

Michael Charles Tobias
Jane Gray Morrison

Anthrozoology

Embracing Co-Existence
in the Anthropocene



Springer

Anthrozoology

Michael Charles Tobias • Jane Gray Morrison

Anthrozoology

Embracing Co-Existence in the Anthropocene

 Springer

Michael Charles Tobias
Dancing Star Foundation
Los Angeles, CA, USA

Jane Gray Morrison
Dancing Star Foundation
Los Angeles, CA, USA

ISBN 978-3-319-45963-9

ISBN 978-3-319-45964-6 (eBook)

DOI 10.1007/978-3-319-45964-6

Library of Congress Control Number: 2016952171

© The Editor(s) (if applicable) and The Author(s) 2017

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

This Springer imprint is published by Springer Nature

The registered company is Springer International Publishing AG

The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

Ecological Bifurcations

Ethical and philosophical activism now confronts a multitude of ecological bifurcations—the sum total of current crisis points—the Anthropogenic, or Sixth Spasm of Extinctions in the annals of biology. What might have been characterized as a theoretical cusp has now brought to a converging panic a multitude of scientific and natural history disciplines all scrounging to wrap their minds around the accelerated truth of what the Anthropocene actually entails. The very planet is on the verge. Of what? Intuitively, many of us fear the answer, but also harbor enormous hopes for what may be possible in the days and nights to come.

In this treatise, the authors are proposing a veritable revolution in comparative sentience, sapience, qualia, and biosemiospheric studies that might lend insight into what will be required to help stave off the worst of biological calamities that have been predicted and, daily, are being tabulated.

It is our goal to merge interdisciplinary theoretical prospects with personal experience by offering a preliminary sketch for an overview of ethical anthrozoological studies that seeks to expand the boundaries of what is thought of as “consciousness,” “intelligence,” “interspecies communications,” and the adaptive evolutionary boundlessness of “feelings in all species.” We view this juxtaposition as a cornerstone, generally speaking, of what has been characterized by several authors as the *biosemiosphere*.¹

¹*See for example, **Comparative Literature—Sharing Knowledges for Preserving Cultural Diversity, Encyclopedia of Life Support Systems**, Volume II, Edited by Lisa Block de Behar, Paola Mildonian, Jean-Michel Dijian, Djelal Kadir, Alfons Knauth, Dolores Romero Lopez, Marcio Seligmann Silva, Published by UNESCO In partnership with EOLSS, Encyclopedia of Life Support Systems, Eolss Publishers Co. Ltd., Oxford, United Kingdom, 2009, p. 59; See also **Culture and Explosion** by Juri Lotman, Edited by Marina Grishakova, Translated by Wilma Clark, from the Foreword by Peeter Torop. xxxi, Walter de Gruyter Publishers, Berlin, 2009. See also: Susan Petrilli’s recent book **Victoria Welby and the Science of Signs—Significs, Semiotics, Philosophy of Language**, Transaction Publishers, New Brunswick New Jersey, 2015; and her earlier **Sign Crossroads in Global Perspective—Semiotics and Responsibility**, by Susan Petrilli, Editor John Deely, Transaction Publishers, New Brunswick New Jersey 2010, p. 139.

Fig. P.1 “Critically Endangered Arabian Leopard, *Panthera pardus nimr*, Northwestern Saudi Arabia,” Photo © M. C. Tobias



Fig. P.2 “Namibian Cheetah, *Acinonyx jubatus jubatus*,” Photo © M. C. Tobias

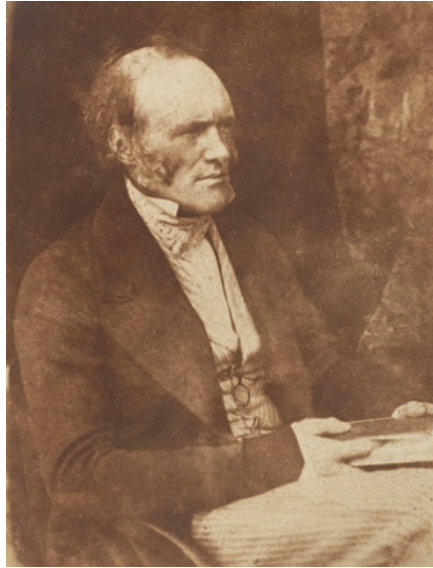


It is our view that, not evolution, but our noninvasive participation in the ongoing and primordial communication pathways between species, is what holds a sane and salubrious clue to our future.

By examining aspects of past and present currents in ecological anthropology, art history, animal protection and legislation towards that end, comparative ethics, literature, spirituality, ethology, and biocultural heritage contexts from every continent, as well as a deeply metaphysical set of perspectives, our aim is to set forth an argument that the human connection to nature is waning, self-destructive, and globally oppressive, but that our best intentions as a species—the celebration and reverence of nature—holds the only true promise for the survival of the biosphere, a word first employed by the Austrian geologist Eduard Suess in 1875 and later used as the title of a book by the Russian geochemist Vladimir Ivanovich Vernadsky (1863–1945) in 1926.

Vernadsky’s use of the term is at great variance with our beliefs and propositions throughout this book, a general orientation that is mostly a product of our era versus that of the early Soviet reality, which deemed humanity’s role in evolution to be

Fig. P.3 “Charles Lyell,” Photo © <https://goo.gl/images/HZ6u5X>



some monumental and unique journey. An adventure that was teleological, a melding of mind and matter into an ontological noösphere. By that juxtaposition of ego into superego, the entire history of our species has advocated for its own superiority, writ as large as some ongoing, planetary geological machination, as first hinted in the early extinction-related insights of the Frenchman Georges Cuvier (1769–1832) and meditations on stratigraphy by the tenacious Scottish geologist, Charles Lyell (1797–1871); our destiny in essence managed by the stars, preordained by atoms, and ceaselessly working, like some Communist 5 year plan in perpetuity to achieve a massive harnessing of Earth.²

The Vernadsky Presumption

The strange conceptual implications for other species, our imagination presuming to out-compete their own, were most apparent, not in Cuvier, who acknowledged the vulnerability to extinction from certain catastrophes, as with such creatures as the mastodon at his speech to the French Institute in 1796,³ or Lyell, who simply believed that the entire past could be gleaned from observations upon a present

²Stafford, Robert A. **Scientist of Empire**. Cambridge, UK. Cambridge University Press, 1989.

³Academy of Natural Sciences, “Fossils and Extinction” <http://www.ansp.org/museum/jefferson/otherPages/extinction.php>, Accessed April 22, 2016.

moment in time—Charles Darwin (1809–1882) mediating in the center of these two giants of biology and Earth sciences. But in Vernadsky’s essay, “The Transition from the Biosphere to the Noösphere,”⁴ there is no proximate reality that would delimit a belief in extreme human exceptionalism, the notion that we are superior and destined to mentally become one with the Cosmos.

Our deep-seated concerns with such belief systems suggesting that humans are superior to other species will become increasingly meaningful as we endeavor to enquire into their minds and feelings. We believe that that multitude of Others experience an endless array of unique circumstances, harboring their own myriad of thoughts, intentions and sensory signals we humans do not remotely understand, except by our focusing upon a crude biological relativity, and an even more reckless presumptuousness.

In Sections 115 and 116 of his “Biosphere to the Noösphere” essay, Vernadsky wrote, “There is a growing understanding that this increase has no insurmountable limits, that it is an elemental geological process... The question of a planned unified activity for the mastery of nature and a just distribution of wealth associated with a consciousness of the unity and equality of all peoples, the unity of the noösphere, became the order of the day. It is not possible to reverse this process, but it bears the character of a ruthless struggle, which, however, is grounded on the deep roots of an elemental geological process...” Color images from October 2009 of phytoplankton growth off the coast of New Zealand, nuclear reactors in Cattenom France, as well as NASA images from 1987, 1991, 2000, and 2012 entitled “The energy of human culture. The greening of the desert near the city of Tubarjal in Saudi Arabia,” all added to William Jones’ fascinating introduction to his translation of Vladimir Vernadsky and might, at first glance, lend vigor to the Russian’s embrace of Einstein’s relativity, atomic energy, and a conception of our species “taking a tremendous leap forward in the development of the noösphere, putting him on the verge of extending his reach into the surrounding universe.”⁵

We mention Vernadsky because of the fact he is largely credited with titling the first book to use the work biosphere: **The Biosphere (1926)**⁶ written during a Soviet context that clearly elicits all of the Marxist obsession with human toil working towards some collective achievement that merits an infatuation with our species over all others, as enshrined in Marx’s **Economic and Philosophical Manuscripts of 1844** (also known as the “**Paris Manuscripts**”)⁷. In that volatile and contentious work, Marx argued that the environment must be subverted into the body of man himself through human labor. In other words, he did not distinguish between nature and human nature, but replaced what we would, in today’s terms think of as natural

⁴Excerpts from “Scientific Thought as a Planetary Phenomenon, Chapter VII,” 1938. Translated by William Jones, 21st Century, Spring/Summer, 2012, pp. 29–30, https://www.21stcenturysciencetech.com/Articles_2012/Spring-Summer_2012/04_Biospere_Noosphere.pdf, Accessed March 5, 2016.

⁵ *ibid.*, p. 14.

⁶**Biosfera**, by V. I. Vernadskiĭ Leningrad: Nauch. khimiko-tekhn. izd-vo Nauch. tekhn. otdel V.S.N. Kh., 1926.

⁷Ökonomisch-philosophische Manuskripte aus dem Jahre 1844 or **Pariser Manuskripte**.

history, with human history. In light of our species' rapaciousness, it is a disingenuous, indeed ill-informed commentary. The Vernadsky-Marx connection is logical within the Russia of the 1920s, where human survival and economic class warfare would effect one of the worst genocidal sprees in human history, namely, the Stalinist regime, replete with its species-supremacist fantasies and the Gulag. But in the geochemist/geologist that was Vernadsky, this species self-importance is an intellectual conceit striving to apotheosize the Greek *noos*, or "mind."

Vernadsky was a product of his times, his well-meaning intellectual goals merged within a brief outline of our materialist endeavors over thousands of years; all those struggles to invent fire, machines, efficient agriculture and the subordination of domesticized animals for traction and food, and so on. Moreover, this line of linear thinking (so symptomatic of much of Western history) is spiced with a quasi-spiritualism. It echoes the wide-ranging Jesuit, Teilhard de Chardin (1881–1955) who studied from Vernadsky early on in his own career and clearly drew upon Vernadsky's noosphere to advance the cause of his own Omega Point, comparable to that imagined zenith of human consciousness not undifferentiated from the Logos of Christ, or of God himself, and all of this essentially Platonic metaphysics (as translated by Origen and then Plotinus)⁸ underlying the physical sciences, and a predestination delusionally inherent to humanity's assiduous reach out into the Cosmos. Terraforming Mars is only decades away, should our species determine that that is a worthy goal; at the very moment we are virtually destroying every vertebrate and an unknown number of invertebrates on Earth.

Such contradictions are only too familiar, akin to philosophical tyranny that sprouts from every disguised self-interest devoted to advancing the sole cause of that agent of the Anthropocene we tragically know only too well. By holding in esteem our dominion over the rest of nature, naming it a transitional phase towards some God-like omniscience that is the very throne of an emulated and incipient consciousness amid celestial spheres, such philosophy and neo-science undermines its modest claims even to the purest forms of introspection. By doing so, such narcissism in the name of science helps lay the groundwork for further biological ruin and surreal indifference to the realities of life on Earth. We see its consequences in the myriad abnegations of ethical research and goodness in general, across the stage of today's political rhetoric, as well as throughout the rising statistics indicating widespread ecological illiteracy, indifference and callousness towards other humans, not to mention those other species, and the rise of violence inflicted across the planet by *Homo sapiens sapiens*.

⁸ See "Towards the Noosphere Futures Singular and Plural," John M Dillon, Stephen RL Clarke, The Prometheus Trust, London, 2013; <http://www.drb.ie/new-books/towards-the-noosphere#sthash.w0Lmvabb.dpuf>. Accessed March 6, 2016; See also Vernadsky's diaries in the "Works" section, summarized in Sergei Glebov. "Russian and East European Books and Manuscripts in the United States" in **Russian and East European Books and Manuscripts in the United States: Proceedings of a Conference in Honor of the Fiftieth Anniversary of the Bakhmeteff Archive of Russian and East European History and Culture (Slavic and East European Information Resources**, Volume 4, Number 4 2003), eds. Jared S. Ingersoll and Tanya Chebotarev, The Haworth Press, 2003.

Fig. P.4 “One of the last remaining tigers killed in Old Singapore,” Photo © M. C. Tobias



It is wonderful to see Democrats have a strike in the House of Representatives regarding gun violence in America (June 21, 2016, Washington DC—“No Bill, No Break”). Now let’s see them strike over the violence towards animals, towards the entire planet. Let us see them become vegans, shut down all slaughterhouses. Stop killing animals. That would be a truly memorable strike on the House Floor. That is more than civil disobedience. That is true rationality. “No Kill, No Break.”

This syndrome of denials is a hindrance of such proportions as to draw into doubt the ability of our kind to rise above so massive a shadow that, by many different names and abiding characteristics, we denominate the syndrome as the Anthropocene.

Quite conversely, our perspective on the biosphere presupposes that life in all her infinite diversity has both subjective and objective Will-Power and Intentionality that is altogether separate from, and probably well beyond, our own severely limited physical and mental grasps; that these innate Qualities of Being, of Soul and Psyche, of Mind and Feeling, are communicated to both Observers, Non-observers, as well as to all Others, whether there is an overt awareness of a message or messages being conveyed or not. Direct objects, so to speak, in terms of communication minutia, do not impress us. We are but one idea, morphed over time into matter, amid a dizzying numerical concept, in our minds, of the numbers representative of wildly varied life forms: Greater in extant, for example, than Planck’s volumes, which connote subatomic scale constants that involve Planck’s length cubed, and many other factors, and might collectively be as vast as 10-to-the-185th. Even that inconceivable magnitude evidently falls short of what is known as Graham’s number, and other mathematical obscurities like “Kruskal’s tree theorem,” or the “Robertson-Seymour” and “Paris-Harrington” theorems. These are alleged to

Fig. P.5 “Chandni Chowk, Old Delhi, India,” Photo © M. C. Tobias



be the biggest numbers thus far conceived in the abstruse, vastly esoteric realms of a field comprising post-googolplexes: Skewes' and Moser's numbers. When equated with biological organisms, our faint conceptualization of a life form takes on the invisibility of what the Jains have called *nigoda*, subatomic life particles, or *jiva*—souls, as remote as a single molecule of moisture in a hurricane encompassing the entire planet, or smaller still, an unknown portion of the smallest subatomic corner of an atom within that unknowable molecule.⁹

Think of all this as the scientific grasping after straws beneath and within the purity of an ideal: The substance of that which we call convictions, beliefs, ethics, and faith. We can't see it or prove it (or not in everyday life sitting around a coffee shop), but we know it is there. On a stele from what is today Dhiban, Jordan, dating to 840 BC, the Moabite Mesha stone, recovered in 1868, bears witness to one of the earliest references to Yahweh, God. The inscribed basalt, with its 34 lines, sits by itself in the Louvre, a source of fascination to those hulking figures, all of us, who go about our lives wondering: are we alone?

⁹See Friedman, Harvey M. (2002), "Internal finite tree embeddings." *Reflections on the foundations of mathematics* (Stanford, CA, 1998), Lect. Notes Log. 15, Urbana, IL: Assoc. Symbol. Logic, pp. 60–91, MR 1943303; Gallier, Jean H. (1991), "What's So Special About Kruskal's Theorem and the Ordinal Γ_0 ? A Survey of Some Results in Proof Theory," *Annals of Pure and Applied Logic* 53(3): 199–260, doi:[10.1016/0168-0072\(91\)90022-E](https://doi.org/10.1016/0168-0072(91)90022-E), MR 1129778; and Kruskal, J. B. (May 1960), "Well-quasi-ordering, the tree theorem, and Vazsonyi's conjecture," *Transactions of the American Mathematical Society* (American Mathematical Society) 95(2):210–225, doi:[10.2307/1993287](https://doi.org/10.2307/1993287), JSTOR 1993287, MR 0111704.

Biological Proliferations

Homo sapiens may lack, at a fundamentally practical level, the evolutionary self-confidence, or, stated in terms of basic physics and chemistry, the very coherence that is abundantly demonstrated by the Others, as the authors refer to them. By that spectrum of Beings we include all other biomes, micro-climes, Domains, Kingdoms, Phyla, Classes, Orders, Families, Genera, Species, Sub-Species (trimonina), and all of the so-called hyponyms, from subphylum, infraphylum, and superclass; to suborder, infraorder, subclass, infraclass, supercohort, cohort, magnorder, and superorder; to tribes, clades, nonclades, the unknown number of individuals, novel beings, biomes, ecosystems, habitat links both linear and nonlinear, breeds, cultivated plants, hybrids, cells, genes, molecules, atoms, as well as an abundance of other habitat and organism-related designations—known and/or inferred under various Code proposals (e.g., that of the International Committee on Bionomenclature, and other phylogenetic characterizations regarding populations) everywhere around us. We reject “race” as a biological category.

All of these concentrations of the life force accumulate into a challenge for human beings: a purpose, if in no other realm than ethics, then self-preservation as a direct function of our inseparability from, and interdependency upon, all of the above biochemical quanta that is Earth. It’s all we know, and we scarcely know what we don’t know. This is a tautological and practical dilemma. A biological double bind, as Gregory Bateson and colleagues first conceived of it.¹⁰ And as the great Greek littérateur Kimon Friar (1911–1993)—best remembered by the public for his translation into English of Nikos Kazantzakis’ indescribably abundant *The Odyssey: A Modern Sequel*¹¹—declared, humanity must aspire to view the human condition “from the vantage of an eagle.”¹²

In the exhilarating work *Totalité et Infini: essai sur l’extériorité*¹³ by the Lithuanian/French existentialist, Emmanuel Levinas (1906–1995), this biological proliferation, in which we are so awkwardly lodged, helps us to recognize not only the Other, by signs and by traces, but also to acknowledge the essence of ethics, as a precondition of all philosophy, science, and information. Imagine our finest predictions translating into action, restraint inhibiting our ungainliness and cruelties. Hope winning out, in evolutionary terms, over destruction.

In a book many years ago, we examined the concept of “traces” (*A Vision of Nature: Traces of the Original World*)¹⁴, in which we suggested that our love of nature is the secret to our success as a species, if indeed we are to survive. Writes Levinas, “To approach the other in conversation is to welcome his expression, in

¹⁰ Bateson, G., Jackson, D. D., Haley, J. & Weakland, J. (1956), Towards a Theory of Schizophrenia. in *Behavioral Science*, Vol 1, 251–264. Accessed April 23, 2016.

¹¹ Simon & Schuster, New York, 1958, London: Secker and Warburg, 1958.

¹² See Kimon Friar’s appearances in the PBS film, “Kazantzakis,” by M. C. Tobias, 1984.

¹³ *Totality and Infinity: An Essay on Exteriority*, Published by Martinus Nijhoff, The Hague, Netherlands, 1961.

¹⁴ Kent State University Press, 1995, <http://www.kentstateuniversitypress.com/2011/a-vision-of-nature/>

Fig. P.6 “Endangered Egyptian Vulture, *Neophron percnopterus*, Socotra, Yemen,” Photo © M. C. Tobias



which at each instant he overflows the idea a thought would carry away from it. It is therefore to receive from the Other beyond the capacity of the I, which means exactly: to have the idea of infinity.”¹⁵

By the sheer enigmatic scope of this evocation we mean as well to imply an essence which is the very codex of our hearts, a subjectivity that confers an ethical obligation on each of us to embrace fellowship at every conceivable level. And it is fundamental to that fantastic recognition, and then embrace, however unnamable or vague, of a God, a god in whatever utterance, far-flung intimation, or softly communing prayer, fairly and equally distributed, if you will, throughout all of Nature.¹⁶

The prayer is a simile, of course, that we tend inordinately to outweigh with our species’ own concerns; preoccupations that have piled up in one vast edifice of self-importance within the conventionally perceived “Great Tree of Life,” as Darwin thought of it, and which more recently has, by some, been renamed the “universal tree of life,” based upon a research renaissance in heretofore unknown microbial studies.¹⁷ But humanity has persistently placed itself atop this tree and that cultural artifact now works perilously against life. This near universally human belief system constitutes nothing less than a deeply flawed and pernicious bias predicated on the brink of our species’ self-destruction. The continuing insistence upon ourselves as the ultimate agents of knowledge has only given escalating pall to a most devious, indeed ruinous proposition. We either recognize the miracle of sentient, sapient, self-reflective, and intentional morality all around us—an infinity of feelings, sophistication, and genius in Others (all other species and individuals of those species)—or risk enshrining the shortest-lived epitaph of most likely any known vertebrate species in Earth’s history.

¹⁵ op.cit., **Totalité et Infini**, p. 51.

¹⁶ See, French: “Aborder Autrui [...] c’est donc recevoir d’Autrui au-delà de la capacité du Moi: ce qui signifie exactement: avoir l’idée de l’infini.” in *Totalité et Infini*, Martinus Nijhoff, La Haye, 1991, p. 22; See also, Alan D. Schrift (2006), **Twentieth-Century French Philosophy: Key Themes And Thinkers**, Blackwell Publishing, p. 159.

¹⁷ “A new view of the tree of life,” by Laura A. Hug, Brett J. Baker, et al., *Nature Microbiology* Article number: 16048 (2016) doi:[10.1038/microbial.2016.48](https://doi.org/10.1038/microbial.2016.48), published online 11 April 2016, Accessed April 13, 2016.

Our fate is psychological and twisted. We call the Egyptian vulture (*Neophron percnopterus ginglyanus*)—with whom we have wonderfully communed at their important breeding sites on the Island of Socotra in that portion of the northern Indian Ocean proprietary to Yemen, and who might number between 20,000 and 61,000 individuals worldwide¹⁸—officially endangered, according to the IUCN. The reasons for their extreme peril are multiple: ingestion of secondary toxins in the form of nonsteroidal anti-inflammatory drugs fed to cattle, particularly in India, where the Egyptian vulture populations have plummeted (most raptors—including owls—as well as storks and cranes are equally at risk to these drugs); poaching; and habitat destruction. But there are countless other species who number in the few thousands, in some cases fewer than a thousand, yet we still debate whether they should be categorized as endangered. Politics, economics, and primordial reflexes easily obscure our natural history lenses, which must be why the majority of our kind collectively think nothing of slaughtering trillions of animals each year. We are diabolically at odds with our definitions, sensibilities, and mindsets yet somehow or other manage to recognize at least rudimentary interdependencies in nature when it comes to one of our oldest pastimes, talking about the weather. We have since 1884 classified weather patterns and zones according to the elegant system worked out by Russian climatologist and botanist Wladimir Peter Köppen (1846–1940), a system that defines specific climate types by the indigenous vegetation it nurtures. Because the fluctuations in weather can be sustained or short-lived, it has never been uncommon for plant specialists to rediscover species growing right in front of them. Every gardener in early spring knows something of this sensation.

But it is a vastly less frequent occurrence amongst animals, particularly vertebrates. When it does rarely happen, our worst fears put to rest, we call those creatures “Lazarus Species,” organisms that have managed to defy the odds of humanity wiping them out.

Two cases of such Lazarus Species come to mind: the enchanting Oliguino (*Bassaricyon neblina*) of the raccoon family, rediscovered in surprisingly higher numbers than ever imagined by Smithsonian scientists led by mammalogist Kris Helgen in expeditions throughout the highlands of Ecuador and Columbia in 2013¹⁹; and the presidential Takahe (*Porphyrio hochstetteri*) rediscovered in November 1948 by Geoffrey Orbell, “tramper” and MD, in the bush behind a remote shore of Lake Te Anau on the South Island of New Zealand. This gloriously large purple/blue ground-dwelling member of the Rallidae family, today hovering around 300 individuals, had been thought extinct since 1898 and had even been depicted in Lord Walter Baron Rothschild’s (1868–1937) momentous work,

¹⁸ See http://www.birdlife.org/datazone/speciesfactsheet.php?id=3371#http://www.aerc.eu/DOCS/Bird_taxa_of%20the_WP15.xls#, Accessed July 11, 2016.

¹⁹ See “Oliguino: ‘Overlooked’ mammal carnivore is major discovery,” by Jane O’Brien BBC News, Washington DC, August 15, 2013, <http://www.bbc.com/news/science-environment-23701151>; See also, <http://www.smithsonianmag.com/science-nature/for-the-first-time-in-35-years-a-new-carnivorous-mammal-species-is-discovered-in-the-americas-48047/?no-ist>, Accessed April 23, 2016.

Fig. P.7 “Critically Endangered Takahe, *Porphyrio hochstetteri*, South Island, New Zealand,” Photo © M. C. Tobias



Extinct Birds, in 1907²⁰ as painted by the illustrious Dutch born British ornithological illustrator, John Gerrard Keulemans (1842–1912).

But such rediscoveries (the former predicated upon an examination of dead specimens—from the more than 600,000 such mammalian specimens at the Smithsonian, as of April 2016, 601,512²¹ and to which genetic research was applied) are rare. Most urgently, it must be recognized that the destructive human catalysts by nearly all accounts are undeniably underway in a ferocious and seemingly unstoppable manner.

Is there time to halt this seemingly run-away train of destructiveness? We think there are two important antidotes. They include (1) a combination of vastly expanded protected corridors and animal liberation/conservation biology convergences and (2) active engagement by individuals in ethically informed interspecies contacts and communications, the immediate (but patient) goal of which is to lead, by any number of curious and relational intimacies, towards a much deeper acquaintance with the Others, and subsequently, to a far more sincere appreciation and outright love of our fellow co-habitants on Earth than our species has ever collectively demonstrated.

Ecological Failure or Amelioration

At this book’s core is a singular proposition, not easily digested: *Homo sapiens* are a species that is failing, in contrast with nearly all those Others on Earth. But our biological redemption is still possible. It will require unstinting kindness, personal humility and sacrifice, and the awakening of the collective conscience in both ideal as well as pragmatic ways that can work to safeguard remaining biomes and individuals—the ultimate drivers of ecological success—in whatever near infinite time

²⁰ Hutchinson & Co., London.

²¹ 19*<http://collections.nmnh.si.edu/search/>, Accessed April 23, 2016.

frames are plausible (recognizing that every species has its own unique temporal reality). The bioremediative impulses may well be preconscious, subconscious, but must be coaxed outward without fail to meet this unprecedented ecological Apocalypse we are collectively up against.

Much paleoecological data exists from Australia, New Guinea, Tonga, Cyprus, California and the southeastern United States, Western Europe, and the Caribbean, among numerous other locations to indicate that we have been reshaping the environment for our own ends, driving species to extinction, traveling between otherwise isolated islands with bioinvasives for at least 23,000 years, and that “altering the planet is something very close to fundamental to the human condition.”²² And for those who believe this argument only applies to vertebrates—the majority of species at least some *H. sapiens* seem more adept at relating to (the family dog, for example)—think again: with “invertebrate catches [that] have increased six-fold since the 1950s”²³ a first of its kind study has released shattering data indicating (not-counterintuitively) that the trophic cascade of damage resulting from such human predation is having enormous impacts on other marine creatures. “Twelve ecosystem models from different areas of the world that included 73 groups of invertebrates”²⁴ showed demonstrative “ecosystem effect[s],” a measurement that is calculated “as the percentage of other trophic groups that had a 40% biomass change at a given level of large invertebrate depletion.”²⁵

If biological success connotes kindness, altruism, and gentle observation, all of which we take as the evolutionary and future *prima facie* preconditions for interspecies relations, then it is our belief that the antidote to a continuing epoch of human destruction is the apotheosis of those relations; conversations at some primeval but accessible level with all who we, for purposes of pellucid concision, call, the Others; the other individuals of other species within populations throughout the biosphere whose lives matter to them, from inside; and to us, with an equal share in, and hopes for, the greater moral community of life.

