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ANNA NEILL

MARVELOUS PLASTICITY AND THE FORTUNES OF SPECIES IN *THE WATER-BABIES*

Abstract. In *The Water-Babies*, the wild, wicked child who matures into a man of science appears to “recapitulate” the story of the human rise to preeminence in the animal kingdom. Yet Kingsley uses evolutionary thought precisely to attack the notion of biological/social progress and the suffering it causes. He does so by identifying the impact of the social and physical environment on individual development and inviting us to consider how the physical interaction between developing mind and developing world affects broader patterns of human behavior. Playfully evoking the evolutionary dynamics involving organism, culture, and species-level traits, he points to a form of extragenetic inheritance prompted by open-ended stories.

Does the writing and reading of fiction affect long-term human social behavior? The question of how imaginative literature has impacted human nature is rather difficult to answer given, of course, the minute period of evolutionary time involved. One way it has been done is by linking creative text to oral storytelling, thereby reverse-engineering the function of fiction back to its Pleistocene origins. The adaptive advantages probably conferred by storytelling, as Denis Dutton so eloquently showed, include “low-cost and low-risk surrogate experience,” as we explore the

“what if” possibilities that might affect our chances of survival; acquiring factual information through rich and striking images; and advancing sociality by encouraging us to explore the beliefs and motivations of other minds. Stories, thus understood, have played a part in our tremendous success as a species. Where other intelligent animals respond to their environments in largely automatic or routinized ways, humans can strategize and manipulate those environments thanks in no small part to the advantages they have accrued through storytelling and story listening.¹

Another strategy—the one I will use here—is to focus on the impact of literary form on human character within the framework of developmental rather than evolutionary time, and from there to consider how interaction between biological development and cultural change might influence patterns of social feeling. For the later Victorians, preoccupied by relationships between heredity and (especially educational) environment, ontogeny and phylogeny, decadent habits and human degeneration, this approach appeared to address key social issues of the time. I shall suggest here that Victorian writers also investigated links between culture and biological evolution in ways that anticipate current inquiry on the subject, including claims for both the stabilizing and transformative effects of art and its capacity to speed up evolutionary change.

As Michael Tomasello has stressed, cumulative cultural evolution, which is enabled in large part by symbolic communication and reproduced through social learning, generates enormous possibilities for navigating and manipulating environments. These accelerate the pace of human evolution well beyond that of natural selection. In the vast societies of the industrial and postindustrial worlds where oral storytelling is no longer a primary source of cultural transmission, another form of symbolic expression—imaginative print culture—stores not only useful facts and ways of interpreting them but also, sometimes, fantastic distortions of our

agreed-upon ways of representing reality. For Tomasello, linguistic symbols “embody the myriad ways of construing the world intersubjectively that have accumulated in a culture over historical time.”² But impossible constructions of the world are also deposited in cultural storehouses, in this case literature, where they can become sites of playful experimentation in the ontogenetic development of intersubjective awareness.

For young readers especially, such literature lifts the constraints on representation that structure other forms of symbolic transmission. This almost certainly, as Dutton shows, reflects an adaptive capacity to construct imaginative laboratories in which we test contingencies, thereby increasing our chances of survival (p. 114). Yet readerly experience of the preposterous and the (im)possible, Charles Kingsley seems to propose in *The Water-Babies*, also decouples assumptions embedded in the broader symbolic world from the process of social and moral development. This, he hints, has its own cumulative effect, shifting cultural landscapes enough to permanently alter the ways in which we think and grow.

