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HANNAH AND JOE: INTERSPECIES ART BETWEEN BIRD AND MAN

Hannah and Joe: Interspecies Art between Bird and Man

“Parrot Architecture”
The Dallas Contemporary
16 April-21 August, 2022
Dallas, Texas

Exhibition website: <https://www.dallascontemporary.org/spring-2022-joseph-havel> (<https://www.dallascontemporary.org/spring-2022-joseph-havel>).

“Joseph Havel: Flight Paths and Floor Plans”

Talley Dunn Gallery
14 May-25 June, 2022
Dallas, Texas

Exhibition website: <https://talleydunn.com/project/joseph-havel-flight-paths-and-floor-plans/> (<https://talleydunn.com/project/joseph-havel-flight-paths-and-floor-plans/>).

Reviewed by:

Charissa N. Terranova
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Hannah is an African grey parrot. She is 24 years old and, based on other African greys that have lived in captivity, she could live double that or more. Her feathers are grisaille in tone, with the ones on her belly darker than those on her crown. In all the photos I’ve seen, her face is alert and attentive. Her bright small eyes contrast with her large dark beak, the two anatomies constituting perhaps the most prized tools of her trade – an aesthetic and artistic collaboration with the artist Joe Havel. While I’ve never met her in person, I’ve come to know her well over the last few years through images and conversations with Joe, an internationally acclaimed sculptor. Friends recognize his many gifts, identifying him also as an animal whisperer. In addition to sculpting and whispering, Joe has been the Director of the Glassell School of Art at the Museum of Fine Arts, Houston, Texas since 1993, a post from which he retires June 2022. Then Joe will move to France with his partner, taking Hannah and Pixel, their teacup Yorkie. For now, Hannah and Joe’s collaboration continues, and is the subject of two exhibitions in Dallas, Texas: a large overview of their work called “Parrot Architecture” at the Dallas Contemporary (16 April-21 August, 2022) and a more intimate show with drawings and smaller works, “Joseph Havel: Flight Paths and Floor Plans,” at Talley Dunn Gallery (14 May-25 June, 2022), also in Dallas.

The creative partnership of Hannah and Joe is a striking example of interspecies communication within art, a category in which works of art result from the interactions and meaningful connections between two different species. Some time ago, Charles Darwin identified the penchant for cross-communication among different kinds of animals, contending that, “With social animals, the power of intercommunication between the members of the same community – and with other species, between the opposite sexes, as well as between the young and the old – is of highest importance among them.”[1] Interspecies communication in art falls under the umbrella field of animal studies, which dates back in its earliest incarnation to the mid 1970s but crystallized in its current formation with what Harriet Ritvo called the “animal turn” in 2007.[2] This genre of contemporary art, as Meredith Tromble writes, emerges from the human desire to dialogue. “Because most humans talk a lot,” Tromble explains, “we want other species to talk back to us, forgetting that even among our own kind, more communication is nonverbal than verbal.”[3] While ecological crisis has made communication between humans and non-human life of sudden and singular importance for artists, it is an idea that also goes back to the 1970s, in particular the work of artist and activist Jim Nollman who published *The Man Who Talks to Whales: the Art of Interspecies Communication* (2002).[4]

Dorothee Fischer argues that interspecies communication within art, or as she simply calls it “interspecies art,” begs many questions, including anthropocentric ideas of agency and free will, as well as the “nature/culture dichotomy and the anthropocentric world generally.”[5] Fischer explores two examples of interspecies art, Aaron Angell’s “Gallery Peacetime” (2014) in which the British artist collaborates with three Mexican walking fish, also known as axolotls, and the ongoing collaboration of two African grey parrots, Clara and Karl, and two artists in Cologne, Ute Hörner and Mathias Antlfinger. The name of parrot-human collective is “CMUK,” with each letter representing the name of one of the four collaborators.[6] For Fischer, the true legitimacy of interspecies art unfolds around human ideas of agency. She finds that Angell’s project with axolotls is less successful as a work of interspecies art than that of CMUK because the latter allows for the African greys to actually perform, that is, whittle away at matter according to their own needs and wishes – per their individual wills – while axolotls function in this instance more strictly as pets.

