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ENV 402 Week 3  
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We met for our third week of Darwin in Our Time on Wednesday, Feb 16 2005. This class was the last session to discuss *The Voyage of the Beagle* (Ch 15-21). Our session was divided into several parts: WH gave an initial presentation on the two editions of *The Beagle*; we discussed two handouts, Darwin's consideration of marriage and a historical timeline of Earth Science; Jim gave a talk on "The Island Concept in Ecology;" and we discussed *The Beagle* readings and Jim's talk. A record of these discussions will follow.

### **Part I: WH Talk, "The World Before Us"**

WH explained that in his last of three talks on the *Beagle*, he would focus on differences between the two editions of the book, supplemented with more historical information about Darwin's life. In 1836, after returning from the trip, Darwin settled in London and worked hard to write about his voyage. While reviewing his notes, he observed a puzzle: why were islands in the Galapagos home to so many species of finches? Darwin was puzzled because all of the finches were related, but there were huge differences in the beaks: from short, blunt and thick to more needle-like. The beaks were considered to be evidence of "transmutation," the change in form or morphology over time. This term was used throughout the 1830s, 1840s and 1850s; however the word "evolution" was not used by Darwin until 1873. Even without mentioning "evolution," transmutation hinted that nature didn't evolve from a divine plan, but from natural events. Because of the hugely controversial nature of this idea, Darwin excluded discussion of transmutation from his first edition of the *Voyage of the Beagle*.

Matrimony: A wife for Darwin was a specimen to capture: "the most interesting specimen of all." However, once he "captured" her he was worried he wouldn't be able to "feed her." In 1838 Darwin created his matrimonial argument, trying to determine whether marriage was rational or not. After he reasoned he should marry, he chose his first cousin, Emma Wedgwood, and they married in January of 1839 both at the age of 30 years old. She was richer than he was. She was pregnant by April, and *Beagle I* was published in 1839. Other researchers from the voyage were slower to publish, and Darwin's book got favorable reviews.

In December 1839 his first son is born, but the strain of work eats away at his health and Darwin develops chronic nausea, suffers from depression, and has trouble keeping his weight on. The family moves to the country in Kent, 16 miles from London in the southeast corner of England in 1842. They move into the old vicarage with 18 acres of farmland when Emma is 9 months pregnant and she loses her second child.

In 1842 Darwin publishes a study of Coral Reefs and writes out a brief sketch of this theory of natural selection, or how species transmute. His primary example was the Galapagos finches. In 1843 he begins considering artificial selection, learning from the crops and agricultural techniques in the countryside around him. What if the mechanism of selection is population survival, he asks. By 1844, though Darwin is keeping his theory secret, he has written over 240 pages of his theory. He fears that the idea is too radical and is worried about religious

controversy. However, in 1844 *Vestiges of the Natural History of Creation* was published, an anonymous book arguing that natural history evolves. The identity of the author was finally revealed in the 1880s to be Robert Chambers, a Scottish phrenologist. Darwin later believed that because of this book, his theory of evolution was more readily accepted.

In 1845 Darwin then published the second edition of *The Beagle*. In this edition Darwin tried to improve on the evolutionary argument in “The Vestiges” by revising Chapter 17 of *The Beagle*, the chapter about the Galapagos. This second edition was a huge hit with the public and became the most famous edition.

WH then gave a brief description of the conditions of the Galapagos: they are in a unique location because they are found exactly on the equator, and every day is an equinox. Furthermore, they receive water from two great ocean currents, warm and cold. Salt water is mixed with fresh water from the Andes, breeding great diversity of marine life and two great storm systems: El Niño and la Niña. Ancient sailors called the islands the “encantadas” (enchanted) because the winds and currents pushed boats in opposite directions so they didn’t make progress. There are over 60 islands in the archipelago, each created by erupting volcanoes. The islands are quite new in geological terms—only 2-4 million years old. The plant and animal species possibly came from winds on currents from Ecuador, and many species are endemic, found nowhere else in the world.

In observing this trend, Darwin commented on the “creative force” of the Galapagos, foreshadowing *The Origin* by writing that “one is astonished at the amount of creative force, is such an expression may be used, displayed on these small, barren and rocky islands...” While another 14 years would pass before he published *Origin*, he wrote: “we seem to be brought somewhere near to that great fact—that mystery of mysteries—the first appearance of new beings on this earth.”

