

## ED PENNIMAN

*Bean Hollow State Beach, 2017*  
Oil on canvas, 30 x 40 in



COURTESY THE ARTIST

## THOMAS CHRISTENSEN

### La Vie en Rose

#### Contemplating consciousness

*Life's but a walking shadow, a poor player  
That struts and frets his hour upon the stage  
And then is heard no more. It is a tale  
Told by an idiot, full of sound and fury,  
Signifying nothing.*  
—Macbeth

One morning in 2016, keepers at the National Aquarium of New Zealand arrived at work to discover the institution's inventory of octopuses unexpectedly halved. Mild-mannered Blotchy remained in his tank, his expression revealing nothing. But Inky, his bold erstwhile companion, was nowhere to be seen.

Sometime during the night, it turned out, Inky had worked his way through a small opening at the top of the tank where a cap plate had been set slightly ajar. From there he had descended to the floor and suckered his way eight feet across it, trailing a telltale drippy track. At that point he slid through a six-inch-diameter, 160-foot-long drainpipe—he could probably hear water noises through it—and plopped into Hawkes Bay, an arm of the vast South Pacific. Whether resentful of his imprisonment or simply curious and adventurous, Inky had returned to the sea. He was free!

It's hard not to see some sort of intentionality in Inky's great escape, a crafty octopean consciousness at work. But René Descartes would have been unconvinced. According to Descartes, only humans possess the nonmaterial mind that he called the *res cogitans*, the realm of thought.

Inky, he would have said, possesses merely corporeal materiality, so his behavior must have occurred within what Descartes called the *res extensa*, the extended realm of noncognitive substantiality. *Cogito ergo sum*, Descartes said—one of philosophy's most famous, and most self-centered, phrases. And something of a fallacious, or at least presumptive, one: What exactly is this “I” that he posits from the presence of thought? Descartes thought, so he thought he was somebody. He did not believe creatures such as Inky could claim the same.

But in 2012 a group of scientists publicly took issue with Descartes. The occasion was the Francis Crick Memorial Conference in Cambridge, England, focusing on “Consciousness in Humans and Non-Human Animals.” It assembled, in the words of the Declaration on Consciousness that it produced in a public signing witnessed by Stephen Hawking, “a prominent international group of cognitive neuroscientists, neuropharmacologists, neurophysiologists, neuroanatomists and computational neuroscientists.” The scientists found that by stimulating parts of animal brains, even without a neocortex (the most recently evolved part of the human brain), they produced behaviors consistent with similar effects associated with emotions in humans.

“The absence of a neocortex does not appear to preclude an organism from experiencing affective states,” the scientists concluded. “Convergent evidence indicates that non-human animals have the neuroanatomical, neurochemical, and neurophysiological substrates of conscious states along with the capacity to exhibit intentional behaviors. Consequently, the weight of evidence indicates that humans are not unique in possessing the neurological substrates that generate consciousness. Non-human animals, including all mammals and birds, and many other creatures, including octopuses, also possess these neurological substrates.”

Good for Inky—I like the way octopuses are specifically included in the Declaration. Yet, with all due respect to the distinguished scientists, I do not see why consciousness must be determined only by reference to its human form. How far is that from Descartes, really?

In a series of 1943 lectures later published under the title *What Is Life?* Nobel Prize-winning physicist Erwin Schrödinger prophetically posited a chromosomal “code-script” governing organic development. Yet he believed

that “consciousness cannot be accounted for in physical terms. For consciousness is absolutely fundamental. It cannot be accounted for in terms of anything else.”

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As a gardener, my strong intuition is that plants are sentient creatures. I think they know when I am standing next to them. Recently I was transplanting a Gruss an Aachen rosebush when the root ball came apart more than I anticipated. I hastily apologized to the plant and assured it that it would be okay and would like its new home. Only plants were around to hear me, so I could speak freely without feeling embarrassed. But when I was shoveling gravel and spilled a spadeful, I let out a brief “oops,” but I didn’t feel the need to apologize to the gravel. Why not? Because the gravel doesn’t appear to be alive. Right?

Which raises the question, what is life? What does it mean to be alive? In natural spaces I often think about that—I do not come to the question from current controversies about abortion or extraterrestrial life but from a deep feeling of wonderment. But it is a difficult question to answer. Maybe life can be defined by opposition to what it is not: it is not dead (if the rose doesn’t survive the transplanting it will no longer count among the living), and it is not inanimate (like gravel). But how can we be sure inanimate things do not possess some spark of spirit? And is death really the termination of life or just a transformation into new forms?

A 1994 NASA committee attempted a working definition of life, which it characterized as “a self-sustaining chemical system capable of Darwinian evolution.” This does not seem adequate to me. How can any living thing be truly self-sustaining? Would it need to be its own environment in which to consume itself and regenerate itself?

