

**Darwin's Ancestors: the Evolution of Evolution**  
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Figure 1: “*Evolution*,” a sculpture by Emma de Sigaldi, 1979, located at the Toronto Metro Center.

Despite his unique contribution to evolutionary theory—the mechanism of natural selection—Charles Darwin can hardly be considered the first evolutionary theorist in history. It is generally acknowledged that organic evolution, or “transmutation” as it was called during his lifetime, was hardly a new idea when Darwin published *On the Origin of Species* in 1859. If ancient Indian and Greek thought is included, evolutionary ideas were thousands of years old by the time Darwin wrote. But even considering his own times, Darwin was not the evolutionary lone wolf that he is often made out to be. In fact, Darwin not only followed closely behind other transmutation theorists, but his own views met with a degree of skepticism not altogether unlike that which greeted his predecessors. As James Secord notes, the scientific consensus regarding natural selection “is a twentieth-century creation” and the “centrality given to Darwin” is also a recent phenomenon (Intro. to *Vestiges* x). As historians of science have begun to dismantle the “all-roads-lead-to-Darwin” consensus (Secord, Intro. to *Vestiges* x) by exploring its social, cultural and even ideological contingencies, an exploration of the evolutionary roads not taken promises to be an important and illuminating venture.<sup>1</sup>

Such explorations become even more important in light of recent studies in evolutionary biology that have begun to reevaluate the role of the organism in the construction of its own environment or niche.<sup>2</sup> Rather than the passive, often hapless victims of natural selection, as they are often depicted in the Darwinian model, organisms are increasingly seen as active agents in their own selection by means of the impact they exert on their environments. The role of nature, or environmental forces that combine to produce “the struggle for existence,” as Darwin called it, is not now being ignored. Rather, the important point is the new emphasis on reciprocity, or the “dialectical” relationship

between organism and environment, part and whole, subject and object (Levins and Lewontin). The resurgence of environmentalism and the role of the “subject” in its construction make sense in light of the enormous impact of human beings on their surroundings, but it also justifies a renewed interest in previous evolutionary schemas. This is especially the case since, as we shall see, pre-Darwinian forms of evolutionary thought generally accorded a greater role to the organism as an agent of change.

As Adrian Desmond argued in 1987, “concentrating too closely on the Darwinian heritage has caused a kind of middle-class myopia, even a denial of rival traditions” (“Artisan Resistance” 79). Desmond and others have partially remediated this myopia (Desmond, *Politics of Evolution*; Desmond, *Archetypes and Ancestors*; Desmond and Moore; Burkhardt, etc.). We now know that pre-Darwinian “rival traditions,” earlier forms of scientific materialism, species transmutation, and mid-century secularist programs had the effect of tilling the soil for Darwinian evolutionary theory, as well as preparing the public for its implications. At the same time, the harsh treatment that such rival traditions received from naturalists and other critics prompted Darwin to refrain from publishing his theory for more than two decades (Desmond and Moore).

This essay treats pre-Darwinian evolution in Great Britain not only to consider the ways in which Charles Darwin adhered to or diverged from the views of late eighteenth- and early nineteenth-century thinkers, but also to understand these works in their own right. I consider the theories of earlier evolutionists and some uses to which their systems were put. I argue that we cannot arrive at a full appreciation for Darwin's contribution without understanding his evolutionary ancestors.

Dr. Darwin and his contemporaries, Spencer, Huxley, Tyn-  
call, et. ei genus omnia, take to themselves great credit for their  
pretendedly new notions about evolution, natural selection, causal  
relations, protoplasm, etc. But, to us, these things are merely old  
fancies with new faces. For example: in a book written by one  
of Dr. Darwin's ancestors, and which was so famous as to have  
reached a second edition in America, nearly three score and ten  
years ago, we think we can find, without much trouble, the  
originals of some of our present scientific novelties.

Darwin's ancestors, such as Dr. Erasmus Darwin and Dr. Darwin, Mr.  
Charles Darwin's father, and deal largely with the controversy between  
Dr. Thomas Brown and Erasmus Darwin and the theories of the latter.  
In the chapters on the Work our author first analyzes the mental character  
of Mr. Darwin with the purpose of accounting for the doctrine of Dar-  
winism, and showing the character and value of the contents of the *Origin  
of Species*, and then attacks its doctrines, submitting the ideas of “struggle  
for existence,” “survival of the fittest,” and “natural selection,” to a very  
searching and damaging criticism. The work is perhaps too elaborate for  
the ordinary reader: but those who will take the trouble to read through  
its pages, more especially the second part, will not be without their  
reward. Dr. Stirling has many new and unexpected things to say and  
proves himself a combatant very difficult to resist.

Figure 2: Montage of reviews mentioning  
“Darwin's ancestors.” Top: The American  
Church Review, April 1874; bottom: The Scottish  
Review, April 1894.

Treatises that at least addressed the notion of species transmutation include Erasmus Darwin's *Zoonomia* (1794), Jean Baptiste Lamarck's *Philosophie Zoologique* (1809), and Robert Chambers's anonymously published *Vestiges of the Natural History of Creation* (1844). As his paternal grandfather, Erasmus Darwin was a biological as well as intellectual forebear of Charles. E. Darwin's scientific views were based largely on the social environmentalist ideas found in pre-Revolutionary France, which had borrowed from the Scottish Enlightenment.<sup>3</sup> His evolutionary ideas were limited to a chapter in the *Zoonomia* and a long poem published posthumously entitled *The Temple of Nature* (1802).

Lamarck was a French zoologist whose name became a byword for radical French materialism. His evolutionary scheme became the object of ridicule, owing to the importance it placed on the volition of the organism as the motor of evolutionary change. It should be noted, however, that in later editions Darwin adopted Lamarck's inheritance of acquired characteristics as an auxiliary means (in addition to sexual selection) by which individuals acquired traits from their parents (Darwin and Carroll 30).<sup>4</sup>

*The Vestiges of the History of Natural Creation* (1844) was published anonymously and created a "Victorian Sensation," the title of a recent work on the treatise.<sup>5</sup> This curious treatise, later found to be written by the Scottish journalist and publisher, Robert Chambers, was considered amateurish by scientists, yet it played an important role in Victorian cultural history. James Secord, the editor of a recent facsimile publication, argues that *Vestiges* and its sequel, *Explanations*, are "key texts for the rise of secular ideologies in Western culture" (Intro. to *Vestiges* x).

