

Seeing the Na'vi Way: Respecting Life and Mind in All Organisms

Kyle Burchett

Jake Sully arrives on Pandora already disenchanted with the human race. His identical twin Tommy was murdered by a fellow human being for nothing more than “the paper in his wallet.” Now, as he disembarks from the Valkyrie shuttlecraft, he enters a world where the same thing is happening on a grand scale, where human predators are ready to sacrifice the lives of countless living beings in pursuit of monetary gain. This disrespect for life is symptomatic of what the Na'vi see as the calling card of the Sky People, an insanity for which they have concluded there is no cure.

The Na'vi's intimate connection to all life on Pandora makes humanity's vicious attitude toward the natural world unfathomable to them. The Na'vi *see* the intrinsic value of *all* life. In their eyes, there can be no justification for the wanton destruction of life on Pandora. All of the unobtainium in the world can't buy back the lives destroyed in its acquisition. To disrespect life in others—whether plants, animals, or persons—is ultimately to disrespect oneself. The Sky People act as if they are *apart* from nature, rather than *a part* of it. Failing to *see* the intricate connections among all living things, they have no understanding of the moral significance of their actions—on Pandora or on Earth. The Na'vi, on the other hand, attempt to *see* through the eye of Eywa and evaluate the moral significance of their actions by whether they uphold the balance of life.¹

The Sky People appraise life on Pandora in monetary terms. Parker Selfridge, the face of the RDA Corporation, and his hired gun Miles Quaritch exemplify the worst qualities of blind human ignorance and arrogance. Like Tommy's murderer, they don't hesitate to take life for the

sake of maximizing profits, without a thought for who or what gets crushed beneath their boot heels. Selfridge explains his corporation's position with the spine-numbing coldness of a genuine psychopath: "Killing the indigenous looks bad. But there's one thing the shareholders hate more than bad press, and that's a bad quarterly statement." The ruthless tactics the Sky People employ to extract unobtainium from Pandora have led them to the brink of war with the Na'vi, whose way of life and very existence is threatened by the clear-cutting of forests and strip mining of the land. Unless a cure can be found for the Sky People's insanity, unless they can learn to *see*, they will destroy Eywa the way that they destroyed their own mother, Gaia. Jake carries the weight and the fate of an entire world on his shoulders.

"They Killed Their Mother": The High Price of Insanity

The Sky People pride themselves on their cleverness. Ironically, however, the cleverness of *Homo sapiens* can get in the way of truly rational behavior. The Sky People are so mesmerized by their technological prowess that they are blind to their true place within a biosphere composed of interconnected components, each making an essential contribution to the whole. Consequently, their behavior toward their natural environment is anything but rational—unless imperiling one's own survival by wrecking the biosphere counts as evidence of superior reason. When corporate executives like Selfridge demonstrate their willingness to condemn humanity to extinction for the sake of short-term profits, they evince a deeply twisted, even logically incoherent, system of values. How could the Na'vi not perceive human beings as insane when they fail to *see* what is so incredibly obvious?

No organism can live outside of a fairly well-defined set of environmental conditions, and all life forms are inextricably linked to the environment in which they evolved and are

situated. The Na'vi understand this quite well and are baffled that human beings can't *see* the importance of maintaining the balance of life. The environment and the organisms that are *in* and *of* it play a vital role in one another's maintenance and evolution. The biosphere makes the survival of individual organisms possible, as each plant and animal species helps to preserve the chemical and molecular makeup of the whole. Consequently, extreme alterations to the environment caused by strip mining and the clear-cutting of forests can be devastating to an entire ecosystem. Prolonged environmental degradation on a global scale can lead to the extinction or massive die-off of countless species. As the removal of one species can alter the environment in a way that makes it less able to support other species, the result could be a chain reaction of mass extinction, precisely what seems to have occurred on the dying world of the Sky People. The Sky People have no one to blame for this catastrophe but themselves, as we hear Jake acknowledge in his prayer to Eywa before the climactic battle scene: "See the world we come from. There's no green there. They killed their Mother. And they're gonna do the same here."