I

As Brian Boyd has argued, imaginative culture in the form of stories taps into the human capacity to concoct counterfactual scenarios—distant possibilities and striking forms that provoke shared attention and thereby consolidate social bonds.³ Creativity, thus understood, has implications for the long-term survival and evolution of the species; it enhances our cognitive flexibility in a way that helps us secure the protection of the group. Yet there are implications too for the influence of imaginative culture on evolution as it operates within the infinitely shorter timeframes of individual development and social-historical change. The neuroscientist Jean

Pierre Changeux proposes a neurobiological account of art's influence in both the social and the human biological realms, arguing that it produces a shared conception of the world that is potentially transformative. By triggering empathy, art "makes one aware of oneself as another."⁴ Through a combination of activity in the prefrontal cortex (where mental representations are partly built and where so-called "mirror neurons" enabling us to attribute mental states to others are active) and the activation of emotions in the limbic system, the human brain generates both aesthetic pleasure and moral feeling as it creates or responds to artistic forms.⁵

Complicating this ethical function, Changeux recognizes, are the constraints on both neural plasticity and creativity: the broad set of synaptic connections shared within a species are largely genetically determined; analogously, works of art are delimited by cultural evolution. Indeed, art plays a role in the reproduction of cultural norms, participating in what the social theorist Pierre Bourdieu calls "habitus." In combination with the innate dispositions that we inherit through biological evolution, the network of institutions, archives, and social rules provide unconsciously registered, cultural scripts with which works of art are inevitably complicit. There is no more absolute freedom in creative form than there is limitless plasticity in mental constructions.

Yet striking and novel forms do invoke new patterns of attention and therefore enable, Changeux suggests, an epigenetic, or experience-driven, evolution of neural connectivity. This process shifts our mental representations of the social world and in so doing helps to shape it. It is through these *epigenetic* processes that many synapses form and stabilize.⁶ Following Gerald Edelman, Changeux proposes that natural selection "chooses" the synaptic connections that respond best to environmental demands; neurons then stabilize in an organizational pattern.⁷ Thus, while genes set development in motion—including the division and differentiation of cell

types and the formation of the molecular structures that form the synapse—epigenetic events after birth, which involve interactions with the outside world (understood physically, socially, and culturally), help to shape and regulate the creation of neural networks.

Through “epigenetic opening up of cerebral connectivity to the external world,” then, the brain is shaped by learning and experience.⁸ At the same time, the epigenetic interfacing of brain and world allows us to create and store representations that can be transmitted to future generations. As culture, these representations condense into norms that in turn form part of the environment in which development takes place. Because of the protracted juvenile stage in humans, we enjoy an extended learning period and establish a larger number of interconnecting neurons than other species. Our slow-developing brains make it possible for us to produce, share, and collectively accumulate information about the social as well as the physical environment, even as the world that we collectively make also shapes our individual growth.⁹

II

Charles Kingsley’s *The Water-Babies* knows nothing of genes, cell growth, or neural circuitry. Nonetheless, it addresses questions about biology, culture, and creativity similar to those raised by Changeux. By telling an evolutionary story in the form of a “writerly” text—one that, as Roland Barthes proposed, invites its reader to participate in the production of meaning¹⁰—the novel evokes a fabulous plasticity of literary form analogous to the way creatures “biologically” make and unmake themselves in the fairy-tale logic of the story. At the same time, it situates this apparently unlimited creative freedom in the context of a Victorian world in which industrialization, class oppression, and moral didacticism saturate the moment-

to-moment environment in which the child grows and learns. The water-baby in this story, like the child reader for whom he is a proxy, does not master his environment (in the sense that he acquires an advantage over other species in the aquatic world he explores). Instead, plunged into a Swiftian universe in which living things take on the forms that represent their behavior and freed from the physical and temporal constraints on evolutionary change, he discovers that the most likely route to happiness, his own as well as that of future creatures like himself, lies in richer social behavior—namely, compassionate actions toward his fellow beings.

Rather like *Alice in Wonderland*, *The Water-Babies* is a story about the rebirth and development of a child protagonist whose shape and size apparently depend upon the way he decides to navigate a thoroughly disorienting and often hostile world. Yet, unlike *Alice*, it is structured as an allegory of Christian growth, representing the journey to adulthood as a series of testing encounters in the course of which childish wickedness gives way to an increasingly moral perspective. These are tests directly or implicitly given to the boy-child reader as well, who is reminded to resist the “mischievous tricks in [his] nature”¹¹ and to learn to be a “thorough gentlemen” (p. 65) by taking his lessons from nature (and the Bible) rather than in schoolrooms or drawing rooms. Also unlike Carroll’s story, it does not record the dream sequence of a middle-class child with “nothing to do”¹² but instead the miraculous transformation of an uneducated runaway chimney sweep into an underwater “baby” (or, more accurately, a fetus) who subsequently grows up to become a man of science. *The Water-Babies* thus posits the almost unlimited influence of play on the intellectual and moral development of the human child while at the same time recognizing the socio-environmental constraints on development that, in the nineteenth-century “land-world,” determine how much and what children learn and how, as a result, they grow.