Given that concepts like “agency” and “will” are human constructs, prima facie it would seem that none of this is possible. From this perspective, collaborations between human artists and nonhumans, interspecies communication, and interspecies art would be impossible. They would just seem to be human projections onto nonhuman life, or one giant anthropocentric endeavor. This is one reason scientists over the years discounted some of Darwin’s most important works, such as *The Descent of Man, and Selection in Relation to Sex* (1871) and *The Expression of the Emotions in Man and Animals* (1872). They dismissed the research in these volumes, deeming it too anthropocentric to be considered ‘good’ science. In light of their recent revival, however, as well as Jakob von Uexküll’s *Umwelt* [7] and the similarly overlooked essay by Thomas Nagel, “What is Like to Be a Bat?” (1974), we are reminded of the importance of observation and empathy to any empirical practice, whether art or science.[8] In both realms, they are arguably non-negotiable tools. Our human embodiment should not deter our proper, even scientific, understanding of nonhuman life. Human observation and empathy are central to interspecies art. By connection this area of art practice brings to bear Darwin in the full breadth rather than Darwinism, and expanded evolutionary theory beyond natural selection. That is to say, interspecies art brings home a pluralist evolutionary theory that includes sexual selection, aesthetic agency, symbiosis, cooperation and female choice. While sometimes irreducible, these forces are always material within descent with modification. Reading evolution with these vectors, in addition to natural selection, offers a more replete sense of Darwin the thinker and writer that should be set against the more parsimonious Darwinism, a language that includes scientific reductionisms like fitness, competition, freeloaders, survival, the selfish gene, procreation, and binary sex. While artists are talented at materializing sexual selection, aesthetic agency, symbiosis,

cooperation and female choice, scientists often find it difficult to mathematically model these forces. Nonetheless, this is an exhibition review essay about Hannah and Joe's collaborative shaping of one particular force within the capacious sense of Darwin and evolutionary theory given shape via interspecies art: the aesthetic agency of the female African grey parrot Hannah.

Joe's ex-wife carried Hannah home from the pet store as a fledging in the late 1990s. "When she was brought home...she simply automatically decided I was her primary person," Joe says.[9] Despite his ex-wife's intentions to have Hannah as hers, Hannah chose Joe as a mate, or so it would appear. As such Hannah and Joe have shared both architectural and emotional spaces for over two decades. Darwin understood that all animals were emotionally expressive, arguing "even insects express anger, terror, jealousy, and love by their stridulation." [10] In a similar vein, Joe recognizes Hannah's various moods. "She gets grouchy; she sometimes needs to be left alone; she can be quite joyful; she can be playful; she can be fearful," he says.[11] Their art collaboration began more recently, during the time of COVID-19 quarantining. For fear of contagion, like so many people around the planet, Joe stayed home for months and had life's necessities delivered. Cardboard boxes piled up and became the stuff of art. And so, the work began as two organisms of different species worked and interworked in tandem, side by side influencing one another, each manipulating the raw materials of artistic form. Joe sketched and built, while Hannah chewed, chiseled, and pecked cardboard with her beak.

In these playful and repetitive actions, Hannah created the whittled boxes that are the basic forms of their collaboration. Joe then cast or poured resin atop them in either single or stacked forms, creating the sparse forest of bronze and resin totems standing in the large industrial space of the Dallas Contemporary. Joe worked closely with Ken King's foundry in Houston to distill in these pieces a striking verisimilitude of form.[12] The tactility of Hannah's tiny chew marks rendered in bronze invite human touch, forever forbidden in the gallery setting. The burnished bronze of certain columnar forms and tan cardboard of others are, in certain instances, difficult to distinguish. Bronze here mimics cardboard. The vertical bronze cartons of "Highrises" create a counterpoint to the single-story coffers of "Neighborhood." Joe calls the large works on the walls, the flattened boxes with Hannah's bite marks and his own gestural brushstrokes of paint, "constructed paintings." A similar type of work, though smaller and sketch-like, hangs on the walls of Talley Dunn Gallery in "Joseph Havel: Flight Plans and Floor Plans." Similar to bird and man, nature and architecture work in tandem throughout. The names of the works - tumble towers, penthouses, high rises, neighborhoods, flight paths, and floor plans - bear out an expansion and layering of systematic complexities. Architecture, infrastructure, bird, and human synchronize and collectively become a network of networks. Empathy is the glue that binds, functioning as a formative material force in the creation of this avian-cum-primate city. Joe explains,