That is deep ethology: a rewilding of psycholinguistics at the heart of this bioseiosphere, this extraordinary world of communication going on at every conceivable level between each and every living organism. It is truly a symphony, and if we are to become musicians worthy of such music and co-creative participation, we need to be informed, observant, and loving. Wrote Albert Schweitzer, “A man [and woman] is ethical only when life, as such, is sacred to him, and that of plants and

²²“The First Hints of the Anthropocene Appeared Far Earlier Than You Think,” see Sarah DeWeerd, *Conservation Magazine*, June 21, 2016, conservationmagazine.org. Accessed June 21, 2016, the Source for the essay, Bolvin N. L. et al. “Ecological consequences of human niche construction: Examining long-term anthropogenic shaping of global species destructions.” *Proceedings of the National Academy of Sciences*. doi:[10.1073/pnas.1525200113](https://doi.org/10.1073/pnas.1525200113).

²³See “The Ripple Effects of Shellfish Fisheries,” by Catherine Elton, Sourced from Eddy, T.D., et al. (2016). Ecosystem effects of invertebrate fisheries. *Fish and fisheries*, doi:[10.1111/afaf.12165](https://doi.org/10.1111/afaf.12165) © John Wiley & Sons Ltd. onlinelibrary.wiley.com, 30 June 2016, Findings republished, July 15, 2016, conservationmagazine.org. Accessed July 19, 2016.

²⁴ *ibid.*

²⁵ *ibid.*

Fig. P.8 “Marieta van der Merwe, Founder of Harnas Wildlife Foundation, Namibia, With Young Lion, *Panthera leo bleyenberghi*,” Photo © M. C. Tobias



animals as that of his fellow men, and when he devotes himself helpfully to all life that is in need of help. Only the universal ethic of the feeling of responsibility in an ever-widening sphere for all that lives—only that ethic can be founded in thought. ... The ethic of Reverence for Life, therefore, comprehends within itself everything that can be described as love, devotion, and sympathy whether in suffering, joy, or effort.”²⁶

Los Angeles, CA

Michael Charles Tobias
Jane Gray Morrison

²⁶ **Out of My Life and Thought: An Autobiography**, translated by C. T. Campion, Henry Holt & Company, New York, Chapter 13, p. 188, 1933.

Contents

1 The Making of the Anthropocene	1
Relational Values and Vicissitudes	1
Rewilding.....	3
The Others.....	6
Pain and Pleasure	9
Gray Tonalities	11
Some Aspects of Due Diligence	12
Data Sets and Dialectic Ontologies.....	15
Melancholic Deliberations	20
Mind in the Forest.....	22
Ecological Enigma Codes	26
Sentience and Accelerated Evolution.....	28
Primate Biometrics and Other Biological Dualisms	32
The Response Conundrum.....	34
Quantum Sapience	38
Darwin’s Umbrella.....	39
Differential Equivalencies.....	41
The Ontology of Mutualism.....	42
2 Our Conquest of Coevolution?	49
Counter-Collaborative Intuitions	49
The Zoological Gaze.....	51
Biorealism, Species Extinctions, and Carrying Capacity	54
The Sorites “Paradox of the Heap” in a World of Fuzzy Logic.....	57
Contradictory Breaking Points.....	61
The Metabolic Truths of Biological De-Constructions.....	63
The Blue Whale Question?.....	64
Post-Holocene Histories.....	66
3 The Metaphysics of Extinction	69
An Overview of Ceballos, Ehrlich, and Ehrlich	69

Existential Animals/Plants at Ground Zero
and the Rewilding Movement..... 74

Resolving Paradox? 85

510 Billion Square Meters of the Earth’s Surface 88

Reproachable Pathways 92

The Genus *Sus* 95

What Constitutes Being Intelligent and Is That Even
a Relevant Word?..... 96

Intelligence Versus Sustainability and Compassion..... 97

Everything That Is a Person..... 98

Living Ghosts from the Middle Miocene: Cohabitation
with the Most Iconic Carnivores in North America..... 99

Bio-Etymologies 109

4 The Conative Spectrum of Other Species..... 113

Fagan Bonds..... 113

Quantum Anthrozoology..... 119

The Many Glitches of Fairyland Zoology 120

Flawed Algorithms and Interpolations..... 121

Epiphanies at the Boundary Level..... 122

Imagination That Translates into Biological Success 124

The Pigeon Test..... 128

Animal Intelligence That Challenges Our Own..... 132

The Semiosphere..... 136

The Disambiguation of Ethics 140

Ecological Communion 146

Comparative Sentience and Sapience 150

A Menage à Trois in the Sea of Cortez 155

5 Arcadian Connections..... 157

Jungles on an Existential Planet..... 157

Art as Interspecies Immanence 160

Of Birds and Dreams and Flannery O’Connor 166

6 The “Other Minds” Challenge..... 171

Jain Bioinformatics 171

Himsā, Violence Towards the Others..... 173

Conflicted Advocacy: When Poetry and Song Fail to Impress..... 175

State Sanctioned Torture of the Innocents 179

Variable Data Sets..... 180

DNA and BioCommunications 183

Ignoring or Embracing the BioCommunicative Challenges?..... 185

7 A Prolegomena of Human Conscience..... 189

Bambi and Beyond..... 189

Reverence for the Individual..... 191

Small-World-Ness..... 192

Combinative Linguistic Capacities	193
Research Dialectics and Triage During Real-Time Crises.....	195
“Qualia” Beneath Seemingly Scientific Chaos	198
The Logic Trap.....	199
The Relativity of Neurons.....	201
Measuring Survival Within the Context of Intelligence	204
8 Experiential, Empirical, and Disturbing Anthrozoologies.....	209
Interspecies Altruisms.....	209
Ecological Dichotomies	219
9 Epiphanies of the Biosphere	225
Our Embrace of Life	225
10 Evolutionary Biographies and the Enigma of the “Other”.....	233
Beyond Solitude.....	233
An Overview of “Readings in Zoosemiotics”	235
11 A North American Family: The Ecologies of Translation.....	245
Redressing the Anthropocene Through Interspecies Communication.....	245
The Brilliance of Songbirds	253
The Parrots	257
A Brief History of Biophilia	260
A California Fanfare: And Josie at the Heart of It All	269
Josie’s Story	271
<i>Gallus gallus</i> and <i>Meleagris gallopavo</i>	272
Conversations with Josie.....	273
Post-Scientific Josie	274
Hominid and Psittacine Semiospheres.....	276
Of Dinosaurs and Other Memories	282
Expanding Contexts to Comport with Reality	285
Feathers Fashioned of Hope.....	291
A Personal Genealogy.....	299
The Fool’s Paradise.....	304
Josie’s Final Narrative.....	313
The Futility of Comparisons	314
The Crisis of One Plus One	318
Josie’s Final Act of Heroism	322
12 Coda	325
The Silence of Järvenpää	325

Chapter 1

The Making of the Anthropocene

Relational Values and Vicissitudes

Throughout the humanities, economics, geopolitical and scientific literature, film and photography, art and anecdotal social media, and other environmental-impact related materials¹ there is now a convergence of enthusiasm, enquiry, and openness to a remarkable new avalanche of human reflection, observation, data, and activism. This confluence is engaged in numerous collaborative avenues of thought, feeling, and endeavor that encompass philosophy, comparative ethology, animal liberation ideologies and commensurate activism, the history of ideas concerning nature, liberation linguistics, linguistics and translations beyond borders, conservation synecology, biosemiotics, the so-called “zoological gaze,” and applied ethological ethics. Of course, there are countless other descriptive disciplines and subsets of disciplines to capture the spirit of this collective impetus, what is little removed from those Copernican-like revolutions punctuating the history of our species’ lense-craft; our re-shifting perceptions and conceptualizations of the Earth we cohabit. The world is not flat and animals and plants think, feel, conceptualize, contextualize, and—at least according to most probability theories in math and cosmology—far outweigh us by dint of their prolonged residency and corresponding meditations here on Earth.

¹For example, see http://davidjwagnerllc.com/Environmental_Impact.html

Fig. 1.1 “Near Threatened White-Crowned Hornbill, *Berenicornis comatus*, Behind Bars in Malaysia,” Photo © M. C. Tobias



This consortium of inquisitive presupposition, hypothesis, dialectic, theory, experience, anecdote, and detail emerges in a context that is saliently at the vortex of anthrozoology. The strangeness of this revolution is that the subjects of our concern are individuals within our immediate neighborhoods, not far off in this or other galaxies—rather, directly inside us, all around us, in our backyards, in our front yards, and on the dinner plates of most humans—and in the clothes we wear and a vast majority of the products we consume and discard, at extremely prevalent and global environmental loss.

In this book, the authors will set forth some of the highlights, history, and current scientific and psychological contexts for what has been an all-out form of combat between our species and all others. We then hope to convey the many rubrics, practical remediations, as well as the ideals for reconciling that war, what, previously, we have termed World War III,² namely, the war humanity has knowingly waged against Earth, our home, for thousands of years. That war has most aggressively been waged during the past millennium, although it was not until the year 2000 that the word Anthropocene was first coined, by chemists Paul Crutzen and Eugene Stoermer.³

By encompassing anthrozoology—the role of humans amid a remarkable profusion of other species—within the Anthropocene, we want to intimate an enormous range of representative data sets, and the crucial philosophical and practical hurdles of which these bode. Our species is at a place where the poignancy and primacy of our own vulnerability and humanity is coming to light at the very moment we are finally owning up—in a deeply psychological and emotional manner—to all those other species who share this vulnerable Earth with us; conferring upon them a level of celebration, dignity, and respect that has long been absent from the working vocabulary, scientific and philosophical stability of our own kind. Who have we been to have shown such indifference, as a matter of policy? Who, what might we yet become?

² **World War III—Population and the Biosphere at the End of the Millennium**, by Michael Charles Tobias, Edited by Jane Gray Morrison, Bear & Co., Santa Fe, NM, 1994.

³ See <http://quaternary.stratigraphy.org/workinggroups/anthropocene/>, Accessed April 4, 2016.

It comes as a relief that someone as eminent as Richard Dawkins should declare, “It is surely thanks to Dr. Dolittle that I still bridle whenever I read (as I do almost daily) someone scorning concern for animal suffering, on the grounds that humans automatically and self-evidently take precedence . . . As with Darwin, the contemplation of slavery transforms Dr. Dolittle’s normal gentleness to passionate anger . . .”⁴

Rewilding

By restabilizing our ecological relationships to this extraordinarily small planet; rewilding our hearts (as our close colleague and friend, Dr. Marc Bekoff, among a few others) has long called for;⁵ and, most important, opening up our minds to the myriad of new paradigms that have utterly shaken the roots of all previous conceptions of other organisms, and behaving accordingly, we are thus able to envision a true communion with other species. That implies a mature new nature that pervades studies of organismic biology and population dynamics. It hopefully will rally consumer restraints beholden to the conscience. In that crystal ball of a new human nature the eco-sciences should easily see an open door, a pathway that both beckons and enables sea change; reliving our earliest enchantments with the natural world, without fear, apathy, or procrastination.

Of course, rewilding connotes in some minds, eco-restoration, a field replete with contradictions and challenges. For example, as author Paddy Woodworth delineates different philosophical approaches by restoration scientist/philosophers, Bill Jordan and James Aronson, there emerges a clear and pressing difference, somewhere between the ideal and the practical, the “metaphorical” and the “mathematical.”⁶ At what timeframe in the humanly perceived and judged ideal landscapes, or ecosystems of the past do we aspire to concretize and fixate some sort of preordained condition, especially noting that humans, almost from the beginning of our speciation, have focused exclusively upon ecosystem disruption with an easily deciphered forensic and archaeological narrative: self-motives? What are the very conditionals of our blind, but supposed supremacy?

To address this underlying pillar of human potency, we must note that our views of nature have been divided. There is the idea of nature; the daily entrenchment synonymous with survival within nature; and then there is a realm of spiritual and ethical ideals that are often united in some manner with nature. But at a brutal coun-

⁴Independent, n.a., “The book that changed me: Richard Dawkins, Doctor Dolittle’s Post Office by Hugh Lofting,” Saturday 27 February 1999, <http://www.independent.co.uk/arts-entertainment/the-book-that-changed-me-richard-dawkins-doctor-dolittles-post-office-by-hugh-lofting-1073782.html>, Accessed April 4, 2016.

⁵See http://www.huffingtonpost.com/marc-bekoff/rewilding-our-hearts-ecoc_b_5959948.html. Accessed January 18, 2016; See also, **Rewilding Our Hearts: Building Pathways of Compassion and Coexistence**, by Marc Bekoff, New World Library, 2014.

⁶See Chapter 14, of **Our Once And Future Planet—Restoring The World In the Climate Change Century**, by Paddy Woodworth, The University of Chicago Press, Chicago, Ill, 2003, p. 408.

ter-distinguishing level, most people are aware of nature as a quantum of biological flux, always changing, evolving, reallocating in a constant trending towards climax (as in a forest biome). Often, that flux is made of magma, or floodwaters, conflagrations, or sudden and enormous seismic change. In the human context Aristotle juxtaposed nature with humanity's ultimate satisfaction, or *eudaimonia* (εὐδαιμονία), also connoting ethical as well as practical wisdom.⁷ Gautama Buddha, conversely, thought of human existence as “suffering,” and chose to proselytize a vision of redemption, holding up Nirvana as a goal to achieve but also to reject, in order to remain in this realm, helping the Other.

Fig. 1.2 “Nirvana Buddha, Ladakh, 16th century,” Private Collection, Photo © M. C. Tobias



Humanity's myriad orientations to Nature were believed by the pre-Socratics to be an intimate and pressing human emotional drive—a language necessarily held in common by all people and the Others, and an intrinsically philosophical language that mirrors our hopes and expectations. But the writings of ancient historians show a very different world—of Peloponnesian wars, angry Gods, of famines and plagues. By the time of the Industrial Revolution, human history had revealed a world stage of frustration, anger, melancholy, ecological illiteracy, and disappointment. While the arts and literature had peered directly into the chasms of all those glaring perturbations between the Self and the Environment—lightning rods of an ethical coup, from Senate floor to dinner plate—scientific discoveries as well were providing glimpses into ages of extinction; a hemorrhaging Earth and, within just the past half-century or so, levels of entropy that could easily spell doom for the human species.

⁷ See Aristotle, also David Ross, Lesley Brown (1980). *The Nicomachean Ethics*, Oxford University Press.

With such histories in mind, where do rewilding methodologies have the best likelihood of finding a stable, relatively unaffected realm of biomes upon which to settle their hoped-for ecological renaissance and to measure their chances of efficacy?

At which point do ecosystems themselves engage in some manner of re-vivification according to often countering geological and biochemical conditions in the greater environment, and not all that far to the side and in spite of human historical and contemporary intrusiveness? Ecosystems, we contend, have their inner thoughts and emotions. After all, what is an “ecosystem”? Sir Arthur George Tansley (1871–1955) is believed to have been the first scientist to have employed the term.⁸ Lest anyone doubt Tansley’s impact on the importance of ecosystem recognition—holistic systems of life—it was Tansley who created the British Ecological Society, and was the first Chairman of the Nature Conservancy, the world’s largest environmental organization for actual protection (although protection with a huge variety of internal contradictions, particularly in regard to animal rights).⁹ He was the first British citizen to be Knighted by the Queen for his conservation work (more than two decades prior to Sir Peter Scott) and probably the first scientist of the twentieth century to be deeply troubled by the question: Is man part of nature or not? He merged psychoanalysis with environmentalism, deeply burdened by all the necessarily juxtaposed considerations, from Freud, to the evolution of ferns, and concluded that a hands-off approach to preservation was fundamental to maintaining ecosystem integrity, the word “ecosystem” actually having been suggested to him by a friend at Oxford, the botanist Arthur Roy Clapham (1904–1990).¹⁰ While ecopsychology is clearly inherent at a multiple of levels, in every nuance and color commencing at least from the time of the earliest documented works of art—long before Lascaux and the Chauvet-Pont-d’Arc Cave—the field’s most relevant revival in conservation biological terms correlates to Tansley’s passion for the notion of “plant communities” and their codification under the British Empire Vegetation Committee, of which he became chairperson in 1924.

Writes Woodworth, quoting Aronson, “If we wait to restore a system until all its structural and functional equations had been demonstrated, it will very likely have crossed several more thresholds of degradation, perhaps irreversibly, before we even begin to restore it.”¹¹

⁸ See Tansley, AG (1935). “The use and abuse of vegetational terms and concepts”. *Ecology* 16 (3): 284–307. doi:[10.2307/1930070](https://doi.org/10.2307/1930070). JSTOR 1930070; See also, Tansley, A. G. (1947). “The Early History of Modern Plant Ecology in Britain”. *Journal of Ecology* 35 (1): 130–137. doi:[10.2307/2256503](https://doi.org/10.2307/2256503). See also, Godwin, H. (1957). “Arthur George Tansley. 1871–1955”. *Biographical Memoirs of Fellows of the Royal Society* 3: 227–226. doi:[10.1098/rsbm.1957.0016](https://doi.org/10.1098/rsbm.1957.0016). JSTOR 769363.

⁹ Cooper, W. S. (1957). “Sir Arthur Tansley and the Science of Ecology”. *Ecology* 38 (4): 658–659. doi:[10.2307/1943136](https://doi.org/10.2307/1943136).

¹⁰ See “The Use and Abuse of Vegetational Concepts and Terms.” *Ecology* 16, no. 3 (1935): 284–307.

¹¹ *ibid.*, quoted from Aronson et al., “Restoration and Rehabilitation of Degraded Ecosystems in Arid and Semi-Arid Lands. II. Case Studies in Southern Tunisia, Central Chile and Northern Cameroon.” *Restoration Ecology* 1, no. 3 (1993): 168–87.

In order to truly change the way we see and act in the company of others, all those trillions of other individuals, we must recognize their needs, wants, dreams, ideals, every possibility for imaginative thrusts out into the Universe. An equal province of enterprise and of hope. To deny that reality is to deny ourselves. This reciprocity is the only true underpinning of the sum of all natural sciences; at the heart of meaningful biophilia.

Those Others, as we have now been inferencing, were formally institutionalized in the 10th edition (1758) of Carol Linnaeus' **Systema naturæ per regna tria naturæ, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis**, "**System of nature through the three kingdoms of nature, according to classes, orders, genera and species, with characters, differences, synonyms, places**": A recognized 4400 animal species (564 of them birds) and 7700 plant species. But the "formalities" of binomial nomenclature should not obfuscate the dramatic etymologies attendant upon every single naming of genera and species. Each denomination holds the power of countless linguistic connotations that are emotional, in the end; that impinge upon psychological nuance as readily as upon logic. As with the word, "bioreverie."¹² This is a key point, wherein taxonomy and drama work towards resolving any and all "two culture" conflicts.¹³

The Others

Our relationships with these Others are fraught with an order of complexity we should have become accustomed to during our past 200,000 years. But most of the social integuments linking our kind have been severed even though we remain biologically interdependent upon every last one of them, whether the majority of people acknowledge that or not. Failing to make salient intersections with other species does not lessen our emotional ties to them. We simply have hardened our arteries of perception and have ignored, or chosen to ignore those links with disastrous consequences for the biosphere.

Nonetheless, millions of people do celebrate other species. An estimated 250 million dogs on Earth are deemed to be "companion animals."

¹² See <http://www.thefreedictionary.com/reverie>, Accessed, April 23, 2016.

¹³ An Update on C. P. Snow's "Two Cultures," A new column that examines the intersection between science and society provides an update on the historic essay, By Lawrence M. Krauss on September 1, 2009, Scientific American, <http://www.scientificamerican.com/article/an-update-on-cp-snows-two-cultures/>, Accessed April 23, 2016.

Fig. 1.3 “Himalayan Dog the Local Monks Believe Was A Reincarnated Sage,” Photo © M. C. Tobias



Canines comprise the most successful carnivore on the planet, excepting humans.¹⁴ In addition, in the USA there are as many as 98 million pet cats.¹⁵

Fig. 1.4 “French-Speaking Cat, Dijon, France,” Photo © M. C. Tobias



But this barely scratches surfaces. Artists struggle to illuminate the depth of our vast connections. Consider the painter George Stubbs who put forth four versions of his “Tygers at Play” beginning in 1767, having read carefully Oliver Goldsmith’s celebrated **An History of the Earth and Animated Nature** (1771).¹⁶ Stubbs sought to convey every detail of the great cats and did so with a love of the leopards (until

¹⁴See “Don’t Call Them Strays,” by James Gorman, ScienceTimes, The New York Times, April 19, 2016, pp. D1 and D6.

¹⁵<http://www.asPCA.org/animal-homelessness/shelter-intake-and-surrender/pet-statistics>, Accessed April 24, 2016.

¹⁶George Stubbs, Painter, By Judy Egerton, Tate Publishing, London, 1996, p. 306.

about 1750 any spotted or striped felid, historian Judy Egerton points out, was called a tiger [sic] that gave viewers continual pleasure. What is that pleasure? How do we measure it, versus the pain we are inflicting on big cats throughout the world?¹⁷ One of Stubb's Tyger paintings sold for 7.7 million pounds in July 2014 at auction at Sotheby's.¹⁸ Other instances of aesthetic impact are too multitudinous to even begin to elaborate, but a few instances are worth noting (and in later chapters we will explore somewhat more in-depth). When Frederick Church's masterpiece "Heart of the Andes," (excited by the very itineraries of Alexander von Humboldt) debuted for 3 weeks commencing in late April of 1859 at New York's Lyric Hall, 756 Broadway, before being transferred to the West 10th Street Studio Building, approximately 12,000 people each paid a quarter to view it (approximately \$7.00 in today's economy). There were mobs all the way around the corners waiting to see this unveiled miracle of a painting.¹⁹ Moreover, the New York manufacturer, William Blodgett would purchase the work at the highest price ever handed out in American history for any living artist, \$10,000. In 1909, the work was bequeathed by the estate of Margaret E. Dows, to the Metropolitan Museum of Art, of which Church had been one of its founders.²⁰

The late Eliot Porter's coffee table book, **In Wildness is the Preservation of the World**²¹ the quotation from Thoreau's essay, "Walking," has sold well over one million copies.²² Hundreds of millions of visitors have flocked to landscape exhibitions over the years, from Paris, to London to New York; from Tokyo to Taipei to Amsterdam. And when a Wal-Mart heiress purchased one of the outstanding Hudson River School paintings by Asher B. Durand, "Kindred Spirits", depicting Thomas Cole and William Cullen Bryant on a rock together overlooking the 260-ft high double waterfalls of the Kaaterskill and spirited it out of the state of New York to Arkansas (prior to lending it back for some time to the Met),²³ there was an outcry,

¹⁷ See "George Stubbs' Leopard Cubs to go to Auction," By Ashitha Nagesh | March 28, 2014,— See more at: <http://uk.blouinartinfo.com/news/story/1020721/george-stubbs-leopard-cubs-to-go-to-auction#sthash.Rgo0Ft8y.dpuf>; <http://uk.blouinartinfo.com/news/story/1020721/george-stubbs-leopard-cubs-to-go-to-auction>; See also the news release on June 23rd of the Ontario zoo keeper caught on tape "mercilessly whipping a tiger and boasting about the pleasure that he derives from intimidating and dominating animals." "Bowmanville Zoo to close this year," by Noor Javed and Brennan Doherty, <https://www.thestar.com/news/gta/2016/06/23/bowmanville-zoo-to-close-this-year.html>, Personal Communication from Ingrid Newkirk at PETA, June 23, 2016.

¹⁸ <https://www.georgeglazer.com/prints/nathist/mammals/stubbstygers.html>, Accessed April 24, 2016.

¹⁹ <http://www.metmuseum.org/toah/works-of-art/09.95/>, Accessed April 24, 2016.

²⁰ *The Art-Makers: An Informal History of Painting, Sculpture, and Architecture in Nineteenth Century America*, by Russell Lynes, Dover Publications, New York, 1970, p. 225.

²¹ See <http://www.cartermuseum.org/press/releases/eliot-porter-the-color-of-wildness-reveals-art-ists-groundbreaking-contribution-to-medium-of-color-photography>, Accessed April 24, 2016.

²² Sierra Club Publishers, San Francisco, 1962.

²³ "A Billionaire's Eye for Art Shapes Her Singular Museum," By Carol Vogel, June 16, 2011, *The New York Times*, http://www.nytimes.com/2011/06/17/arts/design/alice-walton-on-her-crystal-bridges-museum-of-american-art.html?_r=0, Accessed April 24, 2016.

one critic describing the \$35 million dollar purchase as “a lowpoint for New York’s artistic patrimony.”²⁴ Of the ten highest paid-for paintings ever, nearly all of them have two things in common: the portrait of a human, or of human events, and aspects of a landscape. Two Klimts and two Picasso’s are bedecked in landscape elements; Jaspas John’s \$110 million American “Flag” (1958) is an entire landscape, as present; Edvard Munch’s \$119.9 million “The Scream” (1895) is manifested as a mental terror precisely because of the ghostly wisps of a tormenting sunset (or, arguably, sunrise), and Jackson Pollock’s “Number 5, 1948” (which sold for an alleged \$140 million) is entirely a landscape; indeed, it could be an incarnation of the very Anthropocene as perceived by one man. Whereas the \$135,000,000. Klimt “Portrait of Adele Bloch-Bauer I” is the ultimate merging of an evocative woman with her luscious surroundings.²⁵

All of these prices are vastly higher than the Vincent van Gogh’s “Sunflowers” sold to an anonymous buyer in March 1987 for \$39.85 million, which at the time was said to be “three times the highest price ever paid for a painting at auction.”²⁶

Pain and Pleasure

Nature inculcates within our every cell by remote or local recognition an unmistakable pleasure, as we sojourn along the Oconee River in Milledgeville, Georgia, named in the now extinct language of the Hitchiti-Creek peoples, where the Eastern Woodland Bison (*Bison bison pennsylvanicus*)²⁷ once roamed, prior to the last herd being slaughtered in the Winter of 1799—a taxon not to be confused with the 100 individual Canadian Wood Bison (*Bison bison athabascae*) recently reintroduced into Alaska’s wilds.²⁸ On this same day we come upon a dead member of the largest

²⁴“Hudson River Schooled, by Hudson River Schooled by James Panero, This article originally appeared in The New Criterion, Volume 27 Number 1, on page 50, Copyright © 2016 The New Criterion <http://www.newcriterion.com/articles.cfm/Hudson-River-Schooled-3894>, Accessed April 24, 2016.

²⁵<http://www.whudat.de/top-20-most-expensive-paintings-in-the-world/>, Accessed April 24, 2016.

²⁶http://articles.latimes.com/1987-03-30/news/mn-628_1_london-auction, Accessed April 24, 2016.

²⁷“The Validity of *Bison bison pennsylvanicus*,” A. W. Schorger, doi:<http://dx.doi.org/10.1093/jmammal/25.3.313a> 313–315 First published online: 8 September 1944, Journal of Mammology, Editor-in-Chief, Joseph F. Merritt, Accessed April 24, 2016.