In his book, *The Death of Our Planet's Species*, philosopher Martin Gorke warns that we are currently in the midst of a mass extinction event like the one just described. An analysis of the Earth's geologic record indicates that mass extinction events are common in our planet's history, although the current one is unique in not having a natural cause in some cosmic or geological incident, such as an asteroid collision or cataclysmic volcanic eruption.² It is instead a direct result of the irrational behavior of *Homo sapiens*, the supposedly *rational* animal. A steady accretion of scientific data makes it increasingly obvious that our overexploitation of natural resources and burning of fossil fuels are the chief culprits. By even conservative estimates, if we continue reproducing and overexploiting the environment at the same alarming rate of today, at

least fifty percent of all nonhuman species on the Earth will have become extinct within the next hundred years. Listen to Gorke's dire recital of where we are today:

Species are dying worldwide at a rate of about three per hour, or more than seventy per day, and 27,000 per year, each a unique specimen of life that has gradually come to be over hundreds of thousands of years. Extrapolating from present trends, we can expect an even greater increase in the loss of species.³

Gorke reminds us that we of the current generation are not only front row witnesses to the catastrophe, but also bearers of moral culpability. Humanity's culturally-ingrained devaluation of nonhuman life prevents us from *seeing* the rationality of adopting a truly ethical stance toward other species. Our salvation, according to Gorke, depends on setting aside our anthropocentrism and adopting a holistic worldview that recognizes the intrinsic value of the biosphere as a whole and the rich pageant of species and habitats it comprises. As he explains, "In a comprehensive form of environmental ethics both human and nonhuman individuals as well as wholes must be given adequate moral consideration."⁴

When it comes to protecting the Earth's biosphere, perhaps a truly *rational* form of anthropocentrism would be enough. Even if we don't recognize the intrinsic value of *other* species, reason tells us that our *own* prospects for survival are dim unless we start protecting the balance of life on our planet. But this form of rational anthropocentrism gives us no reason to protect species alien to our planet. For the Sky People to respect life on Pandora, they must overcome their anthropocentrism and learn to *see* in the Na'vi way. Just as Eywa's concern extends even to Jake and Grace, despite their being alien to Pandora, so the Sky People must learn to value all life, terrestrial or otherwise, for its own sake.

Philosophers, Dogs, and Viperwolves

The insanity of the Sky People is exemplified by their irrational anthropocentrism, an attitude

that has regrettably been prevalent in Western philosophy since the time of the ancient Greeks. The philosopher Aristotle (384-322 BCE) argued in *De Anima (On the Soul)* that every living thing—plant, animal, or human being⁵—possessed a soul, but he deemed the human soul alone to be capable of rational thought.⁶ Plants were the lowest life form for Aristotle, because they were capable of only feeding, growing, and reproducing. Believing plants to be basically immobile, Aristotle thought they lacked the need, and therefore the ability, to perceive the world around them. He set animals on a higher rung due to their ability to move and perceive, but the pinnacle of mortal powers was the capacity for reason, which he believed belonged exclusively to human beings. Ultimately, he used this hierarchical classification to justify human beings' exploitation of the nonhuman world. In his *Politics* Aristotle claimed that the natural order of things dictated that organisms lower in the hierarchy exist solely for the benefit of those above. No doubt something like this line of reasoning has significantly influenced RDA's corporate philosophy on Pandora. It's simply taken for granted that the Sky People are naturally superior and therefore entitled to commoditize and exploit everything else on Pandora, living or otherwise.