The communication across species takes a great deal of empathy on both sides. This I think is fairly profound as not only is there no shared cultural foundation but biologically our brains are not even structured the same way. Yet she wants my approval for her carving and wants me to understand the raw shapes and materials she wishes to alter and carve as well as her appropriate "creative" environment. I take these things she makes and organize them in a formal way that uses the language of art to refer to architecture and figures. Occasionally she works back into things that I have organized. I cast the majority of them in bronze for the art historical reference as well as preserving the ephemeral nature of both the original cardboard and wood materials in our exchange.[13]

Projection or otherwise, Joe was very receptive to the Giacometti-like forms Hannah made from balsa wood, seeing in them "a tiny standing male Giacometti figure and another head of Diego his brother." [14] Giacometti has been seminal to his creative practice since he saw an exhibition of his work years ago at the Walker Art Center in Minneapolis when he was an undergraduate at the University of Minnesota. While the works of "Parrot Architecture" are reminiscent of the emaciated Existentialist forms of Giacometti's postwar work, Giacometti's Surrealist work of the interwar period allows me to pivot to the scholarship of Kirsten Strom, author of *The Animal Surreal: The Role of Darwin, Animals, and Evolution in Surrealism* (2017). Strom teases out the role of animals in Surrealism, connecting them to the rare but suggestive references to Darwin by Surrealists such as Dora Maar, Max Ernst, René Magritte, Luis Buñuel, and André Masson. She argues that while Surrealists were neither animal rights activists nor practitioners of speciesism, "a critique of anthropocentrism would have been largely consistent with other radical Surrealist platforms." [15] Complementing the argument I make here about a full and replete Darwin and an expanded evolutionary theory, Strom references the *other* Darwin, both *The Descent of Man* and *The Expression of the Emotions in Man and Animal*, in her formulation of the "Darwinian Uncanny" and "Darwinian Marvelous." [16] In these often overlooked texts, Darwin explores the subjective areas of animal life, such as aesthetic agency and emotional expression, casting them for science in ways that are appealing and useful to artists and art historians.

In similar fashion, I draw here on Darwin's *The Descent of Man*, where Darwin develops his ideas about aesthetic agency and beauty, to boldly if not cheekily argue that mate choice is a driving force in the collaborative practice of Hannah and Joe, with, as stated above, Hannah having chosen Joe as her mate. Apropos of this, Darwin connected bird and man precisely through their aesthetic gifts, arguing that "On the whole, birds appear to be the most aesthetic of all animals, excepting of course man, and they nearly have the same taste for beauty as we have." [17] Darwin argues in *The Descent of Man* that the female of most animal species is the aesthetic agent in mate choice, choosing her partner thereby activating sexual selection, another form of selection in addition to artificial and natural. With respect to humans, Darwin was of the Victorian era and not progressive in terms of gender: humans were the exception to the rule of female agency within sexual selection. Yet, in keeping with twenty-first-century mores, the contemporary philosopher Katya Mandoki recognizes the centrality of female agency across mammals within evolution, situating the "pudendal" vector within a matrix of "bio-aesthetics" and the "evolution of sensibility." [18] While most scientists reduce sexual to natural selection, for Darwin they complemented one another. The most striking example of the workings of aesthetic agency at work in the evolutionary mechanism of sexual selection is the iconic example of the peacock. In mate selection, a peahen seeks out the peacock with the most beautiful plumage, that is, the one with the largest, most billowy, and delightfully patterned feathers. This dandy will be her mate because of his beautiful feathers even while they make it very difficult for him to fly, more likely to be prey, and thus less fit in terms of natural selection. The female of the species, the peahen, is an agent of sexual selection. She bears agency rooted in aesthetics and beauty. Of course, the subjective nature of aesthetics and beauty within sexual selection make them difficult to quantify for scientists even while they are real evolutionary mechanisms.

