Introduction
How the child lost its tail

> "Come away, children," said the otter in disgust, "it is not worth eating, after all. It is only a nasty eft, which nothing eats, not even those vulgar pike in the pond."
>
> "I am not an eft!" said Tom; "Efts have tails."
>
> "You are an eft," said the otter, very positively; "I see your two hands quite plain, and I know you have a tail."
>
> "I tell you I have not," said Tom. "Look here!" and he turned his pretty little self quite round; and, sure enough, he had no more tail than you.[1]

Only three years after Charles Darwin's *On the Origin of Species* (1859) brought the theory of evolution by natural selection to the British reading public, Charles Kingsley converted it into a child's tale. In *The Water-Babies: A Fairy Tale for a Land-Baby* (serialized 1862–1863), an orphaned chimney sweep named Tom falls into a river and is suddenly metamorphosed into an newtlike "water-baby." From this new animalized starting point, he must re-evolve back into a human boy, but just how bestial Tom's new body is remains ambiguous. The narrator tells us that Tom is now "3.87902 inches long, and having round the parotid region of his fauces a set of external gills (I hope you understand all the big words) just like those of a sucking eft."[2] Though Tom has the anatomical features of an eft and is not sure what other species he might be, he draws the line at the otter's assertion that he has a tail. Kingsley's narrator concurs, saying, "sure enough, he had no more tail than you."[3] Rather than resolve the issue, however, this phrasing only transforms the question about whether or not Tom has a tail into an inquiry about whether or not the implied child reader has one. Evolutionary theory provided no clear answer. Lord Monboddo, an eighteenth-century Scottish judge and philosopher, was famously convinced that all humans are born with tails and that midwives, doctors, and nurses conspiratorily clip them off after birth.[4] Less dramatically, Darwin confirmed in *The Descent of Man, and*

Figure 1 From Charles Kingsley, *The Water-Babies*, 1863, illustrated by W. Heath Robinson (Boston, MA and New York: Houghton Mifflin, 1915), Title page.

Selection in Relation to Sex (1871) that the human coccyx bone, "though functionless as a tail, plainly represents this part in other vertebrate animals."[5] Kingsley's illustrators came to no consensus either. In a 1915 edition of *The Water-Babies*, W. Heath Robinson offers both possibilities: on the title page, an anatomically human Tom sits astride a tailed fish [Figure 1], but following the table of contents, he is pictured as a baby merman with a back fin, webbed hands, and a tail [Figure 2].[6] *The Water-Babies*, thus, foregrounds the bizarre but intensely critical question at the intersection of Victorian evolutionary theory and child study: to what extent are children animals?

The Victorians did not invent the notion that children are closer to nature than are adults. Cicero referred to animals and children as *specula naturae*, and more recently, Jean-Jacques Rousseau linked the child and the primitive.[7] But after the incursion of evolutionary ideas into the popular imagination, the bestial conception of childhood dictated the way children were to be treated, cared for, and educated. In England and the United States, child advocates borrowed legal and moral arguments from animal protection societies; in 1885, for instance, MP Samuel Smith modeled the Liverpool Society for the Prevention of Cruelty to Children on what he had seen at the Royal Society for the Prevention of Cruelty to Animals (RSPCA) meetings.[8] By the last decade of the century, the animal child was a staple in pediatrics and child psychology. Physician Louis Robinson's

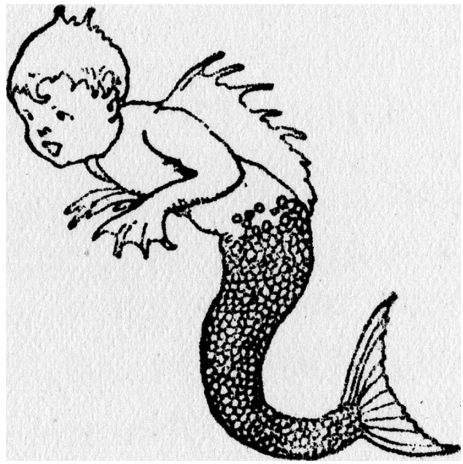

Figure 2 From Charles Kingsley, *The Water-Babies*, 1863, illustrated by W. Heath Robinson (Boston, MA and New York: Houghton Mifflin, 1915), Table of contents.

"Darwinism in the Nursery" (1891) argues that the intensity of the infant's grip, the muscularity of his arms, and his smaller lower limbs present "a striking resemblance to a well-known picture of the celebrated chimpanzee 'Sally' at the Zoological Gardens."[9] In "Babies and Monkeys" (1894), S. S. Buckman claims that "the scar which the loss of the tail has still left on children's bodies" links babies to a particular class of primates.[10] Child psychologist Milicent Shinn's *Biography of a Baby* (1900) points to the "curious resemblances between babies and monkeys, between boys and barbaric tribes" that help explain behavior as much as anatomy.[11] Likewise, James Sully's *Studies in Childhood* (1896) begins with the founding idea that for the infant "life is outward and visible, forming a part of nature's spectacle; reason and will, the noble prerogatives of humanity, are scarce discernible; sense, appetite, instinct, these animal functions seem to sum up the first year of human life."[12] Between the publication of *Origin of Species* and the beginning of the twentieth century, the association between babies and monkeys, children and animals, and boys and barbarians ceased to be a mere metaphorical formulation and became a morphological "fact" with vital psychological, moral, pedagogical, and literary consequences.

Louis Robinson, Buckman, Shinn, and Sully ground their arguments about infant and child life by extrapolating the "law of recapitulation": a corollary of evolutionary theory contending that, during gestation, the

human embryo rehearses the evolution of the species, passing through all the lower animal stages from amoeba to man. This thesis about embryological development was shared, to varying degrees, by most evolutionists in the Victorian period. In his Notebook B (1837–1838), Darwin maintains that "every step of progressive increase of organization being imitated in the womb" replicates that "which has been passed through to form that species."[13] By *Origin of Species*, he may have no longer endorsed the literal equation between individual and species – though to what extent he did is disputed – but his theory of modification counted embryological recapitulation among its foundational pieces of evidence.[14] *Descent of Man* includes sketches of dog and human embryos to show their remarkable similarity; both, by the way, have noticeable tails [Figure 3]. Herbert Spencer first applied the word "evolution," which previously referred to individual growth, to the collective adaptations of a species and in 1852 claimed that ontogenic growth suggests that phylogenic transformation is possible.[15] Just as vital to Victorian conceptions of evolution was Robert Chambers's bestseller *Vestiges of the Natural History of Creation* (1844), which employs recapitulation to show that man preserves his supreme position in nature even without special creation: if he has risen through the entirety of the animal world to arrive at its pinnacle, "man, then, considered zoologically, and without regard to the distinct character assigned to him by theology, simply takes his place as the type of all types of the animal kingdom, the true and unmistakable head of animal nature upon this earth."[16]

The scientific importance and popular appeal of recapitulation cannot be overstated. In *Ontogeny and Phylogeny* (1977), Stephen Jay Gould maintains that it "provided an argument second to none in the arsenal of evolutionists during the second half of the nineteenth century."[17] Gillian Beer's landmark work *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction* (1983) argues that "the blurring of the distinction between ontogeny – individual development – and phylogeny – species development – in the single term 'evolution' proved to be one of the most fruitful disturbances of meaning in the literature of the ensuing hundred years."[18] Subsequent intellectual histories of evolution – Dov Ospovat's *The Development of Darwin's Theory: Natural History, Natural Theology, and Natural Selection, 1838–1859* (1981), Peter J. Bowler's *Evolution: The History of an Idea* (1983), Adrian Desmond's *Archetypes and Ancestors: Palaeontology in Victorian London, 1850–1875* (1982) and *The Politics of Evolution: Morphology, Medicine, and Reform in Radical London* (1989), and Robert J. Richards's *The Meaning of Evolution: The Morphological Construction*