In a way, that sounds like the Gaia hypothesis, developed by James Lovelock and Lynn Margulis in the 1970s. (Plato had proposed something similar around 360 BCE.) Gaia was the goddess of Earth in Greek mythology (the name was suggested to Lovelock by William Golding, author of *Lord of the Flies*), and the essence of the hypothesis is that living and seemingly inanimate things together compose a self-regulating system that can be viewed as a kind of organism: the Earth is itself a living creature. It’s a beautiful notion, which to me recalls the Chinese idea

of *tao* as the life force behind all things, both animate and inanimate, which are constantly evolving through cycles of admixtures of yin and yang. But many scientists are skeptical of the theory. Stephen Jay Gould, for example, complained that Gaia is nothing more than “a metaphor.” Semilogists might respond that such is the nature of language. Microbiologist John Postgate suggested Gaia was “pseudoscientific idiocy.” While some say that looking at the planet as an organism encourages holistic conservation, others express concern that, faced with threats such as climate change, the theory might lead to complacency, since it could seem to suggest the planet can regulate itself out of such problems. Then again, one way it might do that is by regulating humans off of it altogether, in which case, if it were the result of our ignoring climate change, one is tempted to say good riddance. I don’t know how Inky feels about it.

Let’s return to the NASA definition of life. Another problem with it is the question of how to assess evolutionary potentiality. Biologists see such potentiality in the composition of the cell, which holds and replicates an organism’s genome, and they see all life as cellular. Specifically, “all life on earth is chemiosmotic,” according to Nick Lane in his provocative book *The Vital Question: Energy, Evolution, and the Origins of Complex Life*, “depending on proton gradients across membranes to drive carbon and energy metabolism.” This means that life is essentially an energy system (analogy could be made to the *qi* of Taoism; concentration of *qi* energy creates life while its dissipation results in death), one that depends on cellular respiration (and, in the case of green plants, photosynthesis). In the respiratory chain, cells power work by generating energy with adenosine triphosphate (ATP), which is the Bitcoin of life, the currency of all biological energy. Cells spend their ATP currency by breaking it down into adenosine diphosphate (ADP), thereby releasing energy. Then, supplied with more sugars, they add a phosphate back to create more ATP, and the cycle continues—if it fails to continue, death occurs. In short, life is not a condition but a process, a kind of bargain or exchange (of protons). It is by its nature social and transformative.

I should mention that many other qualities besides those named by the NASA committee have at various times been offered as essential attributes of life, among them

movement, excretion, growth, responsiveness, metabolism, resistance to entropy, autonomy, and so on. But on close examination all such requirements for life turn out to be problematic, and moreover they seem arbitrary, as if by establishing some set of made-up rules we have worked out the nature of life. As if we can solve the mysteries of the universe merely by tightening our definition of terms.

Looking at life as a transformative cellular energy system brings us to the realization that all living things are related. The rosebush I am moving to a different spot in the garden is my distant cousin. That’s because, according to Lane, “all complex life on earth shares a common ancestor, a cell that arose from simple bacterial progenitors on just one occasion in 4 billion years.” For biologists, “complex life” means eukaryotes, one of the three main branches of life, the others being bacteria and archaea; eukaryotic life (plants, animals, fungi, and protists) probably arose through endosymbiosis, a process Margulis regarded as evidence of planetary cooperation, as opposed to Darwinian competition. Around two billion years ago a bacterial cell became trapped inside an archaeal cell to become the mitochondrion of a eukaryotic cell, eventually giving rise to complex life. (Lane thinks the eukaryotic Eden was an alkaline undersea hydrothermal vent.)

But now new questions arise. First, why must all life be cellular in this way? Consider viruses. Because they lack such cellular attributes as mitochondria and are unable on their own to process ADP in the same way as the cells of plants and animals, most biologists do not consider them to be alive. E.P. Rybicki, in an article in the *South African Journal of Science*, called them “organisms at the edge of life.” Yet they seem to exhibit lifelike behaviors—they evolve and replicate, for example. But do they meet the NASA committee’s requirement of self-sustainability, since they are parasitic on the energy systems of their hosts? Maybe not, but then, do we? We cannot survive apart from constrained environmental supports. At what point does a chemical process result in actual life? Lane concludes from this sort of argument that “plainly there is a continuum between non-living and living, and it is pointless to try to draw a line across it.”

Take bacteria. They are alive, biologists tell us. But are they alive in the same way as more complex creatures? Is there such a thing as microbial intelligence? They can

organize and cooperate. They respond to stresses such as antibiotics and lack of nutrients. An Israeli researcher, Eshel Ben-Jacob, has shown how bacteria communicate in social networks to make individual and collective decisions for the benefit of the group. Ben-Jacob emphasizes directed microbial creativity rather than accidental mutational evolution. “Evolutionary progress,” he maintains, “is not the result of a successful accumulation of mistakes, but is rather the outcome of designed creative processes in the genome.” Issues such as these are explored in the Microbes Mind Forum ([www.microbes-mind.net](http://www.microbes-mind.net)), which posts scientific articles and commentary exploring “how micro and macro scales inform each other.”

