Chapter 4

Darwin’s Beaks

What a trifling difference must often determine which shall survive, and which perish!

—Charles Darwin,
letter to Asa Gray

When Darwin was a student there, Christ’s College was known as the school of John Milton and the Reverend William Paley. Paley was required reading for a B.A., and Darwin read him over and over, “charmed and convinced by the long line of argumentation.” In fact, Paley’s Evidences of Christianity and Natural Theology gave Darwin “as much delight as did Euclid.”

Natural Theology: Or Evidences of the Existence and Attributes of the Deity Collected from the Appearances of Nature had been a best seller when it was first published in 1802. The book’s first lines are sometimes quoted even today. “In crossing a heath, suppose I pitched my foot against a stone, and were asked how the stone came to be there,” Paley begins; “I might possibly answer, that, for anything I knew to the contrary, it had lain there forever: nor would it perhaps be very easy to show the absurdity of this answer. But suppose I had found a watch upon the ground. . . .”

A watch would require more explanation than a stone. A watch, says Paley, implies a watchmaker. Someone had to invent it; someone had to put it together. And if that is true of a watch, Paley asks, how much more so of the living things we find on the heath? Even the simplest working parts of the smallest plants and animals go so far beyond our mortal powers of artifice that they imply “an artificer of artificers,” a creator of creators, a God.

That was the world view of both Darwin and FitzRoy while they were standing on the black lava of the Galápagos, where a live bird
The shape of a book is an integral part of its design and function. The size, shape, and style of a book can influence how it is perceived and how it is read. A well-designed book can enhance the reading experience and make the content more enjoyable to read. The choice of paper, binding, and typography can all contribute to the overall appearance and readability of a book.
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Evolution in the Flesh

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The medium ground finch on Daphne Major: some peculiar aspects.

Drawing by Hugh Clark.

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Two medium ground finches on Daphne Major: some peculiar aspects.
There have been many discussions about Darwin and the theory of evolution. Some people argue that evolution is a theory based on guesswork, while others believe it is a well-supported scientific fact. Regardless of one's position, it is important to understand the evidence that supports evolution.

One piece of evidence that supports evolution is the fossil record. Fossils provide evidence of the evolutionary history of life on Earth. By studying the fossil record, scientists can see how life has changed over time. For example, the evolution of the horse is a well-known example of evolutionary change. Horses evolved from small, four-footed animals that lived during the Eocene period, about 50 million years ago. Over time, these animals evolved into the large, grazing animals we see today.

Another piece of evidence that supports evolution is the genetic evidence. Genes are the units of heredity, and they are passed down from one generation to the next. By studying the genetic similarities and differences between different species, scientists can see how these species are related to one another. For example, the DNA of humans and chimpanzees is about 99% identical, which suggests that we share a recent common ancestor.

Despite these pieces of evidence, there are some who still doubt the theory of evolution. However, the evidence is overwhelming, and the theory of evolution is now widely accepted by the scientific community.

In conclusion, the theory of evolution is supported by a wide range of evidence. From the fossil record to genetic similarities, there is a strong case for the theory of evolution. As scientists continue to study the complexities of the natural world, we are likely to discover even more evidence to support this theory.
A Special Providence

Chapter 5

A Special Providence

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Tunk,活力 120 or so million times the Earth, in a region where there is no water, not even in the form of ice or snow. A rock is the only solid material present.

Once a rock has formed and cooled to a hard, solid mass, it can be used to support objects or be placed on other rocks. The rock is not only strong and durable, but also has the ability to absorb and distribute heat evenly.

In the context of the current discussion, we see the importance of understanding the nature of rocks and how they influence the environment around them. This knowledge is crucial for various applications, from construction to the study of geological processes.
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Deeper beneath the water's surface, the marine plankton and the corals with their colorful, calcareous structures are home to a diverse array of marine life. These coral reefs are not only a source of food for many species but also provide a sanctuary for marine biodiversity. One of the most unique features of these coral reefs is their ability to support a wide variety of marine life, from the smallest plankton to the largest whales.

Over the years, the marine population has been studied extensively, revealing the complex interactions between different species. These interactions are not only fascinating but also crucial for the health of the marine ecosystem. The coral reefs provide a habitat for many species, and as such, they are an integral part of the marine biodiversity. Each species has a role to play in maintaining the balance of the ecosystem, and any disturbance can have far-reaching consequences.

At the heart of this intricate system, the plankton play a crucial role. They are the primary producers of the reef, providing the nourishment for all other marine life. The plankton not only feed the corals but also serve as prey for larger marine species. This delicate balance is essential for the survival of the reef and the marine ecosystem as a whole.

Despite the threats posed by climate change and human activities, the marine ecosystem is resilient. Efforts are being made to protect and conserve these vital habitats, ensuring their continued survival for future generations. The marine environment is a testament to the beauty and complexity of nature, and it is crucial that we work together to safeguard it for the benefit of all.
strongly selected during a selective episode. That is, they help show investigators which changes in the living form were essential and which were simply following along, which parts of a living form were the targets of selection. This technique (it is known as partial regression analysis) was developed in 1983 by the evolutionary theorists Russ Lande and Steve Arnold. As soon as Lande and Arnold published the technique, Price applied it to Boag's drought. This reanalysis brought the evolutionary event into even sharper focus.

Price knew that the survivors and their offspring were larger in weight, wing length, tarsus length, and also in beak length, depth, and width. However, partial regression analysis shows that not all of those were selected by the drought with equal emphasis. During that terrible drought on Daphne Major, among fortis, nature was selecting most powerfully for bigger body size and deeper beaks. Nature was not selecting for longer beaks; a fortis with a long beak had no special advantage in the drought. And nature was rejecting the birds with wider beaks. So it was big birds with deep but relatively narrow beaks that were favored: perhaps, Peter Grant writes, "because a narrow yet deep bill was the best instrument for performing the difficult task of tearing, twisting, and biting the mericarps of Tribulus to expose the seeds."

So the birds were not simply magnified by the drought; they were reformed and revised. They were changed by their dead. Their beaks were carved by their losses.

In most places on this planet, the sight of a dead bird is so rare that it shocks us, even scares us. We recoil as if something has gone wrong in the cosmos, as if a shutter has creaked open that should have been kept closed, exposing a shadow world beyond our world, a place we were not meant to see.

But on the desert island of Daphne Major, dead birds are commonplace. They are everywhere. The lava is always littered with wishbones and beaked skulls. Whole seabirds lie outstretched here and there as if still in flight, odorless and mummified like feathered pharaohs in the dry and desiccating heat. Each generation lies where it falls, and the next generation builds on the ruins of the one before. They hatch in a morge, breed in a crypt, and lie down with their ancestors, as if here not only life but death too is asking to be watched.

Evolution discloses a meaning in death, although the meaning is like some of the berries that Darwin tasted in the Galápagos, "acid & Austere." There is a special providence in the fall of a sparrow. Even drought bears fruit. Even death is a seed.