Ornithologist Richard O. Prum revisits Darwin's 1871 work in *The Evolution of Beauty: How Darwin's Forgotten Theory of Mate Choice Shapes the Animal World - and Us* (2017). This work has triggered an energetic revitalization of a pluralized Darwin that includes writings beyond *On the Origin of Species* (1859). Prum shows readers examples of beauty within sexual selection in different birds, including the virtuosic sounds and acrobatic displays of the male Golden-winged Manakin, the architecture of the male bowerbird, and the "honest-signaling" paradigm of the male Superb Bird of Paradise. [19] Notably in each of these instances male beauty has evolved out of female aesthetic choice, which in turn is driven by pleasure. With respect to Hannah and Joe, close attachment is essential to the mate choice of parrots. Like monogamous humans, parrots tend to mate for life. Darwin wrote of how "parrots become so deeply attached to each other than when one dies the other for a long time pines." [20] Hannah and Joe are likely together until death and thus a meaningful binding is at the root of this parrot-human artist collaboration.

Darwin also recognized the great intelligences of parrots, acknowledging their strong memories and "unbounded curiosity." [21] He recalled a South American parrot that "was the sole living creature that could speak the language of a lost tribe." [22] Dr. Irene Pepperberg of Harvard University famously worked with Alex, an African grey, for thirty years. By the time of his death in 2007, Alex had a vocabulary of over 100 words, could recognize many different colors, objects, materials, and actions, and understood the concept of zero. [23] He also understood the concept of 'self,' as proven by an instance in which he queried his own color while looking in the mirror. In this moment, he learned the color grey from his caretaker but also revealed to her his own sense of existential awareness and self-reflexivity. African greys like Alex are celebrated for displaying their intelligence through talking - like humans. Yet they are vocal birds both in the wild and captivity. In the wild they "chatter, scream, and whistle," calling one

another while in flight.[24] In captivity, as Alex showed, they use – or imitate – human language to communicate. In frankness, Darwin wrote, “every one [sic] knows, parrots can talk,” as they are vocal mimics.[25] Hannah talks to Joe, his human partner, and their house sitter, using language she has learned from humans likely through mimicry. Without a doubt, mimicry – copying and imitation – is the source of many if not most learning processes in animals, human and nonhuman alike. Joe argues, however, that her shredding and chewing of materials while he works *are not acts of mimicry*, but rather a matter of Hannah altering her own environment, similar to Clara and Karl, the two African greys living with the artists in Cologne.[26]

The subject of mimicry in nonhuman animals allows me to pivot again for the sake of evolutionary theory to the related subject of appearance-based mimicry in butterflies in the scientific research of the Russian-American writer and lepidopterist Vladimir Nabokov.[27] There is a homology, a shared logic, between Hannah and Joe’s working relationship, in particular the irreducible sense of beauty at the core of their interspecies art practice, and Nabokov’s ideas about mimicry, beauty, evolution, chance, and emergent form. Nabokov wrote lovingly of the patterns on butterfly wings, paralleling their shape and symmetries to human works of art: “The mysteries of mimicry had a special attraction for me. Its phenomena showed an artistic perfection usually associated with man-wrought things.”[28] Similar to these workings, the biological laws at work in Hannah and Joe’s collaboration are identifiable, but the processual dance and its outcomes – interaction, communication, and the works forthcoming – are morphogenetic: they are emergent in logic.

Dubious about the reductionisms of Darwinism, Nabokov was both an evolutionary and Darwin pluralist. He was interested in the useful and non-useful in nature, and how they came to be, whether through seeming utility or by chance, via deep geological time or by saltation. Nabokov did not mince words about this doubt,

When a butterfly has to look like a leaf, not only are all the details of a leaf beautifully rendered but markings mimicking grub-bored holes are generously thrown in. “Natural selection,” in the Darwinian sense, could not explain the miraculous coincidence of imitative aspect and imitative behavior, nor could one appeal to the theory of “the struggle for life” when a protective device was carried to a point of mimetic subtlety, exuberance, and luxury far in excess of a predator’s power of appreciation. I discovered in nature the nonutilitarian delights that I sought in art. Both were a form of magic, both were a game of intricate enchantment and deception. [29]

