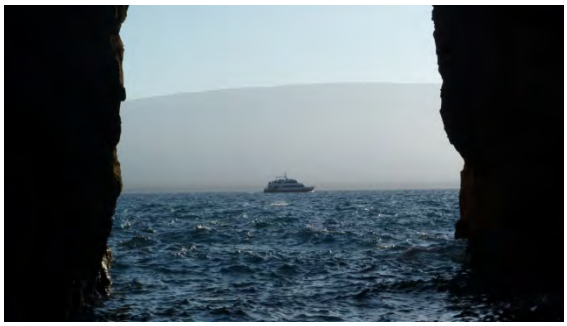
WorldTouristBureau.com
It's a wonderful planet!
You should visit sometime.

Editors Note: *Dr. Jeff Thomason turns a cruise on Ecoventura into a Galapagos adventure for the mind and spirit when he shares his keen insights and joys in a special field report for World Tourist Bureau…….*

Galápagos: the islands that put Darwin on the map

Charles Darwin and the Galápagos Islands share a strange symbiosis in current culture. His iconic status is due to ideas that were conceived in the 'crucible of life' as the Islands have been called. Their current popularity on the list of tourist hot spots arises from the association with Darwin. But Darwin wrote little about the Islands (compared to his prolific output on worms and barnacles, for example), and the tourist industry continuously threatens the fragile environmental that lead to Darwin's thoughts on evolution.



This paradox rattled around in my head as I bobbed on the waves for a week in a 65-foot floating hotel, one of the small boats that cruise among a selection of the Islands' highlights, pampering their guests in a way that Darwin never experienced on the Beagle in 1835. We were fed and watered at regular intervals by an attentive crew, entertained by the story-telling Captain, found towel animals on our beds every day, and were led on guided trips on land and sea by two knowledgeable and personable guides. Ivan and Karina answered all of the 10,000 or more questions we fired at them. They brought the Islands and their denizens to life. And I will never forget Ivan doing a rumba, for whatever reason I do forget, halfway up a steep climb on Bartolome.

Spectacular, forbidding, harsh, and beautiful, all apply equally well to the Galápagos Islands. They were born in the fury of volcanic activity, spumes of magma thrusting upwards through the ocean, only to be quieted and stilled by the waters as the vast Pacific lived up to its name. And each one is destined to slide gracefully

below the waves forever before its 6 or 7 millionth birthday. Such are the processes of geology. None of this was lost on Darwin, who was an excellent geologist, and wrote a treatise on volcanoes later, but it was the flora and fauna that really stimulated and troubled his thoughts.

Clownish birds with painted blue or red feet, or with scarlet balloons inflating on their chests to proclaim their sexual prowess – the fauna of the Islands are hard to miss. The orange, yellow and white

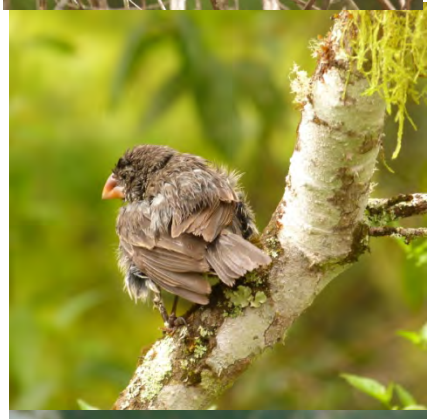



Sallylightfoot crabs are certainly exhibitionists. Even the marine iguanas – one of the unique animal species on the islands – stand out against the black lavarock, despite being camouflaged the same non-color. On Española and Isabela islands, the marine iguanas compete with the birds for color towards the end of the year by becoming mottled with bright red, giving them their nickname of Christmas iguanas.