²⁸“Alaska prepares for wood bison return after a century—Bison disappeared from the state in the 1800s or early 1900s,” by Dan Joling, The Associated Press Posted: Mar 20, 2015, <https://www.accessgenealogy.com/native/native-american-history-of-oconee-county-georgia.htm>; <http://www.cbc.ca/news/canada/north/alaska-prepares-for-wood-bison-return-after-a-century-1.3003762>, Accessed April 24, 2016; See also, Discover, “Wood Bison Roam the U.S. for First Time in a Century,” By Carl Engelking | March 23, 2015, <http://blogs.discovermagazine.com/d-brief/2015/03/23/wood-bison-u-s-return/>, Accessed April 23, 2016; See also, http://www.fws.gov/alaska/fisheries/endangered/pdf/wood_bison/factsheet.pdf, Accessed April 24, 2016.

native snake species in America, the shy and docile Eastern Indigo (*Drymarchon couperi*). It has been killed, the head severed and removed, the body chopped in half and left amid a swarm of flies. So much for that perennial Barbizon picnic in a happily-ever-after landscape painting from Fontainebleau's forests; George Inness' Montclair, New Jersey; the astonishing, revelations that consumed Impressionist Ralph Albert Blakelock, or that jubilation of all things Georgia written by John Muir (1838–1914) in his journeys of 1897 published in book form, **A Thousand Mile Walk to the Gulf**.²⁹

Our revulsion at the reality of a gentle and endangered (indeed, nonvenomous) snake slaughtered for no reason; of bison herds famously and assiduously driven to extinction, strikes a chord in us as powerful as its reverse: pleasure and pain compete in our immediate presence, our very collective and psychological future hinging on the balance of which way our species chooses to go: A visit to the “Heart of the Andes,” or the decision most recently by the government of Ecuador to proceed with the aggressive construction of an estimated 300 oil wells within Yasuní National Park,³⁰ as well as the equally insidious forestry plans by the Polish government for Bialowieza National Park.³¹

Fig. 1.5 “Rare Bracket Fungus in Bialowieza National Park,” Photo © M. C. Tobias



Madness and outright desecration or ahimsa, non-violence.³² These are polarities about which we must forthrightly teach our children.

²⁹ Edited by William Frederic Badè, Houghton, Mifflin Company, Boston, MA, 1916.

³⁰ “Oil Drilling Underway Inside the Yasuni National Park of Amazonian Ecuador, April 22, 2016. Antonia Juhasz says that the Ecuadorian government is planning another 300 wells inside the ITT area and are partnering with several Chinese companies to drill in the region to pay off debt to the Chinese government,” The Real News Network, http://therealnews.com/t2/index.php?option=com_content&task=view&id=31&Itemid=74&jumival=16140=, Accessed April 24, 2016.

³¹ “Poland approves large-scale logging in Europe’s last primeval forest—Greenpeace accuses government of ignoring scientists over fate of Białowieża woodland, home to 20,000 animal species and Europe’s tallest trees,” Agence France-Presse, Friday 25 March 2016, <http://www.theguardian.com/environment/2016/mar/26/poland-approves-large-scale-logging-in-europes-last-primeval-forest>, Accessed April 24, 2016.

³² See *An Ahimsa Crisis: You Decide*, by Suhlek C. Jain, Prakrit Bharati Academy, Jaipur, India, 2016.

Gray Tonalities

Philosophers and poets have rhapsodized all forms of naturalism and the ecological experience, many from an armchair securely vouchsafed from most of this world's harshest truths. We typically do not bring them upon ourselves in comfortable armchairs. Because there is a dialectic, mortality, woven into everything that is (with the apparently rare exceptions of certain immortal cell lines) we—all of us—necessarily feel the urgency of life whose countless mandates are debated fiercely at every level. Yet, for many, there is no debate. Just business as usual, day in day out.

Incontestably, the stakes in this generation are immense, just as they were during World War II. Consider what Auschwitz survivor, chemist and author Primo Levi wrote of a sadistic German soldier, one in particular, in Levi's first book after being liberated from the nightmare of the Holocaust, **If This Is a Man**: "If I knew how to explain fully the nature of that look, exchanged as if through the glass wall of an aquarium between two beings who inhabit different worlds, I would also be able to explain the essence of the great insanity of the Third Reich."³³

August Comte may have invented the word for altruism, but it derives from ancient Latin, referring to "the other." So when we speak of altruism, we are challenged to embrace empathy for all others, on every side of the gray scale. Empathy is not merely an emotional injunction on its own, by its inherent percolations and impulses, but also a concept of *Einfühlung*, translated by Edward Titchener, the British psychologist, as "feeling into."³⁴

Fig. 1.6 "Dr. Biruté Mary Galdikas With Rescued Orangutan," Orangutan International Foundation, Central Kalimantan, Borneo, Indonesia, Photo © J. G. Morrison



We believe that every individual of every species, which includes those who would like to see the rejection of the concept of "species" entirely, and thereby help liberate individuals from scientific boundaries, is endowed with the *Einfühlung*

³³Quoted from William Deresiewicz, "Why Primo Levi Survives," p. 89, *The Atlantic*, December 2015.

³⁴Rae Greiner, "1909: The Introduction of the Word 'Empathy' into English," http://www.branch-collective.org/?ps_articles=rae-greiner-1909-the-introduction-of-the-word-empathy-into-english, Accessed April 24, 2016.

capacity. But given today's astounding bad odds against all things empathic, there is a new biological challenge spearheading this allegedly neurological potential in humans, one with no peripheries, but every reason, as the experience of Auschwitz, imprinted onto Levi, intimates. Namely, that we must reject the I/Thou which Martin Buber so clung to. Replacing that bifurcation, replete with toxic tipping points, with a far more compelling connectivity that involves all of us, without distinction, or preference or bias, in this journey through life. One that knows how to conquer the Holocaust against humans, and against every other species by humans.

This is not to disavow the differences between each and every living individual, on this planet, not even to dismiss some potentially interesting other system of life forms 14 light years away from Earth. But chances are, should such planets exist nearby, in what is known by astrogeophysicists as the "Goldilocks zone," they are likely to be quite different from anything we have yet to imagine.³⁵ Given that the majority of our Earthbound rhapsodies are still clouded in gray uncertainty, all of us, every organism, would be best served by our ethical and legal due diligence here at home, in this generation.

Some Aspects of Due Diligence

Given this aforementioned "chopped snake" confrontational reality, and the corresponding prospect of reversing violence, embracing kindness, it is incumbent upon this generation to realistically pose the legislative frameworks that will help codify information with legal standing. What are some of the historic precedents and scientific margins of success that give us suasion and latitude when it comes to pushing for enforcement of basic biotic components necessary for slowing down the worst of the Anthropocene, ultimately stopping it, if that is possible?

In his compelling history of environmentalism in North America, **After Nature: A Politics for the Anthropocene**³⁶ Jedediah Purdy, a law professor at Duke University considers a vast panoply to hint at our current Epoch's legal complexity, commencing with a comment that the nearly 11,700 years of the Holocene (which we are officially still in, however much it overlaps with the Anthropocene) has, geologically speaking, meant that "plate tectonics has driven the continents a little more than half a mile ..." Writes Purdy with stark wit, "a reasonably fit person could cover the scale of planetary change in a brisk eight-minute walk."³⁷ Yet, in just the last four centuries, hikers—many no doubt out for a quick morning walk—have noticed a change in Scandinavian tree lines, for example. Climatologists have

³⁵ http://www.aol.com/article/2015/12/17/extraterrestrial-life-may-only-be-14-light-years-away/21285253/?icid=maing-grid7%7Cmain5%7Cd13%7Csec1_lnk3%26pLid%3D-323401664. Accessed March 2, 2016.

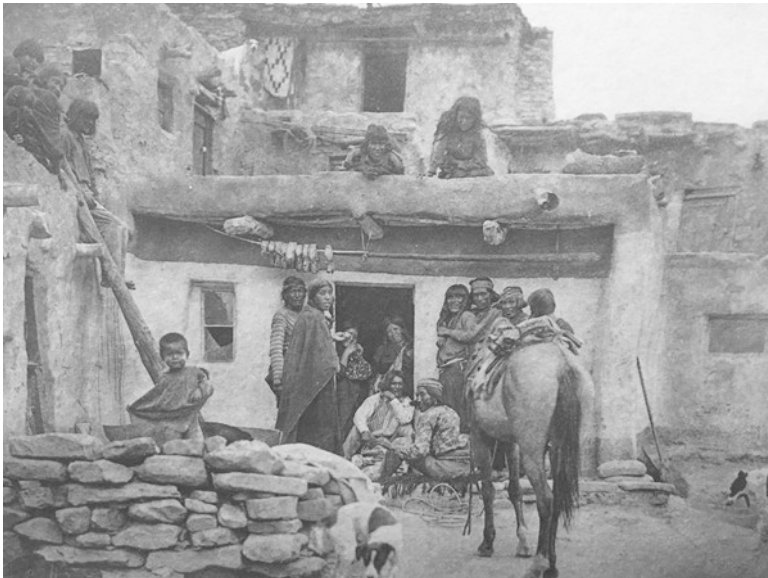
³⁶ Harvard University Press, Cambridge, Mass., London, UK, 2015.

³⁷ From Purdy's the Prologue, p. 1.

definitely noticed. Over the course of some four centuries “the sub-arctic tree line has moved south more than a hundred miles”³⁸ There are no legal precedents to grapple with such anthropogenic change.

As Purdy documents, the 1823 US Supreme Court vote on *Johnson v M’Intosh* (21 U.S. 543) in which the Chief Justice John Marshall presided, determined that the Federal government could negate any and all land claims by Native Americans, turning over such land to settlers, largely Anglo-newcomers from the eastern USA.³⁹

Fig. 1.7 “A Visitor,” (Hopi Village), Photo by Edward Curtis, circa 1906, Private Collection, Photo © M. C. Tobias



By 1972, the tenor of the Supreme Court had most assuredly become more liberal when, in *Sierra Club v. Morton* (405 U.S. 727), Justice William O. Douglas argued that nature has legal standing. We quote at length from a portion of his delivery, as it represents perhaps the most singularly eloquent and promising antidote to the Anthropocene in twentieth century American legal history: “The ordinary corporation is a ‘person’ for purposes of the adjudicatory processes, whether it represents proprietary, spiritual, aesthetic, or charitable causes. So it should be as respects valleys, alpine meadows, rivers, lakes, estuaries, beaches, ridges, groves of trees, swampland, or even air that feels the destructive pressures of modern technology and modern life. The river, for example, is the living symbol of all the life it sustains

³⁸ **What Is Landscape?** by John R. Stilgoe, The MIT Press, Cambridge, Mass., London, UK, 2015, p. 138.

³⁹ *op.cit.*, Purdy, p. 83.

or nourishes—fish, aquatic insects, water ouzels, otter, fisher, deer, elk, bear, and all other animals, including man, who are dependent on it or who enjoy it for its sight, its sound, or its life. The river as plaintiff speaks for the ecological unit of life that is part of it. Those people who have a meaningful relation to that body of water—whether it be a fisherman, a canoeist, a zoologist, or a logger—must be able to speak for the values which the river represents and which are threatened with destruction ...The voice of the inanimate object, therefore, should not be stilled.”⁴⁰

Fig. 1.8 “Fish Left Out on Hot Concrete To Die Slowly, Gulf of Aden,” Photo, © M. C. Tobias



and

Fig. 1.9 “Koi Fish, *Cyprinus carpio*, Japanese Garden Sanctuary,” Photo © M. C. Tobias



This “voice” would legally reincarnate when, in 1992, the Supreme Court ruled in *Lujan v. Defenders of Wildlife* (504 U.S. 555) that plaintiffs, in this case, an environmental organization, claiming a relationship, however minimal, to a region containing endangered species had standing to sue under the Endangered Species Act of 1973 (ESA; 16 U.S.C. § 1531 et seq.).⁴¹

⁴⁰ See Purdy, pp. 209–210.

⁴¹ See Purdy, pp. 223–225.

Reverberations, pro and con, continue to rile juridical deliberations pertaining to nature, particularly with respect to private landowner claims for compensation (as with the 1992 *Lucas v. South Carolina Coastal Council* [505 U.S. 1003]), not to mention the astonishing one million+ estimated “mining claims on federal land” said to be in existence since the 1976 Revised Statute (R.S.) 2477 regarding the 1866 Mining Law.⁴² One country, one region, one time in history, one cultural-divide amongst Americans. It is no different in Mozambique, in Bhutan, in Suriname and in that vast seventh continent, Antarctica, which, legally speaking, anyone has the right to homestead, no visa or permit required.

Data Sets and Dialectic Ontologies

Legalities of these dialectics only touch the bare surface of humanity’s complications. In trying to grasp the fullest dimensions of the Anthropocene, our concerns are fraught with the grotesque and the sublime. Our human debates are tainted from the outset because they rely on our own languages and self-perceptions. Getting outside ourselves, which the brilliantly eccentric Flannery O’Connor has written in **Wise Blood** (1952), was never possible, has proved tempting in any number of categories—spirituality, the language of mathematics, great art, whether a “Messiah” or self-portrait by Rembrandt. But our ontologies that seek to see nature unfiltered also enact extremes of impact—have done so for tens of thousands of years, most noticeably during the last 12,000 years—and these are not up for debate as much as finding the appropriate ways to best characterize their insistent inflictions on other life forms. And then, to extrapolate from the data better ways to grasp the time-frame that awaits us, in terms of re-instituting some level of compassionate conservation if we are—as a species—to defuse the many bombs we have set, and—in so many cases—already ignited.

The swarm of data sets if difficult to even outline, let alone the human rancor that attends upon each “fact.”

Consider just a minute sampling of studies; exemplifications of tedious, troubling research while Rome burns—that is where the human world has landed:

The Harvard Forest, which represents one of the longest running research programs in North America, is shedding light on the rapid decline for the first time in some 5000 years of the iconic Eastern Hemlock ecosystem to the invasive woolly adelgid invertebrate.

The state of Maine, in conjunction with the US Fish and Wildlife Service is sanctioning the “incidental take” of *Lynx Canadensis* as hunters go after other fur-bearing targets, notwithstanding the empirical facts surrounding the rapid decline of the Lynx throughout its US and Canadian territories.

In 2015 Dr. Culum Brown wrote an essay for the journal *Animal Cognition*, that “fish perception and cognitive abilities often match or exceed other vertebrates;”

⁴² *ibid.*, Purdy, pp. 219–220 and 221–222.

that “the extensive evidence of fish behavioral and cognitive sophistication and pain perception suggests that best practice would be to lend fish the same level of protection as any other vertebrate.” But, alas, no nation does. The USA is the largest importer of so-called “ornamental fish” in the world—over 5400 species annually, according to an essay in the *Animal Welfare Institute Quarterly*.⁴³

Consider diet data and the long-standing presumption that if one is simply looking at the energy sector, then the body’s absorption of calories from vegetables takes a higher toll per calorie than meat, goes one theory. “Eating lettuce is over three times worse in greenhouse gas emissions than eating bacon,” according to Paul Fischbeck, a researcher who helped produce a study at Carnegie Mellon University that examined USDA recommendations that people eat more fruit and vegetables.⁴⁴ The study was conducted and funded by CMU’s Steinbrenner Institute for Environmental Education and Research, and the sustainability-focused Colcom Foundation.⁴⁵ The apparent balancing act of calculations pivots not on waistline inches, but calories, as translated in the number of watts (W) per square kilometer in the atmosphere, as induced solely by human activities. And that means that “If you stop eating beef, you can’t replace a kilogram of it, which has 2280 cal, with a kilogram of broccoli, at 340 cal. You have to replace with 6.7 kg of broccoli.”⁴⁶

That’s just one recent opinion. There have been many hundreds of research studies that compared the environment impacts of animal versus non-animal diets: hyper-, meso-, hypo-, and zero-carnivory.⁴⁷ If the minute calories and kilowatts of energy are adopted as the hallmark of environmental protection, then a competition between protection, and violence is set in motion. It is a false dichotomy, as becomes clear between most data sets driven by minds with differing ethical bottom-lines, because both versions of the narrative inflict violence, one directly, the other cumulatively. But also because ethics cannot be refuted by data. The Anthropocene dilemma represents a challenge to differentiate cruelties within the famed Paul Ehrlich, John Holdren, Barry Commoner $I=PAT$ equation, placing human impact in the context of

⁴³“Ethical And Ecological Implications Of Keeping Fish In Captivity,” *AWI Quarterly*, Fall 2015 Volume 64, Number 4, p. 7.

⁴⁴*See “Vegetarian and ‘healthy’ diets may actually be worse for the environment, study finds,” Peter Dockrill, *Science Alert*, 15 Dec 2015, <http://www.sciencealert.com/vegetarian-and-healthy-diets-may-actually-be-worse-for-the-environment-study-finds>. Accessed February 25, 2016.

⁴⁵*Originally published in “Energy use, blue water footprint, and greenhouse gas emissions for current food consumption patterns and dietary recommendations in the US,” by Michelle S. Tom, Paul S. Fischbeck, and Chris T. Hendrickson, *Springer, Journal, Environment Systems and Decisions*, pp. 1–12, First online: 24 November 2015.

⁴⁶ibid., quoting Tamar Haspel in the *Washington Post*, “Vegetarian or omnivore: The environmental implications of diet,” March 10, 2014.

⁴⁷“Roger Gower: Tanzania elephant poachers shoot dead British helicopter pilot in middle of mission—A manhunt for his killer is reportedly underway,” Will Worley, 30 January 2016, [http://www.independent.co.uk/news/world/africa/british-pilot-shot-dead-in-tanzania-on-anti-poaching-mission-a684\)4401.html](http://www.independent.co.uk/news/world/africa/british-pilot-shot-dead-in-tanzania-on-anti-poaching-mission-a684)4401.html). Accessed January 30, 2016.

population, affluence and technology; as well as the Tragedy of the Commons paradigm⁴⁸ which sets in motion a species-wide depletion coefficient of resources.

But most recently, that differentiation was undermined by a new study published in the Proceedings of the National Academy of Sciences in which the authors unequivocally made clear that global greenhouse gas emissions would be curbed by “44 percent” if humanity all embraced vegetarianism, and by “55 percent” if a vegan diet were embraced, the latter also cutting more than a trillion dollars off medical bills each year worldwide.⁴⁹

From a non-ecological standpoint, legally, economically, and perhaps medically it would be difficult to delineate accurately at subjective thresholds between pain and anxiety levels, just as it would be impossible to qualify a bewildering array of human languages. Documentation of etymologies hinges upon the Greek meaning of etymon, true sense, but “true” and “sense” lack that which is beneath the true or the sense, linguistically. Comparative language groups, families, roots, semantic change, our understanding of dialectological variance all are hindered by that which is Original and cannot be verified or even imagined. Allegedly the first language-wielding Homos could utter three vowels, based on cranial research, but even this is very fuzzy, and if it remains so for humans, how much more so for human language attempting to grasp the languages of birds or fish? We know most of our designations from Latin (the most successful language in human history) and Greek, where word origins were turned explicitly into blunt scientific nomenclature. Most genus and species names are surprisingly simplistic, employing obvious words/meanings, like the American Robin, *Turdus migratorious*, Turdus being Latin for Thrush, of the family Turdidae, first mentioned in 1815 (that recently); and thrush related to throstle, spinning cotton (continually). Migratorious, also Latin, for migrate or depart. Combined, how could one ever actually imagine anything about an American Robin?

Of course, two words to describe an American robin grossly miss the object of their affection.

Within the limited languages of ecology, it gets much worse than mere nomenclature the moment economics is involved. The arguments and impulse to monetize any aspect of the natural world is a solely human-advanced cause, typically in the guise of a massively simplistic political argument to win support on allegedly pragmatic grounds for what is otherwise an ecological intangible, like the value of a single tree, a ground orchid or an Old World Monkey. We have enough difficulty just naming life forms intelligently, let alone valuing them. When economic expediency

⁴⁸Ehrlich, P.R. and J.P. Holdren, 1972. Critique: One Dimensional Ecology. Bulletin of the Atomic Scientists 28(5): 16, 18–27. Commoner, Barry. The Environmental Cost of Economic Growth in Population, Resources and the Environment. Washington, DC: Government Printing Office pp. 339–63, 1972; Hardin, G (1968). “The Tragedy of the Commons”. Science 162 (3859): 1243–1248. doi:10.1126/science.162.3859.1243. PMID 5699198.

⁴⁹“Springmann M, H. Charles J. Godfray, Mike Rayner, Peter Scarborough, “Analysis and valuation of the health and climate change cobenefits of dietary change.” Proceedings of the National Academy of Sciences USA doi:10.1073/pnas.1523119113; <http://www.pnas.org/content/early/2016/03/16/1523119113.full>, Accessed March 23, 2016.

based upon market value finds that market moving elsewhere, or crashing, then any presumed ethic at the basis for those bankable numbers and computations also collapse. Our manipulative goals rest on air.

While the World Health Organization recognizes that “250,000 people will die each year worldwide because of the health effects of climate change” between the years 2030 and 2050,⁵⁰ in southern California as many as “150–200” days per year “when the high temperature exceeds 95°” by the end of the century has already been enshrined within the consciousness of residents and the indifference of politicians who will not be in office at that time to worry themselves over the consequences of their inertia in the early twenty-first century.⁵¹ But, in fact, it won’t take that long, according to new European findings. We’re talking decades, not a century, says renowned climate scientist James E. Hansen and colleagues.⁵²

Fig. 1.10 “Melting Glaciers, Alaska,” Photo © M. C. Tobias



The acceleration of the Anthropocene (under the guise of multiple and simultaneous extinctions and accompanying denials and simplifications) has been a subject under the microscope of a multitude of scientific disciplines since before the time of Darwin. But no ethical system has yet arisen to cope with the quantification of suffering. Obviously, a temporary toothache in a beaver will most assuredly cause less damage than the entire beaver lodge being destroyed; a human cold less loathsome

⁵⁰“Health risks of climate change tackled,” by Sounya Karlamangla, Los Angeles Times, Tuesday February 23, 2016, p. B.1, Accessed March 22, 2016.

⁵¹ *ibid.*, p. B5.

⁵²“Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling, and modern observations that 2 °C global warming could be dangerous,” Atmospheric Chemistry and Physics, James Hansen, et al., Atmos. Chem. Phys., 16, 3761–3812, 2016, <http://www.atmos-chem-phys.net/16/3761/2016/>, doi:10.5194/acp-16-3761-2016, Accessed March 22, 2016.

than the afflicted nose-running individual being turned into ground beef or a chicken breast, or unleashing a pandemic. That said, southern California biomes accustomed for thousands of years to a Mediterranean Floristic Province, mildly suffused with a marine haze, afford little if any chance for countless native species to evolve rapidly enough to survive half or more than half of each year under the oppressive 95° daily scenario now factored into climate models for the Northern Hemisphere.

So does one rely upon research predicated on kilowatts and calories, or such fully loaded words as threatened, endangered, vulnerability and extinction, to best gauge personal options and choices? However we phrase to ourselves the damage being meted out, the cumulative weight of knowledge scientists are gleaning from other species has only continued to exacerbate the gulf between us and all the Others. It is Socratic (the more we learn the less we know) and tautologically self-inflictive. But it might also perpetuate options for biospheric survival. That is our abiding goal.

Statistics have certainly given us an edge on gazing upon the multiple windows of species collapse; the use of so-called multidimensional integrals, computational physics, biology and linguistics, “random walk Monte Carlo methods” for honing in on Bayesian statistics, most recently used to determine population collapses in the case of bird species in Hawaii—“A Bayesian approach for characterizing uncertainty in declaring a population collapse.”⁵³

Practically and existentially we are at a complete loss to collectively fix the problem enunciated by Oliver Hazard Perry, “We have met the enemy, and they are ours.”⁵⁴

We know that several trillion vertebrates, not to mention a no doubt vast realm of invertebrates, are slaughtered each year by humans. Something like 200 million people have been killed in wars since the time of about 1850 (the year the first pair of blue jeans were manufactured and the first women’s medical school established).⁵⁵ This underscores the unbearable reality of the other numbers: those pertaining to the sixth extinction crisis of biodiversity which is the defining characteristic of the Anthropocene. Two hundred million people is a big number, but nothing compared with the trillions of other animals people have slaughtered.

⁵³ Kevin Aagaard, Julie L. Lockwood, Edwin J. Green, <http://www.sciencedirect.com/science/article/pii/S0304380016300436-cor0005>, Science Direct, Elsevier Publishers, Ecological Modelling, Volume 328, 24 May 2016, Pages 78–84. Available online 12 March 2016, doi:10.1016/j.ecol-model.2016.02.014, <http://www.sciencedirect.com/science/article/pii/S0304380016300436>, Accessed June 4, 2016.

⁵⁴ <http://www.encyclopedia.com/doc/1G2-3401804500.html>, Accessed March 22, 2016.

⁵⁵ See “The Strange And Surprising Debate Over How To Help A Malnourished Kid,” by Emily Sohn, March 13, 2016, NPR, http://www.npr.org/sections/goatsandsoda/2016/03/13/469943364/the-strange-and-surprising-debate-over-how-to-help-a-malnourished-kid?utm_source=facebook.com&utm_medium=social&utm_campaign=npr&utm_term=nprnews&utm_content=20160313. Accessed March 13, 2016.

Fig. 1.11 “Rhesus Macaque, *Macaca mulatta*, Southern India,” Photo © M. C. Tobias



Melancholic Deliberations

In his compelling book **Dodging Extinction: Power, Food, Money, and the Future of Life on Earth**, Anthony D. Barnosky provides a chilling summary of the IUCN (International Union for Conservation of Nature) levels of risk; of species lurching towards extinction. As of 2014 there were “20,614” species that had been studied from more than 71,576, and they were each in the “vulnerable, endangered, and critically endangered” categories.⁵⁶ While there have been well-grounded critiques of IUCN regional methodologies⁵⁷ what is unambiguous is the fact that not for 66 million years has a situation like this—the sixth extinction spasm—occurred, and never so rapidly. Barnosky photographed the Giant Galapagos tortoise, named Lonesome George, 10 months before George died, in the early summer of 2012, the last of his kind. The image haunts the book particularly given Barnosky’s first chapter heading, “The Last Ones Standing.” But what makes the IUCN data particularly disturbing is the fact that only some 50,000 species have to date (mid-2016) been studied so as to adduce their vulnerability to the general category, “threatened.” There are, as most biologists believe, as many as 8–12 million species at large. But some suspect there to be at least 100 million species, if we take into account the microbial, viral, viroid, and prion species, not to mention the earliest known life forms (first discovered in the 1970s), the non-bacterial single-celled archaean, comprising three domains, namely, the crenarchaeota, euryarchaeota, and korarchaeota groups, the biological truth beneath all the rudiments, presentiments, pillars and

⁵⁶ Anthony D. Barnosky, University of California Press, Oakland, CA, p. 12, 2014.

