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EDITORIAL

The poetry and prose of evolution

'There is grandeur in this view of life.'

—Charles Darwin
Origin of Species

'I have found no documents of human thought more exciting than the notebooks that Darwin filled in London as a young man in his late twenties, just returned from five years aboard the Beagle. He had the key to a new way of life, and he knew it. His mind ranged over the entire intellectual landscape, from biology to psychology, morality, philosophy and literature. Evolution by natural selection impinged on everything'.

—Stephen Jay Gould
On Original Ideas
Natural History, 1/83

Our view of Nature and the living world has been profoundly influenced by Darwin's remarkable insights, in the years that followed his celebrated voyage of discovery, aboard the *Beagle*. Darwin's views on the evolution of life and his enunciation of the principle of natural selection, forever, altered the face of biology. In the span of almost a century and a half that has passed since Darwin, his views on man's place in nature have been championed by some of biology's brightest stars, in a lineage that stretches from Thomas Henry Huxley to Ernst Mayr. But, the public perception of the Darwinian world view has been shaped by many powerful writers, who have presented our changing insights on man's origins, to the world at large. Stephen Jay Gould, more than anyone else spread the message of Darwinism, explained 'natural selection' and attempted to educate a world that 'has yet to make its peace with Darwin and the implications of evolutionary theory'. When Gould died on 20 May, at the age of 60, the world of science lost one of its most articulate spokesmen and the fields of biology and palaeontology one of their most distinguished practitioners. Beginning in 1974, for over a quarter of a century, Gould wrote an uninterrupted monthly column in *Natural History*, entitled 'This View of Life', a phrase borrowed from Darwin's concluding sentence of *Origin of Species*. And, in his essays Gould displayed an unmatched ability to make the most abstruse of science intelligible and to convey a continuous and undimmed enthusiasm for the wonders of nature. Gould's writings grew beyond the monthly essay to encompass an astonishing range of books, often collections of his essays. In the last year of his life he produced his final work of scholarship *The Structure of Evolutionary Theory* (Harvard University Press, 2002), which occupies a formidable 1464 pages. For many who have wrestled with the subtleties of natural selection, the role of

chance and design in biology, the difficulties of interpreting an imperfect fossil record and of course, the philosophical implications of Darwinian evolution, Gould's writings have served as a beacon. Unmatched in the ability to strip layers of incomprehensible complexity from a problem, Gould developed a large, devoted readership, who will undoubtedly miss him.

Gould's professional research revolved around a concept that appeared at odds with the gradual, purposeless march of conventional Darwinian evolution. Together with Nils Eldredge, Gould advanced the idea of a 'punctuated equilibrium'. The Gould–Eldredge view of speciation was a clear departure from the gradualism implicit in a Darwinian model. In Gould's words: 'Species arise in a geological moment – the punctuation (slow by our standards, abrupt by the planet's). They then persist as large stable populations on substantial geological watches, usually changing little (if at all) and in an aimless fashion about an unaltered average – the equilibrium'. The proclamation of a 'punctuated equilibrium' as an evolutionary device was met with considerable derision by strict Darwinians; unkindly characterized as 'evolution by jerks' by its detractors. Ironically, creationists viewed the Gould–Eldredge suggestions as a sign of the cracking of the edifice of evolutionary theory, a development which required Gould to set the record straight in the 1980 Arkansas creationism trial. Gould was a master of the metaphor; he likened Darwinian gradualism to 'pushing a ball up an inclined plane', while punctuated equilibrium appeared like 'climbing a staircase'. Gould revelled in public debate and controversy and in his last book *The Structure of Evolutionary Theory* he provides a spirited counter-attack on his critics, Richard Dawkins among them. In a 1990 review of Gould's *Wonderful Life*, Dawkins laments: 'If only Stephen Gould could think as clearly as he writes! This is a beautifully written and deeply muddled book'. Ernst Mayr in a tribute marking 25 years of Gould's column in *Natural History* is more charitable: 'Whether right or wrong, Steve (Gould) is always stimulating and this is perhaps where he has made his greatest contribution – in awakening in thousands, if not millions, of his readers an enthusiasm for the secret of this wonderful world of ours'. Gould's long-time colleague at Harvard, Richard Lewontin points to an ironic similarity in the 'Gouldian view of evolution' and a passage from the Ecclesiastes: 'For the race is not to the swift, nor the battle to the strong, neither bread to the wise man, nor yet riches to men of understanding . . . but time and chance happeneth to all'. (*Natural History*, 11/99).