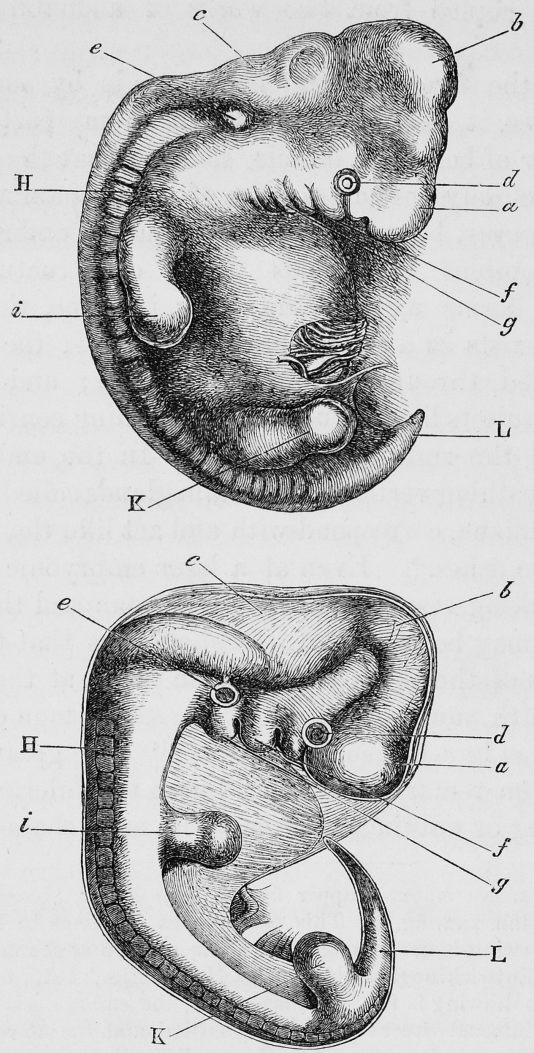

Fig. 1. Upper figure human embryo, from Ecker. Lower figure that of a dog, from Bischoff.

a. Fore-brain, cerebral hemispheres, &c.
b. Mid-brain, corpora quadrigemina.
c. Hind-brain, cerebellum, medulla oblongata.
d. Eye.
e. Ear.
f. First visceral arch.
g. Second visceral arch.
H. Vertebral columns and muscles in process of development.
i. Anterior } extremities.
K. Posterior }
L. Tail or os coccyx.

Figure 3 From Charles Darwin, *The Descent of Man, and Selection in Relation to Sex* (London: J. Murray, 1871), 15.

https://doi.org/10.1017/CBO9781316422700.001 Published online by Cambridge University Press

and Ideological Reconstruction of Darwin's Theory (1992) – continue to affirm the centrality of recapitulation in nineteenth-century biology.[19] Recapitulation appealed to Victorians in part because the analogy between individual and species promised solutions to the most damning disruptions and deficiencies in Darwin's theory. In *Origin of Species*, for instance, Darwin apologizes for the want of intermediate fossil forms transitioning from animal to man that obscured the proof of human evolution. But if ontogeny rehearses phylogeny, then the embryo fills in these lamentable lapses. "The phylogenic [record] is a worn and ancient volume," Shinn writes, "mutilated in many places, and often illegible," lacking "the most interesting chapter," but "a fresh copy of the whole history, from alpha to omega, is written out every time an infant is conceived, and born, and grows to manhood."[20] Perhaps recapitulation's greatest charm was less its scientific use-value than its palliative elegance. Darwinism depicted humans as an accident of random natural processes, but, as Chambers's enthusiasm attests, recapitulation reaffirmed the distinction of humanity and the teleological nature of human development.

While recapitulation assuaged some concerns about our place in the organic universe, it engendered new anxieties about childhood development. Though, in its rigorously scientific formulation, the "law" applies only to embryos, it was quickly extrapolated into a description of children. Louis Robinson claims that "an animal until independent of parental care, and even beyond that point, until the bodily structure and functions are those of an adult, is still, strictly speaking, an embryo."[21] In *The Boy Problem: A Study in Social Pedagogy* (1901), the Reverend William Forbush allows the infant a postembryonic existence, but still argues that the individual's route through the stages of the species' history extends into childhood: "the prenatal child passes up through every grade of animal life," and then "after birth this 'candidate for humanity' continues this evolution . . . by repeating the history of his own race-life from savagery unto civilization."[22] Such speculations about child development sparked new questions about the meaning of evolution applied to the individual life: Did the individual's rehearsal of the species' evolutionary history culminate with birth, or did it continue into the first five, ten, or fifteen years of the child's life? Was childhood but a way station on the road to fully realized humanity, a living relic of a still prehuman, even bestial past? If our early ancestors became human only through a series of fortuitous morphological and intellectual accidents, is the child's path to humanity likewise uncertain and indeterminate? Or if it could be controlled, what

early childhood or formalized educational experiences are necessary to secure humanity for the individual child and thus for the future of the species? Embryology may have offered to fill the gaps in human history, but reversing the formula from speculative evolutionary history back to a prescriptive narrative of individual growth generated a crisis about childhood.

Concerns about what evolution meant for childhood development were exacerbated by contemporary debates about elementary education. After the first Parliamentary grant for education in 1833, the government began inserting itself into the school system, which had been primarily controlled by the Church of England and buttressed by charitable societies like the British and Foreign School Society.[23] Demands for cheaper, nonsectarian, and mandatory education ultimately led to the passing of the Elementary Education Act in 1870, which framed a compulsory school system for children between five and thirteen years of age in England and Wales.[24] In the intervening period, from the 1830s to 1870, politicians, educators, and social activists were actively seeking a standard curriculum that could suit both the upper- and middle-class pupils already enrolled as well as the working-class children just entering the system. At the center of the conversation was the vital question: what branch of knowledge was the most valuable to the greatest number of pupils? With Dissenters and nonsectarians challenging the Church of England's stranglehold over education, religion was no longer the easy answer.[25] Instead, scientific men like Richard Dawes, John Stevens Henslow, and Henry Moseley were arguing for the moral and intellectual benefits of their own disciplines.[26] But this advocacy of scientific education received its most urgent and influential cry only once it was combined with a theory of recapitulation. The year after the publication of Darwin's *Origin of Species*, Spencer wrote an influential pedagogical treatise entitled *Education: Intellectual, Moral, and Physical* (1860), which asks, "What Knowledge Is Of Most Worth?", and answers: Science.[27] Spencer's reason for this pronouncement was recapitulation. Because the growing child is repeating the evolution of the species, Spencer insists, the child must imitate the gradual advancement of our ancestors' primitive mentation, which involved careful observation, determined experimentation, patient trial and error, and thoughtful deduction and inference. Particularly persuasive among his contemporary pedagogues was Spencer's argument that elementary education must prioritize opportunities to employ the scientific method, because it was through this distinctly scientific mode of thinking that man first raised himself above the lower animals.

Fundamental to Spencer's pedagogy is not simply an argument for increased attention to science but a complementary devaluation of literature. What our ancestors all share, according to Spencer, is their common use of the rudiments of the scientific method; even the lower animals exhibit this impulse to maneuver in and to master the elements of their physical environment. What they do not share is access to written texts. Because reading and writing were late inventions in human evolution – indeed, arising only after human societies could rest from the more pressing demands of immediate survival – Spencer claims that they have no place in early education, but rather they must be postponed to occupy only the advanced students' leisure hours. Comparing human evolution to the cultivation of a flowering plant, he makes the root and the leaves analogous to scientific knowledge, while art and literature are the flowers that blossom only at the end of the growth cycle. "The root and leaves are intrinsically of greater importance," he tells us, "because on them the evolution of the flower depends"; meanwhile, "the fine arts, *belles-lettres*, and all those things which, as we say, constitute the efflorescence of civilization, should be wholly subordinate to that knowledge and discipline in which civilization rests."[28] Spencer's analogy seems to ignore that the flower is essential to the plant's reproduction, ensuring the survival of the species rather than merely decorating the life of the individual. Nevertheless, his argument waged a crucial challenge to the pedagogical power of literature: if children were indeed recapitulating the ascent of the species, then, for Spencer, reading books – performing an act neither beast nor early homonid ever did – is irrelevant (at best) and perverting (at worst) to their proper, evolutionarily prescribed course of development.