Like Aristotle, the philosopher René Descartes (1596-1650) placed human beings in a category apart from other living things. But even more boldly, he insisted that human beings alone have minds, while nonhuman organisms are simply mindless automata or machines.⁷ He justified this belief by appealing to something that seemed as obvious to him as it does to many people today, namely, that the supposed inability of the other animals to use language “attests not merely to the fact that the beasts have less reason than men but that they have none at all.”⁸ Another reason was the supposedly limited behavioral repertoire of the other animals compared to “rational” human beings.⁹ To deny that a being has a mind is to grant oneself a moral license to commit acts against it that would otherwise be considered horrendous. One such act is

vivisection, cutting open a living organism in order to view the workings of its internal organs, a practice Descartes not only endorsed but also practiced without any qualms. Jonathan Balcombe, in his book *Pleasurable Kingdom*, offers a poignant description of how Descartes would conduct this cruel procedure:

With his blessing, dogs were nailed to wooden boards by their four paws and flayed alive to see the circulation of their blood. The victims' cries, to Descartes and his disciples, were no more the basis for moral concern than the creaks and groans of crushed, rusty metal.¹⁰

Imagine the horror such a sight would have awakened in a Na'vi. With their ability to commune with individual life forms through the neural tendrils that extend from their braided queues, the Na'vi know with absolute certainty that other organisms on Pandora have a mental life. They can participate directly in the subjectivity of other beings, literally *seeing* through the eyes of the organisms with whom they are joined. When Neytiri chooses to save Jake's life from a pack of viperwolves, she recognizes the moral cost. The pain she feels at slaying these animals who "did not need to die" is palpable as she prays over their fallen bodies.

Seeing Through the Eye of Eywa

It's apparent from their vicious treatment of life on Pandora that Selfridge and Quaritch are—ethically speaking—staunch Cartesians when it comes to nonhuman beings. The Na'vi, on the other hand, take life only when necessary to preserve life, and each life is taken with a respectful attitude and a prayer of thanks acknowledging the agency of the organism whose life is sacrificed. Every interaction with another life form has moral import. To deny one's ethical obligations to other life forms is to blind oneself to the interconnectedness of all life within the biosphere. Since Eywa embodies the collective consciousness of all life on Pandora, the experience of each individual organism is ultimately *seen* through the eye of Eywa. As such, the

Na'vi are aware that they must always strive to uphold the balance of life. Not only will they be held accountable by the organisms with whom they interact, but they will also be judged by their own conscience—and ultimately by Eywa's *all-seeing* eye. It is in *being seen* that one truly learns to appreciate the depth of one's moral obligations. *Seeing* in this sense necessitates respecting each part of the interconnected biosphere as an aspect of Eywa to be valued for both its intrinsic worth and its contribution to the global balance of life.

Neytiri is reminded of the ethical implications of her actions when an atokirina alights on the tip of an arrow she had aimed at Jake with the intention of taking his life. She realizes that this seed of the Sacred Tree, a very pure spirit in tune with Eywa, *sees* her actions quite clearly. As a future *tsahik*, an interpreter of the will of Eywa, she cannot afford to ignore such an obvious sign. At this point, however, Jake does not *see*. When Neytiri saves him from the viperwolves, his expression of gratitude may be well-meant, but it's imbued with indifference for the lives taken on his behalf. His indoctrination into Aristotelian and Cartesian humanism is too deeply ingrained. "I just wanted to say thanks for killing those things," he tells Neytiri, who responds by striking him to the ground. Her reaction of utter scorn and disgust indicates the regret she may be feeling at this moment for not having killed Jake herself. How could it possibly be Eywa's will to save the life of one who does not *see*, one who could actually be thankful for a killing? "You do not thank for this," she rebukes the ignorant dreamwalker. "This is sad. Very sad only." It takes the intervention of more atokirina to remind Neytiri again that she is being *seen*. Eywa's decision to protect Jake Sully forces the Na'vi to reevaluate their own notion of what it means to *see*—*seeing* in the Na'vi way, *seeing* through the eye of Eywa, means recognizing the intrinsic value of *all life*, even if that life comes from an alien world.

Wild Justice for All

Human beings tend to believe they invented justice and morality, but many contemporary thinkers have challenged this anthropocentric notion. Some cognitive ethologists—biologists who study the minds of animals by observing their behavior—have concluded that a sense of justice is actually widespread in the animal kingdom. In *Wild Justice*, Marc Bekoff and Jessica Pierce propose that a sense of right and wrong is something that evolves naturally in many social species because of the advantages it confers.¹¹ Shared acts of kindness, known as reciprocal altruism, promote social harmony and contribute to the survival of the individuals and species involved. Bekoff and Pierce argue that the more socially complex a species' interactions, the more highly developed its inherent sense of right and wrong behavior is likely to be. On Pandora, where life forms are able to engage in the most intimate social interactions involving a genuine meeting of minds, we should expect a highly developed sense of justice to be widespread among life forms. It is doubtful that a Na'vi hunter could persuade his or her ikran to commit acts that are morally reprehensible to an ikran. Of course, such a scenario is unlikely in any case due to the Na'vi's own sense of justice.