⁵⁷ See for example, “The use of opportunistic data for IUCN Red List assessments,” Dirk Maes, Nick J. B. Isaac, Colin A. Harrower, Ben Collen, Arco J. van Strien and David B. Roy, *Biological Journal of the Linnean Society*, Special Issue: Fifty years of the Biological Records Centre Volume 115, Issue 3, pages 690–706, July 2015, Article first published online: 9 APR 2015 doi:[10.1111/bij.12530](https://doi.org/10.1111/bij.12530) © 2015 The Linnean Society of London, Accessed January 20, 2016.

realities of ecosystems as we think we know them.⁵⁸ Staying just with vertebrates and invertebrates, by every glimpse of accountability, we are mathematically in trouble. This is not inherently contradictory, a numbers game given to the few, and leaving out the many. Rather, it is the empirically logical extrapolation from those 20,614 species cited above, that have been most extensively examined. They stand out; either in the sense of being large, or charismatic, or keystone species that exert inordinately critical links in the eco-dynamics of any biological system or biome, such that—no matter how seemingly small or irrelevant at first glance—they are what enable the biotic through story, the many components crucial to interlinking effectively for purposes of multitiered propagation and natural life cycles.⁵⁹ In his concluding chapter, “Back from the Brink,” Barnosky puts the current extinction crisis in the context of the Green Revolutionary Nobel Laureate, Dr. Norman Borlaug whose discovery of an agro-ecological crisis in Mexico back in the early 1960s prompted him to search for new approaches to increasing crop yield that could feed a hungry world. Back then, Barnosky imagines, few people would have wanted to see a billion other people starve to death. And today, he suggests, “you wouldn’t find many people who would be happy to watch three-quarters of the world’s mammals, birds, reptiles and amphibians die out.”⁶⁰ Such quantifications, along with many others specific to such things as the “evaporation of moisture,” the fact that “each degree rise in temperature increases the loss of moisture from 7 to 15%”⁶¹ represent what many, like Veerabhadran Ramanathan, a professor of oceanography at the Scripps Institution at UC San Diego and a delegate to the UN COP21 climate summit in Paris in late 2015 on behalf of the Vatican, have referred to as a “tipping point.” The fact that many people, as Ramanathan describes it, might say, “‘My God, we’ve gone over the tipping point, there’s nothing we can do, we might as well sit and enjoy the rest of the time we have,’ That could be a problem,” he says.⁶²

⁵⁸ See “The Microbe World,” American Society for Microbiology, <http://www.microbeworld.org/types-of-microbes/archaea>. Accessed March 9, 2016. For the first publication regarding the archaeans, see “Discovering Archaea, 1977: Ribosomal RNA fingerprints reveal the three domains of life,” by Abby Olena, March 1, 2014, *The Scientist*, March 2014 Issue, <http://www.the-scientist.com/?articles.view/articleNo/39213/title/Discovering-ArchaeaDOUBLEHYPHEN1977>, Accessed June 24, 2016.

⁵⁹ See Robert D. Davic (2003). “Linking Keystone Species and Functional Groups: A New Operational Definition of the Keystone Species Concept”. *Conservation Ecology*. Retrieved 2011-02-03.

⁶⁰ Barnosky, *ibid.*, p. 169.

⁶¹ “Climate dealer,” by Pat Morrison, *Los Angeles Times*, Wednesday, December 2, 2015, p. A19.

⁶² Pat Morrison, *ibid.*, p. A19.

Fig. 1.12 “Forest in Silent Valley, Nilgiris Biosphere Reserve, Southern India,” Photo © M. C. Tobias



Mind in the Forest

But the loss of that moisture poses the most immediate crisis for floristic kingdoms, obviously. Consider the recent theory regarding “smart plants” advanced by researchers at Princeton University. Senior author Lars Hedin describes what seems to be occurring within the legume family of nitrogen-fixing trees, peas and beans, mostly. “Generally we think of plants as responding passively to their environment, but we found that they can in fact be quite strategic,” Hedin said. “Our theory suggests that the distribution of nitrogen fixers across biomes, and the great success of fixers in tropical forests, is a result of the evolution of ‘smart’ plant strategies in tropical forests in particular.” And he added, “Tropical nitrogen-fixing plants are smart enough to know when to use costly nitrogen fixation to compete with neighboring plants, and when to turn it off, as if they are sentient beings,” he said.⁶³

⁶³“Theory of ‘smart’ plants may explain the evolution of global ecosystems,” Posted December 1, 2015; 10:00 a.m., by Morgan Kelly, Office of Communications. <https://www.princeton.edu/main/news/archive/S44/88/96G13/index.xml?section=topstories>. Lars Hedin, Efrat Sheffer, and Sarah

Not only are plants presumed by many scientists and most passionate gardeners to be totally sentient, but in 2008 “a Swiss Federal Ethics Committee stated the need for the ‘moral consideration of plants for their own sake.’”⁶⁴

Yes, for centuries there has been a general sense that there is indeed an inner world of plants that humans have only collaborated with from a distance, often with deep feelings. Then, in 1973, the best-selling book **The Secret Life of Plants** by Peter Tompkins and Christopher Bird⁶⁵ revealed experiments that had employed a variety of unconventional techniques the sum of which seemed to indicate a veritable cipher describing a whole new world of plant intelligence. In spite of an alleged lack of a brain or a nervous system, plants seemed to indicate sentience. But this proposition would come as no surprise to hundreds of millions of indigenous peoples, not to mention many adherents of the world’s great religious traditions, from Jainism to Buddhism (for whom—moving from plants to animals, it is also no surprise that the more than 300 species of octopus each apparently have eight arms, nine brains and three hearts).⁶⁶

As of late 2015, “sentience” seemed to be the operative word amongst Hedin and fellow researchers at Princeton, as well. Michael Pollan published his groundbreaking essay in *The New Yorker Magazine*⁶⁷ which in so many ways echoed the passionate sentiments of the 1911 Nobel Prize Laureate for Literature, Maurice Maeterlink’s **Hours Of Gladness**,⁶⁸ in which Maeterlink wrote extensively of “The Intelligence of Flowers” concluding with the profound following: “But these are mysteries which it were somewhat idle to interrogate, seeing that we do not yet possess the organ that could gather their reply. Let us be satisfied with having observed certain manifestations of this intelligence outside ourselves. All that we observe within ourselves is rightly open to suspicion; we are at once litigant and judge and we have too great an interest in peopling our word with magnificent illusions and hopes. But let the least external indication be dear and precious to us. Those which the flowers have just offered us are probably infinitesimal compared with what the

Batterman and Simon Levin, Accessed February 24, 2016. Plants also learn how to forget. See, “Reconsidering plant memory: Intersections between stress recovery, RNA turnover, and epigenetics,” Peter A. Crisp, Deep Ganguly, Steven R. Eichten, Justin O. Borevitz, and Barry J. Pogson, *Science Advances* 19 Feb 2016: Vol. 2, no. 2, e1501340, doi:[10.1126/sciadv.1501340](https://doi.org/10.1126/sciadv.1501340).

⁶⁴Quote from the book, *Plant-Thinking: A Philosophy of Vegetal Life*, by Michael Marder, Columbia University Press, 2013; cited in the “International Society for Environmental Ethics Newsletter, Vol. 25, No. 1, Winter 2015, p. 18.”

⁶⁵Harper and Row, New York.

⁶⁶See http://www.nmfs.noaa.gov/stories/2012/08/08_17_2012_octopus_video.html; See also <http://theterramarproject.org/thedailycatch/an-octopus-has-3-hearts-9-brains-and-blue-blood/>, Accessed April 24, 2016.

⁶⁷“The Intelligent Plant—Scientists debate a new way of understanding flora,” <http://www.newyorker.com/magazine/2013/12/23/the-intelligent-plant> A Reporter at Large December 23, 2013, Accessed February 24, 2016.

⁶⁸Translated by A. Teixeira De Mattos, Illustrated by E.J. Detmold, London: George Allen & Co., 1912.

mountains, the sea and the stars would tell us, could we surprise the secrets of their life. Nevertheless, they allow us to presume with greater confidence that the spirit which quickens all things or emanates from them is of the same essence as that which quickens our bodies.”⁶⁹

Fig. 1.13 “Cones, Cedars of Lebanon, *Cedrus libani subsp. libani*, IUCN Vulnerable, Chouf Reserve, Baabda District, Lebanon,” Photo © M. C. Tobias



Maeterlink’s vision derives without the least conceptual interregnum from Charles Darwin’s esteemed grandfather, Erasmus Darwin, author of the revolutionary treatise, **The Botanic Garden** (1791) comprising two poems, “The Economy of Vegetation” and “The Loves of the Plants,”⁷⁰ clearly inspired by both Linnaeus’ attribution of sexual reproductive infrastructure to the world’s plants and their taxonomic descriptions, Linnaeus’ earliest obsessions.

⁶⁹ *ibid.*, pp. 99–100.

⁷⁰ Printed for J. Johnson, London (1791).

Fig. 1.14 “Old Forest, North American Atlantic Seaboard,” Photo © M. C. Tobias



Moreover, it is unlikely that Maeterlink had not read **The Sylvan Year**, by the great Phillip Gilbert Hamerton (1834–1894), in which that famed naturalist (who with his wife rented the entire island of Inistrynich in the heart of Scotland’s third largest Loch Awe, and there wrote prolifically of nature and the imagination) committed these words in his Preface: “...although a man of science might have written about the forest without reference to human sorrows or satisfactions, an artist could not do so except at the risk of sacrificing his most effective forces, those which have influence by means of sympathy and association.”⁷¹

⁷¹ **The Sylvan Year—Leaves From the Note-Book of Raoul Dubois**, 3rd Edition, Seeley, Jackson And Halliday, London, 1883, from the Preface, p. vii.

Fig. 1.15 “Alpine Wildflowers, Colorado,” Photo © M. C. Tobias



Pollan profiles the Calabrian plant physiological pioneer Stefano Mancuso at the International Laboratory of Plant Neurobiology at the University of Florence, who suggests that humans have made neurons into a kind of fetish, raising fundamental questions about the prevailing bias inherent to modern science. If brains or intelligence are involved, plants are, almost by definition, excluded from most scientific conversations, Pollan’s article makes more than clear; notwithstanding the reality that life on this planet occurs among ecosystems comprising more than 70 % water and 29 % plants. Scientists with the US Department of Agriculture have examined root exudation and the communication signals firing between roots, to parasites, fungi, to beetles, to bark and to soil. The whole world is communicating right in front of us, under us. Taproots are de facto repositories of vast collections and recollections of information that are constantly being transmitted. And we vertebrates are all but shut out of the conversation that is essentially called rhizosphere biology.

Ecological Enigma Codes

Most recently, in May of 2015, the German forester Peter Wohlleben published the best-selling **The Hidden Life of Trees: What They Feel, How They Communicate— Discoveries From a Secret World**⁷² in which the author described how “trees in the forest are social beings. They can count, learn and remember; nurse sick neighbors; warn each other of danger by sending electrical signals across a fungal network known as the ‘Wood Wide Web’; and, for reasons unknown, keep the ancient stumps

⁷²**Das geheime Leben der Bäume**, German edition published by Ludwig Buchverlag.

of long-felled companions alive for centuries by feeding them a sugar solution through their roots.’⁷³

Fig. 1.16 “Forest Floor, Bialowieza National Park, Poland,” Photo © M. C. Tobias



A team of researchers from Germany’s University of Würzburg recently discovered that the carnivorous Venus Flytrap (*Dionaea muscipula*) can actually “count.” It does this by deliberately fostering cells that can remember how many times an insect, caught in its gluey lair frantically taps its trigger hairs while trying to get out. “More than three flicks of a trigger hair were needed to signal the cells that produce digestive enzymes to begin” dissolving the doomed creature inside.⁷⁴

Moreover, there has been data to suggest that plants once injured struggle—as inflicted by the verb understood in the most mammalian sense—to survive.⁷⁵

Notwithstanding such *types of evidence*, the overwhelming majority of zoologists continue to resist conferring much “intelligence” in the human sense to a system of life on Earth that has given life to the rest of us through a myriad of crucial pathways, including photosynthesis and carbon sequestration, not to mention, food.⁷⁶

⁷³ See “German Forest Ranger Finds That Trees Have Social Networks, Too,” by Sally McGrane, January 29, 2016, p. 2; <http://www.nytimes.com/2016/01/30/world/europe/german-forest-ranger-finds-that-trees-have-social-networks-too.html?emc=eta1>. Accessed January 30, 2016.

⁷⁴ See “The Venus Flytrap, a Plant That Can Count,” by James Gorman, The New York Times, Tuesday, February 2, 2006, p. D6. Accessed February 2, 2006.

⁷⁵ Bless, H., Fiedler, K., & Strack, F. (2004). **Social cognition: How individuals construct social reality**. Hove and New York: Psychology Press. p. 2.

⁷⁶ Plant Physiology, Vol. 132, No. 1, May, 2003, “Root Exudation and Rhizosphere Biology,” <https://www.jstor.org/action/showPublication?journalCode=planphys>, Travis S. Walker, Harsh Pal Bais, Erich Grotewold and Jorge M. Vivanco, Plant Physiology, Vol. 132, No. 1 (May, 2003), pp. 44–51,

But then, our knowledge of a sublime bilaterally symmetrical cephalopodic mollusc with nine minds has not deterred a global market for octopus, let alone a proliferation of connoisseurs vying for customers.⁷⁷

Sentience and Accelerated Evolution

The same confirmation biases against the intelligence of plants and octopus, include all fish, the subject of a recent focus of a new journal published by the American Humane Society's Institute for Science and Policy known as "Animal Sentience: An Interdisciplinary Journal on Animal Feeling."⁷⁸ Write the editors regarding this new publication, it is "the first journal to focus on the capacity of nonhuman animals to feel. Feeling can be any sensation, such as seeing, hearing, touching, tasting, smelling, moving, wanting, pain, pleasure, emotion, mood, anticipation, or intention. We distinguish *sentience* (the capacity to feel) from *sapience* (the capacity to think), but it also feels like something to think. Hence, we welcome submissions concerning animal consciousness and cognition."⁷⁹ Over a decade ago "Empirical Evidence for Rapid Evolution" (the title of an essay by David Reznick, Helen Rodd and Leonard Nuncy⁸⁰) suggested that in the Northern Range Mountains of Trinidad, with waterfalls preventing genetic drift of the intensively studied fresh water guppy *Poecilia reticulata*, that natural selection had been accelerated perhaps ten million times the normal background rate, with accompanying radical shifts in population size and robustness, as well as a rash of behavioral transformations such evolutionary triggers accounted for. This is a different Darwinism than science can reconcile with classical biology and is indicative of something certainly akin to environmental conditions unleashing choice, in a tiny fish. *Choice* being the operative word that must necessarily be conjoined with consciousness, feeling, the ability to—obviously—see a bigger picture, learn everything one needs to know from a given location and make life work. It has been called "Darwin's Challenge," his statement from a notebook dating to 1838, that "He who understands baboon would do more towards metaphysics than Locke." One wonders what Darwin would have made of seagulls "stamping their feet in a group to imitate rainfall and trick Earthworms to come to the surface."⁸¹ More towards metaphysics, perhaps, than Kant? Or Aristotle himself? In the case of fish, generally speaking—the largest group by far of vertebrates on

Published by: American Society of Plant Biologists (ASPB), Stable URL: <http://www.jstor.org/stable/4281073>.

⁷⁷ <http://www.laweekly.com/restaurants/10-best-octopus-dishes-in-los-angeles-2896608>, Accessed April 24, 2016.

⁷⁸ 2016 No.

⁷⁹ <http://animalstudiesrepository.org/animsent/vol1/iss3/29/>. Accessed February 22, 2016.

⁸⁰ In *Evolutionary Conservation Biology*, Edited by R. Ferrière, U. Dieckmann, and D. Couver, Cambridge University Press, Cambridge, UK, 2004, Chapter 6, pp. 101–118.

⁸¹ http://www.onekind.org/education/animals_a_z/seagull, Accessed May 7, 2016.

Earth, over 30,000 species, who most people think nothing about, and consume with a near universal gusto—Jonathan Balcombe, director of animal sentience at the US Humane Society, has most recently, in his book, **What A Fish Knows: The Inner Lives of Our Underwater Cousins**,⁸² probed deeply into the majestic and myriad behaviors of fish, focusing on their levels of cooperation, planning, the sense of right and wrong and even punishment; the ability to “curry favor,” “develop lifelong bonds with shoalmates,” and in the end engender an ocean odyssey “worthy of the grandest social novel.”⁸³ One of Balcombe’s most impressive analyses concerns the frillfin goby. He writes, “the frillfin won’t strike you as an Einstein among fish. But what these humble dwellers of intertidal zones can do with their minds might cause you to reconsider. At low tide, frillfins hide in rocky tide pools. If danger lurks—a hungry octopus, say—the goby will jump to a neighboring tide pool, with remarkable accuracy. How do they avoid ending up stranded on the rocks? A series of captive experiments dating from the 1940s found something remarkable. They memorize the tide pool layout while swimming over it at high tide. They can do it in one try, and remember it 40 days later. So much for a fish’s mythic three-second memory.”⁸⁴

Other domains of insight, sentience and evolutionary game-changing have been observed among at least five female lions in Botswana’s Okavanga Delta, where they have rapidly evolved an extra Y-Chromosome, developed a mane and roar to resemble males in an effort to better protect isolated prides, against the onrush of a continental implosion: lion numbers have plummeted as poachers have reduced their total from hundreds of thousands to fewer than 40,000 individuals. A female named Mmamoriri is the now celebrated diplomat of this rapid evolutionary strategy.⁸⁵

And it’s not just some big vertebrates that have manifested the propensity for rapid metamorphosis under environmental duress. A study of soil mites in the UK has shown that under pressure of forced stresses, like sudden change of habitat, soil mites can alter their age of maturity within 20 generations, thus confounding traditionally interpolated evolutionary time-frames with temporal jump-starts.⁸⁶ Keep in mind the most numerous of soil mites, those of the Order Oribatida are typically 0.02–1 mm in length, usually in the 0.01-in. size, are endowed with sluggish metabolisms but an r/K selection strategy for reproductive success (determining quantity of offspring versus quality of the environment into which they will be born). This means that millions of virtually sessile organisms, all but invisible to the naked human eye, are thinking hard

⁸² Scientist American, Farrar, Straus and Giroux, Macmillan Publishers, New York, 2016.

⁸³ See <http://us.macmillan.com/whatafishknows/jonathanbalcombe>, Accessed April 29, 2016.

⁸⁴ “Fishes Have Feelings, Too,” By Jonathan Balcombe, May 14, 2016, <http://www.nytimes.com/2016/05/15/opinion/fishes-have-feelings-too.html?emc=eta1>, Accessed May 14, 2016.

⁸⁵ See African Geographic, “Unravelling the mystery of Mmamoriri—the maned lioness,” 28 April 2015, Accessed, January 27, 2016; See more at: <http://africageographic.com/blog/unravelling-the-mystery-of-mmamoriri-the-manedlioness/#sthash.jRl2udHr.dpuf>, Accessed January 27, 2016; <http://www.bbc.com/news/science-environment-22039872>, Accessed January 27, 2016; by Robynne Kotze, <http://africageographic.com/blog/unravelling-the-mystery-of-mmamoriri-the-maned-lioness/>, Accessed January 27, 2016.

⁸⁶ Environmental change ‘triggers rapid evolution,’ By Mark Kinver, Environment reporter, BBC News; <http://www.bbc.com/news/science-environment-22039872>, Accessed March 10, 2016.

about the trade-offs: more offspring or a better environment into which those young will be delivered, in every pinch of soil they inhabit throughout the world? This is the fundamental r versus r/K succession strategy, as algebraically formulated, for all species. Such trade-offs were first postulated by the French population mathematician, Pierre-François Verhulst (1804–1849) who came up with the principles of the Sigmoid or Logistic curve, also known in ecological terms as the Verhulst model of population dynamics. This refers to fundamental carrying capacity (K = “Kapazitätsgrenze” in German, or the limit of carrying capacity), and the parameters in the equation referencing time, population size and the rate of growth.⁸⁷ The formula has subsequently led the way for better grasping deep demography and biogeography. Most importantly, in this instance, it indicates intergenerational ken-altruism in microorganisms.

Scientists point to different levels of significance. Among other things, this means that managing for endangered species, creating new refuges in anticipation of response characteristics of stressed species, will want to anticipate rapid evolutionary strategies that translate into population size, gender, and likely distances and directions of chosen migration paths, in addition to nutrient turnover rates in the soil (and in every known soil-type on Earth) for purposes of rapid adaptation.

It’s not even just animals, plants and microbes that evolve rapidly. As early as 2001, a rapid change at the evolutionary level in enzyme metabolic response to environmental pressure from the herbicide, Atrazine, was discovered by molecular biologists. AtzA, Atrazine Chlorohydrolase is an enzyme that is able to catalyze a conversion from a toxic to nontoxic state; rapid decontamination strategies taking effect virtually overnight.⁸⁸

The post-Darwinian circumlocutions are startling, particularly in light of Ludwig Wittgenstein’s wonderful statement that “there can never be surprises in logic.”⁸⁹ It would be logical, in other words, to ascribe more than mere consciousness and feeling, but astute awareness to a pair of guppies who have grasped the circumstances of their apparent isolation and deliberately taken sexual steps to ensure the propagation of their community of guppies. The evolutionary quanta leave little to the imagination. Scientists still debate whether or not certain dinosaurs could whip their tails faster than 343 m per second, the speed of sound, thus intimidating competitors. Human supersonic speeds in excess of 767 miles per hour (1234 km/h) have only been achieved since the 1950s.

⁸⁷ See Verhulst, P.F. (1838). “Notice sur la loi que la population poursuit dans son accroissement”. *Corresp. Math. Phys.* 10: 113–121; see also, *Literaturübersicht, Abschnitt 2.1.5 Populationsdynamik, Abwanderungsverhalten und Populationsstruktur* (S. 9), http://www.diss.fu-berlin.de/diss/servlets/MCRFileNodeServlet/FUDISS_derivate_0000000011557/02_literatur.pdf?hosts=. Accessed March 14, 2016.

⁸⁸ See *Biochemistry*, Volume 40, Number 43, October 30, 2001, “Rapid Evolution of Bacterial Catabolic Enzymes: A Case Study with Atrazine Chlorohydrolase,” by Jennifer L. Seffernick and Lawrence P. Wackett, <http://pubs.acs.org/doi/abs/10.1021/bi011293r?journalCode=bichaw>. Accessed February 11, 2016.

⁸⁹ See *Prototractatus—An early version of Tractatus Logico-Philosophicus by Ludwig Wittgenstein*. Edited by B. F. McGuinness, T. Nyberg, and G. H. von Wright, with a translation by D. F. Pears and B. F. McGuinness, an historical introduction by G. H. von Wright and a facsimile of the author’s manuscript, Cornell University Press, Ithaca, New York, 1971, line “6.1132–6.1251,” p. 209.

The issue raises concerns fundamentally about the types of experiments humans conduct in the light of overwhelming evidence that every biomedical research subject knows as much or more than the researcher. While this might seem a lofty claim, in absence of countervailing certainties, any precautionary principle must surely be grounded on a generous and ethical deliberation. “Minimum Standards,”⁹⁰ the global prerequisite for most lab animal research, is simply not good enough. In fact, in our opinion any experimentation on any living organism demands an offset that can pass the most stringent ethical costs/benefits meditation.

Consider the famed tissue-culture researchers Alexis Carrel and Albert Ebeling who maintained the heart of a chick embryo for a quarter century,⁹¹ or George Bidder’s investigations in the 1920s regarding the potential of immortal fish, fish that Bidder believed were simply incapable of dying naturally.⁹² The point is, the myriad lenses through which scientists peer out upon their suffering subjects is predicated upon their own preconceived paradigms about the very nature of what Jeremy Bentham (1748–1832) long ago called out: “the question is not, Can they reason? nor, Can they talk? but, Can they suffer? Why should the law refuse its protection to any sensitive being? The time will come when humanity will extend its mantle over everything which breathes ...”⁹³

Fig. 1.17 “Stricken Donkey, *Equus africanus asinus*, Coimbatore, Tamil Nadu, India,” Photo © M. C. Tobias



⁹⁰ See a thorough analysis of Minimum, and Minimal Standards throughout much of the book **God’s Country: The New Zealand Factor**, by M. C. Tobias and J. G. Morrison, A Dancing Star Foundation Book, Zorba Press, Ithaca, NY, 2011.

⁹¹ <https://embryo.asu.edu/pages/alexis-carrels-immortal-chick-heart-tissue-cultures-1912-1946>, Accessed March 12, 2016.

⁹² Alex Comfort, **The Biology of Aging**, Rinehart & Company, NY, 1956, p. 13.

⁹³ http://think-differently-about-sheep.com/Animal_rights_a_History_Jeremy_Bentham.htm, Accessed April 30, 2016.

Primate Biometrics and Other Biological Dualisms

With respect to science specifically, peer-reviewed desensitizing of living beings consistently ensures confirmation bias in biomedical experiments themselves. While such research has continually diminished across the European Union, in the USA and many other countries scientists have justified their behavior. Behavior that has sought to grasp eusocial, prosocial, or altruistic behavior, in absence of any embrace of long-term outcomes by the victims (the individuals being studied); or has aimed to rationalize potentially unique personality as part of the proximate behavior and decision making processes in other species. Science has not distinguished its inflictions whether with regard to those endowed with terrestrial vertebrate brains (e.g., primates), or fish brains (particularly the marine-dominant Teleostei, bony ray-finned fishes of the 448 families of Actinopterygii.) It was not until May 23, 2016 that President Obama finally signed the Frank R. Lautenberg Chemical Safety for the 21st Century Act.⁹⁴ This law phases out the application of lethal and/or painful toxins in biomedical research labs. Slowly, sometimes we move in the proper direction.

But if public outrage had not risen to a plateau of anger regarding chimpanzees (*Pan troglodytes*), particularly as a result of the globally successful Great Ape Project founded by Peter Singer and Paola Cavalieri in 1993⁹⁵ there would probably be no stopping the continued torture of our nearest genetic cousins, their genome not even 2% different than our own,⁹⁶ and bonobos (*Pan paniscus*) sharing 98.7% of human genes. Despite “The Chimpanzee Health Improvement, Maintenance and Protection Act” of November 13, 2013, dozens of chimpanzees will forever remain doomed within the USA at the hands of medical researchers.⁹⁷ Would Congress do the same to 50 randomly selected humans? As the esteemed Journal, *Science*, reported, “Approximately 834,000 rabbits, nonhuman primates, and other regulated animals were used in research last year, compared with more than 1.5 million in the early 1970s. The use of these animals has been on a downward trend since 1993, with a 6% decrease from 2013 to 2014. Since USDA first started posting its numbers on its website in 2008, total use has dropped 17%. The figures do not include most mice, rats, birds, and fish, which make up 98% of lab animals but are not covered under the 1966 Animal Welfare Act (AWA).”⁹⁸

⁹⁴“Historic Victory for Animals! President Signs Chemical Safety Act,” by Craig Shapiro, PETA Blog, as “stated by Jessica Sandler, PETA’s vice president for regulatory testing,” May 23, 2016, Accessed June 22, 2016.

⁹⁵See www.greatapeproject.org

⁹⁶“Human Chromosome 2.” PBS. Accessed April 30, 2016.

⁹⁷Dizard, Wilson (15 November 2013). “Federal government to transfer laboratory chimps to sanctuaries”. Aljazeera America, Accessed April 30, 2016.

⁹⁸See “Use of regulated animals in U.S. biomedical research falls to lowest levels on record,” by David Grimm, July 10, 2015, <http://www.sciencemag.org/news/2015/07/use-regulated-animals-biomedical-research-falls-lowest-levels-record>, Accessed April 30, 2016.