Spencer's advancement of science as a universally essential skill-set resonated with policy makers in the decade leading up to the 1870 Elementary Education Act. But beyond the walls of the Victorian school, the so-called Golden Age of children's literature began to flourish. Many canonical children's texts reveal a surprising investment in the theory of recapitulation as well as a critical stance on the Victorian school. *The Water-Babies* invokes evolutionary theory in Tom's inability to determine whether or not he has a tail, just before launching into parodies of Victorian schoolmarms and students, crammed so full of useless facts that their brains literally burst and ooze out of them. Likewise, Lewis Carroll's *Alice's Adventures in Wonderland* (1865) subjects its heroine to morphological metamorphoses and species confusion while mocking pedagogical commonplaces like rote memorization and final exams, and Rudyard Kipling's *The Jungle Book* (1894) imagines the feral child within

a school story as Mowgli is tutored in geography, history, and comparative linguistics by a bear and a panther. The core texts of children's literature, during the genre's defining era, do not simply adopt the theory of the child's bestiality because it was in vogue. Rather, these works confront the maze of questions incited by recapitulation: about the bestial nature of the child, about the incapacity of the current school system to meet the challenge of humanizing him, and, not at all insignificantly, about the value of literature itself within the child's miniaturized evolution in which books might have no part.

Scholarly work on Victorian and Edwardian children's literature describes the genre's Golden Age as its retreat from reality into fantasy, its divestment of a previous commitment to pedagogy, its new allegiance to play, and its whole-hearted adoption of the Romantic celebration of childhood purity and innocence.[29] In *Evolution and Imagination in Victorian Children's Literature*, I argue that this all-too-accepted version of literary history is incomplete; in particular, it eclipses the genre's fascinating encounter with evolutionary science's relocation of the human – and in particular the child – as well as the genre's distinct defense of literature's role within our evolution. Though the writers examined here entertained the recapitulative theory of childhood, their works do not favor scientific education, or even realistic modes of exposition. They invent, elaborate, and celebrate their uniquely literary elements. If bestial children require humanization, these texts suggest, then it is by reading fantastical, nonsensical, parodic, atemporal, and palimpsestic books and engaging in activities and modes of thought available only within literature that they perfect their natures. Imaginative literature, thus, provides singular opportunities for the reader to evolve. Children's literature from 1860 to 1920, now taken for granted as the genre at its strongest, is in fact a wildly successful reaction to cultural pressures placing the genre at its most vulnerable. In this sixty-year period, the genre deftly pushed aside its former devotion to referentiality and verisimilitude and instead crystallized around a set of antirealist literary modes and techniques that are, I will demonstrate, its authors' ingenious transformation of a scientific construction of the child into the era's most eloquent defense of literature.

How the child got its tail

The theory of recapitulation gained such popularity in the second half of the nineteenth century because it provided an alternative evidentiary source for evolution besides the flawed geologic record and because it

promised to restore man's preeminence in the natural world. The idea that the child repeats human evolution also appealed to the Victorians' preferences for historiography and literary genre. According to science historian Peter J. Bowler, evolutionary morphology and, in particular, recapitulation "helped to sustain the progressivist assumptions of the Victorian era, and to deflect attention away from the complexity of real life evolution."[30] Human history, understood to be moving toward ever-advancing goals, elevated Victorians as the latest, and finest, stage. In literature, the nineteenth century saw the dominance of the *Bildungsroman* – a genre that condensed narratives of national and social progress into stories about individual men and women – and, thus, it is hardly surprising that evolution was granted an individual form. The theory of recapitulation provided the nineteenth century with its most grandiose *Bildungsroman*. For recapitulation to take hold of the Victorian popular imagination, it may not have required very solid biological footing, but the controversies and conflicts that surrounded its scientific origination, as we see throughout this book, affected the ways it was adopted into other cultural arenas. The story that this study tells, then, begins with the early-nineteenth-century development of recapitulation and its influence on pedagogical practices.

Though Chambers gave recapitulation a teleological twist in the middle of the century, the first evolutionists to point out the similarities between human embryos and "lower" animals sought to explain the animal kingdom without recourse to a divine plan. At the beginning of the nineteenth century, Jean-Baptiste Lamarck's theory of transmutation challenged the divinely ordained world of natural theology. Instead of God's omnipotent hand molding each organism at Creation, the natural world now appeared to be the result of organisms' individual powers to transform themselves. Richard Owen, renowned and respected anatomist and later curator and director of London's Natural History Museum, was consistently vocal about his distaste for the tenets of Lamarckian evolution, disparaging the scheme for depending on the "self-developing energies" of organisms operating without any need for divine intervention.[31] Strangely, it was a Lamarckian eager to remove God from the picture even more definitively who offered teleology its greatest comeback by paving the way for the analogy between ontogeny and phylogeny. Étienne Geoffroy Saint-Hilaire, Lamarck's colleague at the Muséum d'Histoire Naturelle, sought to disprove George Cuvier's theory that God intermittently interceded in an ongoing creation.[32] Geoffroy instead focused on the "unity of plan," holding that the anatomical similarities among the members of a particular phylum – the bird's wing,

dolphin's fin, and human's hand, for instance – suggested a limited design, and he hoped, therefore, the absence of a designer.

Soon the idea of the "unity of plan" joined with embryology, on the one hand, and a scheme of developmental sequencing, on the other, to solidify the theory of recapitulation. Geoffroy's student, Étienne Serres, looked to embryology for evidence of unities among seemingly separate species. In the 1820s and 1830s, he showed that, though anatomical homologies are obscured as organisms mature, vertebrate embryos resemble each other, and he notoriously pointed out that humans early on display visible gills, as if passing through a fish stage.[33] Geoffroy's "unity of plan" combined with Serres's sequencing of embryological forms to suggest a developmental course from lower-order similarity through advancing differentiation and multiplicity of forms. Early proponents of recapitulation maintained that all vertebrates begin their embryological growth as the simplest backboned animal (cartilaginous fish) and have the potential to advance into the most complex (human beings); what determines species is where along this sequence gestation stops. According to Serres in 1860, "the entire animal kingdom can, in some measure, be considered ideally as a single animal which, in the course of formation and metamorphosis of its diverse organisms, stops in its development, here earlier and there later."[34] Recapitulation, in its early articulation, sought to displace theology with a purely material explanation for biodiversity. But it was taken for granted that the end of this evolutionary process (ontogenic and phylogenic) was man. The idea that humans repeat the evolution of all life on earth reestablished us comfortably as the telos of creation: the "single animal" of which all others are only a part.

The literalized analogy between individual and species was not without its challengers, though recapitulation was ultimately able to absorb even its detractors into itself. John Fletcher, a lecturer in comparative anatomy and physiology at Edinburgh, argued that though individual organs develop along a linear sequence from simpler to more complex forms, the entire embryo never perfectly resembles any adult form; "the fetus collectively," he wrote in the 1830s, "is never formed upon any model but its own."[35] The most comprehensive refutation came from a professor of zoology and comparative anatomy at Königsberg University, Karl Ernst von Baer. Von Baer denied any correspondence between the developing embryo and the adult forms of less complex animals, citing particularities of embryos (dependence on placental fluid, for instance) that did not replicate the adult stage of any organism. An embryo, in other words, is

always an embryo, with its own special adaptations to survive within its immediate embryological environment. Embryological development, according to von Baer, does not progress through the adult forms of lower species, but sequentially diverges from a purely germinal similarity to a unique complexity that determines species. The human embryo, for instance, is first an undifferentiated vertebrate, then a generalized mammal, specialized primate, and finally an unmistakable unique human. In 1828, von Baer maintained that "the more homogeneous [*gleichmässiger*] the entire mass of the body, the lower the stage of development. We have reached a higher stage if nerve and muscle, blood, and cell-material [*Zellstoff*] are sharply differentiated. The more different they are, the more developed the animal."[36] Without repeating lower animal forms, the embryo develops from the general to the special: from homogeneity to heterogeneity.