Tom is freed from the narrow world of a laboring child when he is drowned and reborn as a four-inch-long water-baby with a set of gills. He subsequently encounters a variety of fantastic aquatic creatures, whom he is tempted to torture and taunt; but he gradually learns (largely through the influence of mother-like fairies with the hefty allegorical names of Mrs. Bedonebyasyouwould and Mrs. Doasyouwouldbedoneby) that his very behavior toward these animals determines the kind of creature he will become. When he is nasty, greedy, and selfish, prickles grow on his face; when he stops tormenting other creatures, the prickles begin to disappear. As a final test, Tom is sent on another journey, one designed to teach him how to like helping those he doesn't like. He has to find his abusive former master and help him, and through this effort of generosity eventually changes back into a fully human child. On this last adventure, he encounters a variety of even stranger creatures whose peculiar shapes and habits also represent the outcome of particular developmental influences. The various pseudohuman species he discovers are deformed in one way or another by a steam-driven society that stunts the moral and physical growth of its members, just as his own miserable circumstances had prevented his emotional maturation when he was a land child. The story therefore carefully resists linking the moral and spiritual development of the individual to the advance of economic civilization and might, describing, on the contrary, how human potential is suppressed by the social conditions that accompany progress. Industrial technology narrows rather than nurtures the mind of the child and ignores the larger ecological and evolutionary outcomes of that child's concern for, or indifference to, the happiness or suffering of others.

Even as it focuses on individual development, the narrative also ruminates playfully on Charles Darwin's account of the emergence of the human species out of lower forms, and it speculates about the range of anatomical and behavioral outcomes that evolution might have

produced. This phylogenetic, or species-level evolution is, like ontogenetic development, bound up with the effects of industrial technology, exploitation, and greed. In his first set of adventures, Tom meets creatures as morally primitive as himself: an ugly nymph who turns into a conceited dragonfly; gnats who are indifferent to the deaths of their fellows; a gluttonous otter; trout who are too busy filling their bellies to venture, like their more advanced salmon cousins, into the greater world of the sea; and other small-minded beings who cannot look beyond their own needs to see a wider moral horizon. In his final journey, he encounters formerly human societies that have degenerated into lower types, either by vociferously gratifying their most immediate needs without attention to the consequences, or by capitulating to an ethos of material progress that squeezes both body and soul into unnatural shapes. Having passed through a vast pit, “up which was rushing and roaring clear steam enough to work all the engines in the world at once” (p. 155), he visits a series of countries each of which is represented by some grand Victorian project whose effect is to dull or destroy the inhabitants: he travels to the Island of Polupragmosyne, where the builders of the much-mocked 1845 Trafalgar Fountains (which spat muddy water at their ceremonial unveiling) have constructed the Pantheon of the Great Unsuccessful; in the land of Gotham, the inhabitants he meets are so blinded by the hubris of a technology that believes it can refashion nature to its own ends (like planting a hedge around the cuckoo to keep spring all the year) that they have become asses; on the Isle of Tomtoddies, he encounters a people who, as children, were forced to learn so many facts that “their brains grew big and their bodies grew small and they were all changed into turnips” (p. 167); and in the land of Hearsay, he meets a giant who is congenitally driven to run backward because he is descended from the Baconian thinkers who assemble knowledge by afterthought rather than by forethought.

The accumulation of scientific and technical knowledge in each case has produced disastrous evolutionary outcomes.