And in 2014, the much aspired to “3 R’s”—reduction, replacement and refinement—of animals in experimentation⁹⁹ certainly did nothing for the 34%+ of those 834,000+ animals exposed to pain with or without some or any anesthetics. At least 9% were deliberately subjected to pain without any anesthetics. The National Anti-Vivisection Society (NAVS) provides a clear breakdown on numbers of individuals subjected to human terror.¹⁰⁰ Those species include: cats and dogs, guinea pigs, hamsters, nonhuman primates, pigs, rabbits and sheep as well as a category known as “Other Farm Animals.”

With respect to the fact in 2015, over 100 million mice and rats were tortured and killed just in the US for experiments¹⁰¹ NAVS—whose mission it should be stated is “Advancing Science Without Harming Animals” points out quite lucidly, in a manner that should best be perceived as doubly characterizing the human arrogation of other species in the following manner: “To the best of our knowledge, every field of research includes the use of mice and rats in experimentation. Cancer research, genetics, immunology, virology, the behavioral sciences, aging, HIV/AIDS, Alzheimer’s, alcoholism, diabetes, obesity, radiation effects, drug addiction, new drug testing, and more are studied in mice and rats in the questionable hope that what applies to rodents will apply to humans. Perhaps Johns Hopkins toxicologist Dr. Thomas Hartung stated it most succinctly when he said, ‘We are not 70 kg rats.’ Nature did not intend for these animals to be stand-ins for people, and it is not safe to assume that what occurs in rodents will predict what happens in people.”¹⁰²

It is overwhelmingly clear that scientists should never employ very dubious and protracted experiments on Others and refer to it as research. The first major window on such deception was the Silver Spring monkey case uncovered by PETA back in May, 1981. These 17 wild-born Philippine macaque monkeys were incarcerated at the infamous Institute of Behavioral Research in the town of Silver Spring Maryland for the alleged purposes of research primate neuroplasticity—that property that suggests continuing growth, with self-reflective neural capacity building in primate brains. But the animals, as undercover investigator and cofounder of PETA, Alex Pacheco discovered, were being systematically tortured, the violence meted out astonishingly cruel, and hidden from research committees, the public and the press; but Pacheco’s images would disclose that horror and prompt, like few other instances, the American animal protection movements.¹⁰³ One can only hope that the above-mentioned Frank

⁹⁹ See: <http://animalresearch.thehastingscenter.org/report/u-s-law-and-animal-experimentation-a-critical-primer/>, Accessed April 30, 2016.

¹⁰⁰ See <http://www.navs.org/what-we-do/keep-you-informed/science-corner/animals-used-in-research/sheep-in-research/>, Accessed May 1, 2016.

¹⁰¹ See <http://www.peta.org/issues/animals-used-for-experimentation/animals-laboratories/mice-rats-laboratories/>, Accessed April 30, 2016.

¹⁰² See <http://www.navs.org/what-we-do/keep-you-informed/science-corner/animals-used-in-research/mice-and-rats/>, Accessed May 1, 2016.

¹⁰³ See Pacheco, Alex and Francione, Anna. “The Silver Spring Monkeys” in Singer, Peter. **In Defense of Animals**. Basil Blackwell, 1985, pp. 135–147. See also, Barnard ND et al. NIH research protocol for Silver Spring monkeys: A case of scientific misconduct (Part I), Americans for Medical Advancement, February 24, 2003, and “Part II”, August 22, 2004. Accessed May 1, 2016.

R. Lautenberg Chemical Safety for the 21st Century Act will speed up the pace worldwide of shutting down laboratories in which animals are jailed.

We believe there are more appropriate adverbs than nouns to describe such enterprises. And it certainly is not science. Some vintners have been known to suggest that by torturing a grape you obtain a better wine. But this has never been an obligate conditional coinciding with ecological stress. With climate change, for example, we still cannot predicate greenhouse gas obligate species, any more than such stresses can provide reliable estimates on biological winners and losers.

Fig. 1.18 “Melting Glaciers in Northwestern Greenland,” Photo © M. C. Tobias



The Response Conundrum

We do know that ecological stress, as thus far intimated, can unleash biological responses which, in some instances may well greatly influence behavioral characteristics that appear to be occurring at accelerated rates. In just one small area, for example, of the Petrified Forest National Park in northeastern Arizona, Plateau Striped Whiptail Lizards (*Aspidoscelis velox*) and Pronghorn (*Antilocapra americana*) both have shown unique and rapid, direct, associated behavior that can be fairly well ascertained. The lizards are all parthenogenetic, comprising only

females.¹⁰⁴ There are at least 70 other vertebrate species that also reproduce asexually, always as a strategic means of coping with a depleted gene pool that would, in absence of the parthenogenetic strategy, likely doom the species. The first major study of this, in lizards, occurred among Whiptail Lizards several hundred miles east of the Petrified Forest, in New Mexico.¹⁰⁵

Fig. 1.19 “Petrified Forest National Park, Northern Arizona,” Photo © M. C. Tobias



In the case of Pronghorns, they are the last of their kind in North America. Writes Alex Hawes, in considering the “distinctly American family of hoofed ruminants, the Antilocapridae, which arose on this continent about 20 million years ago... At least 12 Pronghorn genera—and dozens of species—are known from the fossil record. Only the lone member of the genus *Antilocapra* outlived the Ice Ages, however.”¹⁰⁶ The other numerous species died out, more than likely because of pressure from human hunters. In the Petrified National Park, there is no hunting, but there are numerous freight train crossings daily through the park and according to park signage, the Pronghorn will not expand their clearly isolated range by going over the tracks. This comports with research 130 miles east at Anderson Mesa. There, despite 2 years during which biologists attempted to actively redesign and manipulate fencing that would encourage safe crossings, the herd of Pronghorn, increasingly iso-

¹⁰⁴ See “Plateau Striped Whiptail,” by Thomas C. Brennan, 2008, <http://www.reptilesfaz.org/Lizards-Subpages/h-a-velox.html>, Accessed May 27, 2016.

¹⁰⁵ Andrew Crowe, *Which New Zealand Bird?* Penguin Publishers, Auckland New Zealand, 2001.

¹⁰⁶ “Pronghorns Survivors of the American Savanna,” Zoogoer, November/December 2001, Smithsonian National Zoological Park <https://web.archive.org/web/20090713143546/http://nationalzoo.si.edu/Publications/ZooGoer/2001/6/pronghornssavanna.cfm>, Accessed May 27, 2016.

lated, refused to cross those tracks, as in the National Park, a strategy that were it successful would have enabled them to expand their genetic foothold beyond the Mesa.¹⁰⁷ It would also provide a much broader diet, and presumably greater subsequent fawn recruitment per population of does, research for which was conducted earlier, in 2002, a nutritional research project comparing the food diversity of Pronghorn diets in two distinct populations, one at Anderson Mesa, the other at Garland Prairie, Arizona. Anderson Mesa Pronghorn were suffering diminished food sources, compared with those at Garland and this depauperate flora situation clearly affected every aspect of their social, behavioral and reproductive viability. Researchers identified every likely food type and could relate them to the herds, demonstrating that the Anderson Mesa population showed “a significant decline from an estimated high of 1185 animals in 1985 to an estimated low of 220 in 2001.”¹⁰⁸

Such data begs the question of human involvement as a key stressor. It was a University of Arizona geoscientist, Paul S. Martin (1928–2010) who originated the now well-integrated and accepted theory of the human overkill or blitzkrieg model during the Pleistocene; the human-induced extinction of most large mammals in North America by around 11,000 years ago, most harrowingly described in his book **Twilight of the Mammoths: Ice Age Extinctions and the Rewilding of America** (2005).¹⁰⁹ Martin’s theory becomes all the more plausible when we consider that North America has easily been inhabited by humans for 50,000 years, possibly 60,000, based upon the Topper site of excavation on the Savannah River that archaeologist Dr. Albert Goodyear has long championed.¹¹⁰

Combining just a few emblematic pieces of evidence, windows on other species’ minds, windows on natural history, provide us with more than mere hints at the capacity for species to overcome challenges. They do so, or not, by their own unique social, cultural, biosemiotic, and genetic means. We lack for precision, as yet, in gauging the evolutionary pace of change. Usually it happens in a flash—there may be few witnesses to the loss; but these biological calamities have occurred among as many as 98% of past species—all extinct. There is no more salient nor poignant lesson for us today, in the heart of the Anthropocene—that fact alone—as we speculate upon potential changes in the morphology or behavior of organisms who have come demonstrably into contact with humans. Yes, more than likely those life forms who figure some way through the anthropogenic Scylla and Charybdis will pass that

¹⁰⁷ The Colorado Plateau III—Integrating Research and Resource Management for Effective Conservation, Edited by Charles Van Riper III, and Mark K. Sogge, University of Arizona Press, Tucson, 2008, p. 358.

¹⁰⁸ Final Report Submitted to Arizona Game and Fish Department, “Nutritional Concerns of Pronghorn Antelope on Anderson Mesa and Garland Prairie, Arizona,” by W. H. Miller and Melissa Drake Applied Biological Sciences Department Arizona State University, http://www.azantelope.org/pronghorn_nutritional_study.pdf, Accessed May 27, 2016.

¹⁰⁹ Foreword by Harry W. Greene, University of California Press.

¹¹⁰ “New Evidence Puts Man in North America 50,000 Years Ago,” November 18, 2004, University Of South Carolina, <https://www.sciencedaily.com/releases/2004/11/041118104010.htm>, Accessed May 27, 2016.

genetic information on to successors. For Holocaust survivors—of any and all Holocausts throughout human history—successor genes carry on the memory of their predecessors the way bellbirds, tuis, black robins, Corvidae family members, humpback and orca whales, and elephants pass along their troubled songs, traumas, and other communication modalities. But we should not take these informational chains of succession of genetic relics as a reason for optimism, not when the overwhelming majority of recent extinctions are vastly premature and solely the result of human misbehavior.

In a recent issue of the journal, *Molecular Biology and Evolution*, one team of researchers had postulated that rapid evolution is not the norm; that only the accumulation of approximately two million years' worth of random mutations, independent of any adaptive evolutionary changes, will characteristically result in the birth of a new species across a large spectrum of the known phylogenetic trees to date.¹¹¹ But this theory, as well, remains contentious and obviously unproved. On the other hand, data regarding the birth of new species thus far set forth has no bearing on the traditionally recognized punctuated equilibrium and catastrophisms, particularly in an age of ecological stressors unknown on Earth in some 66 million years. Taken together—the theories, hypotheses, and evidence of past speciation—we are, for any number of possible reasons, but more than likely the sum total of the Anthropocene, beginning to see rapidity of morphological change, genetic inheritance, and behavioral adaptations occurring quite rapidly, as previously outlined in a few specific species cases. Where such changes appear most instructive are within the cultural meme scenarios: societal alterations, affecting human individual thought and feelings; convictions and the many forums aligned in ethical affiliation on behalf of plants and animals that are quickly surmounting norms once thought to be impregnable.

Among the many fits and starts candidates, what we term *punctuated memevolution*, few are as compelling as those concerning language, song, communication, intention, and inflection by way of some form of communication: body language, musical expression, acoustical signs, complex language forms. All of these predicates—interspecies communications—are akin to breaking some kind of sound barrier. Indeed, breaking other types of sound barriers, communication barriers, is more complicated than aeronautical feats. “All acts of communication are acts of translation,” wrote George Steiner in his book, **After Babel: Aspects of Language and Translation**.¹¹² In his essay, “The Need for Creativity, More Lives Than One,”¹¹³ Joseph Wood Krutch describes the beginning of Chapter 5 in *Alice in Wonderland* in which the immortal child has “an important conversation with a caterpillar” dur-

¹¹¹ “Tree of Life Reveals Clock-Like Speciation and Diversification,” S. Blair Hedges, Julie Marin, Michael Suleski, Madeline Paymer, and Sudhir Kumar, *Mol Biol Evol* (2015) 32 (4): 835–845 doi:10.1093/molbev/msv037 <http://mbe.oxfordjournals.org/content/32/4/835.full.pdf+html>. Accessed March 2, 2016.

¹¹² Oxford University Press, New York, 1977; See “What Is Translation?” by Rainer Schulte, <http://translation.utdallas.edu/essays/what-is-translation.html>. Accessed January 20, 2016.

¹¹³ **The Great Chain of Life**, by Joseph Wood Krutch, With Illustrations by Paul Landacre, Houghton Mifflin Company, Boston, 1957, p. 77.

ing which she expresses her concern about a topsy-turvy world in which “size and shape” are in flux. Having plunged through the rabbit hole she speaks, of course, from recent experience. “It isn’t strange at all to turn into a chrysalis, then a butterfly,” says the caterpillar. “Well,” retorts Alice, “perhaps your feelings may be different,” she goes on. “All I know is, it would feel very queer to me.” “‘You!’ said (sic) the Caterpillar contemptuously, ‘Who are *you*?’”

In a stirring October 2015 “Conservation Conversation” filmed at the Earthfire Institute Wildlife Sanctuary and Retreat Center in Driggs Idaho—including the world’s foremost authority on prairie dog communication, Dr. Con Slobodchikoff, as well as Earthfire Institute and Wildlife Sanctuary & Retreat Center founder and executive director, Dr. Susan B. Eirich and her partner Jean Simpson—participants were privy to a deeply emotional transparency across (artificially erected) species barriers. In this the sound barrier was also broken, but there is no sonic boom attendant on these deeply remarkable encounters, only tears of joy and the visible hope inherent to an ethology in action that removes the chatter of humans from the equation. Instead, the quiet celebration of other wild animal lives, is in every instance, an Alice speaking with a Caterpillar: rescued or human-orphaned wolves, bison, foxes; a man playing his mandolin to a grizzly bear and both clearly moved by the aesthetic sum of their connection. Never have we seen wolves so addicted to humans tickling their bellies; and never have we walked like a bison as Jean Simpson walks that deeply Earth-rooted talk. Is it science? Is it eco-psychology? Is it a new level of quantum sentience? We ask the questions because we are addicted to information. But we are asking the questions of ourselves.¹¹⁴

Quantum Sapience

In the universal truism of most species now undergoing biogeographical stress, the ability to speed up their demographic horizons is, of course, an astounding concept to contemplate. Imagine if the family, Noctuidae, with possibly more than 100,000 species of owlet moths (the largest family within the Lepidoptera worldwide) were to lose their ability to fend off predatory bats. Normally, owlet moths do this through a minute inner ear organ that senses bat echolocation and throws the moths’ wings by magnificent and instantaneous reflex action into frantic motion, enabling them to escape the otherwise bullet-speed precision of bat predation in the night.¹¹⁵ Noctuidae are vast pollinators, like the bats; and their noctuid larvae are instrumental in breaking down the so-called “Triangle of U” crucifers (cabbage family mustard plants, cauliflowers, broccoli, etc.; all members of the Brassicaceae family); even exploit-

¹¹⁴ <https://vimeo.com/147121585>. Accessed March 1, 2016; and Private Conversation with Dr. Eirich.

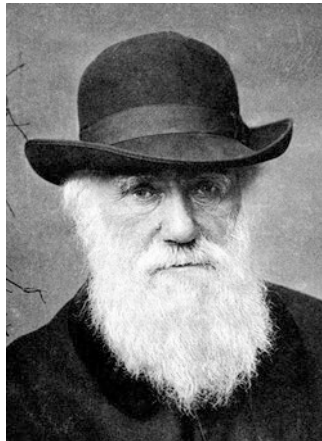
¹¹⁵ Roeder, K.D. (1974). Acoustic sensory responses and possible bat-evasion tactics of certain moths. *Proc. Canadian Society of Zoologists’ Annual Meeting* M.D.B. Burt, ed. (Fredericton: University of New Brunswick Press), pp. 71–78, Accessed April 25, 2016.

ing with impunity tens-of-thousands of food crops that contain toxins many other moths and their larvae are unable to feed upon, such as the Fabaceae and Solanaceae families, containing such flora as tobacco, tomatoes, eggplant as well as thousands of legumes.

Many farmers think of these lovely soft largely nocturnal moths as pests, yet evolution has favored them for a reason which our species has ignored in piling atop crops a mega-tonnage of pesticides to preclude Noctuidae presence, without much success given their ubiquity. But evolution in general ushers in a profound dilemma most markedly impinging on our nearly 7.4 billion *Homo sapiens*: we are either living within the boundaries of Darwin's express notions of evolution, or outside of them. The use of chemicals to deter or enhance agriculture has been a perpetually tainted human story, abundantly documented. What was once perceived as abetting our survival, has turned into one Dust Bowl and cancer and extinction after another, the combined maleffects suggesting one window on how environmental stressors, self-induced, lead to self-annihilation.

Darwin's Umbrella

Fig. 1.20 "Charles Darwin" [commons.Wikimedia.org]



To be perceived beneath Darwin's umbrella, by which one assumes life will go on, with or without us, is of small solace given the corresponding other non-evolution paradigm, which would, in so many words, leave no comfort for any being because evolutionary processes themselves would have no means of redeeming the cruelty our species has inflicted on most others; and no anodyne for all of those that have gone extinct by our hands in a short period of time. Nor can we safely predict as yet unborn mechanisms of survival which evolutionary impulses might devise to transcend the genetic cul de sacs our wayward species is everywhere imposing.

Our species has occupied every conceivable biome on the planet, including the North and South Poles, the Sahara, the Rub' al Khali, or “quarter of emptiness” of Saudi Arabia where the camel-herding Al Murrah peoples still migrate, and other tribes were once vibrantly engaged in what is one of the harshest environments on the planet—the “Saar, the Rashid, the Manahil...Awamir, the Bani Yas, and the Dawasir.”¹¹⁶ Human geographical expansion on all seven (or six continents, depending on your definitions) is equivalent to suggesting that we have, both morphologically and conceptually, rendered evolution obsolete in terms of it having any demonstrable impact on the mobility or arrogance of our kind. Or so we'd like to think. Imagine, for a moment, if each of the approximately 12,900–22,000 known species of ants weighed what humans, on average weigh, and behaved as we do? Let us shrink the analogy and assume that the convergent evolution inherent to the nearly 130-million-year old “true ant family,” the Formicidae, comprising just over 200 species of legionary or army ants, systemically on the move, always fanning out and destroying virtually everything organic in their paths, averaged the weight of human beings, between 140 and 190 lb.¹¹⁷ An even more astonishing calculation would grant the estimated “10 quintillion (10,000,000,000,000,000,000) individual insects alive”¹¹⁸ the equivalent morphological status, geopolitical hegemony and vastly dexterous musculature as we humans. Why even ponder such grim horror movies? For the simple reason that the E. O. Wilson/Bert Hölldobler estimate of 10 trillion ants at any given time¹¹⁹ is a mirror opposite of humanity. Ants have not conquered, or aspired to conquer coevolution, unlike *H. sapiens*. One can ascribe a lesson from ants, in all their diversity, to the principles of symbiotic universality resulting from ants having only arisen on Earth as a result of the sub-divergence from tracheophytes during the mid-Cretaceous that led directly to a dependency on countless members of the by now more than 400,000 flowering Angiospermae species, according to the recent Kew and Missouri Botanical Garden “Plant List.”¹²⁰ All those species of ants, in other words, have maintained a sustainable relationship to the Earth. *H. sapiens* have not figured out how to do it. We don't even appear to want to.

In terms of computational biology the ants' mutualistic ant-flowering plant relationships, and the resulting natural capital asset value represent the most prolific commensalist phenomena, in terms of individuals, in the last 145 million years, akin

¹¹⁶“Empty Quarter,” By Donovan Webster, February 2005, National Geographic, <http://ngm.nationalgeographic.com/print/features/world/asia/saudi-arabia/empty-quarter-text>, Accessed April 25, 2016.

¹¹⁷*Agosti D; Johnson, N F (2003).La nueva taxonomía de hormigas. Pages 45–48 in Fernández, F. Introducción a las hormigas de la región neotropical. (PDF) Instituto Humboldt, Bogota. Accessed April 25, 2016. were the size of humans. <http://www.sciencemag.org/news/2015/08/new-interactive-map-shows-where-world-s-ants-are>, Accessed April 25, 2016.

¹¹⁸http://www.si.edu/Encyclopedia_SI/nmnh/buginfo/bugnos.htm, Accessed May 7, 2016.

¹¹⁹“10 Frightening Facts You Probably Didn't Know About Ants,” Robbie Gonzalez, Daily 10, 1/30/12, <http://io9.gizmodo.com/5880539/10-frightening-facts-you-probably-didnt-know-about-ants>, Accessed April 25, 2016.

¹²⁰See <http://www.kew.org/science-conservation/plants-fungi/environment/how-many-flowering-plants-are-there-world>, Accessed April 26, 2016.

to associative louse flies, remoras, and pilot fish—each of which provides a unique window on evolutionary pressures resulting in symbiotic relationships—but at a level of astounding proportions favoring, in a word, friendships on a geographical scale spanning continents.

Differential Equivalencies

While most mathematical probability/differential equations applied within biological systems have focused upon the Lotka–Volterra equations (named after the early twentieth century chemist, Alfred J. Lotka, and his contemporary, the physicist/mathematician, Vito Volterra), their emphasis was marked by an emphasis upon predator–prey theories, but soon enjoyed a near rudimentary status with respect to biological mutualism. While the algebraic mapping of extinction points, boom-and-bust relationship functions, and convergent curves of probability have continued to be most systematically applied to predator–prey relationships, in fact, gut bacteria and their crucial assistance for most vertebrates to digest food accounts for over 48% of all terrestrial organismic contact between species across Earth. Commensalism is also at the basis of all pollination that we know of. These two vast relational realms of life are fundamental to our recognizing that essentially half of all life forms thus far studied and/or extrapolated, are mutualistic, differing species mutually benefitting one another. That cartography of the Tree of Life represents an enormous bulwark of what must, in its most accessible parlance, be thought of as planetary friendships, billions of years in the making.¹²¹

The notion that *H. sapiens* would strive to undermine this most characteristic function of the life force is by far the most exacting and conclusive evidence supporting our dead-end stature as a species; a veritable mathematical paradox that seems to argue for our species attempt to outsmart, indeed, conquer the very coevolutionary processes that have resulted in our existence and that of nearly every other species on the planet. It is a terrifying notion to contemplate, with basic pillars of nearly every ecosystem dependent on a collaborative basis for all of evolution, which principally enriches Gaia’s organic learning curve; from “fruit-dispersing birds, pollinating insects, nitrogen-fixing bacteria, and mycorrhizal fungi that act like extended root systems in the soil” to biomes in flux. This evanescence which is the way of the world, confounds all of the ordered and mechanistic schemas man has managed to devise.¹²²

¹²¹ Thompson, J. N. 2005 The geographic mosaic of coevolution. Chicago, IL: University of Chicago Press; See Evolution. 2008 Jan;62(1):220–5. Epub 2007 Dec 6. “The geographical mosaic of coevolution in a plant-pollinator mutualism,” Anderson B, Johnson SD. PubMed, US National Library of Medicine, <http://www.ncbi.nlm.nih.gov/pubmed/18067570>, Accessed May 5, 2016.

¹²² See “Geographic Mosaics of Coevolution,” By, Jason D. Hoeksema © 2012 Nature Education, Citation: Hoeksema, J. D. (2012) Geographic Mosaics of Coevolution. Nature Education Knowledge 3(10):19, <http://www.nature.com/scitable/knowledge/library/geographic-mosaics-of-coevolution-26425191>, Accessed May 5, 2016.

Fig. 1.21 “Pollinators,” Photo © M. C. Tobias



The Ontology of Mutualism

While such interlocking ecotones—bacteria in the guts of vertebrates and a world of pollinators—are now sufficiently apparent to the entire ecological community of researchers, it was fairly recently, in fact, beginning probably with the Belgian biologist Pierre van Beneden’s 1875 book, **Les Commensaux et les Parasites**, that we can pinpoint an avalanche of interest in mutualism.¹²³ As Boucher et al. discuss, van Beneden’s analyses were scrutinized in a University of Paris doctoral dissertation by Alfred Espinas, “Des Sociétés Animals,” wherein was analogized a salient intersect: “What is the essence of society?”¹²⁴ The answer was provided from the world of engaged Social Darwinists who were fond of citing the political publishing event of 1902, namely, Peter Kropotkin’s book, **Mutual Aid: A Factor in Evolution**.¹²⁵ Discussing analogies between autotrophs and heterotrophs and the universally beneficial outcomes of their biochemical exchanges (e.g., “(a) breakdown of compounds, facilitating digestion; (b) supply or concentration of nutrients; (c) environmental constancy; and (d) bioluminescence”¹²⁶ the authors of “The Ecology Of Mutualism” also remind us that the true vogue for all of the biotic components of symbiosis aroused its greatest interest in the 1970s. In quick succession emerged the growing realization that the “hotspots” methodology was to be predicated upon

¹²³ See “The Ecology Of Mutualism,” by Douglas H. Boucher, Sam James and Kathleen H. Keeler, *Ann. Rev. Ecol. Syst.* 1982. 13: 315–47, Annual Reviews, www.annualreviews.org/aronline.

¹²⁴ *ibid.*, p. 317.

¹²⁵ See **Mutual Aid: A Factor of Evolution**, 1955, reprinted 2005, with Kropotkin’s 1914 Preface, Foreword and Bibliography by Ashley Montagu; and **The Struggle for Existence**, by Thomas H. Huxley, ed., Extending Horizons Books, Porter Sargent Publishers, Boston.

¹²⁶ *op. cit.*, Boucher, et al., p. 319.

flowering plants, the key component of the profound biophilial benefits of cooperation, namely, that “pollination by mutualism with animals is critical to sexual reproduction in the majority of flowering plants.”¹²⁷

Today, with the harrowing bee and bat colony collapses, and the accelerated diminution of the superfamily Vespoidea, which includes social wasps, yellow jackets and hornets, we can testify to the catastrophic loss of that stratum of beings at the core of all floristic kingdoms and speciation. Every florist shop or green corridor network worldwide is likely to volunteer strategies for attracting healthy native species. The corridors and safe places selected as migratory stopovers by at least half if not more of all bird species—a trend possibly dating back 15 million years—¹²⁸is predicated upon dozens of crucial criteria: protandry (males attempting to be among the first to arrive at key breeding sites prior to females); the energy landscapes benefitting from pronounced solar radiation; environmental cues affecting competitive advantages; energy foraging and storage capacities; loop itineraries corresponding to weather patterns; precedence-predilections that rely upon age-old diurnal versus nocturnal metabolic rituals; range and required altitudes; reliable destinations; countless factors influencing seasonality and timing, corresponding to levels of nesting confidence; solitary versus flocking behavior; nongenetic determinations of migratory duration; neural reflex infrastructure pertaining to the as yet unproved annual ETH, or energy turnover hypothesis, and so on.

However complex the myriad of bird migrations (dating back, initially, to at least 100 million years ago)¹²⁹ today’s most crucial element of migratory closure (the roundtrips, year after year) hinge upon the quality of habitat, and this is utterly dependent upon the human species (short of weather or volcanic anomalies).

Habitat fragmentation and despoliation comprises the sum total of everything that is working against migrations. Climate change perturbations are, obviously, accelerating this sphere of negatives in syncretistic ways; cumulative impacts hammering home a new cartography that is driving migratory species to extinction at rates that go beyond “unprecedented.” The combined anthropomorphic influences are of such an extreme as to suggest the potential for unleashing a new evolutionary contagion of syncretistic stressors that could envelop most endothermic avifauna to reverse their biological strategies towards ectothermic (cold-blooded) metabolisms, reversing 225 million years of evolution.