Such objections were technical, and though they may have swayed embryologists, the idea that individual development encompasses the entire animal kingdom had a popular appeal that they did little to dampen. Chambers, for instance, was familiar with von Baer's rebuttal to recapitulation, claiming to have read William Carpenter's 1839 digest of von Baer's work, and *Vestiges of the Natural History of Creation* defers to the German anatomist: "it has been seen that, in the reproduction of the higher animals, the new being passes through stages in which it is successively fish-like and reptile-like. But the resemblance is not to the adult fish or the adult reptile, but to the fish and reptile at a certain point in their fœtal progress."[37] Despite this admission, however, Chambers immediately asserts a contrary theory of recapitulation in which a pregnant mother can volitionally extend gestation and, thus, advance her offspring one rung up the evolutionary ladder. Though historians of science debate how much of Darwin's thought relied on recapitulation, Darwin wrote in his *Autobiography* (1892) that "hardly any point gave me so much satisfaction" while working on *Origin of Species* as the embryological similarities among organisms of the same class.[38] He expresses disappointment that credit for this notion had gone to German evolutionists Fritz Müller and Ernst Haeckel who, he says, "undoubtedly have worked it out much more fully, and in some respects more correctly than I did."[39] For his part, Haeckel, a professor of zoology and anatomy at the University of Jena, thought that his codification of the recapitulative hypothesis as a "biogenetic law" was the crucial step in proving Darwinism. In *The Evolution of Man: A Popular Exposition of the Principal Points of Human Ontogeny and Phylogeny* (1874), Haeckel asserts:

> This fundamental law . . . on the recognition of which depends the thorough understanding of the history of evolution, is briefly expressed in the proposition: that the History of the Germ is an epitome of the History of Descent; or, in other words: that Ontogeny is a recapitulation of Phylogeny . . . [T]he series of forms through which the Individual Organism passes during its progress from the egg cell to its fully developed state, is a brief, compressed reproduction of the long series of forms through which the animal ancestors of that organism (or the ancestral forms of its species) have passed from the earliest periods of so-called organic creation down to the present time.[40]

To demonstrate the evidence for recapitulation, Haeckel produced sketches of vertebrate embryos, showing their remarkable similarities, and though he pictorially "exaggerated" these likenesses, according to Edward Larson's recent history of evolution, they were "widely reprinted" and "served as a powerful argument for evolution."[41] Not only did Haeckel assert morphological correspondences, but he also used them to postulate ancestral forms of the higher animals, to construct genealogical lineages, and thus to fill in the gaps of the fossil record, though with generous creative license.[42] But despite his fantastic family trees casting embryological stages back into evolutionary time, he gives us the official formulation of the theory and the familiar phrasing: "Ontogeny is a recapitulation of Phylogeny." By the last third of the century, then, Geoffroy's "unity of plan" had matured into a post-Darwinian narrative with Lamarckian inflections: each organism passes through the lower stages of its ancestors, adding one extra stage at the end of its growth to advance individual and species in tandem. Development seems law-driven, progressive, and, for humans, self-aggrandizing.

Vestiges of the Natural History of Creation, Chambers's pre-Darwinian evolutionary manifesto, popularized the analogy between individual and species, but recapitulation most effectively entered culture when it was revised to suggest that it is not only the embryo but more compellingly the child who, after birth, repeats human history. The principal figure in the extrapolation of recapitulation into childhood was none other than Spencer. Spencer had read Carpenter's digest of von Baer, but the latter's refutation of the recapitulation thesis only led Spencer to amplify the theory. He writes in *An Autobiography* (1904), "I came across von Baer's formula expressing the course of development through which every plant and animal passes – the change from homogeneity to heterogeneity," and he explains that he saw in this formulation a description of the universal progress of organisms, species, civilizations, and even solar systems.[43]

In "Progress: Its Law and Cause" (1857), Spencer says that "in its primary stage, every germ consists of a substance that is uniform throughout," and through a series of "differentiated divisions . . . there is finally produced that complex combination of tissues and organs constituting the adult animal or plant."[44] "It is settled beyond dispute," he concludes, "that organic progress consists in a change from the homogenous to the heterogeneous." Here he takes von Baer's thesis that development moves from generality to specificity, but adds to it the idea of evolutionary advancement across viable lower stages; in other words, lower organisms, lower states of mind, and lower societies are simple and undifferentiated, while their advanced counterparts have differentiated limbs and organs, mental abilities, gender roles, classes, and labor forces.

Within three years of reincorporating von Baer's theory of differentiation back into the very theory of recapitulation that it was meant to refute, Spencer invented his incontrovertibly influential pedagogical philosophy, *Education*. Here he argues that science must rule the elementary curriculum because "the development of children in mind and body rigorously obeys certain laws," passed down through the evolution of the species.[45] Like every organism and social system, children begin simplistically and uniformly, their mental abilities directed only at the universal need for survival, but as they develop differentially, their education too should expand its scope. Acknowledging a quasi-Lamarckian notion of progress, Spencer is clear that there is a specific order to how this widening unfolds: "education," he writes, "must conform to the natural process of mental evolution . . . a certain sequence in which the faculties spontaneously develop."[46] The child is not John Locke's blank slate upon which any text can be written at any time, nor is he Rousseau's simple naïf whose innocence should be preserved. Rather, the child carries with him the script of the entire history of organic evolution, and parents and educators must follow this evolutionarily inscribed text line by line lest they pervert the development of the child. *Education* summarizes the social duty to understand and to preserve this inviolate developmental program with the following pedagogical dictum: "if there be an order in which the human race has mastered its various kinds of knowledge, there will arise in every child an aptitude to acquire these kinds of knowledge in the same order . . . and hence the fundamental reason why education should be a repetition of civilization in little."[47]

Pedagogies based on the individual's reprisal of human civilization precede both Spencer and Darwin. In the 1840s, German professor of pedagogy Tuiskon Ziller applied a Hegelian model of self-perfecting world

spirit to education and proposed a curriculum based on an "epoch theory" of European religious progress; pupils first read Greek myths and then Old Testament legends and New Testament parables, culminating in the story of the Reformation.[48] In England, the analogy between individual development and human history defined not the school's coursework but its social structure. Rugby's reformist headmaster Thomas Arnold considered pupils still heathens in "the boyhood of the human race."[49] To fashion them into Christians, Arnold divided their social development into Old and New Testament phases: for the younger boys, he played the role of the remote disciplinarian, while in their final year, he befriended the pupils, forgave their rule-breaking, and taught them the power of mercy. Following this paradigm, Thomas Hughes's tribute to Arnold, *Tom Brown's Schooldays* (1857), describes its lads as "young Ishmaelites, their hands against every one, and every one's hand against them," until "the solemn prohibitions of the Doctor" bestow upon them the sequential gifts of law and grace in the order of man's religious development.[50] Ziller's epochal curriculum and Arnold's conversionary culture of school governance might seem to have presciently fulfilled Spencer's directive that "education should be a repetition of civilization in little." But the ideal course of instruction that Spencer advocated did not so much reprise particular civilizations, an ascending hierarchy of individuated past societies, as it strove to reenact civilization itself, the prior process of becoming human in the first place.

The civilizing power of science, for Spencer, lay in its methodology. Advocates for scientific instruction in elementary classrooms were characteristically divided – and unclearly so – about whether memorizing scientific facts or exercising the scientific method was the substance of a scientific education.[51] Indeed, for most lay supporters of scientific pedagogy in the early nineteenth century, the reward of a science lesson was an appreciation of God's works. Science here meant natural theology, a philosophy wherein careful observation of nature leads to the pupil's recognition of divine design; for a school system largely controlled by the Church of England until the 1860s, such scientific lessons were appropriately religious.[52] *The Quarterly Educational Magazine and Record of the Home and Colonial School Society* for 1848 gives an example which crystallizes how detached from natural fact such lessons could be: after showing students how silver is refined, the teacher punctuates her lecture by saying, "I have given you this lesson on refining silver, to lead you to understand what Jesus Christ does for us."[53] Rejecting this kind of blatant conversion of science into theology, Spencer proposed a distinctly secular scientific

education, but he was also clear that he did not intend for students to recapitulate a history of scientific thought that taught early misconceptions (like the sun's revolution round the earth) before modern scientific theory. Rather, when he placed science at the core of a recapitulative curriculum, he privileged the scientific method. In *Education*, he urges that "children should be led to make their own investigations, and to draw their own inferences. They should be *told* as little as possible, and induced to *discover* as much as possible."[54] These discoveries, in Spencer's plan, should be guided by the exercise of observation, experiment, deduction, and trial and error: the same reasoning that allowed our ancestors to evolve.