Evolutionary thinking was not confined to natural philosophers, or what we now call scientists.<sup>6</sup> Poets and other writers also wrestled with evolutionary ideas. The poet Alfred Lord Tennyson, in *In Memoriam* (1850), a book-length poem on the death of his friend, also struggled with the implications of full-blown naturalistic explanations for the appearance and disappearance of species (and individuals), including humans. In *Mill on the Floss* and *Middlemarch* in particular, George Eliot treated the development of characters as a natural historian would her subjects. *Middlemarch* deals with contemporary evolutionary ideas, especially Darwin's idea of sexual selection (introduced in *The Descent of Man*, 1871) in the marriages of her characters. As Nancy Paxton observes, Lydgate, the socially and scientifically progressive doctor in the novel, is used by Eliot to undercut Herbert Spencer's evolutionary theory of sex selection (171-97). Lydgate's wife Rosamond, unlike George Eliot herself, meets all of Spencer's evolutionary criteria for sexual selection as a wife.<sup>7</sup> Yet she fails posterity (her egotistical concern with "personal beauty" causing her to lose a child).

Additionally, in cheap pamphlets and periodicals, working-class atheists and Secularists celebrated non-theistic explanations of life and its development. As Adrian Desmond notes, some of this material was "cannibalized" from theories they found in French writing by Lamarck and Baron d'Holbach, but much appears to have been homegrown in Britain ("Artisan Resistance"). In the atheistic periodical *The Oracle of Reason* (1841-1843), species transmutation was presented in a serial article almost two decades before Charles Darwin published on the topic.

### Erasmus Darwin

Perhaps the first modern British evolutionist was Darwin's own paternal grandfather, Erasmus Darwin. Erasmus Darwin was a physician, poet, botanist and author of the proto-evolutionary text

*Zoonomia* (1794), a work devoted to “the theory of diseases ... a theory founded upon nature, that should bind together the scattered facts of medical knowledge, and converge into one point of view the laws of organic life” (vii). E. Darwin’s evolutionary formulations appear charmingly naïve and outrageously sexist to the contemporary reader.



Figure 3: *Portrait of Erasmus Darwin by Joseph Wright, 1770.*

Yet *Zoonomia* may have inspired his grandson’s interest in the species question. It is hard to imagine that the young Darwin was not impressed by his grandfather’s tome. And evidence for some influence does exist in the texts. Both Erasmus and Charles included lengthy discussions on animal breeding, underscoring the plasticity of nature. While Erasmus considers breeding and other means of mutability as evidence that the “embryon” develops by the addition or change of parts rather than by the mere unfolding of an already complete “germ” (566-7), in chapter one of *Origin*, Charles Darwin uses it to introduce and illustrate the notion of “artificial selection” (of traits) by breeders in the directional production of desired varieties. Charles Darwin’s metaphor of natural selection derived directly from the artificial selection ascribed to breeders. Drawing on the French natural historian Georges-Louis Leclerc, comte de Buffon (1707-1788), Erasmus Darwin also anticipated Lamarck in terms of the importance of the environment for “the great changes introduced into various animals by artificial or accidental cultivation” and for the notion of the inheritance of acquired characteristics

ZOONOMIA;  
OR,  
THE LAWS  
OF  
ORGANIC LIFE.

VOL. I.

BY ERASMUS DARWIN, M.D. F.R.S.  
AUTHOR OF THE BOTANIC GARDEN.

Principio cœlum, ac terras, camposque liquentes,  
Lucentemque globum lunæ, titanicque æthera,  
Spiritus intus alit, totamque infusa per artus  
Mens agitat molem, et magno se corpore miscet.

VIRG. ÆN. VI.

Earth, on whose lap a thousand nations tread,  
And Ocean, brooding his prolific bed,  
Night's changeful orb, blue pole, and silvery zones,  
Where other worlds encircle other suns,  
One Mind inhabits, one diffusive Soul  
Wields the large limbs, and mingles with the whole.

DUBLIN:

PRINTED FOR B. DUGDALE, DAME-STREET.

1800.

Figure 4: Title Page of Erasmus Darwin's *Zoonomia* with a quotation from Virgil, 1800.

(567). Thus E. Darwin's place in the historiography of evolution is significant.

Although the word "evolution" appears numerous times throughout *Zoonomia*, its usage does not usually signify the evolution of species. Not until the penultimate chapter, "Of Generation," does

Erasmus Darwin unveil his evolutionary ideas. Such a deep burial of these controversial portions of the text may have been strategic. Here E. Darwin begins with a discussion of the “embryon... a living filament with certain capabilities of irritation, sensation, volition, and association,” which when secreted into the female is excited into development by response to environmental conditions.

Erasmus Darwin is concerned to support his hypothesis that the embryo, the sole vital element of propagation, “is produced solely by the male.” However, ontogenesis occurs only when the embryo comes into contact with the “nidus,” the nutritious environment provided by the female. The growth and change of the embryo comes by way of the acquisition of nutriment and air, which “excites... new vessels into action.” The meeting of needs by the embryo within the “nidus” of the female produces new capacities (eventually represented by organs) and is attended by pleasure, which stimulates further development and growth. This process of frustration and pleasurable relief is suggestive of the human sex act itself, which may have conditioned E. Darwin's thinking.<sup>8</sup>

On the introduction of this primordium of entity into the uterus the irritation of the liquor amnii, which surrounds it, excites the absorbent mouths of the new vessels into action; they drink up a part of it, and a pleasurable sensation accompanies this new action; at the same time the chemical affinity of the oxygene acts through the vessels of the rubescent blood; and a previous want, or disagreeable sensation, is relieved by this process... At the same time new particles of matter are absorbed, or applied to these extended vessels, and they become permanently elongated, as the fluid in contact with them soon loses the oxygenous part, which it at first possessed, which was owing to the introduction of air along with the embryo (377).