As it endeavors to reconcile hands-on Christian moral fashioning with evolutionary and developmental ideas, *The Water-Babies* therefore appears to put moral feeling into the framework of biological recapitulation. The bildungsroman-like emergence of the morally upright individual corresponds to that of the physiologically fully human man in evolutionary time. Because the water baby represents both the developing embryo and the developmental stages of through which all organisms pass, it gives imaginative form to Darwin's claim in *On the Origin of Species* that embryology reveals "the hidden bond of connection" in all of life.¹³ In recapitulation theory, the juvenile developmental forms of an advanced species sequence the adult forms of more primitive types, arriving eventually at the pinnacle of the animal kingdom: the adult human form. Recapitulation is generally associated with Ernst Haeckel's "biogenetic law," or the maxim boiled down from his *Generelle morphologie der organismen* (1866) that "ontogeny recapitulates phylogeny," but it had previously had currency among French transcendental morphologists and was championed by the comparative embryologist Étienne Serres in his "Researches d'anatomie transcendente" from the 1820s and 1830s.¹⁴ In 1860, Serres recalled his delight in discovering how human cerebral ontogeny progressed through the forms of fish, reptiles, birds, and other mammals. Recapitulation theory, in Stephen Gould's words, observed a fundamental principle of Romantic biology; namely, that "nature displays a single developmental tendency and a single sequence of forms."¹⁵ This progressive evolution emphasized increasing morphological complexity through the animal kingdom and offered to supply racist anthropology with an analogous hierarchical categorization of human types.¹⁶

Yet Kingsley's story doesn't really show ontogenesis unfolding in a prescribed pattern that follows the map of species development, for Tom's earliest behavioral traits align with the feeble moral characteristics of many of the most culturally "advanced" societies he later discovers as well as those that have degenerated from higher forms. The Doasyoulikes, who sometimes represent Irish "paddies" and sometimes African slaves, and whom Tom learns about in a lesson on evolution given to him by one of the fairies, are a nation who avoid exertion and who live in a climate that barely demands it. As a result, they become increasingly less human and more apelike in appearance, and eventually die out "by bad food and wild beasts and hunters" (p. 130). In their indigence, they forget how to make ploughs, weapons and other tools, lose language; assign supernatural causes to the smoking of the volcano they live under as they discard their knowledge of natural history; and eventually perish. Their physical degeneration and demise combines cultural regression with the pressure of natural selection, which favors more hair as the climate grows colder (for creatures that no longer build houses) and "hulking" shapes that allow swift escape from predators into the trees. But it is also the outcome of indolence in the early stages of life, when each child forgets some of the words he learns from its parents and "has not wits enough to make fresh words for itself" (p. 129). These animals have therefore "thrown their own wits away" (p. 130), and Tom, who saves himself by embarking on his instructive journey is, the fairy warns, at one point similarly in danger "of being turned into a beast" (p. 131).¹⁷

If it does not point to recapitulation, the narrative might instead be seen *here* to link industrious activity with moral improvement. Despite our disgust at the monstrous creations of science that Tom encounters at the end of nowhere, the message we gather from the story of the Doasyoulikes is that human potential may be corrupted by sloth. Children who seek pleasure

rather than productivity will propel the English nation into the degenerate state seen amongst the Irish or in Africa, while those who resist indolence will grow into morally robust men of science, as Tom eventually does. Yet the promise of civilizational advancement through industry has no stronger interpretive purchase on *The Water-Babies* than the theory of recapitulation does since, as the narrator frequently hints, a society that narrowly values scientific and technological progress over other forms of human development will itself produce monstrous cultural growths. In numerous narrative digressions that refer satirically to the cross-generational transmission of industrial culture through forced learning, incomprehensible scientific descriptions or absurd lists of unrelated phenomena are linked as items suitable for the Great Exhibition—the 1851 international celebration of British industrial might. At the same time, the narrator regularly lurches out of the story to steer the boy reader himself away from the forced dogma of science and encourages him instead to frame his encounters with the natural world through imaginative possibility. In response to the anticipated protest from a formally educated child reader, that “water-babies are contrary to nature” (p. 39), he argues that people assume some things do not exist merely because they cannot see them, that the existence of dragons is now proven by pterodactyl fossils, and that in describing an elephant as “fourteenth cousin to a rabbit” (p. 41) we could be accused by those who have never seen or heard of an elephant as speaking contrary to nature. “And if a water animal [like the green drake or dragonfly] can continually change into a land animal, why should not a land animal sometimes change into a water animal?” (p. 42). Science discovers natural phenomena, and particularly the wonders of evolutionary change, in other words, only by imaginatively allowing for their existence, and fairy-tale fantasies will easily do as much for human knowledge as sheer mental and physical slog will do. Tom, after

all, has been “sadly overworked” in the land world, and begins to discover his potential only after he has fallen into the water, where he has “nothing to do but enjoy himself” (p. 49).