“From allergies, to cavities, to asthma—your microbiome is part of the equation,” reads promotional material for an exhibition called *The Secret World Inside You* at the American Museum of Natural History in New York. The exhibition expressed an increased interest in the relationship between micro and macro, about which we are learning more and more—for example, how gut bacteria and archaea send messages to our brains to cause us to crave certain foods. Is it possible that we are merely complex vessels that evolved to serve our microbial masters?

Our deaths, for example, are not accidental failures but planned events. Not necessarily in their particulars but in principle. Consider apoptosis, or programmed cell death. “When a cell undergoes apoptosis,” as Lane describes the process, “it kills itself via a carefully choreographed ballet, the cellular equivalent of the dying swan. Far from simply falling to pieces and decomposing, in apoptosis an army of protein executioners, called caspase enzymes, is set loose from within. These cut up the giant molecules of the cell—DNA, RNA, carbohydrates and proteins—into bits and pieces. The pieces are bound up in little packets of membrane, blebs, and fed to surrounding cells. Within a few hours, all traces of its former existence have gone, airbrushed from history as effectively as a KGB cover-up at the Bolshoi.” He goes on to conclude that “from the standpoint of our constituent cells, death is not all or nothing, it is a continuum.” Like life.

So science seems to bring us back to religion, or to spirituality—to wonder, at least. When organic material can be synthesized from inorganic materials, where does life begin? And what about robotic intelligence—could it



become sentient? Maybe there is something to animism, the ancient idea that there is no significant distinction between the spiritual and the physical. In Shintoism, kami is a kind of spirit or energy that inhabits all things. And not only things. Do places have their own spiritual natures? Gary Snyder suggests as much in *The Practice of the Wild*. You will probably think so too, if you find yourself at the Maya site of Uxmal during the solstice.

If we think this way, do we show respect to our wondrous world, or do we bring ourselves to the brink of fetishism? And do we reach the level of the absurd if we question the autonomy of things themselves—Descartes’s *je*, the rose, the gravel—if we think of all of these as merely transitory, momentary configurations of the constituent parts, if we view the boundaries between things as more fluid than we are accustomed to think? After all, ever since the pioneering work of Niels Bohr, Werner Heisenberg, and others in the early twentieth century there has been a trend in quantum physics to place less emphasis on matter and more on energy (while also seeing the distinction as a false dichotomy). I am reminded of the great seventeenth-century Persian philosopher Mulla Sadra, whom I wrote about in my book *1616*. Mulla Sadra was an existentialist who argued that existence precedes essence. Only God is immutable, he said. Everything reflects divine animation to varying degrees, the rose more than the gravel. So again, according to Mulla Sadra, life and death are not opposite absolutes but points on a continuum. We saw that Nick Lane reached the same conclusion through the route of biology.

Mulla Sadra would argue that everything is alive to some degree (in the sense of animated by divine spirit), but some things possess more vitality than others. (This idea found a twentieth-century echo in the work of French philosophers Henri Bergson and Gilles Deleuze.) I find this a helpful notion. I’ll keep on talking to my roses. The gravel will have to get by without my input.

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I haven’t satisfied myself regarding the nature of life, what it means to be alive. Maybe instead of science and philosophy and religion I should have looked for answers in narrative. Psychologists tell us we define ourselves through our life stories. Through narrative we access the dimension

of time; without it there is only the present moment. And life, as we have seen, is about process. It is about transformation. As is narrative.

Georges Perec’s *Life: A User’s Manual*, which chronicles a multitude of entertaining failures—like my failure to satisfactorily define life—might have something to offer. It is a puzzle of interconnected stories. Paul Auster reads the book as “a parable (of sorts) about the efforts of the human mind to impose an arbitrary order on the world.”

Umberto Eco said that he had come to believe that “the whole world is an enigma, a harmless enigma that is made terrible by our own mad attempt to interpret it as though it had an underlying truth.” He said that “by reading narrative we escape the anxiety that attacks us when we try to say something true about the world.”

Macbeth called life a “tale,” told by an idiot. Cultural ecologist David Abram, a sometime associate of Lovelock and Margulis, has likewise described life as a kind of narrative. “Along with the other animals, the stones, the trees, and the clouds,” he maintains, “we ourselves are characters within a huge story that is visibly unfolding all around us, participants within the vast imagination, or dreaming, of the world.”

The philosopher Zhuangzi dreamt of himself as a butterfly. Afterward he reflected, “Now I do not know whether I was then a man dreaming I was a butterfly, or whether I am now a butterfly, dreaming I am a man. Between a man and a butterfly there is necessarily a distinction. The transition is called the transformation of material things.”

Maybe life is, after all, but a dream.

**Thomas Christensen**, a *Catamaran* contributing editor, lives in the East Bay of the San Francisco Bay Area. He can be reached via [www.rightreading.com](http://www.rightreading.com). His recent books include *1616*, *River of Ink*, and *Landscape with Yellow Birds* (translations of poems by José Ángel Valente). His essay “Shakespeare’s Globe,” about globes and globalism in the context of Shakespeare and his company, recently appeared in the journal *Rosebud*. Speaking of roses, his rose survived its transplanting. It seems happy.

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