Growth and development occur according to a cyclical process of need, acquisition, development, and the formation of new needs. The acquired characteristics derived from the environment (of the female) can result in changed progeny, and even the appearance of new species:

Thirdly, when we enumerate the great changes produced in the species of animals before their nativity; these are such as resemble the form or colour of their parents, *which have been altered by the cultivation or accidents above related, and are thus continued to their posterity.* Or they are changes produced by the mixture of species as in mules; or changes produced probably by the exuberance of nourishment supplied to the fetus, as in monstrous births with additional limbs; *many of these enormities of shape are propagated, and continued as a variety at least, if not as a new species of animal.* I have seen a breed of cats with an additional claw on every foot; of poultry also with an additional claw, and with wings to their feet; and of others without rumps. Mr. Buffon mentions a breed of dogs without tails, which are common at Rome and at Naples, which he supposes to have been produced by a custom long established of cutting their tails close off. There are many kinds of pigeons, admired for their peculiarities, which are monsters thus produced and propagated (394, emphasis added).

According to E. Darwin, the male provides the “genetic” germ of the new individual, while the female provides the environmental circumstances for change in the progeny, and thus the power for producing new species.<sup>9</sup>

### **Jean Baptiste Lamarck**

As a zoologist, Lamarck saw a tendency in organic life toward greater and greater complexity. Yet, he observed, the organic kingdom displays “an *irregular gradation*” of increasing complexity. (241,

emphasis in original).<sup>10</sup> The difference between an ideal gradation and the actually existing one has to do with the impact of the “varied environments of all parts of the world on the general shape, structure, and even organization of these animals” (241-2). The state in which we find any animal, he argued, was the result of the law of increasing complexity on the one hand and the influence of the environment on the other.



Figure 5: *Portrait of Jean-Baptiste de Monet, Chevalier de Lamarck by Thevenin, Charles (1764-1838), French, 1802-3.*

Yet, for Lamarck the environment had no *direct* effect on species. Rather, as the individuals change their habits in response to changed habitats, their constitutions gradually change. Thus, in Lamarckian adaptation the organism itself *strives* to modify its habits and ultimately its makeup in response to environmental conditions. Changes in habit result in permanent alterations of the organisms over time, and such modifications are passed along to offspring. This process is known as “the inheritance of acquired characteristics.”

The classic example of Lamarck’s adaptation theory, often lampooned in contemporary textbooks, concerned the giraffe, whose forelegs and necks, Lamarck suggested, were gradually lengthened as the animal strove to reach the leafy foliage of high-limbed trees, the only source of vegetable food available in the arid regions of Africa. In short, the organization of animals always corresponds with their habits, which develop of necessity in connection with their environments. Environments are not fixed and constant, thus organisms must change and develop in conjunction with their changed habitats, eventually leading to the origin of new species.

The suggestion that organisms had the ability to change and adapt, growing new parts and discarding others, involved a mutability that was at odds with natural theology, the prevailing philosophy of

nature. At least since the neoclassical period in Europe, the natural order was also part of a grand cosmology that included God, the angels, mankind and the rest of creation. The cosmology was fixed and hierarchical and encompassed the social order itself. A progressive view of nature was indeed possible within a framework of natural theology, but such progress was merely further evidence of a hierarchy of creation. For geologists in early nineteenth-century Great Britain, the apparent progress evident in the newly uncovered fossil series was explicable in terms of a series of special creations eventually leading humanity, the crown of creation.

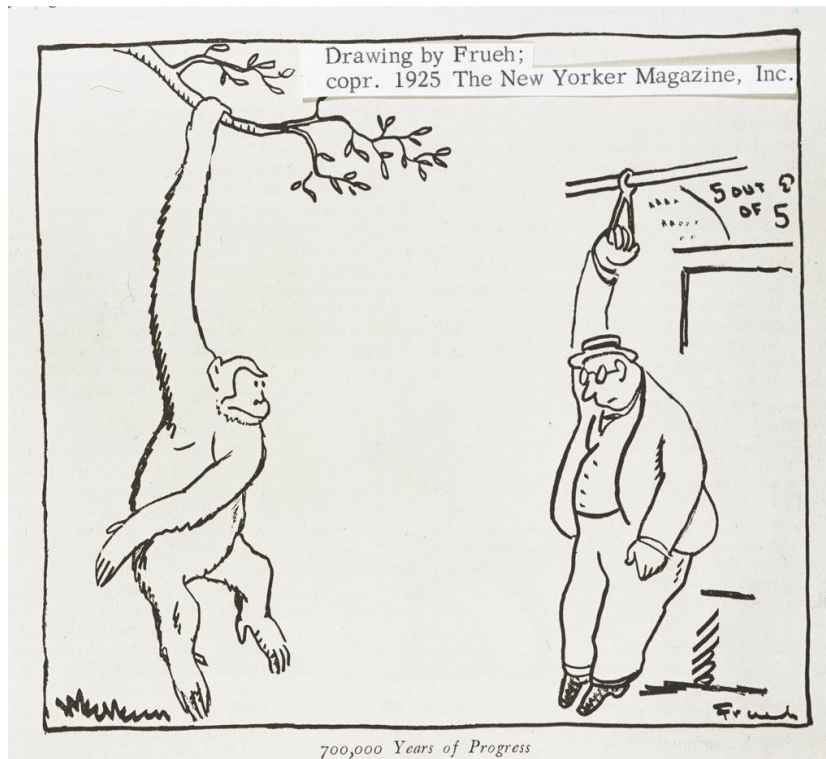


Figure 6: “700,000 years of progress,” Alfred Joseph Frueh, *New Yorker*, July 25, 1925.

