David Norman, Dennis Geist, Greg Estes, Thalia Grant and Andrew Miles. "Into the Field Again Re-Examining Charles Darwin's 1835 Geological Work on Isla Santiago ((James Island) in the Galápagos Archipelago. *Earth Sciences History* 28, no. 1 (2009):1-31.  
<https://doi.org/10.17704/eshi.28.1.mjt982717p162323>

<sup>8</sup> Charles Darwin to Charles Wilkes, 7 November 1836 in Frederick Burkhardt *et al*, eds. *The Correspondence of Charles Darwin* (Cambridge: University of Cambridge Press, 1985), vol. 1, pp. 517-518. See also Herman J. Viola and Carolyn Margolis, eds., *Magnificent Voyagers: The U.S. Exploring Expedition, 1838-1842.* (Washington, D.C. Smithsonian Institution Press, 1985).

<sup>9</sup> Of the thirteen papers at the conference two drew on our work on Isla Santiago in 2007. They were: Sally A. Gibson, "Darwin the Geologist in Galápagos: An Early Insight into Sub-Volcanic Magmatic Processes." (pp. 69-88); Sandra Herbert, "'A Universal Collector': Charles Darwin's Extraction of Meaning from His Galápagos Experience." (pp. 45-68). In Michael T. Ghiselin and Alan E. Leviton, eds., *Darwin and the Galápagos. Proceedings of the California Academy of Sciences* (Fourth Series), vol. 61, Supplement II, 2010.

<sup>10</sup> K. Thalia Grant and Gregory B. Estes, *Darwin in Galápagos: Footsteps to a New World.* (Princeton, NJ: Princeton University Press, 2009. A new edition of this work is presently in preparation.

<sup>11</sup> Gordon Chancellor and John Van Wyhe, eds. *Charles Darwin's Notebooks from the Voyage of the 'Beagle.'* (Cambridge: Cambridge University Press, 2009). Also available at <http://darwin-online.org.uk>

<sup>12</sup> Richard Darwin Keynes, ed., *Charles Darwin's Zoology Notes and Specimen Lists from H.M.S. Beagle.* (Cambridge: Cambridge University Press, 2000). Also available at: <http://darwin-online.org.uk>

<sup>13</sup> See <http://darwin-online.org.uk>. Thalia Grant and Greg Estes have provided a fresh transcription and analysis of all the Galápagos geological notes for this online edition.

<sup>14</sup> Frederick Burkhardt *et al*, eds. 30 vols. *The Correspondence of Charles Darwin.* (Cambridge: Cambridge University Press, 1985-2023). Online at [www.darwinproject.ac.uk](http://www.darwinproject.ac.uk).

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