Finally, WH passed around a paper entitled “From Chronicle to Quest, the Shaping of Darwin’s *Beagle*.” The paper included a chart showing how the document evolved as a literary text from Darwin’s diaries to the first edition to the second edition. By the second edition, Darwin revealed a more progressive theory. The transformations described in this paper are summarized below:

<b>Category</b>	<b>Darwin’s Diary</b>	<b><i>Beagle</i> First Edition</b>	<b><i>Beagle</i> Second Edition</b>
<i>Genre:</i>	Chronicle	Narrative	Quest
<i>Structure:</i>	Rambling	Linear	Progressive
<i>D’s Self-Presentation:</i>	Naïf	Professional	Hero
<i>Attitude toward Nature:</i>	Plenitude	Truth	Creation

## Part II: “Darwin Considers Marriage,” 1838 and Earth Science Chronology

### *Chronology:*

First we considered the Earth Science Chronology that WH sent us before class, beginning in 1768 and ending in 1876. WH asked the class if, through this chronology, anyone observed processes of cause and effect: did anything lead to anything else? Luke commented that exploration leads to discovery. Many of these explorations were similar to the *Beagle's* voyage: for science and geographical knowledge as well as for the empire. We discussed the fact that many of the dates describe medical discoveries, and WH advanced the thesis that exploration of the human body often leads people to think analogously about the body of the globe: many geographical terms are similar to anatomical terms, for example. Therefore, he suggests that studies of the physical body have led to an equivalent relationship with the sciences of geology, biology, geography, and others.

Nick was skeptical of this theory however: is there really a conscious correlation between medics and discoverers? Or does the drive for medicine drive explorers? This question led to a discussion of the potential motivations for exploration, “discovery,” and conquest—for example, discovery could be fueled by a search for foods, spices, and medicinal plants. Caroline noted that medical discoveries and the taxonomical process of classification could be seen as an effort to control nature. WH noted the need for England to control a broad base of resources to feed the power of the Empire—a small island nation with a powerful navy.

We then moved on from a discussion of the motivations of exploration to the consequences and the ensuing rates of rapid change. Conquerors bring diseases, invasive species, and Christianity to the native populations. These diseases and invasive species in turn led to rapid cultural as well as biological change.

Elyse noted that the dates on the timeline are broken into the length of generations, roughly, and presented the concept that ideas and paradigms prevail over the length of a generation, or 20-30 years. Are people learning from one another? WH asked. Freddy pointed out that the process of learning is not necessarily linear or easy to trace. Like genetic and evolutionary traits, WH pushed the class to consider how knowledge is transmitted from one generation to the next, and also from one community of thinkers to another within the same generation.

### *Darwin Considers Marriage:*

We then shifted the conversation to Darwin's notes on “to marry or not to marry.” This document was found in Darwin's papers associated with his autobiography after he died, and was unpublished. Several people pointed out that marriage had very little to do with becoming a great scientist—instead, this document reveals a fullness and complexity of Darwin's character, another side to his life beyond career. Tara commented that he seemed dispassionate, and lost; Charlie noted that his comments seemed very spontaneous and not pre-planned. By referring to a wife as an “object to be beloved and played with—better than a dog anyhow,” many people felt that Darwin seemed cold and distanced in his human interactions. Yet WH pointed out that Darwin loved dogs and thought a lot about them—so this could have been quite a positive

comment, actually. While Aileen believed that the document revealed Darwin's very "scientific" way of thinking about pros and cons, WH also mentioned that it shows a sensual side when he describes a "nice soft wife." Also, as Jim mentioned, the document revealed Darwin's naivety with women: he really didn't know what to expect.

The document also revealed that Darwin didn't view his potential wife as an intellectual equal; according to WH he was bored by society women. Furthermore intellectual women scared him—perhaps because Darwin did not think very highly of his own intellectual abilities. When Darwin does determine that marriage was "necessary," he then worried about when the best time was to do so—being well-born and wealthy did not necessarily make this process easier for him, as he had to worry about societal expectations. WH also noted that his wife was a devoted Episcopalian and Anglican, perhaps explaining his hesitations to publish *Origin*. We discussed the quote "no children (no second life)" and the potential benefits of re-experiencing childhood with one's own children, especially for Darwin who had a lonely childhood. Finally, in conclusion Darwin writes "there is many a happy slave."

#### *Related Beagle Discussion:*

Before the break WH related our discussion of the Earth Science Chronology to *The Beagle* reading by asking the class: did you evolve as a reader while you read it? We commented that Darwin's writing changed dramatically throughout the book, and the scope becomes larger, more speculating, and broader. Caroline notes that Darwin began to look increasingly to the past and also into the future, citing his description of rocks in a mountain stream. As WH noted, the first person changes and develops as the book continues, perhaps reflecting Darwin's improved note taking skills as the voyage continued.

The book began with a sense of chaos, confusion, and a profusion of detail: Darwin's writing was cluttered and he didn't seem to know how to express his feelings in the jungle. As he moved to the mountains, in the Andes sequence, his writing seemed to transform and become more lyrical, smooth, and pondering. This may also be due to the fact that Darwin's greatest training was in geology, not botany; he was more comfortable and confident writing about mountains. We follow the development of Darwin's own knowledge throughout the book. Aileen noted that Darwin presents himself as a stronger character in the end; in the beginning he was more detached. Tim also commented that the conclusion incorporated more personal accounts. In short, Darwin became a better writer throughout the book.

### **Part III: Jim's Talk, "The Island Concept in Ecology"**

Jim's talk focused on the book *Song of the Dodo: Island Biogeography in an Age of Extinctions*, by David Quammen. During the talk he addressed the questions: why have islands been important in ecology as well as evolution? What have they come to signify? Biogeography, Jim explained, is a study of what organisms live where, why, and why not.