The Na'vi probably wouldn't be surprised to learn that in experiments conducted on Earth, rats will adamantly refuse to push a lever for food if they know it will also deliver an electric shock to another rat in a neighboring cage.¹² Bekoff and Pierce conclude that these rats sense that it is *wrong* to harm another member of their species with whom they are capable of interacting socially. While the decision to forego food rather than subject a fellow rat to torture may not promote the survival of a conscientious rodent in a laboratory setting, the moral sense shared between two rats would indeed prove advantageous to them in more natural situations. And we might add that these rats exhibit a deeper understanding of morality than Descartes ever

did in the laboratory. Despite the wealth of data supporting the theory that a sense of justice is not unique to human beings, many people still cling to the anthropocentric view. As Bekoff and Pierce explain, “A lot of people have caved in to this assumption [that human beings have morality and other animals don’t] because it is easier to deny morality to animals than to deal with the complex reverberations and implications of the possibility that animals have moral behavior.”¹³

The traditional view of nature *red in tooth and claw* doesn’t hold up under scrutiny when observing the everyday lives of most nonhuman organisms. Even on Pandora, where Colonel Quaritch warns that “every living thing that flies, crawls, or squats in the mud wants to kill you and eat your eyes for jujubes,” most animals pass the greater part of their lives nonviolently. It’s the ignorance of the Sky People that frequently elicits violent reactions from Pandora’s animal life. Foolishly entering the territory of a hammerhead titanotheres—and, even more foolishly, firing off a couple rounds in the animal’s direction—is bound to lead to an unpleasant confrontation. Since the Sky People do not *see*, they have no understanding of the consequences of their behavior toward Pandoran life. “All this is your fault,” Neytiri admonishes Jake, whose ignorant bumbling—“like a baby”—had provoked the viperwolves’ attack that required her to kill them. At that time, Jake viewed them as nothing but walking, stalking nightmares. Later, however, Neytiri shows him a family of viperwolves enjoying an activity more common to their everyday lives—delighting in each other’s company as a contented and highly social group. After witnessing the gentle playfulness and conviviality of the viperwolves, Jake no longer ignorantly demonizes them. As he learns to *see*, he begins to set aside the false belief that the law of the “jungle” is only competition and violence. The natural world is also a place of cooperation and tenderness.

Where There's Life, There's Mind

Grace Augustine is a scientist whose interest in the rational behavior of nonhuman beings represents a paradigm shift that challenges many of the reigning assumptions of her discipline. The contemporary philosophers of mind Alva Noë and Evan Thompson are providing a theoretical framework for this paradigm shift. Their theories shake the foundations of the Aristotelian and Cartesian belief that the rational mind is something apart from the rest of nature.¹⁴ Instead, they argue that where there is life, there is mind, with some degree of consciousness or sentience present in every living being. While there might be significant differences between the consciousness of one organism (say, a bacterium) and another (say, a proud philosopher in his or her ivory tower), these are really just differences in degree rather than in kind.¹⁵ Here we see a parallel to Bekoff and Pierce's argument on wild justice. Differences in the sense of justice between one organism and another might also be only differences in degree, ranging from the primitive sense of fairness exhibited by rats to the abstract principles of justice developed by human beings.

The conceptual framework provided by these theories is useful for describing the type of experiences involved when various organisms on Pandora interact, whether those interactions occur within a single species or across species boundaries. The continuity of mind allows the Na'vi to connect with and understand the minds of other organisms, as the continuity of morality allows those interactions to be conducted in a manner that does not transgress the moral sense of the species involved. Without that continuity, harmonious interactions would be much more difficult, particularly when they involve a linkage of neural tendrils that permits the joined organisms to *see* as one.