In the case of North African migratory red-knots (*Calidris canutus canutus*), intermediary emergency stop-over locations en route to north central Siberia were studied by researchers back in 2010. Wind conditions were determined a key factor in assessing models of migratory behavior, given the fact as much as 50% of a bird species energy needs are consumed during migration.¹³⁰ But strong gusts of wind

¹²⁷ *ibid.*, p. 322.

¹²⁸ “Avion Biology: Migration—<http://people.eku.edu/ritchisong/migration.htm>,” by Gary Ritchison at gary.ritchison@eku.edu, Accessed May 9, 2016.

¹²⁹ *ibid.*

¹³⁰ See “Stochastic atmospheric assistance and the use of emergency staging sites by migrants,” Judy Shamoun-Baranes, Jutta Leyrer, Emiel van Loon, Pierrick Bocher, Frédéric Robin, Francis

slowing down migrations, forcing emergency landings for food and water, would be relatively speaking minor deterrents to life cycle success (as viewed over millions of years of population coevolutionary models) when compared with new data on the multiple stressors associated with climate change.¹³¹ As Carl Zimmer reports, from research published in *Science* by Jan A. van Gils, an ecologist at the Royal Netherlands Institute for Sea Research, and his colleagues, the headline says it all: “Body shrinkage due to Arctic warming reduces red knot fitness in tropical wintering range.”¹³² The sequence of events is happening to species everywhere. In the case of red knots, diminishing food reserves due to early hatching of insect larvae in Arctic breeding grounds, a function of the increasing rapidity of Arctic ice and snow melt, means less protein and fat storage in young birds who are then smaller; who grow smaller, less durable beaks. And this diminished morphological capacity leaves them unable to go after their normal bivalves, having to feed instead upon “seagrass rhizomes” who secure their own niches at higher surface levels in the sand of Atlantic beaches in Mauritania. A cycle millions of years old, broken in a matter of years because of human induced temperature increases across the planet.

So in mapping the environmental stressors, triggers and viability of present and future migrations, mutualism is logically quite fundamental to any and all successful strategies. Indeed, it is the core value of migration in the first place. For mutualistic mechanisms to be broken by third party primates means doom for hundreds-of-billions, if not trillions of individuals.

Beyond avifauna, migratory pathways for all species that cover distance also invite the reality of communities in flux; aggregates of great ungulate migrations (e.g., wildebeest, elk and antelope, elephant, turtle, whales and hundreds-of-billions of fish species; locust, tarantula, and human nomadic peoples as well, touching upon just a minute few representatives of biospheric populations on the move). But in addition, we must acknowledge nigoda, spores, seedlings, pollen, and unimaginably vast realms of invertebrate odysseys, like those of every lobster.¹³³ Our unleashing of an Anthropocene involves all the paragons and coming aggregates first deciphered in such primordial biomes as that at Shark Bay, Australia; abiogenetic traces

Meunier, Theunis Piersma, Published 13 January 2010. doi:[10.1098/rspb.2009.2112](https://doi.org/10.1098/rspb.2009.2112), Proceedings of the Royal Society B, Biological Sciences, <http://rspb.royalsocietypublishing.org/content/early/2010/01/13/rspb.2009.2112>, <http://rspb.royalsocietypublishing.org/>, Accessed May 15, 2016.

¹³¹ “Climate Change and the Case of the Shrinking Red Knots,” by Carl Zimmer, May 12, 2016, *The New York Times*, *Science*, <http://www.nytimes.com/2016/05/17/science/climate-change-bird-red-knots.html>, Accessed May 15, 2016.

¹³² Jan A. van Gils, Simeon Lisovski, Tamar Lok, Włodzimierz Meissner, Agnieszka Ożarowska, Jimmy de Fouw, Eldar Rakhimberdiev, Mikhail Y. Soloviev, Theunis Piersma, Marcel Klaassen, *Science* 13 May 2016, Vol. 352, Issue 6287, pp. 819–821, doi:[10.1126/science.aad6351](https://doi.org/10.1126/science.aad6351), <http://science.sciencemag.org/content/352/6287/819>, Accessed May 15, 2016.

¹³³ See http://www.si.edu/Encyclopedia_SI/nmnh/buginfo/bugnos.htm, http://www.si.edu/Encyclopedia_SI/nmnh/buginfo/bugnos.htm, Accessed May 7, 2016.

in metasedimentary rock at Isua, Greenland.¹³⁴ This infected global environment encompasses every in situ population, while intimating demographic exodus from the deep vents adjoining a globally scattered cartography of oceanic seamounts. The chaos even includes those behavioral risks attendant upon eye and other sensory contacts among both warm and cold blooded taxa, amid the hospices traditionally provided millions of species whose worlds have been defined by slow and graceful means: genetic drift.

Human migrations across one civilization after another, have been conditioned by all the same scales, lures, impositions, competitive threats and environmental change as has occurred among all other species. Our best strategies have always relied upon mutual conditionals; teamwork; the passing down of stories, topographical routes, treasure maps, tales of Paradise, and the like.

A poet like Percy Bysshe Shelley knew quite well how, even as an early prodigal son, to negotiate family and friends and loved ones; an inheritance with Sword-of-Damocles strings attached, so as to liberate himself (and two female companions) off to the European Continent, making a beeline for Chamonix, and—in his poetry—to a cliff-ledge in the Kashmir Himalayas. Just as Thor Heyerdahl lived for several years with his girlfriend in a remote quadrant (at times within a cave) of the Marquesan island, Fatu Hiva during the years 1937–1938. Concluded Heyerdahl, “There is nothing for modern man to return to. Our wonderful time in the wilderness had given us a taste of what man had abandoned and what mankind was still trying to get even further away from ... Progress today can be defined as man’s ability to complicate simplicity”¹³⁵ To a lesser extent, the inescapably profound commentaries by William Turner on the motives of his many incandescent titles to his nearly 500 paintings, 2000 watercolors, and 1500 other drawings on paper, reveal the harsh, evolutionary battle-grounds, but never in place of joyful collusions, substitutions and sheer immersion in something new—as radical and geographically fantastic as all the combinatorial suasion resulting from the many journals kept by Lewis and Clark. Or, in other realms, the ideological thrusts of great works of art, political philosophy and literature that were symbiotically populated in Dante or Milton, Leonardo or Giorgione. Or the many superb landscapists during the Japanese Azuchi-Momoyama Kanō school, patronized by the three great Shoguns of that time, Oda Nobunaga, Toyotomi Hideoshi, and most notably, Tokugawa Ieyasu.

¹³⁴ Ohtomo, Yoko; Kakegawa, Takeshi; Ishida, Akizumi; et al. (January 2014). “Evidence for biogenic graphite in early Archaean Isua metasedimentary rocks”. *Nature Geoscience* (London: Nature Publishing Group) 7 (1): 25–28. Bibcode:2014NatGe..07...25O. doi:10.1038/ngeo2025. ISSN 1752-0894. Accessed May 7, 2016.

¹³⁵ Thor Heyerdahl: **Fatu-Hiva—Back to Nature**, George Allen & Unwin, 1974.

Fig. 1.22 “Sakya Coming Out of His Mountain Retreat, by Kato Moriuke, Kano School, late 16th Century,” Private Collection, Photo © M. C. Tobias



In each of these categories of instances, even the most solitary-minded philosopher kings, artists, and explorers each worked in tandem with fellow human beings: other explorers, outfitters, a community of like-minded artists in geographical range of one another; at trading posts, or around campfires, or poetry salons in Paris and Moscow. To paraphrase that teeming aspect of Walt Whitman’s “Leaves of Grass” in the Nobel Laureate Saul Bellow’s early novel, **The Adventures of Augie March** (1953),¹³⁶ “I am an American, Chicago born—Chicago, that somber city—and go at things as I have taught myself, free-style, and will make the record in my own way: first to knock, first admitted; sometimes an innocent knock, sometimes a not so innocent. But a man’s character is his fate, says Heraclitus, and in the end there isn’t any way to disguise the nature of the knocks by acoustical work on the door or gloving the knuckles.” Autobiographical expression relies upon readers and viewers. Neither Fra Angelico nor Taoist hermits ever achieved their respective “nirvanas” in isolation. No species has ever survived as an individual. This fact, alone, lodges a crucial insight, one of many, into the Mutualism Hypothesis.¹³⁷

¹³⁶ Viking Press, New York.

¹³⁷ See “Evidence for Enhanced Mutualism Hypothesis: *Solidago canadensis* Plants from Regular Soils Perform Better,” by Zhen-Kai Sun, and Wei-Ming He, PLoS One: Published: November 3, 2010, <http://dx.doi.org/10.1371/journal.pone.0015418>, <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0015418>, Accessed May 9, 2016. See also, Oikos Vol. 36, No. 3, Mar., 1981, “Mutualism between Grasses and Grazers: An Evolutionary Hypothesis,” Denis F. Owen and Richard G. Wiegert, *Oikos*, Vol. 36, No. 3 (Mar., 1981), pp. 376–378, Published by: Wiley on behalf of Nordic Society Oikos, doi:10.2307/3544637, Stable URL: <http://www.jstor.org/stable/3544637>, Page Count: 3. http://www.jstor.org/stable/3544637?seq=1#page_scan_tab_

Fig. 1.23 “Young Buddhist Monk, Bhutan,” Photo © M. C. Tobias

In Theravada Buddhist tradition, nirvana is replaced with the notion of Buddhahood, the idea that Buddhist wisdom, and the achievement of what is typically perceived to be nirvana, is actually nirvana on Earth: Buddha renounces paradise in order to work to ensure the salvation of all his fellow sentient beings here on Earth. Such self-sacrifice—a double-negative in the context of the Anthropocene—that represents the ultimate argument in favor of collaboration among ourselves, all species, all individuals, in the pursuit of non-violence for the many, not just the one.¹³⁸

In a deeply provocative essay published in *Nature*, “Gene-for-gene coevolution between plants and parasites,” John N. Thompson and Jeremy J. Burdon¹³⁹ led the way for a theory proposing mutualism as a precursor of much speciation.¹⁴⁰ The inordinate leverage which double-negatives command throughout evolutionary landscapes enlists a set of uncanny strategies which may cause us to rethink and ultimately engage in direct interspecies communication as it stems from our own histories: a few hundred thousand years of mutual regard and mutualistic necessities.

contents, Accessed May 9, 2016; See also, “Testing the mutualism disruption hypothesis: physiological mechanisms for invasion of intact perennial plant communities,” by Alison N. Hale, Stephen J. Tonsor, and Susan Kalisz, *Ecosphere*, [http://onlinelibrary.wiley.com/advanced/search/results?searchRowCriteria%5B0%5D.fieldName=author&start=1&resultsPerPage=20&searchRowCriteria%5B0%5D.queryString=%22Susan Kalisz%22](http://onlinelibrary.wiley.com/advanced/search/results?searchRowCriteria%5B0%5D.fieldName=author&start=1&resultsPerPage=20&searchRowCriteria%5B0%5D.queryString=%22Susan%20Kalisz%22), First published: 18 October 2011 Full publication history, doi:10.1890/ES11-00136.1, <http://onlinelibrary.wiley.com/doi/10.1890/ES11-00136.1/full>, Accessed May 9, 2016.

¹³⁸ See Duckworth, Douglas (2011), **Jamgon Mipam: His Life and Teachings** (Kindle ed.), Shambhala Publications, Publishers, Boulder, CO, pp. 430–436.

¹³⁹ Review articles, *Nature* 360, 121–125 (12 November 1992); doi:10.1038/360121a0 <http://www.nature.com/nature/journal/v360/n6400/abs/360121a0.html>, Accessed May 5, 2016.

¹⁴⁰ “Evolutionary Tapestries,” by Peter Abrams, This Article from Issue, January-February 2006, Volume 94, Number 1, Page: 1, <http://www.americanscientist.org/bookshelf/pub/evolutionary-tapestries>

Chapter 2

Our Conquest of Coevolution?

Counter-Collaborative Intuitions

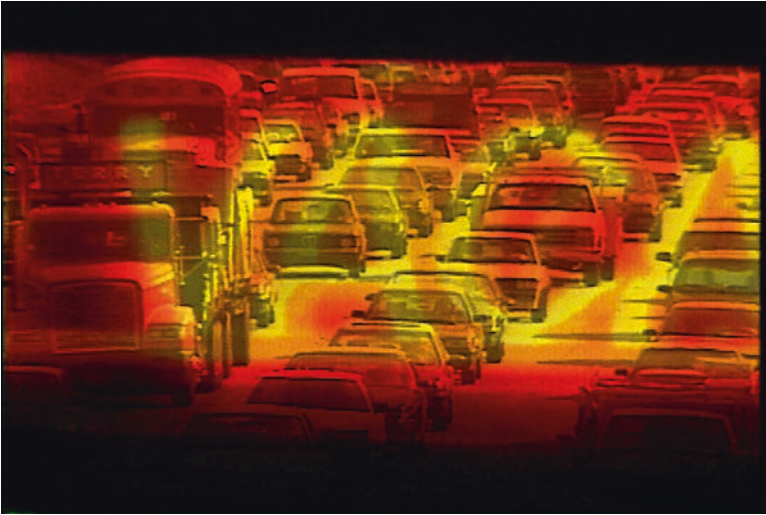
If you doubt the prospect underlying all ethological breakthrough (interspecies mutualisms) consider the “the first study to reveal the adaptive nature of rhizobial cheating and to trace the evolutionary origins of uncooperative rhizobial mutants,” from a critical study in May of 2010.¹ Or, in the same year, coral reef research that yielded a similarly spectral finding: “Molecular phylogenetic analyses have repeatedly recovered clades formed by colonial/zooxanthellate and solitary/azooxanthellate taxa, suggesting that coloniality and symbiosis were repeatedly acquired and/or lost throughout the history of the Scleractinia” corals.² Both scenarios invoke what has been characterized as *the* “Zone of Possible Agreement (ZOPA),”³ in terms of human negotiation within a wide margin of latitudinal cross-species behavioral morphogenetic and neural differences and similarities. Our political, ethnic, and linguistic variations, routinely expressed in forms leading away from any shape of, or communion with the Others, is hard pressed to make empathy a realistic goal.

¹ J Evol Biol. 2010 May;23(5):1075–89. doi:[10.1111/j.1420-9101.2010.01980.x](https://doi.org/10.1111/j.1420-9101.2010.01980.x). Epub 2010 Mar 24, “Origins of cheating and loss of symbiosis in wild Bradyrhizobium,” Sachs JL, Ehinger MO, Simms EL. <http://www.ncbi.nlm.nih.gov/pubmed/20345811>, Accessed May 3, 2016.

² “Repeated loss of coloniality and symbiosis in scleractinian corals,” Marcos S. Barbeitosa, Sandra L. Romanob, and Howard R. Laskerc, Author Affiliations, CrossMark, <http://www.pnas.org/content/107/26/11877.full>, Accessed May 3, 2016.

³ By Brad Spangler, June 2013, Original publication date June 2003; updated in June, 2013 by “Heidi Burgess,” “Beyond Intractability,” <http://www.beyondintractability.org/essay/zopa>, Accessed May 03, 2016.

Fig. 2.1 “Los Angeles Traffic,” Photo © M. C. Tobias



Nonetheless, we know that we have it in our genes, these willing connections in the polis of all animal and plant species; that open-air agora wherein communion has always occurred; where transactional benefits accrue to those willing to risk new strategies for survival.

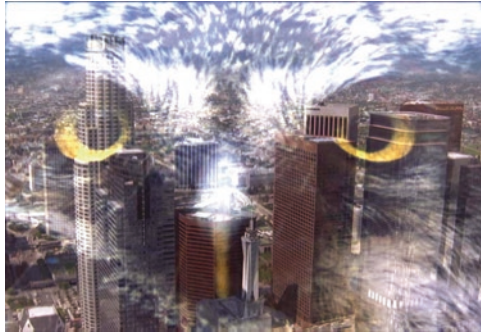
This leaves all that agreeable research into the nature of biological translation on an ambiguous tightrope: it is possible, but, thus far, the evidence supporting it is tenuous, no matter how many times we insist that our dog is our best friend. Indeed, one August 2015 PoochPerks.com poll of 1000 humans declared that 38 % of those surveyed preferred their dogs to their human partners. No one has ever managed within their finite lifetime to transcend all those continuing debates regarding the origins of altruism, caregiving, tenderness, kindness and the function of these special behavioral units within an evolutionary framework more accustomed to looking back than looking forward.

We have witnessed a veritable Renaissance with respect to the recent arguments affording quantifiability to empathy. We tend towards coherence in our individual choices. A life spent cohesively is a worthy goal that easily argues in favor of a sphere of arrangements that have more purchase on the world than selfishness. Selfish gene theories are at once suspect because—and this is particularly true for species with family characteristics—no matter which organism-type is represented in which biological musical chair, there are common themes that are impossible to overlook. Empathy, in all her spheres of transitivity, gives vertebrates a good name because we see the principles of mutual aid universally represented. If we empower our observations with a bias favoring all unicellular and multicellular behaviorism, then the distribution of noble causes, of virtue, of gentleness is autonomous, dependent upon no deep-dwelling rules, but mathematically a given. Free and unburdened to express itself.

This algebraic accumulation of numbers equivalent to behavioral functions of some intangible, immutable Good, is empirically proof-positive; it has persuaded

social norms within every known organism, even in those that have overtaken the facile hope of redemption.

Fig. 2.2 “Eyes Over Los Angeles,” Photo © M. C. Tobias



The Zoological Gaze

We are saying several things here. First, empathy is as solid a pillar of zoology as hydrogen is for the Periodic Chart, inchoate; making our alleged conquest of coevolution all the more unlikely a scenario. Second, it should follow that the expression of this lasting hope for life on Earth in her most ubiquitous, salubrious, tangentially forbearing and magnanimous aspects, is co-emergent with the increasingly trained lenses that peer longingly out windows into forests, across meadows, towards mountain and rivers. Some philosophers have likened this zoological gaze as the most holy of sutras. It is not rooted to any particular religious orientation or genome. Our nostalgic handshakes with ancestors grants every cemetery a mirror image of our collective predisposition to want, to recognize, to partake of the biological benefits that devolve to all those individuals and their populations that actually chew the cud of kindness. Stewardship transforms the contemporary visions of art, of nature, of all of our lives going forward.

Unlike the fresh water guppies above referenced, our feelings and choices have not given way to anything remotely Darwinian, not since we diverged from earlier Hominini taxa, except in the seriously flawed and erroneously attributed social Darwinian, survivalist paradigmatics.

While capuchin-like fossils have been discovered in North America, near to the Isthmus of Panama⁴ (a species, at least in what is today's Brazil's Serra da Capivara National Park that has been using tools for at least "700 years") and at least five other Genera of primates have been found in North America, the oldest, *Purgatorius*, dating to nearly 65 million years at what is today called Purgatorius (*P. unio* and *P. cera-*

⁴"First North American Monkey Fossils Are Found in Panama Canal Excavation," Published: April 20, 2016. Released by Smithsonian Tropical Research Institute, <http://www.sciencenews-line.com/summary/2016042020520063.html>, Accessed April 26th, 2016.

tops), unearthed in 1995 at what is known as the Hell Creek Formation in Montana,⁵ our recent, non-arboreal ways in the last 200,000 years worldwide have outsmarted the union of different Hominini, extirpating every other species in our Genus, despite genetic vestiges, and—for a time—apparently viable hybridizations, such as between *Homo sapiens* and *Homo neanderthalensis*. There have been any number of theories to try and grasp what it was about us that succeeded in wiping out the other six *Homo* subspecies—*erectus* (the most successful, having survived for over 2-million years, until about the time of the Toba supervolcano, approximately 65–70,000 years ago; and the one ancestral member of our clade who allegedly invented fire); *forensiensis*, *habilis*, *heidelbergensis*, *naledi*, and *neanderthalensis*.

It is quite likely *erectus* did *not* discover fire, only how to transport it in the manner of numerous bird species—raptors in Australia, for example—that have been doing so, most likely, for millions of years.⁶

Our present status as dominant is entirely lodged on the nebulous basis of the countless and severe destructions we have evinced. No species can outrun its shadow, even if it has conquered coevolutionary dependencies, for the time being. What, precisely, would *H. sapiens* have accomplished in bypassing symbiosis, mutualism, interdependency? The answer is unambiguous: suicide. The approximately one million known suicides per year⁷ corresponds to the low estimate for the global human population at the dawn of agriculture approximately 10,000 years ago.⁸ By today's demographic comparisons (with nearly 7.4 billion and counting) a million suicides per year, or approximately 114 per hour, or fewer than two per minute, does not trend statistically as anything other than a nearly zero-based anomaly. The rate of metastasis, of the vast varieties of binary fission, sexual and asexual reproduction, render human self-destruction almost meaningless, except for one telling fact: the biography of each individual, and all those who were connected somehow to that person and his or her nearly 25,000 protein coding genes.

In other words, each suicide underscores that story of our connections, and the greater tale of our odyssey, which is a combined storyline involving all of the tens-of-billions of people who have lived and died in just the past 200,000 years; each one connected to other species, whether they knew, acknowledged, or cared about that fact. Biorealism has been employed as an expression and a movement by some architects, but in ethological terms, our biorealistic situation makes our connections to other species a profound given. And, curiously, architecturally so. We cohabit a sphere of biographies whose stories we actually depend upon for our own survival. The more poetic, mysterious, alluring, aesthetically pleasing, it appears the more

⁵“Five Early Primates You Should Know,” By Erin Wayman, Smithsonian.com, October 31, 2012, Accessed April 26, 2016. For capuchin tool use, see “These Monkeys Have Used Tools for 700 Years,” by Brandon Keim, Conservation Magazine, July 13, 2016, Utilizing data from Haslam et al., “Pre-Columbian monkey tools,” *Current Biology*, 2016. doi:10.1016/cub.2016.05.046).

⁶See “Ornithogenic Fire: Raptors as Propagators of Fire in the Australian Savanna,” by Robert A. Gosford and Mark Bon, p. 32, 2015. Raptor Research Foundation, Annual Meeting, Nov. 4–8, Sacramento, CA, http://www.raptorresearchfoundation.org/wpcontent/uploads/2015/11/2015_conference_program.pdf, Accessed April 26, 2016.

⁷See <http://www.medicalnewstoday.com/articles/234219.php>, Accessed May 15, 2016.

⁸Luc-Normand Tellier (2009). *Urban world history: an economic and geographical perspective*. Via Google Books. p. 26, Accessed May 15, 2016.

likely our survival is. Great art is biologically motivated and orchestrated, like great empathy. Mahavira, Buddha, Christ, St. Francis, and Gandhi were not anomalies. The impulses are universal.

Fig. 2.3 “A Thai Buddha,” Photo © M. C. Tobias



Most critically, however profound those connections, they are contradicted second-by-second as the vast swathes of our anger is spent in so many death tolls among the Others; Holocausts that cumulatively indict the word “hope”. This is beyond tragedy, because so many of us want to be hopeful; are clued in daily to a heroism of daily life, as Carl Jung referenced that unheralded and cumulative potential within us. Biorealism leaves us exhausted philosophically. We fail to account for our actions in the sphere of plant and animal interrelatedness. We are isolated, alone, yet to the brim with all that surrounds us, in every meaningful sense.

Fig. 2.4 “Man and Donkey,” Painting by New Zealand Artist John Holmwood, 1973, Private Collection, Photo by J. G. Morrison



Biorealism, Species Extinctions, and Carrying Capacity

When ecologists speak of carrying capacity, or “the Netherlands Fallacy” (human populations, regardless of nation, flag, region, or city, which are totally dependent upon trade beyond borders) the number of planet Earths needed to provide and sustain the magnitude of our current consumptive pattern of resources, within the $I=PAT$ equivalency (e.g., the aggregation of megacities—those in excess of ten million human residents) represents an immoral and implausible multiple of the present state of the Earth’s finite resources, as captured in every economic system, ultimately.

Fig. 2.5 “Baby Dolls, Downtown Mexico City,” Photo © M. C. Tobias



Most importantly, they are not *our* resources. The very word, resources, resource “to rally, raise again,” from Latin *resurgere* “rise again,” dates to the Old French usage of the term to connote the resurgence of a country’s *in situ* *resurgere*, revival, the entire country’s wealth, a definition first employed in 1779.⁹ But it is most elegantly applied in the case of being resourceful, not in exploiting resources. Hence, it is clear that we are, in essence, something altogether new and ungainly on this planet, in this form. Short of a Chicxulub impact-like event, which triggered the last major extinction crisis (the K-T), Earth has never witnessed a species emerging so rapidly, so aggressively with impact results so deadly and fully global. Ten trillion ants, by comparison, are a picnic.

Do such demonic testimonies from science bode of some total undoing of our capacity for empathy, not only with guppies and owlet moths but amid the entire

⁹Online Etymology Dictionary, © 2001–2016 Douglas Harper, www.etymonline.com/index.php?item=resource, Accessed May 5, 2016.

whorl of biodiversity still managed by the rubrics of accelerated or decelerated evolutionary pathways? It is guesswork but not an impossibility. Even as we continue to ignore well over 700 million hungry humans, and a billion+ micronutrient deficiency cases (biographies).

Usually, human guesses have been utterly out of tune with what the world needs. It is estimated that nearly 107 billion individual *Homo sapiens* have come and gone since our first generation, which occurred approximately 200,000 years ago (although other researchers have suggested 135,000 years ago).¹⁰ At least 98 % of the estimated eight billion other vertebrate and mostly invertebrate and floristic species—each numbering between several thousand and several billion individuals, since the origins of life (abiogenesis, nearly 4.1 billion years ago),¹¹ have also gone extinct, and that this is just the way it is here on Earth. But that does not currently concern the trillions of ants, nor would it have bothered the now extinct Rocky Mountain Grasshopper (*Melanoplus spretus*), a single swarm of which, from 1873 to 1875 is said to have spread from the Mid-West to the East Coast, numbering at least 12–13 trillion individuals, giving it the status as one of the most numerous single species in the history of biology, and one whose fate was actually sealed because of plains irrigation and plowing systems of agriculture and the ruination of those stable soil nesting sites in which each female grasshoppers laid her hundreds of egg cases.¹² A similar situation can be deciphered in the case of the Ohlone beetle whose future is quietly being obfuscated by mountain bikers riding herd upon the beetles' larvae. Our pleasure, the world's despair.

All of the numbers that accompany these hour-by-hour exterminations form their own chilling calculus we prefer to ignore, although anomalies might hold more than a little interest in the full mathematical modeling of biomes across Earth, with target vortices where genetic drift and/or distribution confront barriers. Those ecological edges are where we are most likely to recognize new biological success stories. Speciation, primarily a function of barriers of population distribution, is exponentially enhanced beyond any easily understandable model when the rise and fall of species has become headlines; the life and death of populations and individuals, and of a deep biological veering away from stability, entirely driven by human machinations coming into drastic focus.¹³

Those “headlines” are rife with stressors undermining carrying capacity, inflicative flux, boom-and-bust, the proliferation of withering taxons, 63 million dead trees in California's High Sierras during the Summer of 2016. We can sense the majesty of these seemingly vague mathematics as they apply to biochemistry and our own

¹⁰The Dead Outnumber the Living (Infographic), by Live Science Staff, February 07, 2012, www.livescience.com/18336-human-population-dead-living-infographic.html. Accessed February 14, 2016.

¹¹Elizabeth A. Bell. “Potentially biogenic carbon preserved in a 4.1 billion-year-old zircon”. Accessed April 26, 2016.