As Victoria N. Alexander writes, “Nabokov had a profound respect for coincidences as coincidences.”[30] He viewed the facile tendency in both scientists and lay people to attribute causality where there is none, whether in the form of natural selection or a metaphysical God-Creator, as simple hubris. By contrast, there were great similarities for Nabokov between the making of art its aesthetic appreciation, and chance formations of beauty within nature. Like nature and the patterns on a butterfly’s wings, an artist works according to the logic of what Alexander outlines as a form of nonlinear teleology and emergent form, embarking on a project, knowing something will emerge, but never quite sure how exactly it will look. As with Gould and Lewontin’s “spandrels of San Marcos,” constraints as much as selective forces dictate how nature forms.[31] Alexander cites several examples of hard science offering similar kinds of evolutionary workings, none of them seeking to discount Darwinism but simply to make a more accurate and complete evolutionary metanarrative. These include D’Arcy Wentworth Thompson, Alan M. Turing, Brian Goodwin, and H. Frederik Nijhout. Alexander elaborates:

Thompson insists that biological form was to be explained in terms of physical and chemical processes. Turing claims the task of the biologist was to discover the set of forms that are likely to appear. Only then is it worth asking which of them will be selected. Goodwin proposes expansion and alternatives to the modern synthesis of Darwinism and twentieth-century genetics. Nijhout has examined butterfly wing patterns using nonlinear dynamics and theories of spontaneous pattern formation.[32]

All of this is to say that there are other legitimate ways of describing the biological matrices, albeit the evolutionary workings, of Hannah and Joe’s process and project, in addition to and beyond the natural selection of Darwinism. Why reduce their connection to sheer survival – Joe providing food for Hannah -- when it can also be perceived according to mutualism, symbiosis, cooperation, and selflessness – Joe and Hannah working together, trying to understand one another, and giving each other manifold kindnesses in an ongoing feedback loop?[33]

Darwin identified a certain interspecies magnanimity in parrots, describing an instance in which “a parrot which took care of a frost-bitten and crippled bird of a distinct species, cleansed her feathers and defended her from the attacks of the other parrots which roamed freely about [the] garden.”[34] In 2020, scientists at the Max Planck Institute for Ornithology in Germany have shown similar behavior. They proved what Darwin described 150 years ago, namely that parrots have the ability to act selflessly. They conducted experiments in which African grey parrots were trained to exchange metal tokens for treats. Two parrots were then paired in adjacent compartments with an opening between them. One bird could reach the scientist’s hand, while the other had the tokens. The birds with tokens gave them away while receiving nothing in return, exhibiting selflessness in nonhuman animals as an evolutionary fact.[35]

Based on all of the data I have presented, I argue in closing that microbiologist Lynn Margulis’s thesis on symbiosis provides a better genesis myth for organic life and a more propitious way to frame the great metanarrative of biology than natural selection alone. Beginning with her groundbreaking essay of 1967 on the origins of eukaryotic cells in *The Journal of Theoretical Biology* (published under her then married name Lynn Sagan), Margulis proved repeatedly for the next forty years that symbiosis is central to life.[36] In the concept of endosymbiosis, Margulis showed how mitochondria and chloroplasts, which are elemental to the eukaryotic cells of “higher organisms” such as plants and animals, began as free-living protists, or unicellular prokaryotes often referred to as “lower organisms” such as microbes. Through accommodation and symbiosis, “higher” organic life evolved. The cytoplasmic DNA inside of mitochondria and chloroplasts is evidence of their former autonomy as bacteria. Margulis’s endosymbiosis expanded Darwin’s evolutionary theory and has become standard biological data, even while the idea of “nature, red in tooth and claw” at the center of natural selection-centric Darwinism continues to hold sway. When Margulis distilled this reality within the “microcosmos” of cells, she found “symbiosis everywhere,” in life of all shapes and sizes, arguing that “symbioses are like flashes of evolutionary lightning.”[37] Similar to how aesthetic selection functions as a propagator of diversification within evolution, for Margulis, “symbiosis [operates] as a source of evolutionary novelty help[ing to] explain the observation of ‘punctuated equilibrium,’ of discontinuities in the fossil record.”[38]