However tongue-in-cheek the invitation to believe in fairies precisely because we do not have physical evidence of them might be, it establishes a link between imaginative thought and development that is at the heart of the story and suggests that it is by opening its mind to the unseen that the child may change himself and affect his environment for the better. “Instead of fancying . . . that your body makes your soul, as if a steam engine could make its own coke” the narrator insists, “your soul makes your body, just as a snail makes his shell” (p. 49). Here the figure of the soul as steam initially connects moral to industrial development, but that link is quickly subsumed under the subsequent organic metaphor. As the narrator emphasizes a few pages earlier, organic growth is not mechanical, but instead coterminous with movement and thought: “There is life in you; and it is the life in you which makes you grow, and move and think: and yet you can’t see it” (p. 34). Analogously, in his digression on the “hippopotamus minor,” he mocks the paleontologist Richard Owen’s claim for the supposedly uniquely human “hippocampus minor”—a region of the brain that, according to Owen, determined the absolute difference between humans and apes. In fact, the narrator points out, that difference is found principally in the learned talents “such as being able to speak, and make machines, and know right from wrong, and say your prayers, and other little matters of that kind” (p. 83). Because it is mediated by the transmission and transformation of knowledge and tradition, human nature is neither mechanically nor anatomically predetermined. By imagining the evolutionary outcomes of its own behavior, the child reader may reflect and act upon the environment in which he grows. Like Tom, he is pulled back through evolutionary time, from which point of view (again with fairy help) he then looks ahead to various possible physical human destinies (including

extinction) that represent the likely outcomes of the moral and social development of ancestral beings like himself.

It is therefore difficult to take the narrator entirely seriously when, at the end of the story, he says that Tom himself grows up to be a “great man of science [who] can plan railroads, and steam-engines, and electric telegraphs, and rifled guns, and so forth; and knows everything about everything, except why a hen’s egg don’t turn into a crocodile” (p. 182). What this means, presumably, is that Tom eventually abandons the childish inquiry that propels him playfully through the world and that has allowed him to, as the narrator puts it, “[open] his eyes and ears” (p. 101) to the existence of water-babies and all other manner of creatures in the fairy world. Like the other men of science in the story who scoff at the idea that there is any such thing as a water-baby or that species may degenerate into monstrous lower types, the adult Tom will turn away from the world of fantastic forms that characterize the child’s questioning, and use his inquiring mind instead to serve the great movement of industrial modernity. But the unanswered question, “why a hen’s egg don’t turn into a crocodile” (p. 182), is the one that escapes such instrumental learning. The lingering question as to why chicks don’t turn into crocodiles directs the child reader toward the material constraints in evolution. But in the process of asking it, that child imagines another fantastic fairy-tale creature—half chick, half crocodile—which returns him to the marvelous evolutionary possibilities that Tom discovered underwater. His own metamorphosis belongs to the fairy world, but it enters evolutionary history as the child reader explores what Barthes describes as “the infinite play of the world” in the writerly text.¹⁸ It is in that impossible place of free self-and-world-fashioning that a *fairy* named “Science” announces “the one true doctrine of this wonderful fairy tale”—namely that “that your soul makes your body” (p. 49).