By comparison with these unashamed show-offs, the three animals that flagged Darwin's attention were drab characters: mockingbirds, tortoises and finches. At least they were drab at a distance – a mockingbird close up is quite striking. The mocking birds have two connections with Darwin, the first being water. On arid Española, the birds recognize that certain plastic bottles contain water, and clamor around to solicit a drink. (The guides asked us not to comply, to prevent the birds becoming too dependent on handouts.) Darwin's encounter with water shortage was when he was dropped on Santiago for 9 days with 2 assistants, but without water because they thought the island would have plenty. It did not, and only a full barrel supplied by a passing whaling vessel prevented a potential disaster. The other connection between Darwin and mockingbirds is that he noticed differences between the species that are found on separate islands. This was his first inkling that species might not be immutable, and that the four might have derived from a single colonizing ancestral population.

A second thought along the same lines came from the giant land tortoises, which reach gargantuan sizes in the absence of any predator other than our own all-devouring species. They are brown, lumpish, magnificent, and have inscrutable wisdom in their eyes. By chance Darwin met English Vice-Governor, Nicholas Lawson, who remarked during a conversation on Darwin's activities that the shape of a tortoise's shell told which island it inhabited.

Indeed, the shells of tortoises isolated on the slopes of Isabela's volcanoes by intervening lava fields are distinguishable from each other. Darwin recorded Lawson's remarks in his notebook, but only later realized the possible significance of the tortoises: that they too had evolved from a single colonizing population. Too late! He had not collected any adult tortoises, and those that had been brought onto the ship had been eaten and the shells thrown overboard (a fate of many thousands of their kind in those times). A golden opportunity missed, but how Darwin's brain must have been fermenting at this point. I wonder what he dreamed about.



Like shadows in a dream, the third set of creatures important to Darwin flit among the rocks, cacti and tree branches. Small and unimposing to my eyes, and difficult to photograph, they initially had only marginally more status to Darwin's own eyes. As ship's naturalist he had no hesitation in netting some to add to the more than 5000 specimens he collected while on the Beagle's voyage. But he misidentified them as a combination of blackbirds, grosbeaks and finches, rather than separate species of closely related finch. It was only when he got back to England, and turned them over to renowned ornithologist, John Gould, that Darwin was unpleasantly surprised to learn of his mistake. Having spent many happy hours trying to identify the species in my photographs, I understand his confusion. The distress was magnified for Darwin because he had not identified the island of provenance of his specimens. Fortunately another crewman and the Captain, Robert FitzRoy, also had made collections with more careful notes. Darwin was then able to allocate the species, with their subtle distinction in beak shape and size to their islands of origin. In the second, 1845, edition of his "Voyage of the Beagle" he was emboldened to write: "*Seeing this gradation and diversity of structure in one small, intimately related group of birds, one might really fancy that from an original paucity of birds in this archipelago, one species had been taken and modified for different ends*". Hence the fame of these birds is indelibly inked onto the pages of the history of evolutionary thought: from a few colonizing birds of one species, a dozen others had evolved and adapted to their distinct island habitats. In 2010 a whole volume of the prestigious scientific journal, The Philosophical Transactions of the Royal Society, was devoted to recent scientific work on the finches, from biomechanics and behavior to genetics and hybridization. Such

excitement about tiny birds, unimpressive among the boobies and frigate birds, and even among the mockingbirds and tortoises!

The beaks of the finches tell the story that finally presented itself to Darwin, and it is deceptively easily told: Large beaks crack hard seeds; medium beaks crunch softer seeds and insects; and pointy beaks probe for fluid in cacti, or even other birds. The mechanisms by which these adaptations arise are immensely complex, as is every similar story in biology. Forgive me for the following oversimplification. Current wisdom has it that a small group of finches arrived on the islands in a few colonizations. They exhibited a versatile repertoire of behaviors and the ability to expand that range. Once they inhabited several islands, the different vegetation among islands presented different food choices to the finches. Even on a single island, small populations of the finches selected different food choices to their neighbours. Learning how to exploit a narrow range of food was accompanied over time by modifications in the beaks. Beak size and shape is very sensitive to minute changes in the expression of only a few genes, so natural selection could act on whether or when these genes were turned on or off, and not necessarily on whether they had mutated extensively. The populations began to look different, and to change their songs (perhaps in relation to the beak alteration), with the effect that breeding among populations became reduced and they diverged more and more widely. The result was 13 species of finch, close in genetic makeup to each other and to a species on the mainland, but separate species in that hybridization between them is limited or impossible. Very little of this part of the story was accessible to Darwin – the science of genetics was many decades in the future (despite the fact that the seminal research was conducted by Mendel in Austria about the time that Darwin was writing "On the Origin of Species by means of Natural Selection"). A friend of mine likens the fact that Darwin was able to successfully and correctly defend the notion of evolution without the support of genetics to "getting a 747 off the ground without engines."

