

The Vampire's Heart

David Berlinski

1) James Downard has recently posted a critique of Ann Coulter's *Godless* to **Talk Reason**. Entitled 'Secondary Addiction,' it is an exercise remarkable both in its indignation and the length required fully to express it.

Although it is Ann Coulter's book that is under discussion, I note that it is my views that from time to time are under attack.

"Berlinski is a special case," Downard writes (addressing readers of **Talk Reason**). "I happen to know that he is theoretically aware of much of the information you are about to read. And the reason I know this is because, a few years ago, I sent it to him - - *at his specific request*. That none of these data filtered through to Coulter suggests two pedagogical possibilities (not mutually exclusive): that Berlinski has no skill at retaining or communicating relevant subject matter, and Coulter is one pretty dull student."

Now these, I must observe, are uncharitable remarks, the more so since they divulge part of a private correspondence without ever indicating the whole. As it happens, I *did* read James Downard's unpublished manuscript, and I thought that if edited it could very easily become a commendable contribution to the literature. I have not in any way changed my opinion. Downard and I worked together toward this end for six months. As an MIT author, I then asked the MIT Press for an expedited reading. The manuscript was turned down, and turned down again at the Princeton University Press. I showed the manuscript to my New York publishers, only to be told – reasonably, I think

– that its commercial prospects were negligible. I also asked contributors to **Talk Reason** for help in placing the manuscript. I received no response.

With these facts in mind, I am minded to observe that James Downard thought rather more of my “skill at retaining or communicating relevant subject matter,” when he believed that he might derive some benefit from my acquaintance than he does now.

2) Having on a number of occasions driven a stake through the heart of Nilsson & Pelger’s well-known essay about the formation of the eye, I have recently been alarmed by twitches in the resulting corpse, most obviously in Downard’s essay.¹

This note will thus serve as a follow-up stake.

The facts: Nilsson & Pelger’s study, which was widely considered a computer simulation, contained *no* computer simulation whatsoever. It contained, in fact, no *computer* analysis at all, perhaps because it contained no *analysis* at all. It was Richard Dawkins who conveyed the widespread impression to the contrary, writing about a computer simulation that did not exist with the excitement of a man persuaded that he had seen a digital vision. As, indeed, he had. Commentators at the time came to Dawkins defense with a gratifyingly prompt display of personal generosity, so that what was, in fact, a complete fabrication took on the aspects of an understandable but trivial error. Any man, after all, might mistake nothing for something.

James Downard is now prepared to accommodate the obvious: “True, a

¹ “A Pessimistic Estimate of the Time Required for an Eye to Evolve,” Proceedings of the Royal Society, London B (1994) 256, 53-58, and hereinafter, Nilsson & Pelger. My critique, ‘A Scientific Scandal,’ together with the letters it elicited and my responses, may be found on the Discovery Institute website.

‘computer’ wasn’t involved in these calculations,” he writes, “so let’s all slap Richie Dawkins for being a bad student.”

Now I yield to no man in my eagerness to see Richard Dawkins slapped, but Downard’s remark, although true in essence, is also both misleading and tasteless.

Misleading because: 1 it suggests by means of scare quotes that the word computer has been given an unusual denotation; and 2 because the issue at hand is not a computer calculation but a computer *simulation*; and 3 because fabricating data is hardly a schoolboy error, like flubbing the declension of a Latin verb.

And tasteless because: So long as my fingers are hovering over the keyboard, Richard Dawkins is and will remain *Richard* Dawkins.

In my original *Commentary* essay, I drew attention to the fact that Nilsson & Pelger’s study contained *no* defense whatsoever of its chief assertion, namely that 1829 steps are required to transform a light-sensitive patch into a functioning eye:

Moreover, Nilsson and Pelger do not calculate the “visual acuity” of any structure, and certainly not over the full 1,829 steps of their sequence. They suggest that various calculations have been made, but they do not show how they were made or tell us where they might be found. At the very best, they have made such calculations for a handful of data points, and then joined those points by a continuous curve.

The calculations to which Nilsson & Pelger appeal are neither in their paper, nor in their footnotes, nor in a technical appendix, nor are they available on their website. In the twelve years since their paper was published, they have never appeared in any public forum.