Unlike Descartes, Noë and Thompson don't presume that human beings are the only organisms on Earth or elsewhere capable of rational behavior. The gradual and continuous nature of evolution makes the notion of our sudden preeminence as the sole possessors of mind not only incredibly implausible but outright absurd. In the words of cognitive ethologist Donald Griffin, "Evolutionary biologists are rightly suspicious of claims that some trait suddenly appears *de novo*, without any precursors."¹⁶ Of course, this statement equally applies to life on Pandora. Wherever it appears, life implies mind.

Consciousness is experienced by an organism as a whole, the result of body and sense organs interacting with a world of which the organism is an inextricable component. This entails the surprising corollary that an organism need not have a brain in order to have a mind. Plants on Pandora obviously have minds, as is evident from the behavior of the atokirina that remind Neytiri of her moral obligations.

"More Connections than the Human Brain"

Soon after Jake is initiated into the Omaticaya clan, Neytiri leads him to a grove of trees that are sacred to the Na'vi. Connecting the end of his queue to the tendrils of one of the trees, he is amazed to hear the voices of several Na'vi. It is a Tree of Voices, through which the Na'vi have access to the minds of their ancestors, who live on within Eywa. The implications are astounding—the consciousness of each organism on Pandora does not cease at death but continues, embodied within the network of interconnected trees that are globally linked through a complex root system with "more connections than the human brain." The next morning, as one of the Omaticaya, Jake sees the RDA Corporation's heavy machinery roll in to destroy what can never be replaced. Soon after, Tsu'tey rides up to survey the landscape ravaged by the Sky

People's genocidal drive for profit. His look of helpless dread says it all: the Sky People are utterly *insane*.

Sharing some of Tsu'tey's outrage, Grace attempts to enlighten Selfridge as to the significance of the trees that he so thoughtlessly destroyed. "What we think we know," she explains, "is that there is some kind of electrochemical communication between the roots of the trees, like the synapses between neurons." Her futile effort at explanation is met with befuddlement, as Selfridge bursts into sardonic laughter, snapping back, "What the hell have you people been smoking out there?" The notion that a network of trees can embody anything resembling consciousness simply makes no sense in his worldview. His cup, it seems, is already overflowing with assumptions that are beyond question. Deeply ingrained in Selfridge (and others) is the belief that plants are mindless automatons that exhibit as much behavioral versatility as an automatic door.

It may surprise some readers to learn that Grace's research on plant communication is not entirely science fiction, however. Due to the work of biologists such as Anthony Trewavas, the intelligence of plants is no longer the laughing matter that Selfridge makes it out to be. On the contrary, the unquestioned assumption that plants are mindless is being exposed as untenable by new research within the up-and-coming scientific field of plant neurobiology. In fact, Grace's words to Selfridge sound a lot like those of real-world scientist Trewavas when he writes, "From the current rate of progress, it looks as though plant communication is likely to be as complex as that within a brain."¹⁷

The knee-jerk reaction of people like Selfridge may be to insist that plants are inflexible organisms unable to adapt to novel situations, but research by Trewavas and others clearly demonstrates that plants exhibit enormous adaptability to an incredible variety of environmental

factors. Since plants are literally rooted to one location, they can't pull up and move to a different spot when environmental conditions drastically change. Consequently, their survival depends on the ability to adapt to their surroundings by reacting intelligently to changing variables such as light, mineral composition, water, touch, temperature, space, neighboring plants, disease, insects, and many other factors. "Autonomic responses can be rejected," writes Trewavas, since "the number of different environments that any wild plant experiences must be almost infinite in number. Only complex computation can fashion the optimal fitness response."¹⁸ Plants are not mindless automatons, nor are they incapable of movement. Their appearance of immobility is due to our inability to *see* them in their own timescale. It takes sped-up video recordings or time-lapse photography for us to see how much movement is really going on. Plants interact with their environments, constantly performing meaningful actions in response to sensory stimuli.