As I frolicked happily around the Islands, a smile permanently on my face (as was remarked upon by my companions), it felt like the young Darwin was with me. Galápagos immerses you in the stark beauty and rawness of Nature. Life is born in its many forms, it struggles to survive, and then it dies. Mummifying corpses or bones representing several species – sea lion, fish, booby, whale, iguana, even an introduced rat – were constant reminder of the unremittance of death. Seeing the whole panorama of this cycle enacted by countless organisms in front of your eyes is an amazing confirmation that we are part of the same story. The idea that Galápagos fertilized in Darwin's mind locates us firmly in God's creation. It is only our own arrogance that drives us away from that realization. Back in the comfortable routine of my daily life, I have the luxury of being edified and educated by the experience of visiting the Islands, without that knowledge

being the burden that it was for Darwin. It reinforces a story that began for me many years ago as a callow undergraduate when I had the opportunity to see and study the very finches collected by Darwin. Instead of being inspired I was underwhelmed by these dried, loosely stuffed skins on sticks. I might see them differently now having seen their living descendants.

And what is the future for those descendants? Does the brilliance of Darwin's discovery turn into Darwin's curse for Galápagos as it becomes flooded with tourists? His statue watches them arrive and depart from San Cristóbal. Many people were alarmed when the U.N. World Heritage Committee recently removed the Islands from their danger list. But that news is good: it represents a vote of confidence that the Ecuadorian Government is managing the National Park enclosing the islands effectively. Tourists were not the main threat – their invasion has been carefully controlled for years – and the overfishing that raised the red flags is coming under control. The Darwin Centre on San Cristóbal has an encouraging exhibit showing that the Government appreciates the concept of sustainable tourism. For the islands that put Darwin on the map, and *vice versa*, the many trail weary feet that scramble over their rocky paths every year carry their story to the world. The last lines in that story might read: "Go to the Galápagos Islands at all costs. Beg, borrow or steal, just get there. They will exceed your expectations. But take away only pictures – and memories."

About the author:

"Jeff Thomason is a Professor at the Ontario Veterinary College in Canada where he guides the 1st-year students through the intricacies of mammalian anatomy. His research is on the mechanics of horses legs, trying to find ways to prevent the limb injuries that are not uncommon in these majestic animals. This line of study evolved from his doctoral work on the well known series of fossils that illustrate the evolution of the modern horse, interpreting how the function of the legs might have changed in concert with their anatomy. As a student in zoology, Jeff received a broad education in vertebrate biology and evolution, including the history of evolutionary thought. For someone with such training, a visit to the Galapagos islands is *de rigueur*, although it took some time before that could be arranged (and thanks are due to his lovely wife, Melody who made it happen). Although his prior knowledge of the natural history of the islands was not extensive, with a little background research Jeff was able to engage with the islands and its inhabitants, and the two excellent guides who certainly enhanced that experience. The article is the resulting synthesis of learned information, observation, opinion, and overall enjoyment of a remarkable experience."

More information:

By the great man himself: The Zoology of the Voyage of H.M.S. Beagle
http://darwin-online.org.uk/EditorialIntroductions/Freeman_ZoologyOfBeagle.html

Great pictures and information:
http://www.arkive.org/ (search 'finches')
http://people.rit.edu/rhrsbi/GalapagosPages/landbirds.html
Academic:
Philosphical Transactions of the Royal Society, B - Biological Sciences. Theme Issue 'Darwin's Galápagos finches in modern biology' compiled and edited by Arhat Abzhanov. Volume 365, Issue 1543, April 2010.
Listing of books:
http://www.underwatercolours.com/bookstore/galapagosbooks.html
For your amusement:
http://pandasthumb.org/archives/2010/01/darwins-finches.html