In responding to my observation – no data, no evidence, no calculations, and thus no reason to assent – James Downard has now managed inadvertently to confirm the alarming currency of Dawkins’ urban legend: “When I wrote Nilsson to check up on

these matters, I did ask about his data set, and he readily supplied a neat summary of the ten variables involved in the *simulation* and the stages of their acquisition,” (emphasis added).

It is a great merit of Nilsson & Pelger’s study that based as it is on a non-existent simulation, it can be defended on that basis as well.

Downard is nonetheless still persuaded that had I pursued the matter more diligently, I might have discovered at least the raw data missing from Nilsson & Pelger’s original paper. “I confirmed with Nilsson that Berlinski had never even bothered to request the original data summary, let alone establish that there was anything biologically unjustifiable about it.”²

This is correct. I never bothered. If James Downard were to claim possession of a flying pig, it is presumably not *my* responsibility to inquire after the particulars. It is *his* responsibility to make those particulars plain. By the same token, serious scientists making an historically important claim have an obligation to *publish* their evidence, or in the age of the Internet, to make it *publicly* available on-line. This Nilsson and Pelger did not do, and this they have never done.

It is astonishing to me that in a long essay in which he affirms his own partiality to the methods of science, James Downard does not once consider the completely

² The data set that Downard claims to have received from Nilsson is reprinted in my appendix; it was posted originally on **Talk Reason**. Three obvious comments. Despite Downard’s claim that he is able to discern 1,829 steps in this list, I myself can see only 41, the missing steps swallowed in a grand *etcetera*. 2 The list describing these steps is incomprehensible. And 3, there is no indication at all as to how these steps were derived, or from what.

uncontroversial principle that evidence, like courtesy, must be displayed if it is to be believed.

3) I must now consider and correct certain technical confusions, altogether a more agreeable undertaking.

Writing about Nilsson & Pelger in his most recent post, and judiciously changing their simulation to a *study*, Downard claims that their paper “contained an entirely valid *mathematical* analysis of eye evolution basing each stage of the process on *biologically known* intermediaries,” (first emphasis added). It is, of course, impossible to verify the second of these claims, if only because Nilsson & Pelger, having given no description of *any* process, could hardly have supplied something that might correspond to each of its stages.

There remains the matter of that “entirely valid mathematical analysis.” I have myself filled in the details that are, in fact, missing from Nilsson & Pelger’s paper.

Nilsson & Pelger’s dynamical model consists of two parts. The first tracks changes in the magnitude of a population of imaginary cells (in units that are never specified), the second changes in the mean value of a single quantitative characteristic, namely visual acuity.

Their first dynamical model is based on the ordinary differential equation

1 $dx/dt = ax.$

Solutions are, of course, exponential

2 $x(t) = Ke^{at}.$

If $K=1$, and $a = .01$, it follows that

3 $x(t) = 1.01^t,$

since $e^a = e^{.01} \cong 1.01$.

Subject to the condition that

$$4 \quad 1.01^t = 80,129,540$$

it follows that $t = 1829$.

Like every other number in Nilsson & Pelger's paper, the number 80,129,540 is derived from nothing at all and just appears like an alarming blob. Thus for all practical purposes, Equation 4 could be rewritten as:

$$5 \quad 1.01^{1829} = x,$$

since 1829 and 80,129,540 are equally numbers that have been invented.

Equation 1 represents the whole of Nilsson & Pelger's dynamical model. There is nothing else and there is certainly nothing more.

But Equation 1 is a first-order, linear, *deterministic* ordinary differential equation in the obvious sense that the states of the system that it describes are completely determined by the equation and its initial conditions. It thus does not under *any* interpretation remotely suggest a Darwinian process, a point that I have made with what is now tiresome frequency.

Nilsson & Pelger's second dynamical model is identical to their first:

$$6 \quad dx/dt = ax,$$

but with a different parametric value for the coefficient of proportionality a .

The new value is derived from Falconer's *short-term* response statistic \mathbf{R} , which is a percentage measure of changes to the mean value of a quantitative characteristic in a single generation:

$$7 \quad \mathbf{R} = h^2 \times i \times V \times M.$$

Nilsson & Pelger assign the following values to the equation's parameters:

a) $h^2 = .50$

b) $i = 0.01$

c) $V = 0.01.$

d) $M = 1$

Substituting 0.00005 for a , yields

8 $1.00005^t = 80,129,540,$

whence Nilsson & Pelger's conclusion that $t = 363,992.$

But, of course, if Equation 1 does not express a Darwinian system, then neither does Equation 6. They are, after all, precisely the same equation.

