

AGASSIZ AND GRAY:
A RECENTLY DISCOVERED LETTER

By Brenda Hooser

Dear Agassiz,

Because the loss of our friendship pains me greatly I feel I must make one last attempt to convince you to look again at the evidence for evolution and natural selection as its mechanism. Please do not be angry with me for trying; my great love for you compels me to do so.

First, I must admonish you. Your well-known objections to the theory of evolution are grounded in your presuppositions about Nature and God; “that species do not pass insensibly into one another, but they appear unexpectedly, without direct relations with their precursors” and that “fossils were so well fitted to their needs they were surely the result of intelligent planning.” (Bolles, p. 29) Mr. Darwin, after comparing the human eye to a telescope concludes, “and we naturally infer that the eye has been formed by a somewhat analogous process. But may not this inference be presumptuous? Have we any right to assume that the Creator works by intellectual powers like those of man?” (p. 219) Indeed, the telescope is constructed differently than the eye it mimics. You encourage your students to open their eyes, look and not be afraid to consider new ideas. And what is evolution but a new idea? I understand you recognize “the innovation inherent in Darwin’s new method, [yet think that] theories should not be founded on hypotheses, but on close observation of nature and comparison of facts.” (Croce, p. 48) I urge you to look again at the facts.

And what are those facts, those truths that Mr. Darwin has brought to our attention? To begin with he reminds us of the work of Malthus on human populations, *An Essay on the Principle of Population*. As you are aware, he shows that man is capable of increasing

exponentially while our resources only increase arithmetically. The earth is not overpopulated because not all individuals succeed in producing offspring, some never marry and some die too soon. Darwin applies this doctrine “with manifold force to the whole animal and vegetable kingdoms; for in this case there can be no artificial increase of food, and no prudential restraint from marriage.” (p. 117) It is not a great leap of faith to conclude as he has that some of the organisms will die; there will not be enough resources for all. Those individuals most fit for the current circumstances will survive to have offspring; this is the struggle for existence.

Having been a child at the time you will remember the unseasonable cold during the summer of 1816. The severe cold resulted in a loss of crops, food riots and famine in addition to the typhoid epidemic that killed many people. Looking at this with the struggle for existence in mind we would say that the individual plants that were hardiest survived; likewise those men that were hardiest also survived both the famine and the fever. This is an apt demonstration of not only Malthus’ doctrine but also of Darwin’s idea of the struggle for existence. And it is not such a great leap, is it, to accept that those individuals would in turn have offspring that would have similar qualities, thus improving the survival of the species as a whole? To my mind it is very conceivable that the trait that helped one individual to survive would be passed on, through several generations to enough individuals such that they would be different enough to be classified a new species?

Indeed, we do this with plants and animals ourselves. Darwin describes in detail how this process of selection works in raising and breeding pigeons. A breeder will choose those

pigeons with the characteristics he desires to mate because he knows that some of the offspring will be born with the desired combination. Our knowledge of breeding pigeons is such that we know how long each feature will take to reproduce. According to Sir John Sebright, the most skillful breeder “would produce any given feather in three years, but it would take him six years to obtain head and neck.” (Darwin, p. 90) Darwin also discusses the curious fact that sometimes an offspring will revert to the parent type, in this case the rock pigeon, even when neither of the parents has this trait. “Now, in every one of the domestic breeds, taking thoroughly well-bred birds, all the above marks, even to the white edging of the outer tail feathers, sometimes concur perfectly developed.” (p. 85) He continues, “We can understand these facts, on the well-known principle of reversion to ancestral characters, if all domestic breeds have descended from the rock pigeon. (p. 85-86) Breeders using the process of selection for desired traits explains both the change in the form of the birds and the occasional reversion. If humans can accomplish these things in the span of a few years, what could nature not accomplish given the eons available to her?