But Lamarck’s ideas were associated with the French materialist theories expounded by the *ideologues*, French social environmentalists and materialists, who argued for human perfectibility made possible only through changed circumstances. French materialism was considered the philosophical basis of the French Revolution, a dreaded possibility for Britain’s establishment (Trollander 115-17, Kelly 161-75, Knight 35).<sup>11</sup> Thus, works that bore affinity with such French thinkers were viewed with deep suspicion, and for good reason. With its emphasis on the environment and “uprising nature,” Lamarckian evolution was compatible with radical political programs, and as we shall see, could serve radical, working-class political objectives (Desmond, “Artisan Resistance”). These earlier theories of evolution, associated with radical politics and atheism, may have provided a foil against which Charles Darwin could be seen as respectable and even politically and religiously moderate.<sup>12</sup> On the other hand, the later Darwinian evolution arguably reflected and served middle-class values and aims (Desmond, “Artisan Resistance” 79; Lewontin 10-11).<sup>13</sup>

Lamarck's theory was the object of vituperation in the nineteenth century, especially by the geologist Charles Lyell. Despite his insistence on considering only uniform, natural causes for the study of geological phenomena, Lyell was careful to disassociate uniformity in nature with its usual assumed provenance: radical materialism. Likewise, he inserted large sections into his *Principles of Geology* (1830-1833) that argued against progress in the fossil record and animal series, and to oppose, in several lengthy chapters, Lamarckian species transmutation (Secord xxxi). His "uniformity" of natural law thus excluded a major series of phenomena, the apparent progress of the fossil record that pointed to a series of special creations or were otherwise explicable in terms of the transmutation theories that he denounced. The appearance of humanity was also excluded from uniform, natural causality. According to Lyell, humans were specially created, an exception to the rule of non-interventionist uniformity. Lyell's aversion to evolution, as his personal papers later revealed, was largely due to its distasteful consequences. If humans were viewed as a product of natural causes or as evolved from non-human ancestors, their (and Lyell's own) high estate might be imperiled (Secord, Intro. to *Principles*). Ironically, Lyell's reputation was later secured on the basis of his reluctant advocacy of Darwin's theory of natural selection. But his earlier response is explicable in terms of the radical connotations that evolution held from the late eighteenth century through the mid-nineteenth century in Britain.

Today, critics of Lamarck do not care much about his political associations or the potential use of his theory for radical purposes.<sup>14</sup> Contemporary criticism, when it deigns to be voiced, is generally supposed to be based strictly on the science. It generally has to do with the central role that Lamarck ascribed to the will or volition of the organism as the *modus operandi* of change. The idea that an organism, using its individual will, can alter its own structure during its own lifetime and pass those alterations along, is a voluntarism quite at odds with the more "mechanistic" worldview of contemporary science. In contrast, Charles Darwin's natural selection does not involve the will or the alteration of the individual during its lifetime, but rather the "selection" of traits by the environment when they serve to increase the differential survivability of an organism's progeny. The mechanistic character of Darwin's theory, apiece with "scientific reductionism," also has a share of critics.<sup>15</sup> But the "vitalism"<sup>16</sup> of Lamarck draws near universal scorn.

### **Radical Science and Artisanal, Working-Class Evolution: *The Oracle of Reason***

In the first three decades of the nineteenth century, Great Britain experienced the vicissitudes of the first industrial revolution and the birth pangs of industrial capitalism. In the aftermath of the French wars, it became increasingly clear that the great social, economic and political problems had to be addressed. Working-class activists responded to waves of economic depression with mass violence, reaching their height in such momentous occasions as the "Peterloo Massacre" of 1819 and the Chartist uprising of 1839. The surges in working-class agitation were met with greater state repression, including newly enforced laws against blasphemy and sedition, stamp taxes on newspapers aimed at squelching the pauper presses, and the outlawing, with the anti-combination acts, of political and workers' unions. By 1839, the cultural conservative critic Thomas Carlyle coined "the Condition of England Question" to describe the situation of the plebeian classes. Friedrich Engels continued the discussion in 1844 with *The Condition of the Working Class in England*.

In the early 1840s, fed up with the failure of working-class movements to address the rising tide of working-class poverty and disgusted at the apparent appeasement of the authorities by the version of Owenite socialism then prevalent, a small cadre of working-class atheists began publishing *The*



and recommendations. The role of science in working-class radicalism has been treated by Adrian Desmond, and others. At least since the publication of Carlile's *Address to Men of Science* in 1821, artisan radicals used scientific materialism as a part of a wider strategic, ideological and political war on an established social order based on a state religion. As Desmond suggests, working-class materialists envisioned a secular society in which science replaced religion and scientists replaced priests. Such a social order would be secular, egalitarian, and dependent upon scientific means for the material improvement (if not perfectibility) of human society and life ("Artisan Resistance"). Later, as a development from *The Oracle of Reason* and the later pennies *The Movement* and the *Reasoner*, George Holyoake, the founder of Secularism, attempted to construct a moral and scientific system based strictly on materialist premises.

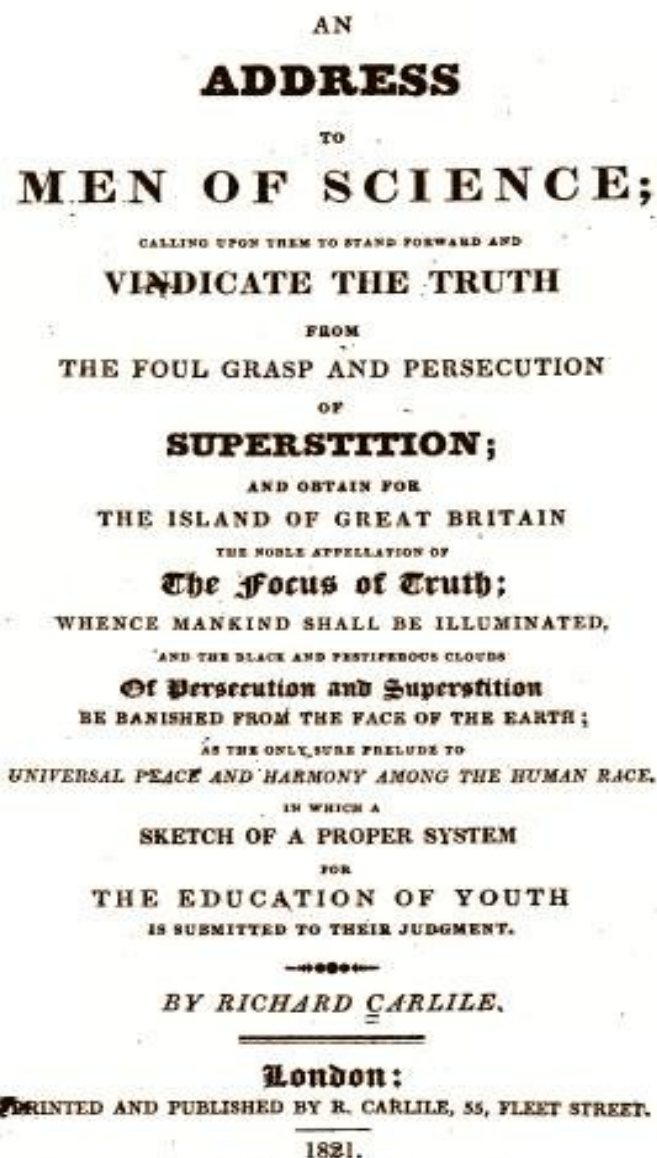


Figure 8: Written and published while he was imprisoned in Dorchester Jail, the title page to Richard Carlile's *Address to Men of Science* (1821). The pamphlet called on men of science to openly avow what Carlile saw as the obvious implications for religion of contemporary science, especially chemistry.