Even regarding the Pandoran network of interconnected roots that Grace describes, truth may be stranger than fiction. Biologist Tom Wakeford refers to the root networks that connect large communities of plant species as the *wood wide web*. Botanists believe that most plant-to-plant interactions take place underground in the hidden world of roots, where Grace noticed the chemical and electrical signaling that she compared to the many neuronal connections within the human brain.¹⁹ The roots of plants on Earth may also have something in common with our esteemed brains. Flowing through plants are some of the same neurotransmitters found in the brains of human beings and other animals.²⁰ Exposure to environmental stress triggers a dramatic increase in the production of these plant neurotransmitters. On Pandora, where life forms evolved the capacity for deep mental communion, plants may be among the most mindful organisms of all, due to their constant exchange of information through a globally-linked root

network. This would be especially true of the Sacred Tree—the Tree of Souls—whose animal-like seeds, the atokirina, are taken as signs of Eywa's will.

The vast underground networks of interconnected roots that extend across Pandora may also be much closer to science fact than many people can fathom. Botanists now know that virtually all wild plants have fungal networks connected to their roots that can extend, in some cases, for several miles. Along the myriad pathways of this fungal root network, different species of plants and trees share resources with one another in active displays of altruism. Discussing Suzanne Simard's research on such networks, Tom Wakeford writes,

In their exploration of this wood wide web, Simard's teams have found what could be a new principle of dynamic underground interdependence. Shaded plants, many of which are young seedlings struggling for light, are subsidized by those already bathed in sunshine at the top of the forest canopy. There seems to be an equalization process going on underground. Supplies are shared both within and among species: to those without shall be given, and those with plenty shall have it taken away.²¹

These networks defy our long-held presupposition that nature is solely a domain of ruthless competition rather than cooperation. With an uneven distribution of resources both above and below ground, it's more rational for most plants to pool their assets and share. Underground root networks permit them to exchange both information and resources. On Pandora, this sharing is made possible by a linkage of roots that are as intimately intertwined as the joined queues of two Na'vi lovers, mated for life.

Last Shadow

When Jake learns to *see* the Na'vi way, he comes to understand what such *seeing* entails. As *seen* through the eye of Eywa, all life is intrinsically valuable. In order to fulfill his moral obligations in a world where he is now both *seer* and *seen*, he cannot sit back and allow the balance of life on Pandora to be destroyed by the Sky People with their irrational ideologies.

In the final scene of *Avatar*, Jake attains the pinnacle of *seeing* by passing through the eye of Eywa and returning to the world of the Na'vi, a feat that perhaps no other living being on Pandora had ever accomplished. We can only imagine what a profoundly transformative experience it must be to achieve intimacy with the embodied consciousness of an entire world's biota. Jake's transformation bodes well for our own fate. For if—contrary to what the Na'vi believed before witnessing Jake's remarkable evolution from Jake of the Jarhead Clan to one of the People—our insanity *can* be cured and we can learn to *see* the value of protecting the balance of life on Earth, there may still be hope that *Homo sapiens* can avoid its own extinction. Otherwise, Jake Sully may truly be our Last Shadow.

¹ Since the appearance of life on Earth, life forms have adapted to countless biospheres. Due to cosmic and geologic events, a completely unaltered “balance of life” can't be maintained for a species like ours. The “balance” I refer to should be understood as the chemical and molecular composition of a planet's atmosphere, without which life would be impossible for many species. If, for example, carbon dioxide levels in the Earth's atmosphere increased too much, the balance of life would be greatly altered for many species, *Homo sapiens* included. Such a balance can be disturbed by human activities that radically alter terrestrial or aquatic ecosystems.

² Of course, since *Homo sapiens* is a part of nature, all actions undertaken by the species are ultimately natural. However, the natural events I refer to as cosmic or geological are essentially unavoidable. The human-induced mass extinction event, while probable, was not an absolute necessity according to the physical laws of nature responsible for Earth's other mass extinction events. Human beings are capable of choosing a path other than the one they currently stomp upon.

³ Martin Gorke, *The Death of Our Planet's Species: A Challenge to Ecology and Ethics* (Washington: Island Press, 2003), p. 1.