And now let us turn to your area of expertise, fish. Darwin reminds us “there are fish with gills or branchiae that breathe the air dissolved in the water, at the same time that they breathe free air in their swimbladder. (p. 221) Since the swimbladder is used for flotation, how do you account for the apparent fact that “an organ originally constructed for one purpose, namely flotation, may be converted into one for a wholly different purpose, namely respiration” if species do not change through time? (p. 220) It is my considered opinion that you are being “theistic in excess” in insisting upon each species being created just as we now see it. (Mandelker, p. 89) Darwin addresses this issue in

another way when he states, “He who believes that each being has been created as we now see it, must occasionally have felt surprise when he has met with an animal having habits and structure not at all in agreement . . . yet there are upland geese with webbed feet which rarely or never go near the water.” (p. 216) If fossils are “so well fitted to their needs” as you believe, why would ducks who never swim have webbed feet? (Bolles, p. 29) Why would swimbladders be used for respiration? Why would our own bodies be designed so that it is possible to get food in our lungs when we eat? Natural selection resolves these mysteries and others as well.

I must now confess, I had my suspicions about natural selection several years before Mr. Darwin confided in me. In 1840 I noticed “while reviewing a book on Japanese plants, that they bore a striking resemblance to those in the eastern United States which [I] had been studying intensively for years.” (Croce, p. 51) Darwin, having read the essay I published on the matter, requested I do more research on the curiosity that none of the species existed anywhere between Japan and the eastern United States. After counting “the number of species and genera in each region, [. . .] the statistics showed that some nearly related species occurred in east Asia and eastern North America. The inference was clear that they had descended from common ancestors”. (Croce, p. 52) By 1856, “the difficulty of drawing boundaries around species” became as apparent to me as it was to Darwin. (Croce, p. 53) This difficulty is also apparent in naturalists of each specialty being unable to agree on what exactly makes a species different from a variation. I “believe that they have only a relative fixity and permanence.” (Croce, p. 53) Along with Darwin, I am struck by the fact that when species are imported to new areas by travelers they sometimes overrun the native species. (p. 132) These facts are easily explained by

evolution working through natural selection. In fact, they are expected under the theory of natural selection; they become anomalies when one believes that each species was created for the area in which it lives.

And yet, in spite of all the above facts, I must confess there are some difficulties with the theory. The first and most difficult to overcome is that although the theory explains the many facts discussed in the book and elsewhere, it is not provable. It may be provable sometime in the future, but at the present time it is the best explanation we have of the facts at our disposal. Natural selection serves “to connect and harmonize [facts] into one probable and consistent whole.” (Croce, p. 54) I am convinced that with the addition of knowledge future generations will provide, the theory can eventually be proven.

Another difficulty, also quite grave, is the current imperfection of geological record. If we consider the millions of years natural selection has had to work, there must have been innumerable transitional forms. Yet we do not see them. However, given the fluidity of the definition of species and varieties in nature, it is possible that we could be seeing them and not recognizing them. We must remember, too, that natural selection works on individuals, not entire species, therefore, it is also possible that the individuals in question were not preserved. If this were the case, species would appear suddenly in the fossil record, as we observe. We must also consider that natural selection might act on soft tissue, which is very rarely preserved. Another thought to keep in mind is the rarity of fossils themselves. However, with more fieldwork and fossil excavations I believe this difficulty can easily be overcome. Given all these considerations, I do not think it will be

difficult to imagine that with time and increased knowledge, we will be able to find and identify these transitional forms.

In summary, I wish to reiterate my reasons for supporting natural selection. First, and most important, I “support natural selection because it serve[s] to reflect on the philosophical difficulties of the inductive approach and its impossibility of demonstration with certainty.” (Croce, p. 48) It is becoming clear to me that certainty in science is perhaps more than we can attain in all cases. It seems to me absurd to not believe in anything unless the proof is ironclad. In addition to gathering facts, it is important to “recognize the thought that binds them together as a consistent whole.” (Croce, p. 48) Although natural selection has not been proven, it is the only hypothesis that explains the facts as we know them in the most elegant way.

And so I once again urge you to follow the advice you give your students, to open your eyes, “look! look! look!”, and do not be afraid to consider new ideas. (Marcou, p. 96)

I remain your dear friend,

Asa Gray

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