*The Oracle* was from start to finish a penny publication. Lasting for two full volumes, it was initially quite successful, attaining at its height a circulation of some 4,000 copies per week, a circulation that compares favorably to those of such up-market monthlies as *The Edinburgh* and *Quarterly Review*. With the imprisonment for blasphemy of its first editor, Charles Southwell, however, the publication was interrupted and circulation likewise fell, never to rebound entirely (*Oracle* 1843, 2, iii; Carpenter 102; Royle 74).<sup>17</sup>

*The Oracle* included a serial article begun by Charles Southwell and continued by William Chilton entitled "Theory of Regular Gradation," with woodcut illustrations of primitive man, fossils, and "early" organisms. Serial publication lent itself well to the illustration of a theory of serial species change and development. "Theory of Regular Gradation" began with an engraving of "Fossil Man," representing "man underdeveloped, as we are justified in supposing he was at that stage of his progress, when he was not exactly either monkey or man" (*Oracle* 1841, 1, 21).

Species transmutation followed logically from the thoroughgoing ontological or philosophical materialism espoused by the article's authors. In its third installment, the article put forth its premise that "there are no fixed modes



Figure 9: the first installment of "The Theory of Regular Gradation," featuring a woodcut engraving of "Fossil Man," *The Oracle of Reason*, November 6, 1841.

(laws as they are styled) for each species and each part, there being nothing fixed in the parts of nature."

William Chilton, the article's second author, whom Holyoake described as "the only absolute atheist I have ever known" (*Sixty Years* 142), argued in the seventh installment "that the inherent properties of dull matter, as some *bright* portions of it have designated it, are good and sufficient to produce all the varied, complicated, and beautiful phenomena of the universe—however numerous the differences in other spheres may be in addition to those of our own..." (*Oracle* 1, 1841, 77, emphasis in original). The usual objections to materialism, Chilton argued, were based on an inadequate and

impoverished conception of matter as “dull” and inert. Instead, he saw matter as eternal and inherently possessing all of the properties necessary to produce its multifarious emanations, found throughout time and space:

For believing matter to be infinitely extended, to be divisible, and capable of or arrangement of the particles—we see no reason in flying to supernaturalism for an explanation of the ultimate causes which produce the results we witness... (*Oracle* 1, 77-8).

Chilton even dismissed the usual distinction between living and non-living matter. Stones and crystals were “alive.” They changed and evolved in the same sense as did “organic” matter.

Such materialism was blasphemous, since it granted to nature properties traditionally (and in Britain, legally) reserved for God. For these materialists, matter was the sole creative force in the universe, capable of doing anything previously ascribed to God, including the production of new species. God was a phantasm invented to strip matter of its rightful throne. Lacking in this serial article was an adequate explanation regarding causality. Like Lamarck's theory, Chilton posited an inherent, *a priori*, teleological disposition in a nature that tended toward complexity and progress. Later, despite his descendants' characterizations to the contrary, Charles Darwin would deny that any such teleological or progressive tendency was implicit in his theory of natural selection. For Darwin, evolution had no goal and nature did not necessarily “improve.” Unlike Lamarck or Chilton, Darwin was a relativist regarding species transmutation.

### ***Vestiges of the Natural History of Creation***

Published in 1844, the anonymously authored *Vestiges of the Natural History of Creation*, revealed much later in the century to have been penned by the journalist and publisher Robert Chambers, “created one of the great public controversies of the nineteenth century” (Secord, Intro to *Vestiges* ix). This enigmatic work has recently become the object of James Secord's compendious and remarkably innovative work in the history of science and culture—*Victorian Sensation* (2000). As Secord notes in his introduction to the recently published facsimile edition, *Vestiges* was an instant commercial success, with fourteen editions released in Britain and more in America. A bestseller read not only by important literary and scientific figures, but by a wide readership of mostly middle-class men and women, it was discussed in polite quarters, granting radical ideas unprecedented access to respectable circles. *Vestiges* represented the first major introduction to a wide readership in Britain of a developmental cosmology. Speculation regarding its authorship became a popular parlor game during the season of its release (1844-45) (Intro. to *Vestiges*, ix, xxxvii).

The authorship of the work, it was believed, held a key to its meaning and intention. If the authorship were uncovered, the work's purpose might be understood and its credibility ascertained. Several possible authorial sources were floated, including Richard Vyvyan, an advocate of phrenology and Lamarckian species transmutation; Henry Brougham, a parliamentarian and proponent of plebeian education; Harriet Martineau, a popularizer of political economy and the first translator of Auguste Comte into English; Anne Chambers, wife of Robert; and Ada Lovelace, daughter of the poet Lord Byron and a friend of Charles Babbage, whose calculating machine featured prominently in *Vestiges*—among many others. The book's provenance could proliferate and constrain the range of meanings, helping readers to place it and thus either dismiss or deal with its enormous consequences. Ascribing the work to a female author was used to dismiss it as a work of fiction rather than science, but such a tactic indicates the threat that the work posed to British society (Intro. to *Vestiges* xxxviii-xliii).

As Chambers's title suggests, in *Vestiges* we have an attempt to marry natural theology and materialist cosmogonies, as well as what Secord refers to as a "domestication" or softening of radical materialist evolutionism (Intro. to *Vestiges* xxiv). Retaining a "Divine Author" as a "First Cause," while leaving all further "creation" to matter, *Vestiges* strikes a pose of conciliation between creationism and evolution, and initiates an infinite regress toward a deism coupled with sufficient secondary causes, the position effectively assumed in Darwin's *Origin* fifteen years later (although Darwin developed it some ten years before *Vestiges*).