⁴ *Ibid.*, p. 209.

⁵ We should never forget that human beings are in fact animals. The culturally-ingrained notion that we are distinct from the natural world is evident in how “human” and “animal” are generally understood to be mutually exclusive.

⁶ *The Complete Works of Aristotle*, Vol. 1, ed. Jonathan Barnes (Princeton: Princeton University Press, 1984), pp. 659-660.

⁷ One reason Descartes gave for this judgment was the supposedly limited behavioral repertoire of the other animals compared to “rational” human beings. But in saying that he only betrayed his ignorance of what the other animals are actually capable of doing. For a fascinating overview of the incredible versatility of animal behavior, including their capacities for language and tool use, see Marc Bekoff, *Minding Animals: Awareness, Emotion, and Heart* (New York: Oxford University Press, 2002).

⁸ René Descartes, *Discourse on Method in Philosophical Essays and Correspondence*, ed. by Roger Ariew (Indianapolis: Hackett Publishing, 2000), p. 72.

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¹⁰ Jonathan Balcombe, *Pleasurable Kingdom: Animals and the Nature of Feeling Good* (New York: Macmillan, 2006), p. 26.

¹¹ Marc Bekoff and Jessica Pierce, *Wild Justice: The Moral Lives of Animals* (Chicago: The University of Chicago Press, 2009)

¹² This research was conducted in 1959 by Russell Church, although the findings haven't been fully comprehended or taken seriously until recently due to anthropocentric notions that animals such as rats couldn't possibly be moral agents. Bekoff would never condone such cruel research since he has a fundamental attitude of respect for all animals. He merely reports the findings to support his theory that animals are inherently moral beings.

¹³ Bekoff and Pierce, p. 10.

¹⁴ See Alva Noë, *Out of Our Heads: Why You Are Not Your Brain, and Other Lessons from the Biology of Consciousness* (New York: Hill and Wang, 2009), especially chapter 2, "Conscious Life," and Evan Thompson, *Mind in Life: Biology, Phenomenology, and the Sciences of Mind* (Cambridge: The Belknap Press, 2007).

¹⁵ For a brilliant discussion of the social lives and communication of bacteria, see Myra J. Hird, *The Origins of Sociable Life: Evolution After Science Studies* (New York: Palgrave Macmillan, 2009).

¹⁶ Donald R. Griffin, "Afterword: What Is It Like?" in Marc Bekoff, Colin Allen, and Gordon M. Burghardt, eds., *The Cognitive Animal: Empirical and Theoretical Perspectives on Animal Cognition* (Cambridge: The MIT Press, 2002), p. 472.

¹⁷ Anthony Trewavas, "Aspects of Plant Intelligence" in *Annals of Botany* 92: 1-20, 2003, p. 6.

¹⁸ Anthony Trewavas, "The Green Plant as an Intelligent Organism" in František Baluška, Stefano Mancuso, Dieter Volkmann, editors *Communication in Plants: Neuronal Aspects of Plant Life* (Berlin: Springer-Verlag, 2006), p. 3.

¹⁹ In addition, research is currently being conducted into volatiles released by plants above ground as a medium of plant-to-plant communication. See, for example, Velemir Ninkovic, Robert Glinwood, and Jan Pettersson, "Communication Between Undamaged Plants by Volatiles: the Role of Allelobiosis" in František Baluška, Stefano Mancuso, Dieter Volkmann, eds., *Communication in Plants: Neuronal Aspects of Plant Life* (Berlin: Springer-Verlag, 2006).

²⁰ For more details, see Aaron Fait, Ayelet Yellin, and Hillel Fromm, "GABA and GHB Neurotransmitters in Plants and Animals" in František Baluška, Stefano Mancuso, Dieter Volkmann, eds., *Communication in Plants: Neuronal Aspects of Plant Life* (Berlin: Springer-Verlag, 2006).

²¹ Tom Wakeford, *Liaisons of Life: From Hornworts to Hippos, How the Unassuming Microbe Has Driven Evolution* (New York: Wiley, 2001), p. 49.