Though a quarter of a century later, Thomas H. Huxley famously debated Matthew Arnold about the merits of pursuing the natural sciences over the literary arts in the university curriculum, Spencer denounced the value of literature in the *elementary* classroom first and much more stridently. Because primitive man could not rely on books to induct him into knowledge of himself, his surroundings, or his means of survival, Spencer disparaged books that substitute reading for self-motivated discovery. In part, he was responding to the way that science lessons were conducted: without the resources or the teacher training in the sciences, early Victorian classrooms relied on texts. In his history of science education in England, David Layton says, "the dependence upon the printed word for the transmission of science led to an ironic situation in which the use of observation and experimentation to acquire knowledge was more read about than practiced."[55] In the decades following the publication of Spencer's treatise, however, school policy makers became more attuned to science not as course content alone but as a distinct methodology for pursuing and discovering that content. The Revised Code of 1881, for instance, states that "it is intended that the instruction in the Science subjects shall be given mainly by experiment and illustration, and in the case of Physical Geography by observation of the phenomena presented in [the students'] own neighborhood."[56]

Spencer's prescriptions were eagerly adopted because they came at a time of transition for the schools. The prospect of extending formal education to working-class pupils made choosing morally edifying and socially productive school subjects even more crucial. Following the Great Exhibition of 1851, Victorian policy makers were acutely aware of the importance of scientific and technological progress to the fate of the nation. Liberal MP William Foster, the Elementary Education Act's principal defender and drafter, lamented in a Parliamentary speech that the poor state of education in England and Wales would soon leave "our work-folk . . . over-matched

in the competition of the world."[57] The language of competition seems drawn from Darwinism, while the urgency of his appeal can be traced back to the shift in popular thinking around the Great Exhibition. The idea that working-class pupils, temporarily removed from the market and the factory, would be returned into the workforce as productive labor reassured middle-class parents worried about mixing their own children with those of the lower classes. Meanwhile, the promise of their children becoming skilled artisans and budding scientists helped convince working-class parents to relinquish the money that could otherwise be earned from their children's work now for the sake of greater economic prosperity later.[58] True universal education became a reality in the United Kingdom only well into the second decade of the twentieth century, and by then, the scientific, political, and pedagogical landscapes had shifted. But in the middle of the nineteenth century, the agitation for compulsory schooling and the push for scientific instruction in the elementary classroom went hand in hand, fortified by evolutionary theory and its accompanying notion of nations pitted against each other in a survival of the fittest.

Not everyone was as unequivocally optimistic as Spencer that science provided children with everything necessary to become fully formed workers, citizens, and humans. Three decades before he took on Huxley over the issue of university education, Matthew Arnold was working as a Schools Inspector and publishing near-annual reports on the state of elementary education. In this official capacity, he advocated for universal education and supported a common curriculum provided that the core was literature. He did not exclude science, proposing what he called "*Natur-Kunde*," an all-purpose course that would confine scientific instruction and limit the proliferation of specialized scientific subjects.[59] But for him, if the goal of the school was to "humanize" its students – a phrase he used often – then only literature could do the job. As early as 1852, he argued, "training [in literature] would tend to elevate and humanize a number of young men, who at present, notwithstanding the vast amount of raw information which they have amassed, are wholly uncultivated."[60] In the 1870s and 1880s, as Spencer's suggested reforms began to take effect, Mathew Arnold became more virulently critical of science, insisting that "the problem to be solved is a great deal more complicated than many of the friends of natural science suppose."[61] Talking about basic instruction in health and hygiene, for instance, he writes,

> To have the power of using, which is the thing wished, these data of natural science, a man must, in general, have first been in some measure *moralised*; and for moralising him it will be found not easy, I think, to dispense with

> those old agents, letters, poetry, religion. So let not our teachers be led to imagine, whatever they may hear and see of the call for natural science, that their literary cultivation is unimportant. The fruitful use of natural science itself depends, in a very great degree, on having effected in the whole man, by means of letters, a rise in what the political economists call *the standard of life*.[62]

Without referencing evolutionary theory directly or naming Spencer, Mathew Arnold's reports nevertheless reveal his working out the claims he will later use against Huxley.[63] Evolutionary theory exacerbated the struggle between science and literature for cultural dominance – a struggle still ongoing today – first in the arena of elementary education and then in the question of children's reading. Spencer and Mathew Arnold exerted significant influence over educational policy, and though science and literature coexisted in the curriculum, their proponents continued to debate their relevance for decades.[64] During this cultural crisis about the comparative merits of literary reading and scientific experiment – sparked by the coincidence of recapitulation's reconstruction of the child and the push to mass schooling – the Golden Age of children's literature was forged.

The descent of the child

In addressing evolutionary theory and recapitulation, children's literature was toying with theories that ominously forecast its own irrelevance. Because the child was repeating the history of the species, Spencer argued, he needed to *do* and not to *read*. Recapitulation, thus, posed what might seem an insolvable problem that best be kept out of children's literature – that is, if a form of this problem had not been constitutive of children's literature from its origins. But, in fact, the conflict between doing for oneself and reading from authority is one of the genre's defining features. Drawn from the theories of Locke and Rousseau, children's literature arises from a philosophy deeply suspicious of textuality and, instead, supportive of unmediated play. In *Some Thoughts Concerning Education* (1693), Locke maintains that "Reading, and Writing, and *Learning*, I allow to be necessary, but yet not the chief Business" of the child's education.[65] According to Locke's theory of the mind as *tabula rasa*, sensory experiences of real-world physical objects are the building blocks of ideas, while reading offers the mind only derivative facts and befuddles the natural growth of rational skills. Rousseau's indictment of books is even more severe; in *Émile; or, On Education* (1762), he virulently declares that "reading is the curse of childhood," infecting the

mind with information that the child has not independently acquired and hence does not really know.[66] Locke denounced all books for children except the Bible and *Aesop's Fables*, and Rousseau, slamming fabulists as little better than liars, suggested only Daniel Defoe's *Robinson Crusoe* (1719) because of its supposed fidelity to natural, untextual experience. Despite their shared derision of children's reading, however, Locke and Rousseau are rightly credited with initiating the invention of children's literature, a genre painfully at odds with itself about what kind of experience it offers the child.

What Locke and Rousseau spawned in the eighteenth century was children's literature that tried to look as little like literature as it could, seeking to mimic raw sensation. Discussing this strange phenomenon of the antitextual children's text, Alan Richardson's *Literature, Education, and Romanticism: Reading as Social Practice, 1780-1832* (1994) cites Richard Edgeworth's preface to Maria Edgeworth's *Early Lessons* (1814). Richard Edgeworth counsels parents that in all good children's books "action should be introduced – Action! Action!"[67] Children's authors crammed texts with action rather than description and, likewise, employed dialogue to mimic real conversation; the goal of the text, it seems, was to dissolve the boundary between fiction and life. The mother narrator of Sarah Trimmer's *An Easy Introduction to the Knowledge of Nature, and Reading of the Holy Scriptures* (1780) asks her son, "is not this a charming place? You know that it is called a meadow. See how green the grass looks, and what a number of pretty flowers! Run about, and try how many different sorts of grass you can find, for it is now in blossom. One, two, three: you have got eight sorts, I declare!"[68] The familiarity of the setting (an English meadow), the narrator's imperatives ("see," "run," "try . . . [to] find"), and the enumeration of potentially tangible objects ("one, two, three") elide the distinction between acting and reading and attempt to present the text as an invitation to unmediated physical experience. Other writers used the opposite tactic; instead of detextualizing their texts, they suggested that everything was text, especially their readers' own minds. Richardson shows that a number of early-nineteenth-century books encouraged "the child to take its place in a discursive universe" by "thematizing the act of reading; training the child to participate in its own textualization by writing about itself; and instilling a sense in the child of its own legibility, its status as a text open to the perusal of its parents and (ultimately) to the all-seeing eye of God."[69] Locke's idea of the child's mind as *tabula rasa* was, thus, converted – through logical contortions – into a pedagogy where reading could substitute for experience because mentation was itself textual.