Unlike Darwin's later treatise, which concerned only the evolution of species, *Vestiges* is an evolutionary history of the entire universe, beginning with the cosmos, continuing through to the evolution of humanity, conjecturing about humanity's possible future evolution, and finally contemplating the probability of life on other planets. It aimed at synthesizing all natural knowledge in one work, "the first attempt," it claimed, "to connect the natural sciences into a history of creation" (388).

*Vestiges* posits a gradation in organic nature, comprised of numerous branches rather than a single line, beginning with the simple and advancing to the complicated:

Starting from the primeval germ, which, as we have seen, is the representative of a particular order of full-grown animals, we find all others to be merely advances from that type, with the extension of endowments and modification of forms which are required in each particular case; each form, also, retaining a strong affinity to that which precedes it, and tending to impress its own features on that which succeeds (192-93).

The likeness of organisms to their precedents and successors testifies to a "unity of structure" (193), which shows at once that a plan is at play. The organic world consists of branches of divergence from particular types, beginning with the "germ." A unity of structure is observable in the development of homologous organs, or organs derived from the same original type, put to different uses. "For example: the ribs become, in the serpent, organs of locomotion, and the snout is extended, in the elephant, into a prehensile instrument" (193). Similarly, organs based on different structures perform similar tasks in different animals. "Thus, the mammalian breathe by lungs; the fishes by gills. These are not modifications of one organ, but distinct organs" (193).<sup>18</sup> Similarly, the baleen of the whale and the teeth of land mammals are different organs performing the same task. The embryonic whale shows rudiments of the teeth, but they are not needed and thus go undeveloped. "The land animals, we may also be sure, have the rudiments of the baleen in the organization" (193).

Like Darwin after him, the author of *Vestiges* also marshaled the evidence of "rudiments"—remnants of organs important for ancestral species that no longer have a function in their descendents (such as the appendix in humans). Vestiges of such organisms are left behind in the process of evolutionary change. Rudiments prove that species derive from one another, which must occur as part of a plan. Otherwise, rudiments would have to be regarded as mistakes made by the Creator, which is inconceivable. They also evidence nature's planned economy:

So, also, where a special function is required for particular circumstances, nature has provided for it, not by a new organ, but by a modification of a common one, which she has effected in development (197).

Like much of the material sutured together in *Vestiges*, such as the Nebular Hypothesis<sup>19</sup> and Hilaire's anatomy, the book's explanation for the development of new species was not original. *Vestiges* drew on earlier works for the mechanism of transmutation, in particular the "ontogeny

recapitulates phylogeny” theory of Etienne Serres and Friedrich Tiedemann (Secord, Intro. to *Vestiges* xvii). The theory held that an organism’s embryonic development reflected or “recapitulated” the species’ evolutionary history (198-99). The author of *Vestiges* also borrowed from the theory of Karl Ernst von Baer, which involved a process of differential branching from a common type (Secord, Intro. to *Vestiges* xvii). Thus, in the process of gestation, an embryo passes through the final *fetal* stages of its ancestral background. A fetus needs only a longer gestation period to develop into a new, “higher” type.<sup>20</sup>

Thus *Vestiges* combines archetypes, with their roots in Platonic idealism, with erstwhile materialist theories of development, allowing for “modifications of that plan to suit the particular conditions” (192).<sup>21</sup> Along the same lines, *Vestiges* combines natural theology with species transmutation. Rather than a singular creation, or a series of special creations, the organic world evidences a creation “that must have depended upon one law or decree of the Almighty, though it did not come forth at one time” (197). The Creator introduced the secondary laws by which nature would unfold, thus maintaining his dignity and perfection. The anonymity of the book’s author helped to secure the non-denominational character of the Creator, for if the author’s identity were known, so too would be the author’s religion, class, and gender. *Vestiges* is non-committal beyond allowing for an anonymous Creator at least once-removed.

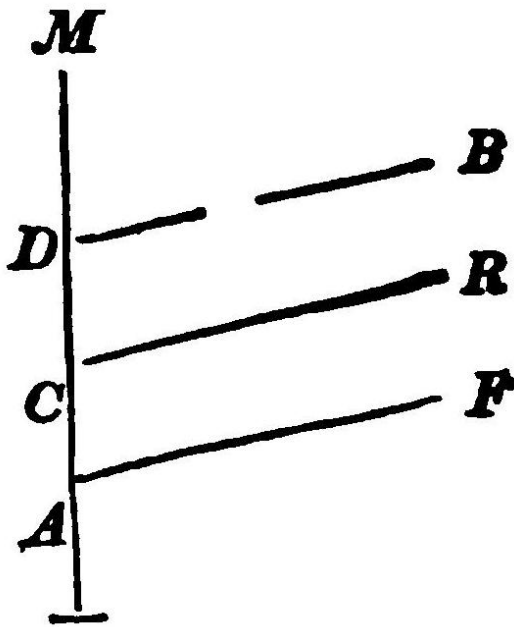


Figure 10: *Diagram of Fetal Gestation and Development* from page 212 of *Vestiges of the Natural History of Creation*. “The foetus of all the four classes may be supposed to advance in an identical condition to the point A. The fish there diverges and passes along a line apart, and peculiar to itself, to its mature state at F. The reptile, bird, and mammal, go on together to C, where the reptile diverges in like manner, and advances by itself to R. The bird diverges at D, and goes on to B. The mammal then goes in a straight line to the highest point of organization at M (212).

### Darwin and Natural Theology

In *Darwin's Metaphor* (1985), a breakthrough work on the impact of Charles Darwin's theory, Robert M. Young argues that Darwin did not usher in the kind of cataclysmic rupture in cosmology that historians following “science versus religion” model had suggested. While Darwin's theory of evolution represented a major paradigm shift in scientific, philosophical and religious thinking, it was, Young suggests, accommodated quite well by the intelligentsia of the period. Rather than representing an epochal war between science and religion, “the evolutionary debate was merely a demarcation dispute within natural theology” (13). That is, the basic paradigm of science operative in

the early nineteenth century, natural theology, was merely extended to accommodate Darwin's thesis. While such an accommodation may not have fully come to grips with the complete implications of Darwin's theory, it nevertheless allowed for an appropriation of evolutionary thought such that the Christian worldview was not turned on its head.