¹²Lockwood, Jeffrey A. (2004). **Locust: the Devastating Rise and Mysterious Disappearance of the Insect that Shaped the American Frontier**, (1st ed.). New York: Basic Books. ISBN 0-7382-0894-9. Accessed March 10, 2016.

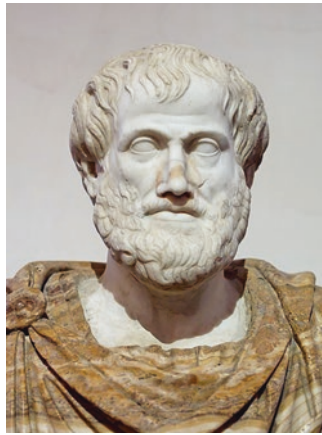
¹³See <http://water.usgs.gov/edu/ph.html>, Accessed May 6, 2016.

personal lives against sweeping backdrops, as far as can be gleaned and contemplated in a work as impressive as Rembrandt's "Aristotle Contemplating the Bust of Homer" (1653, in the New York Metropolitan Museum of Art).¹⁴

This unique portrait draws our attention to the orbit of two men, both myths in their own time; two individuals separated by what some have termed *notional ekphrasis*. By that we mean the power of art to illuminate; inviting consideration of the revelatory echoes and contradictions inherent to being mortal, as in W. H. Auden's poem 'Musee des Beaux Arts (1940)'. "Without imagination there would be no science."¹⁵

History prefers the notion of Aristotle in contemplation; of the exiled philosopher/scientist dying in his ancestral home, in his early 60s, alone and haunted.

Fig. 2.6 "Bust of Aristotle," © Wikipedia Commons



And we think of Homer (whose burial site has never been ascertained, three Greek island municipalities all claiming possession of it—we searched for it once in a gully, swarming with bees, on the north end of Ios) invested with all the emotion of great Greek dramatists. This painting has perpetually endowed its two mythic personages with a solemn sense of order in the world, the commiseration that lends sanctuary to opposing poignancies of life and death,¹⁶ condensed by inference and precision into a densely scattered vision whose biological corollaries meet speciation head-on.

Humans are not one thing: we are evolving, remembering, keeping tabs, deciphering code, generating ideals, and dying out. Rembrandt's act of communication, as Simon Schama brilliantly articulates in his **Rembrandt's Eyes**¹⁷ portrays each and every one of us fixated for an instant in the throes of coevolution.

¹⁴ See <http://metmuseum.org/art/collection/search/437394>, Accessed May 6, 2016, <http://metmuseum.org/art/collection/search/437394> Accessed May 6, 2016.

¹⁵ See <http://sianprior.com/2015/04/notional-ekphrasis-what-even-is-it/>, Accessed May 6, 2016.

¹⁶ See Joseph Newton Hallock, **The Christian life: For devotional reading and family worship**, Catskill, New York, 1892.

¹⁷ See Alfred Knopf, New York, 1999.

If the painting, ultimately, enshrines a “who’s who?” it is little removed from the taxonomist’s dilemma in general: All of history is mere gossip, said Dante. And natural history even more so. Aristotle and Homer, who in their respective worlds were contemporaries of both the Dodo and Great Auk, had they but known what was to come might have portrayed Helen of Troy, or philosophy’s most cherished First Principles, dressed in most colorful feathers. While a great artist revives legends and life based upon what he/she knows, or imagines to be, nature accomplishes it in totality every nanosecond, giving loft to the many truths of biological reincarnation in the guise of normal ecological interplay. We continue to populate at a pace which suggests we believe we are on to something; that in our perpetuations each generation, with greater and greater population sizes hotel chains for gene expression-knows something *we don’t know*.

That constitutes a bit of a thriller, and one quite clouded with careening uncertainty.

The Sorites “Paradox of the Heap” in a World of Fuzzy Logic¹⁸

There is some evidence to indicate that *M. spretus* has a solitary phase, which means it could return, even though its official extinction was declared in 2014.¹⁹ *M. spretus* loved the taste of wheat, was magnificently well-distributed and of a highly social nature. One swarm was estimated to measure the size, approximately, of all of California. Today’s living counterparts might be likened to the 81 species of long-lived (10 years) Arthropod subphylum, crustacean krill, the most prominent being those individual members of the astonishingly widespread Euphausiidae family, whose herbivorous sons, daughters and cousins, in the case of the Antarctic *Euphausia superba* species, can weigh collectively nearly 380 million tons²⁰ and are visible from space, under the right conditions and lens power. Yet, for all their magnificence, indeed, as gorgeous and survival oriented as any species (they exhibit massively honed escape strategies and speed from predators) krill are subject to daily massacres by an unlikely, nonmarine mammal competitor. Humans kill approximately 200 tons of krill each year (down from 520,000 tons in 1983),²¹ unloading enormous stress upon the available food supply for the less than 1 % of the remaining blue whales (*Balaenoptera musculus*

¹⁸ See Barker, C. (2009). “Vagueness”. In Allan, Keith. Concise Encyclopedia of Semantics. Elsevier. p. 1037. ISBN 978-0-08-095968-9, Accessed April 29, 2016; <http://www.sciencedirect.com/science/article/pii/B008044854201083X>, Accessed May 7, 2016.

¹⁹ Hochkirch, A. (2014). “*Melanoplus spretus*”. IUCN Red List of Threatened Species. Version 2014.3. International Union for Conservation of Nature. Accessed March 10, 2016.

²⁰ A. Atkinson, V. Siegel, E.A. Pakhomov, M.J. Jessopp, and V. Loeb (2009). “A re-appraisal of the total biomass and annual production of Antarctic krill” (PDF). Deep-Sea Research 156: 727–740. Accessed March 13, 2016.

²¹ See http://www.coolantarctica.com/Antarctica%20fact%20file/science/threats_fishing.php, Accessed March 14, 2016.

intermedia) in Antarctica. Their populations plummeted from probably more than 300,000 amazing individuals to fewer than 400, and are slowly making a comeback today, it is hoped.²² However, determining a precise number of Antarctic Blue Whales is thus far not possible. The technology for satellite tagging is cumbersome and time-consuming.²³

But if it is sociality, culture, and numerical superlatives that one examines in an endeavor to establish a kind of biological defuzzification, the Milo of Croton of *H. sapiens* when it comes to one species' claims to global dominance, not even krill come close to the recently discovered virus, alleged to be the most multitudinous of all living beings, namely, HTVC01P. "*Pelagibacter ubique* is often cited as the most common organism ever: it's a third of all the single-celled organisms in the ocean." But scientists recently discovered four parasites that eat *P. ubique*, and one of them has the highest numbers of all, that being the virus called HTVC01P, according to researchers at Oregon State University.²⁴ Viruses also inhabit a kind of capitalistic biological world: there are headstrong winds, competitors, such as *Prochlorococcus* which has been found to be abundant in the euphotic zone of the world's tropical oceans and some argue may indeed be more plentiful, even, than HTV with a global yearly abundance calculated at between 2.8 and 3.0 octillion (~10-to-the-27th) individuals.²⁵

A single human body, on average, as extrapolated from the one nanogram per cell weight, contains between 34 trillion and 70 trillion cells (astonishingly disparate estimates). What most surprises the author of the paper examining such numbers, Carl Zimmer, is that so many trillions of cells figured out how to cooperate for, on average, 70, 80, 90 years, to nurture a microbial world called a functioning mammal, in this case, a bipedal primate known as a human being.²⁶

²² Circumpolar Diversity and Geographic Differentiation of mtDNA in the Critically Endangered Antarctic Blue Whale (*Balaenoptera musculus intermedia*), Angela L. Sremba, Brittany Hancock-Hanser, Trevor A. Branch, Rick L. LeDuc, C. Scott Baker, PLOS, Published: March 7, 2012, doi:10.1371/journal.pone.0032579, <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0032579>, Accessed March 14, 2016.

²³ Reuters, Wed Mar 27, 2013 "Tagging, satellite tracking reveals mystery of blue whales," by Pauline Askin. www.reuters.com/article/us-australia-antarctic-whales-idUSBRE92Q02M20130327, Accessed March 14, 2016.

²⁴ See <http://www.smithsonianmag.com/smart-news/guess-what-the-most-abundant-organism-on-Earth-is-19254662/#PeOIKze7vtJ7YWSL.99>; <http://www.smithsonianmag.com/smart-news/guess-what-the-most-abundant-organism-on-Earth-is-19254662/?no-ist>. Accessed February 19, 2016.

²⁵ G. Rocap, F. W. Larimer, J. Lamerdin, S. Malfatti, P. Chain, N. A. Ahlgren, A. Arellano, M. Coleman, L. Hauser, W. R. Hess, Z. I. Johnson, M. Land, D. Lindell, A. F. Post, W. Regala, M. Shah, S. L. Shaw, C. Steglich, M. B. Sullivan, C. S. Ting, A. Tolonen, E. A. Webb, E. R. Zinser & S. W. Chisholm (2003). "Genome divergence in two *Prochlorococcus* ecotypes reflects oceanic niche differentiation". *Nature* 424(6952): 1042–1047. doi:10.1038/nature01947. PMID 12917642.

²⁶ "How Many Cells Are In Your Body?" by Carl Zimmer, The Loom, National Geographic website, <http://phenomena.nationalgeographic.com/2013/10/23/how-many-cells-are-in-your-body/>, 10/23/2013. Accessed January 20, 2016.

Fig. 2.7 “Young Woman Among Sikkimese Mountain Tribe,” Photo © M. C. Tobias

There are other ways to consider big species considerations by focusing on ring related collations of life, or *Rassenkreis*²⁷ that would not only include the aforementioned viruses and bacteria, but also those relational species marked by their ranges. Species like the Greenish Leaf Warbler (*Phylloscopus trochiloides*) whose life cycle takes them from Europe to Nepal to Siberia via the Tibetan plateau. The known 66 species of the Phylloscopidae family literally form a kind of ring of associations, genetically connected around vast geographical regions, with no referenda ever threatening a biological Brexit. Even more pronounced and earlier studied are the 28 species members of the gulls, or Laurus Genus, circumpolar, their family, the Laridae, geographically discernible at New Jersey urban landfills and atop icebergs floating in the North Atlantic. The Ploceidae family throughout Africa, including the Red-billed Quelea, *Quelea quelea*²⁸ is another bird species that would rank at the continental ring level of biospheric resiliency and inexplicable success, as least for now.

And, of course, one of the most commonly experienced *Rassenkreis* species in North America is the Aspen tree, *Populus tremuloides* whose root systems are millennia’s old, and which all descend from a single seed, making them the ultimate clonal colonists. When the western tent caterpillar (*Malacosoma californicum*) goes into 1 or 2 years of frenzied leaf consumption, as is currently taking place across large swathes of the Rockies, notably throughout portions of the Sangre De Cristo mountains of the 1.6 million acre Santa Fe National Forest (New Mexico), it is this very colonial system that more often than not provides the Aspen their defense against insect predators. Safety in large numbers.

²⁷ Brown, Rob. ““Same Species” vs. “Interfertile”: concise wording can avoid confusion when discussing evolution.”

²⁸ Arnaiz-Villena, A; Ruiz-del-Valle V; Gomez-Prieto P; Reguera R; Parga-Lozano C; Serrano-Vela I (2009). “Estrildinae Finches (Aves, Passeriformes) from Africa, South Asia and Australia: a Molecular Phylogeographic Study” (PDF). The Open Ornithology Journal 2: 29–36. doi:[10.2174/1874453200902010029](https://doi.org/10.2174/1874453200902010029).

Fig. 2.8 “Clonal Aspen Complex, *Populus tremuloides*, Sangre De Christo Mountains, Northern New Mexico,” Photo © M. C. Tobias



But this theory has not worked for bovines, or sheep, turkeys, or pigs, when up against our species; while, conversely, nearly 7.4 billion *H. sapiens* thus far have found safety nets—at the species-entire level—even if distinct populations teeter, or disappear entirely; and individuals are capable of, and vulnerable to enormous and/or permanent harm.

Species like the vast interconnected quaking Aspen, particularly at the golden heights of autumn, convey great beauty and hope, both in geographical and numeric terms. Their fuzzy logic dissipates on the cusp of a different set of mathematical confirmations. Nonetheless, those survival stratagem, so different from that of the nearly 650 species of primate who typically live in communities whose populations rarely exceed 150 individuals, offer no easy predictability with respect to biological procedures or prospects for survival, as was thoroughly explored in Ernst Mayr’s classic study of modern evolutionary synthesis, his book **Systematics and the Origins of Species**.²⁹ What is problematic about assertions regarding relational species is the algebra that relies upon variables, if/then suppositions and infinite-valued logic. In other words, uncertainty in every aspect of scientific reasoning and proof. Mathematic models, whether applied to genetics, systematics, or any predicate, cannot be refined beyond fringes; obtuse membership rules, compromised probability specifics. Anything is possible within the fuzzy détentes guiding biological theory when big numbers, big history, big ideas and ideals are involved.

²⁹Columbia University Press, New York, 1942; See http://www.nasonline.org/programs/sackler-colloquia/completed_colloquia/systematics-and-the-origin-of-species-on-ernst-mayrs-100th-anniversary.html, Accessed April 29, 2016.

Contradictory Breaking Points

All of biology, physics, and chemistry hinges in great measure upon such numbers as have been flying back and forth, thus far. The challenge in tracking such multitudes, at whatever scale, is that our definitions of a species, of their linguistic and other behavioral norms are realms for philosophy and morals, not mathematics, which provide a different kind of window on what's going on, namely, expansiveness and population dynamism, without judgment; indeed, absent any qualitative analysis whatsoever. In a neutral world of such numbers, all is lost when morality enters into proposed equations that will translate into human common sense, politics, economics, public opinion, and legislation.

The more numeric specificity science grants evolution and coevolution—the number of genes an organism possesses, for example—the greater likelihood of error; of totally misreading that specifically targeted ‘reality,’ and the larger, more frustratingly irremediable gulf separating human cultures from animal and plant cultures. Cultural schisms are at the heart of anthrozoology’s mission to rectify and remedy.

Our knowledge bases, when multiplied, are incapable of substantiation. By scoring and accumulating, negating and positing, we have virtually tainted all translations; undermined tandem possibilities with the Others; worked hard to sabotage all competition among Other-than-humans; proscribed the moods, largesse and methodologies that might yet ensure a reciprocity that is fundamentally the precursor to our own survival. We simply don’t have a clue how to make the closing of this abyss happen in ways that work for both parties to the negotiation.

Because we have for so many thousands of years endeavored to isolate ourselves, buttress our strongholds, keep the Others out (aside from the sporadic vogue for Corgies, pet Persian cheetahs, raptors of the Arabian Peninsula, chocolate point Siamese, Pekinese, etc.) we have undermined our possibilities for communion. This is tragic, deeply depressing, and real. Breaking bonds with biophilia, walking from the table of ethological discourse, melting the North and South poles, raining an atrocious toxicology upon all other life forms is our continuing legacy. Unlike the biotic components essential to any community of life forms, as described at many levels heretofore, our species has gone out on a limb like no other, attempting to do it all alone.³⁰

Stranger, and more awkwardly still, we have translated our aloneness into biological success, as we have done with our species’ TFRs, or, Total Fertility Rates;³¹

³⁰For but one example out of thousands, see, *Plant Ecology* Vol. 165, No. 2, 2003 Distribution, Specie...<http://www.jstor.org/action/showPublication?journalCode=plantecology>, “Distribution, Species Diversity and Life-Form Spectra of Plant Communities along an Altitudinal Gradient in the Northern Slopes of Qilianshan Mountains, Gansu, China,” Guohong Wang, Guangsheng Zhou, Limin Yang, and Zhenqing Li, *Plant Ecology*, Vol. 165, No. 2 (2003), pp. 169–181, Published by: Springer, Stable URL: <http://www.jstor.org/stable/20146379>, Page Count: 13, http://www.jstor.org/stable/20146379?seq=1#page_scan_tab_contents, Accessed May 9, 2016.

³¹See The Population Reference Bureau data sets, <http://www.prb.org/Search.aspx?search=TFR>, Accessed June 17, 2016.

urging our demographic madness to the summit of a population Mount Everest, an ecological chasm, in other words, containing sooner than later probably ten-billion individuals or more who will be living in absence of the slightest consideration of the many consequences of their destructive aggregations. Every single indicator of such delusional triumph is trapped by irreconcilable data sets condemning us, and rightly so, to what is cumulatively a clear and present proclivity for outright ecocide. But this is the same edge known as biological suicide. That transcends in its cause of nullity the most fragile and telling of ecological boundaries, namely, habitat and population levels. In other species we find this same edge of death-throes in genetic bottlenecks that correspond with massive extinctions, die-offs, all of the concerted destruction whose outlines clearly illuminate the Anthropocene.

Is such self-destructive behavior at the population level simply a matter of mass stupidity? Morbidity? Insanity? It is, however described, a clinical crisis that no one is taking seriously enough.

H. sapiens' isolationism is an indicator of species-wide planetary failure, our most self-damning indictment and the one most likely to ensure our extinction as a species. The successor hominidae, if there is one, will endeavor desperately to eke out survival in spite of evolution, having diverged entirely from any sustainable biospheric conditions of their own making. Such a future is a conditional that can be projected at this time. Our attempt to overthrow evolution by causing our own nature to prevail above all others mirrors precisely the global problematique: we have turned our back on the mirror of ourselves and waged war against the Earth. Only a Fool of a Species would think to do that. Are we clinically suicidal? It is worse than that. We are a species governed by serial killing as the most obvious through-story of our history.

Fig. 2.9 "From Cimetière du Père Lachaise," Photo © M. C. Tobias



Even the geographic expansionism of our restless selves eludes any other explanation or clarity. We may *think* that we understand a continent, a shoreline, a forest. But, as with the classic case of the famed Heraclitus of Ephesus (535 BC–475 BC), who wrote, “δὶς ἐς τὸν αὐτὸν ποταμὸν οὐκ ἂν ἐμβαίης, You could not step twice into the same river,” as remembered by Plato in his *Cratylus*, 402a.,³² the investiture corresponding to our having laid claim to all six (some say seven) continents, demonstrates that we cannot stop ourselves. Topophilia (as denominated by geographer Yu Fu Tuan) has transmogrified into topocide. The talk of restraint is reserved for poetry and ethical literature but does not hold a candle to the darkness of human multitudes struggling within their miniature mortal coils of habitation.

A heap of a billion grains of sand is still a heap plus-or-minus one, two, even two million grains. One plus one, in other words, does not equal two, a discussion about which will be taken up at the end of this book. In any outdoor ethical discourse, for one plus one to equal zero, or worse, is writ large on too many emergent epitaphs of our fellow species to be ignored any longer.

The Metabolic Truths of Biological De-Constructions

The point is that such big numbers may mean little to us, other than the vague consolation—as gleaned from the conglomerations of an Anselm Kiefer, the stark bifurcations of a Mark Rothko or photographic montages, blurred and self-indulgent that mark those countless, often illuminating experiments performed on the world by a Gerhardt Richter—that when we die as a species, all that other calculus of strangers will more than likely still be doing their grand metabolic, life-fostering work out in the forests, the meadows, the prairies, mangroves, neo-tropics, and oceans, at least some of them will. Jacques Cousteau raised a generation on this belief system, just as Disney enterprises rallied on behalf of painted deserts, scorpions, Pinocchio, Lion Kings and—eventually, along with other corporate stewards such as Pixar, the favoring of populist sharks, penguins, parrots, and lemurs.

But there is more to it than that. Forgetting these astronomical-sized biological numerics, beneath, or outside Darwin’s umbrella—that paradigm which all but assures the supremacy at some point, of mutations—our problem is also a philosophical and moral prospect, indeed, an opportunity if you are up to concession: to reconcile our apparently compulsive need to exploit with an attitudinal change at once aesthetically satisfying and mutualistic in terms of the Others—the other species still left on the planet. This takes courage, principally because you are likely to be alone in Sussex, overlooking a pond, engaged in quiet commiseration with what your neighbors take to be pests and weeds. That would be, perhaps, for starters.

Regardless of your age of retirement from the hubbub of nose-y neighbors, it would indeed be helpful to understand how to forego exploitation, without having

³²Stanford Encyclopedia of Philosophy, <http://plato.stanford.edu/entries/plato-cratylus/>, Accessed April 29, 2016.

to sneak about throwing walnuts to squirrels and chunks of seven-grain bread to the rabbits, and mustelids. And to be stuffing your suet boxes, other hidden peanut caches, cookie stashes, nut castles and chopped tofu habitats for other-than-humanity without behaving like a thief in the dark; and in as many configurations and positive outcome scenarios as possible. The patron of these humble gifts to your true neighbors, the other animal species, is, of course, Prince Charles—a true Prince, as far as can be determined; and others of his ilk, like Bridget Bardot, Michael Aufhauser, and Reinhardt Brandauer. Dr. Biruté Mary Galdikas, Linda Tucker, Pramoda and Gurudev Chitrabhanuji, Dr. Marc Bekoff, Ingrid Newkirk, Dr. Paul Waldau, Dr. Jane Goodall. Shelley, one can be sure, did not stint when it came to feeding birds. Nor did Petrarch. Schakleton, Milton, Dante, Sannazaro, Da Vinci, Einstein, Schweitzer, Beethoven, or Monteverdi, Bernardt de Ventadorn, Dürer and the earlier Martin Schongauer of Colmar, as well as the subsequent engraving family dynasties like the de Passe's and Wierx's and Sadelers. Vivaldi or Mozart. They have all revered life. It is what makes humanity humanity.

The Blue Whale Question?

Had we driven the Blue Whale to extinction—which was nearly a fact, what could we have possibly learned from that tragedy? How could it have helped the Earth? Are we learning lessons, or ignoring them? Do we even believe that our species could be imperiled as was the Blue Whale? Is there a critical mass of humans who even care whether we go extinct? The average Blue Whale weighs 200 tons, a human 62 kg or 136.687 lb. The African bush elephant (*Loxodonta africana*), of which there are thought, possibly, to be four subspecies, the largest of the males weighing over 13,000 pounds, are the Earth's terrestrial equivalent of the Blue Whale (excluding Sequoia and Redwoods, of course), and today we are watching their populations being decimated. The IUCN has downgraded their conservation status from Endangered to merely Vulnerable³³ based on the fact of the animal's widespread ranges across much of Africa, which translates into huge gaps in analysis or the infrastructure to reliably ascertain from region to region, year to year, their number. Tracking, as with Blue Whales, is difficult.³⁴ And for conservationists, not to mention the elephants themselves, this is acutely frustrating. If there is a Devil in such statistics it is the combinatorial power of poverty, poaching, the human population explosion, and elephant habitat loss. All four of these dilemmas should be soluble, and education through communication is key.

Anthrozoology is very much about communicating: people to people; but as importantly, the willingness of people to *listen* to elephants and Blue Whales. It was Scott McVay, in his seminal investigation of the whaling industry for Scientific

³³ See <http://www.iucnredlist.org/details/12392/0>, Accessed March 14, 2016.

³⁴ See <http://www.globefoundation.org/projects/about-elephant-tracking-and-collaring/>, Accessed March 14, 2016.

American, who first exposed the true horror and near extinction levels being faced by whales everywhere.³⁵

These concerns and conjectures reverberate amid a flood of numbers, admittedly. And there are good reasons for ascribing some importance to data. A Blue Whale consumes some 40 million individual krill every day. How is it a small primate, humans, were able in the space of two centuries to virtually extinguish the Blue Whale, and why? And what has our inglorious intercession done by so depleting those numbers, each one of which—a point we must drive home insistently—is a living individual comprised of great importance in the overall scheme of life? Otherwise, and in spite of the insistence, all these numbers are a meaningless blur, to be permanently shelved, ignored, and by logical inference, forgotten.

Does “forgotten” merit consideration? Is there some kind of planetary reconciliatory gesture on our part, within this vast numbers game, that is feasible? One that would go so far as to promote, somehow, our making friends not only with whales and elephants and grasshoppers but with antibiotics, with bacteria and viruses, to the extent possible? At least not mindfully accelerating their mutations by flushing other species with antibiotics, or applying many of the bars of soap that are normally (and legally) manufactured to our own bodies? Should the loss of antibiotic resistance truly worry us as much as the accelerating loss of Bengal tigers (*Panthera tigris tigris*) or Black (hook-lipped) Rhinos (*Diceros bicornis*)? Even the southern-white rhino (*Ceratotherium simum simum*) sub-species in Africa numbers fewer than 20,500 individuals in the wild.

Fig. 2.10 “Southern-White Rhino Family, South Africa,” Photo © M. C. Tobias



³⁵“The Last of the Great Whales,” Scott McVay, Scientific American, August 1 1966, <http://www.scientificamerican.com/article/the-last-of-the-great-whales/>, Accessed June 1, 2016.

Post-Holocene Histories

Anthrozoology is that broader science of orientation which prescribes a basic public policy that comports with primordial ethics: every living being wants to survive. We have repeated this, and will do so again. What we feel, and think and do with respect to the Others, all of the Others, is also what we do to ourselves. It all matters deeply. The Anthropocene is that geological period of time, post-Holocene, now upon us, singularly characterized by the catalyst of all those activities conceived and empowered by humanity, directly and indirectly alike. That impact is the history of environmentalism, but it also reigns in the problem we face today at an unprecedented convergence and convolution of crises which the Anthropocene illustrates.

Could Darwin's umbrella be changed radically? The notion of altering human evolution is not a new concept. Just recently, with respect to the capacity to "edit genetic mistakes" (read: "cystic fibrosis, muscular dystrophy and even HIV and cancer") the concept emerged: "We're talking about something that would affect human evolution," said UC-Berkeley geneticist Jennifer Doudna, in an interview with CBS News.³⁶

We are only too aware of the fact that our very tenuous relationship with the natural world is predicated upon our own impact upon that world. Certainly our species' relationship with the Boll Weevil (*Anthonomus grandis*) is one of the great case studies in ecological gratification backfiring. Commencing with its entry from Mexico in 1892, much of the cotton production—itsself hugely destructive to the environment—was impeded by the beetle's robust feeding frenzy. The blame goes strictly to the cotton growing throughout the southeastern USA, a practice that resulted in vast losses of biodiversity. By 1915, in the state of Georgia, the beetle's love affair with cotton had devastated croplands by nearly 50%, within less than a decade, resulting in what historians call the "great migration"; farmers put out of business and moving to where jobs might be found in the northern states.³⁷ Following WWII, farmers were back in business massively spraying pesticides like DDT to control the beetles, thus amplifying one ecological disaster (loss of habitat, extinctions, and soil erosion—more than half-a-foot of soil depth in every field)³⁸ with an outbreak of toxicants, prior to the revelations of the scientific community, largely driven by the publication, of course, of **Silent Spring** (1962) by Rachel Carson.³⁹

³⁶"Could revolutionary gene-editing technology end cancer?" CBS News, November 30, 2015, <http://www.cbsnews.com/news/crispr-jennifer-doudna-gene-editing-technology-diseases-dangers-ethics/>, Accessed March 4, 2016.

³⁷"Business and Economy," Original entry by Phillip M. Roberts, University of Georgia, 05/18/2004, <http://www.georgiaencyclopedia.org/articles/business-economy/boll-weevil>, Accessed March 31, 2016.

³⁸See "Environmental History of Georgia: Overview," by Leslie Edwards, 05/25/2004, <http://www.georgiaencyclopedia.org/articles/geography-environment/environmental-history-georgia-overview>, Accessed March 31, 2016.