III

Yet, if evolution is fantastic in *The Water-Babies*, imitating the child's imaginative interior world, and thus liberated from the constraints of both biological and cultural heredity, it nevertheless does not invoke a Romantic imaginative transcendence of the *material* world. The opening epigraph to chapter one from Wordsworth's "Lines Written in Early Spring" does lure us in this direction, invoking the authority of the child's voice independent of the adult's, even as it points to the self-fashioning of the human soul, or what "man has made of man" (p. 5). And the adult voice that protests the illogic of land creatures turning into water creatures, or that argues against the concept of degeneration and "things changing downwards into lower forms" (p. 43), suggests that the adult imagination is stunted like that of the speaker in Wordsworth's "We Are Seven" who rejects the child's insistent claim that her dead siblings are part of her living family. Adult minds that deny the greater spiritual vision of life "fancy that such and such things cannot be, simply because they have not seen them" (p. 42). Yet Kingsley's child fancies do not so much point to the higher truths that transcend material realities like death as they represent the contours of the unfolding mind as it explores human and nonhuman worlds.¹⁹ The narrator hints as much when he points out that to dismiss improbable and unknown phenomena as the fancies of childhood is to ignore the marvels that belong to evolutionary history as well as to imagination: "Does [the skeptic] know about the strange degradation of the common goose-barnacles which one finds sticking on ships' bottoms . . . ?" (p. 43). Even as the storytelling narrator here recalls the claim from medieval bestiaries that barnacle geese grow from the branches of trees overhanging water, he also implicitly invokes Darwin, whose extensive research on barnacles over two decades helped him develop the theory of natural selection.²⁰

Indeed, for Kingsley, such overlapping of the marvelous with the material befits the early stages of intellectual development in the individual. In a book of essays on natural history for the young reader, *Madame How and Lady Why*, he proposes that science is “the reading of God’s book” and can do “nothing but good.”²¹ By experiencing nature directly, “learning something of the world about [them] by [their] senses and [their] brain[s],” children learn to defend themselves against “conceit and ignorance.” Natural history should be taught by moving through nature with “the eyes and the senses” and “by watching the common things around you” (pp. xvi–xvii). But at the same time, the lesson must also engage the child’s passion for the fantastic. Kingsley opens *Madame How* with a lesson in geography that draws upon the child listener’s experience of his own outdoor adventures:

All round these hills . . . you see the same shaped glens; the wave-crest along their top and at the foot of the crest a line of springs which run out over the slopes, or well up through them in deep sand-galls, as you call them—shaking quagmires which . . . you love to dance upon in summer time. Now the water of all these springs is nothing but the rain, and mist, and dew, which has sunk down first through the peaty soil, and then through the gravel and sand, and there has stopped. And why? Because under the gravel (about which I will tell you a strange story one day) and under the sand, which is what the geologist call the Upper Bagshot sand, there is an entirely different set of beds, from a place near the New Forest; and in those beds there is a vein of clay, and through that clay the water cannot get, as you have seen yourself when we dug it out in the field below to puddle the pondhead; and very good fun you thought it, and a very pretty mess you made of yourself. Well: because the water cannot get through this clay, and must go

somewhere, it runs out continually along the top of the clay, and as it runs undermines the bank, and brings down sand and gravel continually for the next shower to wash into the stream below. (P. 12)

The child learns that the shape of the glens, which form the landscape of its play, originates in this “strange story” of gravel, sand, and mud deposits. Natural history, in other words, is best absorbed in the *activity* of play, particularly play in nature. Kingsley deliberately contrasts “God’s book, which is science” with bookish learning, for “mere reading of wise books will not make you wise men: you must use for yourselves the tools with which books are made wise; and that is—your eyes, and ears, and common sense” (p. xiii). And he recognizes that learning happens through “the brain and the senses,” so that “you begin to find out that truly Divine mystery, that you had a mother on earth, simply by lying soft and warm upon her bosom” (p. xvi).