A question remains, however. How could such relatively easy adaptation to Darwinian evolution take place if most leading scientists—including geologist William Buckland, philosopher and “gate-keeper” of science William Whewell, comparative anatomist Richard Owen, and French paleontologist Georges Cuvier—still held tenaciously to one version of creationism or another? Young explained that Darwin did not affect such a rupture in the cosmology of Victorian belief as previously supposed. Rather, *On the Origin of Species* (1859) merely placed God at a greater remove. While God created the universe, henceforth he acted only through secondary causes (e.g., natural selection). Darwin did not kill God; he merely altered his *modus operandi*. At the same time, as if by way of compensation, Victorian faith became a matter of personal experience. “Knowledge” (or experience) of God was had not by the head but by the heart.<sup>22</sup>

Yet Young's thesis left many other questions unanswered. For one, it did not explain why adherents to natural theology remained resistant if not downright hostile to Darwinian evolution. Why did an important scientific luminary and natural theologian like William Whewell lambast evolution if it fit so well within his worldview? More to the point, why did the Victorian crisis of faith precede Darwin by several years if not decades? As we have seen, working-class propagandists for a materialist science produced and disseminated evolutionary ideas well before 1859. Rather than fearing a loss of religious faith or experiencing it as catastrophic, they gladly embraced the materialist doctrines, doctrines that supported their anti-clerical, republican and radically egalitarian worldviews. Middle-class agnostics, meanwhile, had experienced the “loss of faith” as spiritual crisis. Therefore, while it may be true, as Young suggests, that Darwin did not precipitate a crisis in faith, it is also true that materialist ideology had *already begun* to erode the Christian cosmology decades before the *Origin*.

Darwin's ancestors thus at least partially paved the way for the introduction of his theory. At the very least, we know that they alerted him to the consequences of publishing views about the provenance of species at odds with those found in Genesis. We also know that his evolutionary ancestors bore the brunt of state and religious persecution and worked to change laws that spared Darwin similar treatment. They broke legal ground by facing and fighting arrests that Darwin would never encounter.<sup>23</sup> In the case of *Vestiges*, they suggested possible rhetorical strategies that proved effective in warding off a total theological backlash by maintaining a deity and making the work of species “creation” a function of secondary laws ordained by God. They also may have helped to cushion the blow dealt to human hubris and religious belief by introducing naturalistic (albeit rejected) explanations for the appearance (and future disappearance) of human life. And despite the ridicule that they drew, especially in the case of Lamarck, they provided an ancillary mechanism (in the use and disuse of parts) for aspects of inheritance that seemed unaccounted for by natural selection alone. Today, they may provide hints for revisions of Darwin's theory by biologists (re)turning to the agency of organisms in the production of their environments. All together, the recovery of pre-Darwinian evolutionary thought suggests that Darwin's ancestors deserve partial credit for the gestation, eventual delivery, and revision of the theory of evolution.

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<sup>1</sup> The Sociology of Scientific Knowledge (SSK) has been the dominant rubric for historians of science for the past thirty years. Rather than considering science as the necessary result of logical inquiry alone, this approach considers the social

factors and interests involved in the production, exchange and use of knowledge. The tenets of SSK are found in David Bloor's *Knowledge and Social Imagery*. Uses of SSK historiography can be found in, for example, Jack Morrell and Arnold Thackray, *Gentlemen of Science* (1981); Roger Cooter, *The Cultural Meaning of Popular Science* (1984); Steven Shapin and Simon Schaffer, *Leviathan* (1985); Adrian Desmond, *Politics of Evolution* (1989); Steven Shapin, *A Social History of Truth* (1994); James Secord, *Victorian Sensation* (2000); among many others.

<sup>2</sup> See Odling-Smee, Laland, and Feldman, *Niche Construction: The Neglected Process in Evolution* (2003). A search in Bobcat for "niche construction" under Physical Sciences yields a plethora of articles.

<sup>3</sup> Social environmentalism stressed the importance of circumstances or environmental conditions in the production of human character. Locke's theory of knowledge was the philosophical basis of social environmentalism.

<sup>4</sup> Joseph Carroll writes in his introduction to the recent republication of the *Origin*: "The inheritance of acquired characteristics was for Lamarck a secondary or subsidiary mechanism. Darwin himself conceded some limited scope to this latter principle, and progressively more in later editions of the *Origin* as he sought to hedge his bets against criticisms based on problems in the theory of inheritance and the extent of geological time" (30).

<sup>5</sup> James Secord, *Victorian Sensation: The Extraordinary Publication, Reception, and Secret Authorship of Vestiges of the Natural History of Creation* (2000).

<sup>6</sup> The word "scientist" was not used until 1834, when William Whewell coined it to distinguish between the study of the arts and humanities, and that of natural knowledge. As Richard Yeo points out, the term was especially meant to connect the specialists in science under a common rubric, tied together by a common object of natural knowledge. For a history of the word "scientist," see S. Ross, "'Scientist': The Story of a Word."

<sup>7</sup> See Nancy Paxton's fascinating discussion in "Feminism, Evolutionism, Gender" in *George Eliot and Herbert Spencer: Feminism, Evolutionism, and the Construction of Gender* for the relationship between Herbert Spencer and George Eliot in connection with his evolutionary theory as applied to the human sexes. As Paxton observes, Spencer's earlier agreement with the principles of nineteenth-century feminists was later supplanted in his evolutionary theories. Spencer's theoretical tendencies were mirrored by his practical relationship with George Eliot; he rejected her as a lover on the grounds of her lack of "Personal Beauty" (the title of a Spencer essay, 1854). In a subsequent essay, "Physical Training," Spencer argues that "of the many elements uniting in various proportions to produce in a man's breast that complex emotion which we call love, the strongest are those produced by the physical attractions; the weakest are those produced by intellectual attractions..." (qtd. in Paxton 33). Spencer's own rejection of Eliot as a "cultivated intelligence based upon a bad physique" underscores the cultural contingency of his scientific theory. The question is not whether Herbert's theory "benefitted" from his personal experience with Eliot, but rather that his treatment of gender in both were mediated by his own cultural biases.

<sup>8</sup> We would be mistaken if we imagined that such social imagery disappeared as science "progressed." As Lewontin points out, the process of "sexual selection" in animal mating described by Charles Darwin in *The Descent of Man* (1871) resembled "the standard Victorian view of the relationship between middle-class males and females. In reading Darwin's theory, one can see the proper young lady seated on her sofa while the swain on his knees before her begs for her hand, having already told her father how many hundreds a year he has in income" (11).