Jim began with an abbreviated biography of Alfred Russell Wallace, a contemporary of Darwin's who was a freelance collector who sent specimens back to England for his livelihood. Wallace spent a lot of time in Indonesia, where he independently came up with the idea of natural

selection (though he didn't use that term). Wallace also spent a great deal of time collecting alone; linking the ideas of island and personal isolation.

Islands are interesting to ecologists because they don't tend to have very many species on islands in comparison with the mainland. As Darwin observed in the Galapagos, different types of species appear on different islands. This contributed to the idea that isolation and barriers play a huge role in generating diversity; islands create these barriers. Jim also notes that evolution and diversification can take place without isolation, but isolation commonly leads to divergence: two species where formerly, there was one.

Jim discussed some characteristics of island organisms: to get to an island you need some kind of dispersal ability, like wings. Once there, however, a species might lose that dispersal ability if it is no longer necessary. For example, Darwin witnessed a loss of defensive adaptations on the Galapagos with the birds that were not afraid of humans, and marine iguanas that Darwin was throwing into the water. Each time he threw them into the water they swam back to land and to Darwin—probably because they didn't have any land predators at the time, Darwin theorized.

Adaptive radiation of Galapagos finches (from presumably one founding species to a many different species) was possible because of isolation. Islands are also very subject to invasions because they tend to have more open niches on islands where a new species could take over, like the morning glory in Australia and the brown tree snake in Guam.

Next, Jim addressed the question: why are there fewer species on islands? Some can't get there, and some can't make a living there, he explained. He then presented MacArthur and Wilson's equilibrium theory. The main principles follow.

*A. Immigration & extinction rates:*

Equilibrium between extinction and immigration rates is reached

*B. Effect of island size:*

On a smaller island, there is a lower rate of immigration and a higher rate of extinction because smaller islands are harder to find and there are less available resources

*C. Effect of distance from mainland (far versus near):*

As you get farther from a mainland there is less immigration, but the extinction rate is similar.

Finally, Jim shifted to a discussion of forest fragmentation as an example of different kinds of "islands." He discussed the impacts of forest fragmentation through human activity and the dilemma of how to conserve fragmented land. In his book, Quammen presented the SLOSS debate: Single Large Or Several Small reserves; Quammen favors large reserves to create enough conserved habitat for larger animals.

We then began to discuss how island theory has an impact on land management issues; Jim also posed a question to the class about Darwin's conservation ethic. In *Beagle* Darwin mentioned the impact of invasive species, like the impact of English greyhounds on kangaroos in Australia. While Darwin appeared to be callous about shooting animals, Jim suggested that Darwin also had a far-sighted view of conservation.

#### **Part IV: Discussion of Jim's Talk and *The Beagle* Reading**

Our discussion began with Jim's questions: what is Darwin's conservation ethic? WH observed that 1.5 million visitors a year come to the Galapagos; many are attracted by the "tameness" of the animals there. We discussed the parallels between invasive plant and animal species discussed in the *Beagle* and the relationship between colonists and indigenous people, prompting Jim's question: are human beings the ultimate invasive species? This question in turn led to a discussion of whether trends in human populations could be compared with evolutionary trends in plant and animal populations. We discussed the impact of missionaries on the native populations, and the movement of colonizing Europeans across the globe as an invasion. What influences diversity in human societies, we asked? The process of globalization as a result of exploration seems to be leading humans to amalgamate, diminishing the original variety between cultures. Is democracy an enemy to diversity? WH asked.

##### *Political Paradox:*

Our discussion then shifted to the interplay between religion, evolutionary theory, and politics in *The Beagle*, and many of the apparent contradictions in Darwin's message. When Darwin introduces his theories of species change in the Galapagos chapter, the divine is never invoked: he appears to suggest that the natural process of evolution is unguided by God's hand. In contrast, in the final chapter Darwin shifts to his discussion of the British Empire, begins to refer to Christianity and lauds the "march of improvement" that the British Empire has initiated in the world. We observed that this shift might reflect his need to end the book on a positive note—was he trying to sell the book to his British readers, as well as the mission of his voyage? Furthermore, his positive portrayal of Britain might reflect his own homesickness and nostalgia for his country as Darwin nears the conclusion of the voyage. WH points out that the book moves from the South America where everything is portrayed in dark terms, and throughout the book he moves towards the British Empire, towards light, becoming more benignly imperialistic. Tim confirms this view, mentioning his description of Australia as a "shining jewel in the sea."

Jim mentioned the contradiction between Darwin's understanding of the negative impact of invasive species, like the greyhounds in Australia, with his joyful description of the English gardens in New Zealand. We also highlighted Darwin's contrast between glorifying the wild natural world while also admiring civilization. This led to a discussion of the differences between Darwin's portrayal of plants and animals versus human beings. Freddy commented that Darwin did not appear very confident in indigenous peoples—"man in his lowest and most savage state." He clearly has a diverse view of different cultures however, seeming to prefer the Tahitians to the natives of New Zealand, for example. Finally, we commented on the psychological implications of the voyage, contrasting Darwin's sense of loss of friends, society, and familiar places with the benefits of coming to see "the world as an entire entity."