This geological lesson, however, is also a fairy story: the reorganization of matter across time is supervised by a fairy named Madame How, whose work is distinguished from the more removed and purposeful influence of another named Lady Why. This latter fairy’s intentions remain outside the province of what senses and brains can teach us, but the child can approach them by humbling himself before the wonders of “Madame How’s” natural world. Lady Why in one sense stands in for Providence: even as the child begins to absorb the fact that nature’s beauties preexist the human lives that can appreciate them, the adult narrator reminds him that there is “one Uncreated who has seen them and enjoyed them from the beginning” (p. 147). Yet the fairies also represent an animation of nature by the young mind that makes the very process of acquiring and storing information about the world also a means of increasing mental

flexibility and the capacity for learning. While Madame How represents the wondrous geological and chemical transformations that lie behind ordinary observable natural objects, Lady Why personifies the effort of mental experiment which penetrates the surface of objects. For instance, she accounts for why fire burns—“that you may take care not to play with it” (p. 4). Her province is “to make all men wise and all men good” (p. 20)—something that is realized in the process of active inquiry, producing knowledge that can in turn be stored and shared. Lady Why can, for example, explain why so many innocent people are killed in an earthquake: it has nothing to do with the will of God, but it does say something about societies that establish “careless and happy” communities in an earthquake-prone area (p. 25).

The boy’s intellectual development, then, is shaped, not top down through adult instruction but in physical and mental activity that helps the growing mind to store useful information about the world. Kingsley’s effort to synchronize his faith with mid-Victorian geology and the evolutionary theories it supported plays out here in the terrain of contemporary education debate. In *Education: Intellectual, Moral and Physical* (1861), Herbert Spencer offered an evolutionist argument against the system of forced learning that Charles Dickens famously linked with industrial development in *Dombey and Son*. In that novel, the child who is made to sit before his books, cramming Latin phrases, is literally worked to death. Spencer begins by asking how education contributes to the self-preservation of the individual and his offspring either directly, in terms of what immediately enhances survival; or indirectly, in terms of the greater social, industrial and commercial progress of nations that in turn secure the welfare of their citizens. Like free trade, he argues, noncoercive education follows the contours of development and expansion in nature.²² The child’s mind, like all things that develop, follows the laws of life, spontaneously becoming more complex.²³ Education should supply knowledge

at a pace appropriate to the unfolding faculties that can absorb it, just as in the child's own self-development, playing with toys helps him to grasp the properties of matter. *The Water-Babies*, echoing Dickens rather than Spencer, refuses to align organic development with industrial progress.²⁴ Immersed in a fantastic marine world rather than in Latin grammar books, Tom gradually arrives at the fully human form that expresses not so much his entrepreneurial potential—his future as a “man of science”—as it does his mature moral recognition of the feelings of other creatures.

In his introduction to the 1868 edition of the Brothers Grimm's *Popular Stories*, John Ruskin declares that children

have no need of moral fairy tales; but they will find in the apparently vain and fitful courses of any tradition of old time, honestly delivered to them, a teaching for which no other can be substituted, and of which the power cannot be measured; animating for them the material world with inextinguishable life, fortifying them against the glacial cold of selfish science, and preparing them submissively, and with no bitterness of astonishment, to behold, in later years, the mystery—divinely appointed to remain such to all human thought of the fates that happen alike to the evil and the good.²⁵

In Kingsley's story, this “animation of the material world” does not occur in “old time”—the premodern realm in which children relive the primitive beliefs of their ancestors—but in the imaginative transformations of modern industrial life. Delighting in creatures with physical characteristics that reflect their own states of intellectual and sympathetic development, the child reader generates a representation of moral order in the natural world that shapes his navigation of

(and therefore his impact upon) the environment he explores. The mystery of “fates”—or evolutionary fortunes—animated through fantastic stories of physical transformation, loops back into the material world.

What Carlyle called “steam-engine utilitarianism”—the system of calculation whereby profit and pleasure rather than spiritual growth become the measure of man’s achievements—is perhaps the central object of Kingsley’s satire.²⁶ The narrator’s efforts to end the story with a traditional moral message combines a reminder that children should be kind to creatures inferior to themselves with an admonition that they learn their lessons and wash in cold water so as to avoid slipping backward into the flat-skulled, wide-jawed, small-brained, ribless, long-tailed, stupid, and dirty ancestral form to which the water-babies partially represent a return (p. 183). The well-scrubbed Tom seems to have slipped out of the fairy story at this point, as does the “dear little man” (p. 182) reader who is likewise instructed to wash and learn. Both are apparently inducted into the forward-moving, recapitulatory logic that aligns progress into adulthood with the forward march of both industrial civilization and human evolution, rather than released into the fluid fantasy world in which, as one of the fairies explains, creatures “make themselves” (p. 149). Yet this “moral” is itself the object of childish frippery. The narrator’s closing remark that “this is all a fairy tale, and only fun and pretense . . . even if it is true” (p. 184) reminds us that the future material world of kinder beings is intimately bound up with our marvelous imaginings of it.