Children's literature scholars who focus on the genre's enduring Romanticism rarely take up this anxiety about textuality as it continued into the nineteenth century. Since George Boas's *The Cult of Childhood* (1966) claimed that the Victorian literary child "is innocent of all the arts and sciences, unspoiled by the artifices of civilization," scholars have almost universally accepted that the Golden Age children's literature is "closely bound up in the Romantic movement," according to Humphrey Carpenter, and "fundamentally affected by the Romantic concept of childhood," to quote James McGavran.[70] The most ambitious scholarship on children's literature has blamed the genre for using Romanticism to sidestep questions about the child's relationship to textuality. Jacqueline Rose's seminal study *The Case of Peter Pan: or, The Impossibility of Children's Fiction* (1984) argues that children's literature is "impossible": "not in the sense that it cannot be written (that would be nonsense) but in that it hangs on an impossibility, one which it rarely ventures to speak. This is the impossible relationship between adult and child."[71] For Rose, children's literature establishes an unbridgeable abyss between adults and children (such that the latter require their own literature) but then has the adult author speaking to the child reader over the very same abyss that it has asserted. Because the adult cannot speak to the child, the author constructs a fantasy of the child (almost always of the Romantic ideal of presocial and presexual innocence) that stands in for the child he can never get. Children's literature, then, does not speak to any real children, only to the adult's desire. Rose's account is to be credited for helping to make children's literature a serious critical subject, but her insistence on the unequal relationship between the acting adult and the passive child overlooks other textual inconsistencies, such as the genre's contradictory commands that the child both do and read.

There are signs that scholarship is deviating from this model of the passive reader. Marah Gubar's thoughtful *Artful Dodgers: Reconceiving the Golden Age of Children's Literature* (2009) argues that, "rather than promoting the idea that young people are primitive naïfs, these [Golden Age] authors more often characterize the child inside and outside the book as a literate, educated subject who is fully conversant with the values, conventions, and cultural artifacts of the civilized world."[72] Gubar nicely undercuts the model inherited from Locke and Rousseau, illuminated by Rose, and assumed by so many critics, by showing off the savvy, street-smart, and articulate children populating Victorian texts. More importantly, she shows that these texts turn reading into an active, interpretive process, in which child characters manipulate, reassemble, and challenge

the narratives that adults give them. Like Gubar's, my analyses will highlight a more active role for the child reader. But whereas Gubar juxtaposes the "literate, educated subject" that she examines with "the Child of Nature paradigm, which holds that contact with civilized society is necessarily stifling," I do not dismiss the second category as much as break it open.[73] For the second half of the nineteenth century and the beginning of the twentieth century, the "Child of Nature" was no longer the Romantic ingénue; he was not "trailing clouds of glory," as Wordsworth characterized him, but rather dragging behind him vestiges of our savage and bestial prehistory.[74] And because, according to the scientists who defined him, this recapitulating "Child of Nature" required a developmental trajectory seemingly antithetical to textuality, his appearance inside and outside children's books became vexed.

My study is not the first critical exploration of evolutionary theory in nineteenth- and early-twentieth-century children's books, though it is the first to argue that the evolution featured in these books might actually be for children. The assumption that the Victorian child is an echo of the Romantic "Child of Nature" – in which both child and nature are innocent alternatives to erudite adult culture – has proven so resilient in scholarship that any scientific content of children's literature has been regarded as addressing adult, rather than child, readers. One year before Rose's book, U. C. Knoepflmacher argued that Victorian children's literature constitutes the genre's aesthetic zenith because it simultaneously addresses two distinct audiences: child and adult. "It is no coincidence," he writes in "The Balancing of Child and Adult: An Approach to Victorian Fantasies for Children" (1983), "that the self-divided Victorians who found themselves 'wandering between two worlds' in their Janus-like split between progress and nostalgia should have produced what has rightly been called 'the Golden Age of children's books.'"[75] Later literary critics seem to have taken from Knoepflmacher this "Janus-like split" between the child and adult audiences and from Rose the impossibility of the child reader. The result is a children's literature criticism that dodges the question of the child reader's relationship to the text altogether. Nowhere is this more discernible than in the current work on children's literature and evolution, in part because Darwinism seems a subject beyond a child's understanding and in part because the field of literary scholarship has condoned this approach. Alan Rauch's *Useful Knowledge: The Victorians, Morality, and the March of Intellect* (2001), Tess Cosslett's *Talking Animals in British Fiction, 1786–1914* (2006), and Caroline Sumpter's *The Victorian Press and the Fairy Tale* (2008), for instance, admirably discuss the evolutionary

content of Victorian children's books, but they often interpret the references and allusions to contemporary science in this literature as knowing winks to the parent reading over her child's shoulder.[76]

Despite modern critics' claims about the child's exclusion from evolutionary discourse, however, it is clear that Victorian writers and publishers were organizing the genre of children's literature around recapitulation.[77] In the second half of the century, new editions of Aesop's fables filled publishers' catalogs; some specifically attributed their relevance to the theory of evolution. The preface to Joseph Jacobs's *Fables of Aesop* (1889), for instance, admits that the ancient tales are "too simple to correspond to the facts of our complex civilisation," but for children who "pass through . . . the various stages of ancestral culture," they are just right.[78] Fairy tales, too, garnered new value because, as Sumpter recognizes, they were considered "the record of man's earliest spiritual impulses" and, thus, in line with children's development.[79] Victorian folklorist and anthropologist Andrew Lang described his twelve-book project, beginning with *The Blue Fairy Book* (1889) and concluding with *The Lilac Fairy Book* (1910), as a recuperation of prehistoric culture concurrent with the child's archaic character. In the Preface to *The Violet Fairy Book* (1901), he writes, the "tastes [of young readers] remain like the tastes of their naked ancestors, thousands of years ago."[80] And it was not only these oral traditions that received recapitulative reframing. In the United States, popular children's publisher D. Appleton reissued a number of children's texts in a Home Reading Series with a preface praising the works of Darwin, Spencer, and American evolutionary psychologist G. Stanley Hall. The introduction, written by W. T. Harris, the standing U. S. Commissioner of Education, not only affirms that "all nature is unified by the discovery of the law of evolution," but it also asserts that children's literature had best recognize that fact.[81] The Appleton series' edition of *The Story of Oliver Twist* (1897) instructs readers to analyze the initial period of Oliver's life in terms of "The Struggle for Existence" because that is the first phase of all life.[82]

Just what young readers were expected to learn about evolution (either of the species or their own) has remained largely unanalyzed in part because of the scholarly consensus that the Golden Age differentiated itself from previous iterations of the genre by eschewing education and foregrounding the readers' pleasures. This book challenges the assumption that Victorian and Edwardian literature shook off the shackles of social issues like education and science. My analysis of the genre during this period contests the connotations of purity, innocence, and proximity to the divine that the very term "Golden Age" implies. Rather, the

children's texts explored here struggle with the problem of what, or even how, the prehuman, premoral, prerational, and especially preliterate child should read and, in doing so, they intensify the fissures between reading and doing at the genre's core. *Evolution and Imagination in Victorian Children's Literature* argues that many of the best-known and canonized children's works written during the period from just before the publication of Darwin's *Origin of Species* until the First World War not only incorporate the figure of the bestial child into their plots and tropes but also acutely understand that recapitulation's derision of literature demanded a literary response. Post-Darwinian children's writers, thus, faced a new challenge, even as they were working within a genre already immersed in the problem of textuality versus real-world experience. Unlike their predecessors, these writers were not fashioning stories to inscribe Locke's blank slate or to shelter Rousseau's untainted innocent. They, instead, sought to humanize their readers by, first, recognizing their bizarrely liminal inhumanity and, second, articulating how literature could provide the child with the principal modes of intellectual, moral, emotional, and aesthetic evolution.