Far from being "an entirely valid mathematical analysis," what Nilsson & Pelger have offered involves *no* mathematical analysis whatsoever, and since they have not even solved their own differential equation, no *appearance* of mathematical analysis either. The mathematics that does appear in their paper is entirely ceremonial and could be effectively conveyed in ordinary English by the declaration that as far as Nilsson & Pelger are concerned, eye sensitive cells appeared long ago and have then grown like crazy. If this counts as a defense of Darwin's theory, then the theory does not require critics. What is at issue is whether the emergence of the eye can be *explained* by Darwin's mechanism of random variation and natural selection? In this regard, neither Equations 1 nor 6 are of the slightest interest, since they involve neither random variations nor natural selection.

4) In writing to me about these points, a contributor to **Talk Reason**, has suggested that both Equations 1 and 6 might be considered deterministic approximations to an

underlying stochastic process. The idea is not on its face absurd; but it requires a substantially different basis in analysis, one designed to accommodate the fact that random variables do not in general comprise differentiable functions.

In the theory of stochastic differential equations there is – and has been for almost one hundred years – a rich and flexible mathematical system for dealing directly with stochastic processes in differential terms. It is this theory that leads to the drift and diffusion equations characteristic of population genetics.

In any event, no population geneticist would assume, as Nilsson & Pelger do, that variance is a parameter that might remain unchanged for more than 360,000 generations, not least of all because it is well-known that changes in gene frequencies affect variance, often by linkage disequilibrium. The word *variance* might suggest as much, suggesting, as it does, something that *varies*. It is generally thought, moreover, when $4N_e \times i$ is less than 1, where N_e designates effective population size, that stochastic effects will predominate over selection, another reason to doubt the relevance of Equations 1, 6 or 7.

5) A final comment. On a number of occasions, James Downard has taken pains to remind readers that along with other members of the Discovery Institute, I am thanked in the appendix to Ann Coulter's book. It is a matter that appears morbidly to have inflamed his curiosity. Whatever I may have done to elicit Ann Coulter's gratitude is of no general concern, and it is certainly none of James Downard's business.

Appendix

type of change start end 1% steps sum 1% steps

Stage 1 to 2 176

corneal width (curve) 46.5 46.5 0

corneal thickness 3.35 10.1 110

upper retinal surface width 46.6 47.2 1

lower retinal surface width 46.6 51.2 9

upper pigment surface width 46.6 53.9 14

lower pigment surface width 46.6 58.0 21

Stage 2 to 3 362

corneal width (curve) 46.5 46.5 0

corneal thickness 10.1 25.8 94

upper retinal surface width 47.2 75.6 47

lower retinal surface width 51.2 85.9 52

upper pigment surface width 53.9 97.7 59

lower pigment surface width 58.0 108.9 63

Stage 3 to 4 270

corneal width (curve) 46.5 40.2 15

corneal thickness 25.8 37.0 36

upper retinal surface width 75.6 130.6 54

lower retinal surface width 85.9 143.9 51

upper pigment surface width 97.7 145.6 40

lower pigment surface width 108.9 158.7 37

Stage 4 to 5 225

corneal width (curve) 40.2 29.5 31

corneal thickness 37.0 43.7 16

retinal surface width 137.2 202.3 39

pigment surface width 152.1 208.6 31

Stage 5 to 6 192

corneal width (curve) 29.5 37.2 23

corneal thickness 43.7 46.6 6

central refractive index increase from 1.35 0.010 0.060 180

Stage 6 to 7 308

corneal width (curve) 37.2 55.4 40

corneal thickness 46.6 42.3 9

iris width 4.76 11.99 92

retinal surface width 202.3 132.1 42

pigment surface width 208.6 143.7 37

central refractive index increase from 1.35 0.060 0.090 41

lens width 28.4 21.9 26

lens height 24.0 20.2 17

Stage 7 to 8 296

corneal width (curve) 55.4 60 8

corneal thickness 42.3 30.7 32

iris width 11.99 15.88 28

retinal surface width 132.1 72.6 60

pigment surface width 143.7 82.6 55

central refractive index increase from 1.35 0.090 0.180 70

lens width 21.9 16.7 27

lens height 20.2 16.7 19

Grand total 1829