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7. See Gerald M. Edelman, *Neural Darwinism: The Theory of Neuronal Group Selections* (New York: Basic Books, 1987).
8. Changeux, *Physiology of Truth*, p. 209.

9. Changeux, *Physiology of Truth*, pp. 184–210. See also Kenneth J. McNamara, *Shapes of Time: The Evolution of Growth and Development* (Baltimore: The Johns Hopkins University Press, 1997), pp. 298–305; and Michael Tomasello, *The Cultural Origins of Human Cognition* (Cambridge: Harvard University Press, 1999), pp. 14–15.

10. Roland Barthes, *S/Z*, trans. Richard Miller (New York: Hill and Wang, 1974).

11. Charles Kingsley, *The Water-Babies* (Oxford: Oxford University Press, 1995), p. 51.

Subsequent references are inserted in the text.

12. Lewis Carroll, *The Annotated Alice*, ed. Martin Gardner (New York: Bramhall House, 1960), p. 25.

13. Charles Darwin, *On the Origin of Species by Means of Natural Selection*, ed. Joseph Carroll (Peterborough, Ontario: Broadview Press, 2003), p. 373.

14. Stephen J. Gould, *Ontogeny and Phylogeny* (Cambridge, Mass.: Belknap Press of Harvard University Press, 1977), p. 47. See also Jessica Straley, “Of Beasts and Boys: Kingsley, Spencer, and the Theory of Recapitulation,” *Victorian Studies* 49, no. 4 (Summer 2007): 583–607 (588).

15. Gould, *Ontogeny*, p. 37.

16. See Gould, *Ontogeny*, pp. 115–67; and Joshua Garrison, “A Problematic Alliance: Colonial Anthropology, Recapitulation Theory, and G. Stanley Hall’s Program for the Liberation of America’s Youth,” *American Education History Journal* 35, no. 1 (2008): 131–47.

17. Straley, in “Of Beasts and Boys,” makes a strong case for understanding the role of imagination as recapitulative in *The Water-Babies*: the child’s engagement with the literary text itself, she argues, directs it out of savage habits in a way that reenacts ontogenetically the great phylogenetic story of civilization. However, the narrative’s deep ambivalence about the spiritual destiny of civilized man suggests that it recognizes, not a single progressive history of species

whose recapitulation in the human body is assisted by the very cultural forms that progress has produced, but rather a wide landscape of evolutionary possibilities.

18. Barthes, *S/Z*, p. 5.

19. My thanks to Byron Caminero-Santangelo and Paul Outka for their suggestions about the significance of Kingsley's references to Wordsworth.

20. See Rebecca Stott, *Darwin and the Barnacle* (New York: W. W. Norton, 2003).

21. Charles Kingsley, *Madame How and Lady Why* (London: J. M. Dent and Sons, 1926), p. xvii. Subsequent references are inserted in the text.

22. Herbert Spencer, *Education: Intellectual, Moral, and Physical* (New York: D. Appleton and Company, 1897), p. 99.

23. Spencer, *Education*, p. 110.

24. On this subject see Sally Shuttleworth, *The Mind of the Child: Child Development in Literature, Science, and Medicine, 1840–1900* (Oxford: Oxford University Press, 2010), p. 133.

25. John Ruskin, "Introduction," in *German Popular Stories [by] Jacob Grimm [and] Wilhelm Grimm*, ed. Edgar Taylor (London: Chatto and Windus, 1875), pp. v–xiv (p. ix).

26. Thomas Carlyle, *On Heroes, Hero-Worship, and the Heroic in History* (New York: D. Appleton and Company, 1841), p. 198.