<sup>9</sup> Not to have males outdone by the power of the female, however, E. Darwin went on to argue that the "imagination" of the male parent may affect the characteristics of the offspring, an imaginative power that "belongs solely to the male."

<sup>10</sup> Citations of Lamarck are from Laura Otis, *Literature and Science in the Nineteenth Century*.

<sup>11</sup> Due in part to the British reaction to the French Revolution and the subsequent Reign of Terror, natural theology, or the use of natural knowledge to affirm divinity, enjoyed an Indian summer between the publication of William Paley's *Natural Theology* in 1802 and the *Bridgewater Treatises* beginning in 1836. In his *Natural Theology* (1802), a seminal work in the discourse of nature, William Paley argued that just as a watch implied a watch-maker, so the created world implied a grand designer. Species were perfectly fitted to their environments by the designer. To suggest otherwise amounted to a criticism of God himself. To include mankind in a process of evolution threatened man's high station and dignity as near angel. Further, to argue that species were not so perfectly fitted, and that change and progress were not

only possible but inevitable, was also to suggest that the social order would also change. In short, such a theory suggested an entirely mutable world, a view that did not sit well with the established Church and the aristocracy that it supported.

<sup>12</sup> As Desmond and Moore point out in their biography, and as noted earlier, Darwin withheld his theory for two decades for fear of being associated with atheism and radical politics.

<sup>13</sup> Darwin's theory hinged on Thomas Malthus's conservative population theory as expounded in his *Essay on Population* (1798). Population, Malthus suggested, grew at an exponential rate, while the food source reproduced arithmetically. If the poor were encouraged to reproduce through poor relief, the artificial increase in population would only be the source of greater misery. Malthus's theory of population and scarcity was indispensable for Darwin's natural selection. Without the scarcity of food, space, or other resources, the differential selection of individuals and varieties would be unnecessary. It is thus inaccurate to suggest that Social Darwinism distorted Darwinian evolution by interpreting the theory in ways that mirrored capitalism. Darwin's theory, as we see, incorporated social, political and economic theory from the outset.

<sup>14</sup> So much damage was done to the name of Lamarck by Soviet agricultural practices by T.D. Lysenko and his followers that Lamarck's ideological potential has been demolished—precisely because it has been deemed ideological. While the jury is out as to what role Lamarck played for Lysenko, the guilt is by association. A full discussion of Lysenkoism is beyond the scope of this discussion. See David Joravsky, *The Lysenko Affair* and Valerii □. Soi □fer, *Lysenko and the Tragedy of Soviet Science*, among others.

<sup>15</sup> Richard Lewontin is chief among them.

<sup>16</sup> The vitalism-materialism debate in Great Britain focused on the question of life: was life a substance or vital influence imparted on matter from without (vitalism), or did life occur “on its own” by virtue of an auspicious set of material conditions, such as organization (materialism)? The public debate in the late teens involved two Professors at the Royal Society of Surgeons, John Abernethy and William Lawrence, and was joined by Thomas Rennell, “Christian Advocate” in the University of Cambridge, and George D'Oyley, reviewing the debate for the *Quarterly Review*. Lamarck was a materialist, but the volitional aspect of his theory can be called vitalist.

<sup>17</sup> Open atheism was illegal in Great Britain for most of the nineteenth century. Southwell was arrested, tried and imprisoned after the fourth issue of *The Oracle* for “The Jew Book,” an inflammatory article in which he denounced the immorality of Biblical tracts. Southwell later admitted that he wrote the piece to incite the authorities to arrest him. As Secord rightly notes, the article was “an ugly attempt to exploit popular anti-Semitism to mock the Bible” (Secord, *Victorian Sensation* 307). Similarly, other materialists, such as William Lawrence, often succumbed to racial thinking when promoting an otherwise progressive agenda.

Holyoake was the next to be imprisoned for his discussion after a Socialist lecture in Cheltenham (Holyoake, *Sixty Years of an Agitator's Life*; Holyoake, *The Last Trial for Atheism in England*; *The Oracle of Reason*). The third editor, Thomas Paterson, was imprisoned for selling blasphemous placards in London. A fourth editor, George Adams, was next imprisoned for selling a copy of the *Oracle*. William Chilton then succeeded Adams, until the *Oracle* was superseded by *The Movement*, edited by Holyoake (Robertson 73).

<sup>18</sup> Here *Vestiges* adopted the theory of homologues and analogues introduced by the French anatomist Geoffrey St. Hilaire. According to Hilaire, homologues were organs derived from a common type put to different uses in different animals, while analogues were observed when the same function was performed by organs having different origins.

<sup>19</sup> For a study of the Nebular Hypothesis, see Simon Schaffer, “Nebular Hypothesis.”

<sup>20</sup> The requirement that many representatives of a species undergo the same change in order for a species change is not addressed.

<sup>21</sup> For a discussion of idealism in nineteenth-century comparative anatomy and its implications for evolutionary theory, see Adrian Desmond, *Archetypes and Ancestors: Paleontology in Victorian London 1850-1875*. Charles Darwin discarded such holdovers from idealism in his theory of natural selection.

<sup>22</sup> For an example of this approach see Francis W. Newman, *The Soul, Her Sorrows and Her Aspirations* (1849).

<sup>23</sup> For evidence that members of Darwin's camp acknowledged the role that earlier freethinkers played in tilling the soil for them, see George Jacob Holyoake, "Characteristics of Prof. Tyndall," in *John Tyndall Memorial* (1894): "I remember meeting Tyndall one day in Dundee, when the British Association for the advancement of science met there. The Duke of Buccleugh was President. Narrow-minded, of little knowledge, and possessing a larger share than was due to him of Scottish intolerance, the Duke had a bad time in the chair while Tyndall was addressing the saints and philosophers assembled. When the meeting was over I said to Tyndall, 'It's very well for you, you have come to Dundee late; the Duke's ancestors would, and I think he would, treat you like a witch, and try the persecution of fire upon you.' 'Ah! Holyoake,' he replied, 'it's very well you went before us. We do but gather where you have sown'" (2).

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