As a microbiologist, Margulis in part described the rapid mutation and diversification of microbes perhaps most easily recognized today via antibiotic-resistant bacterial infections. However, at its core, Margulis’s work in microbiology tells of the centrality of bacteria in the genesis of life, reinforcing the fact that bacteria should not solely elicit fears of disease but also foment better practices of good health as well. This is many years before the “hygiene hypothesis” or “old friends hypothesis” taught humans in the new millennium about the necessity of a balance of flora in the gut, among other places in the human body.[39] Yet, even beyond microbes, Margulis truly did see symbiosis as a probable source of diversification across all scales of life, similar to how Darwin viewed sexual selection as the source of the churning and differentiation of species. She argued, “Living beings defy neat definition. They fight, they feed, they dance, they mate, they die. At the base of the creativity of all large familiar forms of life, symbiosis generates novelty.”[40] Symbiosis at a scale other than bacteria, that of Hannah and Joe, most assuredly generates novelty. Their interspecies art collaboration evidences that there’s more to the evolutionary story than natural selection alone.

[1] Darwin, Charles, *The Expression of the Emotions in Man and Animals* [1872] (New York: Oxford University Press, 1998) 63. Author’s emphasis.

[2] Fischer, Dorothee, "Art between Species: Two Case Studies of Animals' Agency in Interspecies Art," *Journal of the Lucas Graduate Conference, Special Issue on "Animals (Un)tamed: Human-Animal Encounters in Science, Art, and Literature,"* No. 8 (2020) 68. See also Harriet Ritvo, "On the Animal Turn," *Daedalus*, Vol. 136, No. 4, *On the Public Interest* (Fall, 2007), 118-122.

[3] Tromble, Meredith, "Interspecies Communication: An Introduction and a Provocation," *Public*, Vol. 31; No. 59 (Spring 2019) 7.

[4] Fischer, 69.

[5] Fischer, 70.

[6] Similar to some of the pieces in the Dallas exhibitions, works hung on the wall by the parrot-human collective CMUK bring to mind the post-WWII torn-poster pieces of French affichiste artist Jacques Villeglé. Fischer compares the CMUK pieces to similar works by the German artist of the same period Wolf Vostell, connecting them to his philosophy of *décollage*.

[7] Uexküll's *Umwelt* translates variously as surrounding-world, phenomenal world, self-world, and environment. The term names a given animal's singular experience of perception. For example, the canine world is shaped by the primacy of scent, while the bat world is the sonic, and humans the optical. See Jakob von Uexküll, "The New Concept of Umwelt: A Link between Science and the Humanities," *Semiotica*, Vol. 134, No. 1 / 4 (2001) 111-23.

[8] See Jacob Von Uexküll, *A Foray into the Worlds of Animals and Humans [1934]* (Minneapolis: University of Minnesota Press, 2010) and Thomas Nagel, "What is Like to Be a Bat?" *The Philosophical Review*, Vol. 83, No. 4 (Oct., 1974) 435-450.

[9] Conversation between Joe Havel and author. 05/27/2022.

[10] Darwin, *The Expression of the Emotions in Man and Animals*, 347.

[11] Conversation between Joe Havel and author. 05/27/2022.

[12] Texas Asia Society, <https://asiasociety.org/texas/artist-joseph-havel-shares-processes-inspiration-new-bronze-works>, accessed 05/31/22.

[13] Conversation between Joe Havel and author. 01/14/2020.

[14] Conversation between Joe Havel and author. 05/27/2022.

[15] Strom, Kirsten, *The Animal Surreal: The Role of Darwin, Animals, and Evolution in Surrealism* (New York: Routledge, 2017) 10.

[16] Strom also references Darwin's *On the Origin of Species*.

[17] Darwin, Charles, *The Descent of Man, and Selection in Relation to Sex [1871]* (Princeton, NJ: Princeton University Press, 1981) 39.

[18] Mandoki, Katya, "Bio-aesthetics: The Evolution of Sensibility through Nature," *ContemporaryAesthetics*, Vol. 15 , No. 24 (2017) https://digitalcommons.risd.edu/cgi/viewcontent.cgi?article=1374&context=liberalarts_contempaesthetics. Accessed 06/01/22.