Gould was diagnosed as suffering from a rare and serious abdominal cancer in 1982, 'with a median mortality of only eight months after discovery'. His response was an extraordinary essay 'The Median Isn't the Message'; a wonderfully

positive interpretation of depressing statistical distributions. Gould noted: 'The distribution was indeed strongly right skewed, with a long tail (however small) that extended for several years above the eight month median. I saw no reason why I shouldn't be in that small tail . . .'. To Gould this was 'a personal story of statistics, properly interpreted, as profoundly nurturant and life-giving'. Gould's essay must undoubtedly be the most persuasive argument for the importance of carefully analysing statistics and a fitting rejoinder to sceptics like Hilaire Belloc, whom Gould quotes: 'Statistics are the triumph of the quantitative method, and the quantitative method is the victory of sterility and death'. Gould walked the tightrope between the twin careers of a professional scientist and popularizer of science, particularly a view of life that emerges at the crossroads of biology, geology and palaeontology. His opening sentences in a tribute to one of the 20th century's greatest public expositors of science, Carl Sagan, underline the difficulties of this dual role: 'As Saul despised David for receiving ten thousand cheers to his own mere thousand, we scientists often stigmatize, for the same reason of simple jealousy, the good work done by colleagues for our common benefit. Because we live in a Philistine nation filled with Goliaths, and because science feeds at a public trough, we all give lip service to the need for clear and supportive popular presentation of our work. Why then do we downgrade the professional reputation of colleagues who can convey the power and beauty of science to the hearts and minds of a fascinated, if generally uninformed public.' (*Science*, 1997, 275, 599).

Gould's ability to integrate seemingly unrelated subjects in explaining Nature's grand design was one of the most engaging features of his writing. And, of course, he frequently turned to poetry. In wondering about the amazing organization of life, Gould was often confronted (and indeed, all of us are), with the Darwinian problem of ascribing an important role to chance in the evolution of life. Biology's greatest paradox is the emergence of organized life from chaotic randomness. In wrestling with this problem Gould noted Alexander Pope's 'facile solution' which 'simply banished the very idea of chance by a decree of faith':

*All nature is but art unknown to thee;
All chance, direction which thou canst not see;
All discord, harmony not understood;
All partial evil, universal good.*

Gould, while musing on the teaching and learning of science noted that 'most quotations are fabricated' and added that 'we know many great literary lines by a standard misquotation rather than accurate citation'. As an example he chose the standard misquote, 'a little knowledge is a dangerous thing' and went on to analyse Pope's famous lines:

*A little learning is a dangerous thing;
Drink deep, or taste not the Pierian spring;
There shallow draughts intoxicate the brain,
And drinking largely sobers us again.*

Gould, disarmingly, notes that a turn to an encyclopedia and the venerable Oxford English Dictionary established the mean-

ing of 'Pierian spring', allowing him then to expand on the theme of learning.

But, my favourite in the Gould collection is his analysis of Tennyson's famous line often used as a 'canonical descriptor' of Darwinian evolution: 'Nature red in tooth and claw'. Ironically, Tennyson's *In Memoriam*, a long and as Gould notes, generally unread poem, appeared in 1850, while Darwin chose to unveil *The Origin of Species* only in 1859. But, Tennyson's ode to his friend Arthur Hallam, had a remarkably prescient view of science:

*A time to sicken and to swoon
When Science reaches forth her arms
To feel from world to world, and charms
Her secret from the latest moon?*

*Behold, we know not anything;
I can but trust that good shall fall
At last – far off – at last, to all
And every winter change to spring.*

Gould notices a forerunner of the Darwinian world:

*Are God and Nature then at strife
That Nature lends such evil dreams?
So careful of the type she seems,
So careless of the single life.*

(A poetic allusion to the stability of species, while unmindful of individual deaths.)

The pitiless and often misleading metaphor of natural selection as 'survival of the fittest' found its echo in Tennyson:

*Who trusted God was love indeed
And love Creation's final law –
Though Nature, red in tooth and claw
With ravine, shrieked against his creed.*

(S. J. Gould, *Natural History*, 1992, 11, 14.)

Discussions of creation, nature and evolution abound in poetry. My own favourite from William Blake might serve as a tribute to Gould:

*Tiger! Tiger! burning bright
In the forests of the night,
What immortal hand or eye
Could frame thy fearful symmetry?*

*When the stars threw down their spears,
And water'd heaven with their tears,
Did he smile his work to see?
Did he who made the Lamb make thee?*

Stephen Gould did not worry about 'rhyme or meter' in his writings. But, if we were to anoint a poet laureate for science it would be Stephen Gould. At times, his prose was sheer poetry.

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