This study focuses on books for young readers that entertain the theory of recapitulation but that simultaneously reject the drive to become more scientific. For that reason, I do not here examine natural histories or science readers for classroom use, nor do I explore the legions of nineteenth-century texts that introduce themselves as "encyclopedias," "conversations," "practical observations," or "easy introductions" to and about natural facts and processes.[83] My analysis, instead, turns to fanciful children's books that foreground their very literariness by inviting readers to engage with their most exaggerated unrealistic, nonsensical, and intrinsically rhetorical elements. Victorian and Edwardian children's literature is renowned for its use of impractical play, magical metamorphoses, fantastical adventures, and forays into absurdity that, for most scholars working within the field, mark the genre's abandonment of any pedagogical purpose. While these texts discard many of the familiar didactic moves and moral agendas of previous children's literature, for reasons I have hinted at above, I argue that these texts nevertheless advance an education about literature's special role in our evolution. They do not sketch out an education in *belles lettres* that, according to Matthew Arnold, teaches the child "the best which has been thought and said in the world"; such pedagogy would ignore the roots and stem of civilization and give the child only the flowers, to recall Spencer's metaphor.[84] They do, however, demonstrate how the skills acquired and enhanced by reading literature are those that humanize us, and their

emphasis on their literariness suggests that this precise education is available nowhere else.

Examining scientific, pedagogical, and literary constructions of the child, *Evolution and Imagination in Victorian Children's Literature* brings together intertwined and tangled strands of an extensive interdisciplinary conversation about the child's origin, nature, abilities, development, education, and aims. My book broadens the contexts of both the current discussions of nineteenth-century evolutionary theory beyond Darwin and the literary reception beyond novel audiences. In expanding our sense of both the scientific theories and the lay readers in on the conversation about evolution, this study joins recent scholarship, such as James A. Secord's *Victorian Sensation: The Extraordinary Publication, Reception, and Secret Authorship of Vestiges of the Natural History of Creation* (2000), Geoffrey Cantor's, Gowan Dawson's, Graeme Gooday's, Richard Noakes's, Sally Shuttleworth's, and Jonathan R. Topham's collection *Science in the Nineteenth-Century Periodical: Reading the Magazine of Nature* (2004), Aileen Fyfe's and Bernard Lightman's edited volume *Science in the Marketplace: Nineteenth-Century Sites and Experiences* (2007), and Lightman's and Bennett Zon's interdisciplinary anthology *Evolution and Victorian Culture* (2014).[85] Kenneth B. Kidd's *Making American Boys: Boyology and the Feral Tale* (2004) and Dana Seitler's *Atavistic Tendencies: The Culture of Science in American Modernity* (2008) show the influence of evolutionary theory, and in Kidd's case, recapitulation, on early-twentieth-century American literature.[86] Shuttleworth's *The Mind of the Child: Child Development in Literature, Science, and Medicine, 1840–1910* (2010) superbly articulates how instrumental evolutionary theory and recapitulation, in particular, were in Victorian attempts to define childhood sexuality and insanity both medically and psychologically. My work extends her discussion of midcentury fears about the Victorian educational system in texts like *The Water-Babies* and Charles Dickens's *Dombey and Son* (1848). Unique among this excellent critical work addressing the cross-disciplinary terrain on which recapitulation redefined the child in the nineteenth and early twentieth centuries, however, *Evolution and Imagination in Victorian Children's Literature* focuses on how recapitulation altered the children of children's literature, not simply the genre's characters but also its implied readers, and the formal features invented to suit this prehuman audience.

Beyond opening up a new context in which evolutionary thought played out, my book examines the ways in which the assertion of childhood animality within evolutionary theory prompted children's authors to

advocate for literature as the primary conduit to humanity. Here my work not only looks beyond Darwin and the novel but also challenges critical assertions about the relation between science and literature in the nineteenth century. The pioneers of Darwinist literary studies, Beer and George Levine, stressed the intersections, overlaps, and shared rhetoric of Victorian practitioners across disciplinary lines.[87] In the tradition established by Beer and Levine, Lightman's and Zon's recent *Evolution and Victorian Culture* reasserts the cross-disciplinary currents that allowed nineteenth-century scientific theories to flow smoothly within and among the diverse arenas of literature, photography, cinema, art, theater, music, architecture, and dance. Their collection's introduction states, "in a Victorian culture immersed in evolutionary thought, the culture of science and the culture of the humanities were complementary rather than oppositional."[88] However, while the sciences and the humanities may have appeared on better speaking terms then than they do today, they may not have harmonized so melodically as the "one culture" model of Beer and Levine, and now Lightman and Zon. As my book will also do, other scholars are putting pressure on this argument for interdisciplinary accord. Dawson's *Darwin, Literature and Victorian Respectability* (2007), for instance, shows how the link between science and literature was "regularly exploited and manipulated for a variety of strategic reasons" in attempts both to legitimize and to discredit Darwinism.[89] Similarly in *Moral Authority, Men of Science, and the Victorian Novel* (2013), Anne DeWitt maintains that instead of viewing science as a companion discourse, nineteenth-century "novels are attempting to delimit science, defining its concerns as distinct from fiction's – and inferior."[90] For Dawson and DeWitt, science and literature were porous to each other's influences, but simultaneously invested in defining their boundaries.

Though my study explores the ways in which children's literature adopted scientific conceptions of childhood development, which were themselves forged out of a particularly nineteenth-century collusion of evolutionary theory and narrative forms like the *Bildungsroman*, an essential part of the story that this book tells concerns a battle between science and the humanities for pedagogical dominance. The interdisciplinary encounters investigated here were not made up merely of innovative theories now open for artistic experiment or fresh tropes manipulated in novel contexts. Rather, new pressures on the mid-Victorian school system created a practical conundrum for educators and politicians, as well as a clash between disciplines for prominence in the critical questions of what children must learn and how they must learn it. For DeWitt, the novel is

the most fitting literary medium to challenge the mounting cultural authority of the sciences because, she says, "moral cultivation and moral questions more broadly are claimed by the novel as its own domain of expertise."[91] Novels may very well have been the primary conduit for ethical instruction for adults, but children's literature governed the moral and intellectual education of a much more impressionable segment of the population. After the incursion of evolutionary theory into both the public awareness of and the political debates about education, children's authors necessarily confronted the threat that scientific experiment could displace the children's book as the transmitter of knowledge and the replicator of essential human experiences. From 1850 to 1915, the period this book investigates, the genre enthrallingly and ambivalently adapted science to itself and itself to science while it also competed with science as the child's first and most important teacher.

Evolution and Imagination in Victorian Children's Literature recasts the Golden Age, not as the straightforward declension of Romanticism, but as a response to scientific constructions of the animal child recapitulating the course of human evolution. This literature is not the product of a golden age, a mythological period of primordial perfection before a fall. We might say that, like Kingsley's Tom, who reverts to his animal origins so he can redirect his development along a more productive vector, Victorian and Edwardian children's literature returns to the problem at its origin – the conflict between reading and doing – in order to carve out a more formidable role for the literary in human evolution and childhood development. The classic texts of children's literature transform the multivalent meanings and inassimilable incoherencies of the bizarre analogy between individual and species into new ways to imagine the implied child reader and new plots for his ascent. Bringing together nineteenth-century constructions of evolutionary history and the complementary literary investment in the animal child, this book seeks to reveal a unique relationship between what it means to be human and what role literature plays in our humanity. Victorian children's texts made literary experience the pivotal mechanism of human evolution, capable of teaching the child how to retract his bestial "tail" and how to enter instead into a higher, distinctly human world of extraordinary, edifying, and imaginative "tales."