[19] Prum, Richard O., *The Evolution of Beauty: How Darwin's Forgotten Theory of Mate Choice Shapes the Animal World - and Us* (New York: Doubleday, 2017).

[20] Darwin, *The Descent of Man*, 108.

[21] Darwin, *The Descent of Man*, 109.

[22] Darwin, *The Descent of Man*, 236.

[23] Young, Arnesia, "This African Gray Parrot Is The First Animal To Ever Ask An Existential Question" (12/29/2020). <https://mymodernmet.com/alex-the-african-gray-parrot/>. Accessed 06/01/22.

[24] Ayres, Pamela, "Study in Vocal Mimicry of the African Grey," *American Federation of Aviculture*, Vol. 6, No. 5 (1979) <https://journals.tdl.org/watchbird/index.php/watchbird/article/view/2899>. Accessed 06/01/22.

[25] Darwin, *The Descent of Man*, 54.

[26] Conversation between Joe Havel and author. 01/14/2020.

[27] Of course, Nabokov is famous for his novels, but very little known for his lifelong work on butterflies, which was disregarded during his lifetime but proven correct in the new millennium. His research on the migration of the South American butterfly, the *Polyommatus blue*, was painstaking and empirical, rooted in the careful dissection and observation of butterfly anatomy. Embedded within this data are his theories of mimicry, chance, and evolution.

[28] Nabokov, Vladimir, "Butterflies: On Life as a Lepidopterist," *The New Yorker* (June 5, 1948) <https://www.newyorker.com/magazine/1948/06/12/butterflies-vladimir-nabokov>. Accessed 06/01/22.

[29] Nabokov, Vladimir, "Butterflies: On Life as a Lepidopterist," *The New Yorker* (June 5, 1948) <https://www.newyorker.com/magazine/1948/06/12/butterflies-vladimir-nabokov>. Accessed 06/01/22/. See also Dean Flower, "Darwin's Really Dangerous Idea," *The Hudson Review* (Autumn 2018) <https://hudsonreview.com/2018/12/darwins-really-dangerous-idea/#.Ype5jezMLDI>. Accessed 05/30/22.

[30] Alexander, Victoria N., "Nabokov, Teleology, and Insect Mimicry," *Nabokov Studies*, Vol. 7 (2002/2003)

[31] Gould, S. J. and R. C. Lewontin, "The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptionist Programme," *Proc. R. Soc. Land.*, No. 205 (1979) 581-598.

[32] Alexander, 187-88.

[33] See Lee Alan Dugatkin, *Cooperation Among Animals: An Evolutionary Perspective* (New York: Oxford University Press, 1997).

[34] Darwin, *The Descent of Man*, 109.

[35] Brucks, Désiree and August M. P. von Bayem, "Parrots Voluntarily Help Each Other to Obtain Food Rewards," *Current Biology*, No. 30 (Jan.20, 2020) 292-297.

[36] See Margulis, Lynn, *Origin of Eukaryotic Cells: Evidence and Research Implications for a Theory of the Origin and Evolution of Microbial, Plant, and Animal Cells on the Precambrian Earth* (New Haven: Yale University Press, 1970) and Antonio Lazcano and Juli Peretó, "On the Origin of Mitosing Cells: A Historical Appraisal of Lynn Margulis' Endosymbiotic Theory," *Journal of Theoretical Biology*, No. 434 (2017) 80-87.

[37] Margulis, Lynn, *Symbiotic Planet: A New Look at Evolution* (Amherst, MA: Basic Books, 1998) 8.

[38] Margulis, *Symbiotic Planet*, 9. See also Prum, 1-16.

[39] Guarner, Francisco, et. al., "Mechanisms of Disease: the Hygiene Hypothesis Revisited," Nature (14 February, 2006) https://www.researchgate.net/profile/Willem-Van-Eden/publication/7107710_Mechanisms_of_disease_The_hygiene_hypothesis_revisited/links/54ca51540cf2c70ce521c26b/Mechanisms-of-disease-The-hygiene-hypothesis-revisited.pdf. Accessed 06/02/22.

[40] Margulis, Symbiotic Planet, 9.

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