How the child lost its tail

The thesis that ontogeny recapitulates phylogeny – though promising a singular, all-inclusive narrative of universal development – was, in

fact, a fractured and contradictory set of assumptions about the species' past and hopes for its future. Recapitulation rested on an analogy that was at best metaphorical, though it was solidified into a somewhat confused and confusing biological thesis, and then imported into pedagogical debates and youth movements. *Evolution and Imagination in Victorian Children's Literature* demonstrates how these scientific and cultural strands are interwoven through the children's literature of the period, and how this literature then offers back to popular culture and pedagogical discourse new conceptions of childhood distinct from their Enlightenment and Romantic predecessors. But more importantly, this book illustrates how the genre's incorporation of evolutionary tropes and plots was not nearly as significant as its invention of new literary styles and stratagems for both appealing to the not-quite-human reader and completing his (and later her) humanization. The textual features of these children's classics are their authors' distinctly literary mechanisms for humanizing the reader and their ingenious responses to contemporary claims that science could do it better. My chapters are not case studies illustrating either a coherent scientific theory (which recapitulation was not) or a monolithic literary rebuttal (which is similarly chimeric). They are rather linked investigations into how the child's development, the species' history, and the ways that literature could intercede in both were imagined and reimagined from the 1850s, when anxieties about human evolution and universal education merged into a newly concentrated focus on the child, until the 1910s, when concerns about the declining British empire and the impending world war renewed national and international interest in the child's fitness.

The book is divided into two parts. The authors discussed in the first three chapters – Margaret Gatty, Charles Kingsley, and Lewis Carroll – were writing just as evolutionary theory commanded popular attention and collided with the pedagogical debates about whether literature or science provides the better civilizing and more morally edifying instruction. Chapter 1, "The child's view of nature: Margaret Gatty and the challenge to natural theology," opens my discussion of post-Darwinian children's literature with a look at pre-Darwinian texts. Eighteenth- and early-nineteenth-century children's books strove to be scientific, commanding child readers to observe nature and to perform experiments. This conflation between science and literature worked (more or less) when science meant natural theology, a philosophy that saw the natural world and, by an extension taken for granted, the social world as reflections of God's benign and unchanging plan. But Gatty anticipated the disturbance that

evolutionary theory's emphasis on randomness, chaos, and struggle might cause, especially if it were to become the content of universal education. In *Parables from Nature* (1855–1871), she seeks to fortify the literary tradition of natural theology against the incursion of evolutionary theory. If nature fails to display moral order, her parables suggest, then literature should not direct readers toward it, but rather point back to itself and its own visible elements of design.

Kingsley, the subject of Chapter 2, "Amphibious tendencies: Charles Kingsley, Herbert Spencer, and evolutionary education," shared Gatty's investment in divine design, but not her wish for the social and theological status quo. Eagerly accepting the political and religious potential of evolution and applauding the democratic impulse of scientific instruction, he embraced the purely scientific pedagogy initiated by Spencer and, in *The Water-Babies*, attempted to invent a children's book capable of mimicking experiential education even more forcefully than earlier children's literature had done. Whereas Gatty minimizes the "scientific" attributes of children's literature, Kingsley initially emphasizes and expands them. However, while Kingsley thought that scientific experiment could confirm Christianity's moral codes, he also thought that, to believe in God, one must first learn to believe in phenomena not available to the empirical senses. The resulting fairy tale suggests that it is literature, and not science, that grants us access to this realm beyond visible nature. Thus, while *The Water-Babies* begins as a literary manifestation of Spencer's pedagogical prescription, Kingsley ends up infusing his fairy tale with antirealist modes, like nonsense and fantasy, because these literary elements are alone capable of completing the child's evolution to full Christian humanity. Nonsense and fantasy become, for Kingsley, special kinds of didactic tools by which the child escapes scientific materialism and begins to imagine what cannot be seen or tested.

One year after *The Water-Babies*, Carroll's *Alice's Adventures in Wonderland* also employed nonsense, though not for the purpose of effecting the reader's religious conversion. Chapter 3, "Generic variability: Lewis Carroll, scientific nonsense, and literary parody," argues that Carroll was both apprehensive about evolution's destabilizing effect on man and skeptical about religion's ability to set things right. Instead, he offered his child reader language games and linguistic exercises: a focus that aligns *Wonderland* with Matthew Arnold's exaltation of literary education, in contrast to *The Water-Babies*' initial alliance with Spencer's scientific pedagogy. However, while Arnold advocated pupils' memorization of great works, Carroll celebrated his heroine's ability to parody the revered

texts and conventions of children's literature, drawing the readers' attention to the way literary forms can be simultaneously altered and preserved within the new, mutated forms. In *Wonderland*, Carroll illustrates that learning to manipulate literature, especially through parody, models willed change rather than random variation and human control rather than uncontrolled chaos. *Wonderland*'s parodies turn Arnold's pedagogical prescription – of memorized recitation as opposed to Spencer's spontaneous experimentation – on its head, but they nevertheless make one of the nineteenth century's best cases for the humanizing power of literature.

The fourth chapter begins the book's second part. The effects of the 1870 Elementary Education Act were not immediate; science subjects coexisted alongside literary ones, and debates about education shifted away from curricular matters. But the issue of the child's education and its evolutionary underpinnings was revived in the last decade of the century amidst concerns about Britain's imperial prospects. Chapter 4, "The cure of the wild: Rudyard Kipling and evolutionary adolescence at home and abroad," shows that Kipling feared that British civilization, mimicking the life span of an individual, was approaching old age. *The Jungle Book* and *The Second Jungle Book* (1895) express Kipling's hope that the animal child can reinvigorate the race. His portrait of the unapologetically wild "man-cub" Mowgli garnered him admirers, among them Sir Robert Baden-Powell, who established the Boy Scouts, and Hall, through whom Kipling's recipe for British remasculinization was transported to the United States and Canada. This chapter argues that Kipling's desire to preserve the animal exuberance of childhood went much farther than his imitators allowed. *The Jungle Books* articulate a literature of deferral: prolonging, distending, reversing, and pausing the narrative of recapitulation and the traditional forward thrust of the *Bildungsroman*. Ostensibly a salve to the problems of the Empire, the poetics of the Mowgli stories disrupt the very notion of "progress" that undergirds Victorian ideas about empire, education, and evolutionary theory.

Recapitulation enabled a fantasy of cultural masculinization that had no room for little girls. Chapter 5, "Home grown: Frances Hodgson Burnett and the cultivation of female evolution," traces the corresponding evolutionary cast for the girl's development. Little girls were not encouraged to revive their natural savagery in order to fight, but they were urged to stay physically fit and to choose the right partners in order to produce healthy sons, especially in light of an impending world war. Burnett's *The Secret Garden* (1911) tackles the contradictory prescriptions for girls' education, including eugenic directives and more traditional motherhood training,

and combines them in a narrative that transgenders the recapitulative plot usually reserved for boys. Transported from India to England after her parents' death, Burnett's Mary Lennox embarks on a developmental trajectory that both reverses the formula of *The Jungle Books* and expands it even further outward, shifting from the singular male hero to multiple protagonists and imagining the group as the unit of evolution. The "garden" in Burnett's title functions as a transitional stage of development, between natural wildness and gentrified cultivation, but it is the "secret" that becomes central to the girl's and the group's evolution, binding the children together and replacing physical facts with the elevating ability to tell stories about them.

My study draws together the intellectual history of evolutionary theory, the social history of educational reform, and the literary history of the burgeoning genre for children in order to enhance our understanding of all three fields. Children's literature, far from seeking to escape its historical situation and to preserve the child's innocence, instead self-consciously developed nonsense, fantasy, parody, digressive play, metamorphosis, hybrid forms, shifting perspectives, and multiple protagonists in order to counter the call that children be more versed in science for the betterment of the species. Through its investment in pedagogical, sociological, and scientific contexts, this book is concerned primarily with the literariness of children's literature: the collective response to a new scientific conception of human history. Focusing on the adoption of evolutionary theory in child study and children's literature, on the way scientific theory influences literary form, on literature's simultaneous role in reshaping Victorian perceptions of scientific concepts, and on the contested value of the humanities within the rising dominance of science, *Evolution and Imagination in Victorian Children's Literature* is a project about interdisciplinarity itself and about the convergence of these discordant and multidimensional discourses around that inexorably puzzling figure: the child.