³⁹See "How 'Silent Spring' Ignited the Environmental Movement," By Eliza Griswold, September 21, 2012, The New York Times Magazine, <http://www.nytimes.com/2012/09/23/magazine/how->

When we speak about humans tampering with evolution, the history of the state of Georgia is certainly quintessentially all about human intervention and destruction, unabated from the earliest Mississippian culture fire-alterations for early agriculture between AD 800 and 1600; and subsequent mass extermination by colonizing Europeans of fur bearing animals, then longleaf pine forests, along with the rice and cotton cultivation crazes, subsidized by slavery, all echoing a human pattern that has been several thousand years in the works.

But then we must add the interbreeding and artificial selection of (in essence, genomic qualities) that would be favorable to those plants we prize, and to the domestication of animals we can utilize and who can optimize benefits to themselves by associating with our species. In the case of canines, geneticists at UCLA have now discovered that such domestication can cause predictably far higher mutational problems (some 115 possible mutation types for over-bred dogs) by comparison, for example, with genome studies of wolves in Tibet, or on Isle Royal in Michigan.⁴⁰

[silent-spring-ignited-the-environmental-movement.html?_r=0](#), Accessed June 17, 2016.

⁴⁰“The domestication of dogs has caused harmful genetic changes, study finds,” by Peter Dockrill, 23 Dec 2015, Alert, <http://www.sciencealert.com/the-domestication-of-dogs-has-caused-harmful-genetic-changes-study-finds>. Accessed February 27, 2016.

Chapter 3

The Metaphysics of Extinction

An Overview of Ceballos, Ehrlich, and Ehrlich

Most recently, our tampering has come to light in a haunting phrase, which is the title of a powerful book, **The Annihilation of Nature—Human Extinction of Birds and Mammals**.¹ The authors examine a vast rash of “long-silenced songs,” “vanishing mammals,” “drivers of death,” “birds in trouble” and conclude with various solutions that can get our collective “beyond mourning.” This window on a global crisis cannot be described as hopeful, only revealing.²

¹By Gerardo Ceballos, Anne H. Ehrlich, and Paul R. Ehrlich, With Original Art by Ding Li Yong, Johns Hopkins University Press, Baltimore, MD, 2015.

²Much of the forgoing material on the Ceballos, Ehrlich, and Ehrlich book was first published as a book review in MAHB, the Stanford University web-based site, Millennium Alliance for Humanity and the Biosphere, <http://mahb.stanford.edu/nodal-activities/combating-the-darkness/>, Accessed June 17, 2016.

Fig. 3.1 “Two Extinct Freshwater Fish from Lake Biwa, Shiga Prefecture Japan. The Amur Ninespine Stickleback, *Pungitius sinensis*,” Photo © M. C. Tobias



Ceballos, Ehrlich, and Ehrlich are necessarily selective in their data and presentations, given the many encyclopedias that would be necessary to come close to fully portraying the plight of wildlife and habitats on Earth; but the cumulative effect of their examples could not be more anthropocentric in their study’s blow-by-blow analysis of just how sadly unique a moment *H. s. sapiens* has unleashed, in biological time. One would like to see their commentary become mandatory reading for every member of every Congress and Parliament; for every student of possible age.

If you think it is unlikely that politicians would take out time from their busy schedules, think again. It has been over a quarter century since Prime Minister Margaret Thatcher made unprecedented news with her alarming speech about ozone depletion. A chemist by training, PM Thatcher had conferred with numerous scientists and was deeply alarmed, indeed taken by surprise at the pace of acceleration of the ozone crisis. On June 27th, 1990, she spoke in the direst possible terms to representatives of 100 nations that ozone depletion was happening even faster than scientists had initially feared and a worldwide cessation of all chlorofluorocarbon chemicals was essential.

A US independent observer from the World Wildlife Fund, Richard Benedick, who had previously been the lead US delegate in 1987 at the Montreal Protocol negotiations, admitted to astonishment at the urgency of Thatcher’s conveyance. “We’re seeing something completely unprecedented in the history of diplomacy,” said Benedick. “Politicians from every bloc and region of the world are setting aside politics to reach agreement on protecting the global environment. Governments are backing off hardened positions to get an agreement, and even the customary disagreements between North and South—the developed nations versus the developing nations—lack their usual edge.” And that was just about the fear of skin cancer and reduced

food supplies for populated cities of the North³. And yes, that kind of thinking almost sounds too good to be true. Politicians who are chemists and concerned, at the same time, about the global environment. Now we have much more to worry about than skin cancers and declining krill populations (we did in 1990, as well, to be clear; nor is that in any way meant to underestimate both problems, although the most recent data indicates that early stratospheric ozone levels in the Fall of 2015 over Antarctica show cumulative diminutions). But what **The Annihilation of Nature** has provisioned everyone's working vocabulary with, is a deeply sensitive, informed context and a scientific overview of the daunting challenge before us all: those untold numbers of ecological holocausts among wildlife occurring every day throughout this planet. We have been hearing of them on various levels from the earliest anti-vivisection debates in the mid-nineteenth century in the UK, and most comprehensively from organizations like PETA, People for the Ethical Treatment of Animals, noting that our tracking of anthrozoological perspectives within the Anthropocene Epoch is limited to the last 11,700 years or so. Although we know that long before the Anthropocene, there were human-induced Quaternary megafaunal extinctions.⁴

And it must be declared and reiterated, particularly in the context of anthrozoology, that the wildlife holocausts our species is inflicting mirror the countable catastrophes met out daily to so-called farm animals, a preposterous distinction, despite what genetical neutrality—in an ethical sense—alleges with respect to breeding characteristics.

For decades the Ehrlichs, in particular, have been writing and warning of vast extinction patterns across the biosphere, but in **The Annihilation of Nature**, with their colleague Ceballos (as well as the late conservation biologist Navjot Sodhi, who passed away before the book could be completed), they have summarized the state of the world's biological disasters in a methodical manner no one before them has accomplished in so urgently contemporary a context. It is an unnerving, heart-stopping overview of just what exactly is going on with respect to the sixth extinction spasm.

The book's images are poignant to the extreme—beauty that is our burden—and from every corner of the globe. A two-page color spread showcasing one astounding vantage point on Guadalupe Island, just off the coast of Baja California, the Galapagos of Mexico, and as much a Lost World as one could ever envision, though efforts are in place to preserve some of this island's amazing native and endemic species. An image of the Southern Muriqui, still being hunted for food in Brazil quite close to the outskirts of São Paulo, despite this gorgeous primate numbering fewer than 1500 individuals and being Brazil's largest species other than humans; the recently extinct and once gorgeous Inca rat; the Sumatran (hairy) rhinoceros, the world's smallest, rarest and least known rhino; the now extinct in the wild Hawaiian crow—the 'alalā (to be discussed later in this work); and the first mammal known

³“Ozone Fading Fast, Thatcher Tells World Experts,” By Malcolm W. Browne, Special to The New York Times, Published: June 28, 1990. Accessed January 15, 2016.

⁴“Global late Quaternary megafauna extinctions linked to humans, not climate change,” Christopher Sandom, Søren Faurby, Brody Sandel, Jens-Christian Svenning Published 4 June 2014. doi:[10.1098/rspb.2013.3254](https://doi.org/10.1098/rspb.2013.3254), Proceedings of the Royal Society B: Biological Sciences.

to have gone extinct in the past 50 years, the “goddess of the Yangtze,” the baiji, one of—what was—six known freshwater dolphin species.

The authors describe a 2006 international team of scientists who explored 2175 miles of the Yangtze hoping to find the baiji still surviving. They did not. The leader of the expedition is quoted upon seeing footage taken of one, in 2002, a baiji named Qi Qi who had been kept in captivity for 22 years: “I consider myself a strong man, but when I saw that footage [of Qi Qi] I cried for several minutes. It’s just so terribly sad.”⁵ One other solitary baiji was seen in 2007, but by 2008 the species was officially deemed to be Extinct. Several years into Mao Zedong’s PRC, in the 1950s, it is estimated there were still probably 5000 baijis enjoying the Yangtze. But that was all before China’s “great economic transformation” and nearly 1.4 billion Chinese consumers. And thus the dizzying tale wends mournfully, from location to location, an ecology of cemeteries.

At least 50 % of all sizeable wildlife has been lost worldwide in the last 40 years: as much as 70 % in South America.⁶ Given that among the 5500 or so known mammals on Earth, only 100 of them have been biologically detailed in any depth,⁷ the gaps in data are as chilling as the numbers in general are galling. The International Union for Conservation of Nature (IUCN) recognizes that since about the year 1500, eight mammals have gone extinct, with another 27 “possibly extinct”⁸ “But on top of that, the IUCN declares that at least 188 mammals are critically endangered, 450 are endangered, and 493 are threatened with extinction.”⁹ All of these mammals—approximately 20 % now threatened—are descended from others of their nurturing kind who first co-evolved on Earth during the Triassic Period, some 245 million years ago, our collaborative ancestors. But the IUCN is also a vast work in progress. Remember the earlier discussion of Anthony Barnosky’s data. That, as of 2014, of the approximately 71,576 species studied (out of a minimum of at least 1.8 million species identified by science), 20,614 species—including the aforementioned mammals—have been placed in the “threatened” category, which translates somewhere between “vulnerable, endangered, or critically endangered.” And that 1.8 million number is more likely to be in excess of 10 million species (more than 80 % of them unstudied save for the most superficial reading of what/who they are). As we stated earlier, some have suggested 100 million species out there (taking into account all forms of life, including the bedazzling bacterial and viral species).

All these dizzying tabulations have varied dramatically during the past several decades. Most recently, E. O. Wilson suggested that there are “roughly 10 million” species of “fungi, algae, plants and animals” ... “give or take a million.” Wilson adds that in terms of species that have actually been examined within this vastly greater reservoir of beings are “63,000 described species of birds, mammals, reptiles, amphibians and fishes” and as for flowering plants, “approximately 270,000 spe-

⁵ **The Annihilation of Nature**, op.cit., p. 73.

⁶ *ibid.*, p. 135.

⁷ See “In vitro puppies offer hope for rare wildlife,” by Melissa Healy, Los Angeles Times, Sunday, December 13, 2015, p. A14.

⁸ **The Annihilation of Nature**, op.cit., p. 69.

⁹ *ibid.*, p. 80.

cies.” He also points out the most comprehensive “census” to date, at least within the USA, is that of the Great Smoky Mountains National Park in which, Wilson goes on, “Fifty thousand hours of field work there by specialists and assistants have yielded records of 18,000 species of animals and microorganisms alone, with 40,000–60,000 considered likely on the roster when all transients, as well as rare and undescribed species, have been registered.”¹⁰ The danger, of course, in all of these numbers is the fluent currency of millions and billions that humans are accustomed to: watching more than \$2.2 trillion dollars disappear in 12 hours from the global markets in reaction to the June 23, 2016 UK vote to leave the European Union, for example.

At one point, the authors of **The Annihilation** hint at the (remote) suggestion that there could well end up being a billion species on Earth. This is not a widely held figure by any means, but that it was even thrown out there as a possibility renders mind-boggling speculations that verge upon those earlier referenced Planck-type numbers when multiplying species times their individuals. But whichever power-of-ten proves to be closer to the truth, the scientific gap analyses are enormous, and tell us that if it is that bad for 20,614 species out of a most modest sampling of 71,576 species, the implications are dire for the rest, and for the habitats upon which those species, populations and individuals (many of them pollinators, soil, marine and atmospheric stabilizers, not to mention the source of food for everyone) depend.

In previous research publications the Ehrlichs and colleagues have made clear that something like 44,000 populations are going extinct every single day. That could refer to a colony of the small Utah prairie dogs, or a skein of Himalayan ravens, among 43,998 other population extinctions on that day.

In looking at the “Drivers Of Death”¹¹ the authors provide four examples more than telling: “In Brazil more than 24 million animals are estimated to be hunted every year. In Sulawesi, one of the larger islands in Indonesia, 90,000 animals are sold in a single market every year. And in Borneo 108 million are killed every year in Sabah, one of the smaller territories on the island. In Mongolia in 2004 hunters killed 3 million marmots and 200,000 gazelles, mostly illegally.”¹² The aforementioned Brazilian statistic is amplified by an additional estimate by the authors which shows “60 million birds and mammals” being killed every year in Brazil (whose human population exceeds 203 million, a causal relationship that is clearly key to the book’s fundamental proposition that *H. sapiens* are intensively at fault for this senseless and colossal tragedy of local, regional, and global biodiversity loss).¹³

The mortality and extinction statistics in **The Annihilation of Nature** may seem all pervasive (the phrase over-kill would be an insult to this massive synthesis of data) but, in fact, they are merely emblematic, and, if anything, conservative. The authors have been sparing in their survey. For the jaded, unwary, or only mildly interested, that might be difficult to imagine. Read the book. The many numeric mind twisters visited upon the reader are not cumulative for accumulation sake.

¹⁰“The Global Solution to Extinction,” E. O. Wilson, The New York Times, Sunday Review, March 14, 2016, Accessed March 14, 2016.

¹¹ Ch. 9 of **The Annihilation**.

¹² *ibid.*, p. 152.

¹³ *ibid.*, p. 152.

Rather, each instance of grim or perilous encounters between other species and *H. sapiens* comes with a terse, accessible story or explanation that is characteristically heartbreaking, enraging, or—in a few cases, encouraging. But what is inescapable in this remarkably lean yet comprehensive book is the plain-speaking narrative that directly pertains to personal experiences with the species and ecosystems described by three of the world’s preeminent ecologists/biologists. Their convictions and feelings derive from arduous odysseys and assiduous field research over many decades, the sum conveyance of which needs no embellishment.

Fig. 3.2 “Baby Cheetah and Tortoise Buddy, Western Namibia,” Photo © M. C. Tobias



Existential Animals/Plants at Ground Zero and the Rewilding Movement

Writing from Ground Zero, Ceballos, Ehrlich, and Ehrlich have carefully measured the epitaphs, while underscoring the fact that calculations lead us only so far. And then all the zingers in the world become sad, usually criminal history. Thoughtful, pragmatic action is the only rational, empathetic and realistic option open to us. The authors carefully recommend scores of conservation measures: every conceivable refuge configuration—parks, corridors, translocations; forceful legislation to combat further adulterants, hundreds-of-thousands of toxins and endocrine disrupting chemicals being targeted annually at the global commons, like those pesticides (DDT—dichlorodiphenyltrichloroethane) first elaborated upon by Rachel Carson; more genetic research to understand subspecies, as in the case of the four subspecies of gorilla, all under siege at various levels; stepped up efforts to cope with bioinvasives and—as last resorts—the inevitability of preservation of some species within, alas, glorified zoos.

Fig. 3.3 “Iberian Wolf, *Canis lupus signatus*, Portugal,” Photo © M. C. Tobias



In addition to the obvious benefits of responsible ecotourism, the authors call for a ramping up of the “rewilding” movement. For some years it has been gaining traction across much of Europe and now, more and more, in North America, as well.

In one version of the rewilding initiative, the Al-Wabra Wildlife Preserve in Qatar is working to repopulate several captive macaws back onto 5437 acres of land it has purchased in Brazil, at the very location where the last wild Spix’s macaw was observed.¹⁴ Additionally, the authors take great pains to clarify why capstone and keystone species, such as the reintroduced wolves of Yellowstone, or of prairie dogs, are so exemplary of the very basic natural downstream capital all human economics, and the economies of nature depend upon at their functional quintessence. In the animal rights world, this can easily be summed up in the phrase, the humane economy (used recently for the title of an important book by US Humane Society president, Wayne Pacelle)¹⁵ But in eco-dynamics generally speaking, rewilding is a matter of natural logic, interdependency and, ultimately, the sheer mystery and majesty of how nature functions, from photosynthesis to evolution herself.

Some years ago John Donian and colleagues published an essay entitled “Rewilding North America” in *Nature*¹⁶ that looked to the re-visitation of camels, lions, and 60 million *Bison bison* in North America. It’s too late for those who have gone extinct, like the Florida Cave Bear; or the Woolly Mammoth with its enormous amount of bone marrow, a species with whom the first human “Floridian’s” coexisted and preyed zealously upon, just 14,550 years ago¹⁷ and most recently on Wrangel

¹⁴ *ibid.*, p. 49.

¹⁵ **The Humane Economy: How Innovators and Enlightened Consumers Are Transforming the Lives of Animals**, published by William Morrow/HarperCollins, 2016.

¹⁶ *Nature* 436, 913–914 (18 August 2005) | doi:[10.1038/436913a](https://doi.org/10.1038/436913a); Published online 17 August 2005. <http://www.nature.com/nature/journal/v436/n7053/full/436913a.html>, Accessed March 29, 2016.

¹⁷ “Pre-Clovis occupation 14,550 years ago at the Page-Ladson site, Florida, and the peopling of the Americas,” *Science Advances* 13 May 2016: Vol. 2, no. 5, e1600375, doi:[10.1126/](https://doi.org/10.1126/)

Island, Russia.¹⁸ It's also too late for the remarkable *M. exilis*, a pygmy elephant whose remains dating to the demonstrable beginnings of the Anthropocene—and the alleged predation by California's 10,000-year old Arlington Springs peoples, on at least three of California's Northern Channel Islands have been recovered.¹⁹

Fig. 3.4 “Nearly Extinct Florida Panther, *Puma concolor coryi*,” Photo © M. C. Tobias



But for those others, genetically similar to their North American allies thousands of years ago, there are interesting prospects. In the state of Texas alone, dominating various private refuges, Donian and his colleagues point out, there are today nearly 70,000 individuals such as African elephants roaming free. Our Pronghorn would not run so fast but for the fact there was once an American indigenous Cheetah, now extinct. Donian and colleagues examine the challenges and their conclusions about Pleistocene rewilding are very exciting.

But our primary embrace of the rewilding paradigm stems from its initial successes in Europe, especially in areas like the Danube and Oder Deltas.²⁰ Remember, we're speaking not simply of species, but also the biomes that provided for the complete plant and animal lifecycles, their existential realities. We use the word “existential” in light of the fact that the U.S. Fish and Wildlife Agency suggests that as of December 15, 2015, there were “2244” recognized endangered species in North America, with 603 recovery plans, many of which can take five, even 10 years—if ever—to become politically codified, state by state, and then carefully activated.²¹

Rewilding/reintroduction efforts are fraught with uncertainty and vulnerability. One eye-opening example is that of the Mexican wolf, the rarest subspecies of the

sciadv.1600375, <http://advances.sciencemag.org/content/2/5/e1600375>, Accessed May 14, 2016.

¹⁸ See <http://ngm.nationalgeographic.com/2013/05/wrangel-island/sides-text>, Accessed March 30, 2016.

¹⁹ For general descriptions of these peoples, see Kennett, D. J.; Kennett, J.P.; West, G.J.; Erlandson, J.M. (2008). “Wildfire and abrupt ecosystem disruption on California's Northern Channel Islands at the Ållerød–Younger Dryas boundary (13.0–12.9 ka)”. *Proceedings of the National Academy of Sciences* 104 (27–28): 2530–2545. Bibcode:2008QSRv..0.27.2530K. doi:10.1016/j.quascirev.2008.09.006.

²⁰ See <https://www.rewildingeurope.com/>, Accessed March 30, 2016.

²¹ See http://www.biologicaldiversity.org/programs/biodiversity/endangered_species_act/listing_species_under_the_endangered_species_act/, Reaccessed March 29, 2016.

North American gray wolf. Like the beetle family, Scarabaedidae, and open prairie sagebrush, the two primary food sources upon which the Greater Sage Grouse (*Centrocercus urophasianus*) chicks and then adults depend—this gorgeous and iconic bird species' habitat being chipped away in one state and Canadian province after another—so too the Mexican wolf provides an even more dire and controversial saga.

Canis lupus baileyi or lobo, the smallest endemic North American gray wolf subspecies, has met with such mixed emotions by rural Americans as to write the book on a most fickle and frustrating human eco-psychology. This species—much like the Iberian wolf in parts of Spain and Portugal²²—excites knee-jerk reactions of fear, even loathing, and a mythological terror in some people verging on demonic/religious cultism.

The tragic extirpation of wolves was poignantly treated in the famed Disney adaptation of Farley Mowat's penetrating tome, **Never Cry Wolf**, brought to the screen by the meticulous director, Carroll Ballard, in 1983.²³ The largely non-fiction film had much the same energies of response, and sense of ecological stewardship by viewers as such other "advocacy" movies as "The Cove"²⁴ but also such gloriously emotional works as "Fly Away Home" (also directed by Carroll Ballard in 1996),²⁵ the 2001 "Winged Migration," the astonishing 1996 feature, "Microcosmos," directed by Claude Nuridsany and Marie Pérennou²⁶ and finally, the riveting film, "March of the Penguins," directed by Luc Jacquet, particularly Jacquet's original French version.

This highly charged dramatic genre of "nature films," be they fiction or non-fiction, has gone a long way towards sensitizing people to rewilding (even if in some cases, as has been widely documented, the wildlife settings and situations are partly or entirely staged). In the case of animated features, fish, particularly sharks, have become so globally popular on screen as to have unleashed a crisis of captive sharks in aquaria. In other instances, the profoundly self-aware Manta Rays, who it is well known instantly recognize themselves—Themselves—in a mirror, must suffer the fools and buffoons who gather at aquatic parks swept over in a fleeting enthusiasm of indifferent gawks.

The rewilding of New Mexico and Arizona with the Mexican wolf has opened up a sad window on the nefarious emotions that swirl around what should be a classic opportunity for rewilding the American West with one of its most charismatic and biologically keystone predators. Yet this glorious animal has witnessed only harassment, death by torture, total habitat fragmentation and the few genetically distinct populations so ravaged, that extinction indeed would loom large, but for the very determined, indeed heroic efforts of the U.S. Fish and Wildlife Service, operating under the authority, ultimately of the 1973 US Endangered Species Act.²⁷ As of

²² See Sanctuary: Global Oases of Innocence, by Michael Charles Tobias and Jane Gray Morrison, A Dancing Star Foundation Book, Council Oak Books, Tulsa OK and San Francisco, CA, 2008, pp. 66–77.

²³ See http://www.imdb.com/title/tt0086005/?ref_=nm_fmg_dr_5, Accessed May 14, 2016.

²⁴ 2009, <http://topdocumentaryfilms.com/cove/>, Accessed May 14, 2016.

²⁵ <http://www.imdb.com/title/tt0116329/>; See also <http://www.imdb.com/title/tt0301727/> Accessed May 14, 2016.

²⁶ See <http://www.imdb.com/title/tt0117040/>, Accessed May 14, 2016.

²⁷ *Endangered Species Act of 1973* (16 U.S.C. 1531-1544, 87 Stat. 884), as amended—Public Law 93-205, approved December 28, 1973.

1917 there were all of 103 individual Mexican wolves in New Mexico, confined to the Gila National Forest. Not for another 8 years would that region, in combination with the Aldo Leopold Wilderness and Blue Range Wilderness, become America's and, indeed, the world's first bona fide "wilderness area," the 558,014 acres (872 mile²) designated a Wilderness on June 3rd 1924.

So much for the efficacy of conservation legislation: within 3 years, by 1927, wolves were declared extinct in New Mexico. Bounties on their heads all but continue, legally, and illegally, depending on the year in question, and who one talks to: rural ranchers and farmers and their lobbyists in Washington D.C., local government agents for "Wildlife Services," animal rights investigators, scientists, or environmentalists.²⁸

The bitter whorl of species deprecations incites near philosophical panic when looking for pragmatic solutions to the rewilding paradigm. The decline in numbers of the Greater Sage Grouse from over 15 million individuals at the time Martha, the last Passenger Pigeon went extinct in 1914, to somewhere between 200,000 and half-million today, compared with the Mexican wolf, suggests that this unique grouse has got a chance, the Mexican wolf much less so, obviously. The numbers matter.²⁹ And with the current count of Mexican wolves at 97 (down from 110 individuals in 2015, another 300 or so in captive breeding centers), the Endangered Wolf Center in Missouri, working with dedicated members of the U.S. Fish and Wildlife's Mexican Wolf Interagency Field Team, have quite the challenge. The onerous task stems from the resistance by the New Mexico Department of Game and Fish, whose only reflex is to file a feckless lawsuit in an effort to prohibit any more wolves getting into New Mexico, and the reaction by a few pathologically hateful ranchers capable of leveraging their local power holds on officials, claiming that their livestock is preyed upon. Those same ranchers are compensated for any losses in animal counts—animals they were raising for slaughter, just to be clear—under the U.S. Fish and Wildlife Service program known as "pay for presence." A rancher's wild-west schizophrenia betrays a most odious dichotomy of ethics, abetted by the US Government's all but top-secret Wildlife Services.

Fortunately, for the two recently translocated wolf pups, their survival may well be assured. They were first gently removed from a den in Missouri in the middle of the night, placed in a backpack of a wolf specialist who hiked out of the region, boarded a plane for Albuquerque with the pups in a soft container under the seat in front of her, and in absolute sync with her Interagency team, when the female wolf of a recently established pack in the Gila Wilderness began her characteristic (and famed) "whelping" were introduced to their new home in the Southwest. The hope is that the female of the so-called New Mexico Luna Pack, will permanently take them in. As a rule, evolution knows of no wolf orphans. Moreover, the whining of state agencies on behalf of those few disgruntled wolf-hating ranchers, is immate-

²⁸ See for example, "The killing agency: Wildlife Services' brutal methods leave a trail of animal death," by Tom Knudson, April 28, 2012, <http://www.sacbee.com/news/investigations/wildlife-investigation/article2574599.html>, Accessed May 17, 2016.

²⁹ Broder, John M. (2010-03-05) No Endangered Status for Plains Bird. *Nytimes.com*, Accessed May 14, 2016.

rial. The Federal Government, Congress, every American taxpayer, represents a higher jurisdiction over recalcitrant states, when the ESA (“Endangered Species Act”) comes into play. State Attorney Generals can make all the noise they want, but they will lose, while such rewilding initiatives can only win; win for the animals and habitat involved, and win for the human spirit.³⁰

While in 1995 the US Fish and Wildlife had more success with reintroducing gray wolves into Yellowstone National Park, red wolf introduction to eastern North Carolina’s “‘pocosin’ swamp forests” has proved even more painfully difficult than the crisis situation in New Mexico, with no more than “50–75 red wolves left in the wild.”³¹

Fig. 3.5 “Critically Endangered Iberian Wolf and biologist Francisco Fonseca, Co-Founder of Grupo Lobo, Portugal,” © M. C. Tobias



Sadly, with the best of intentions, cross-breeding and cross-fostering initiatives and translocations can too easily break up the families of highly social beings (no different from all of us), but it appears, at this stage to be the only way to hopefully combat genetic inbreeding depression, resulting in the long-term genetic cul de sacs, or squeezes which ultimately doom any species to a condition of homozygous redundant gene pool options for robust populations down the road.³² This may well be the case with the Steward Island Robin (*Petroica australis rakiura*).³³

³⁰ See “New Mexico says no to wolves, creating quandary for federal officials,” By Cally Carswell, Oct. 2, 2015, Science AAAS, <http://www.sciencemag.org/news/2015/10/new-mexico-says-no-wolves-creating-quandary-federal-officials>, Accessed May 18, 2016.

³¹ See “Ecological Impacts Of Red Wolves In North Carolina,” by Dr. Ron Sutherland, Wildlands Network, AWI Quarterly, Spring 2016 Volume 65 Number 1, p. 10.

³² See http://evolution.berkeley.edu/evolibrary/news/101201_panthers, Accessed May 14, 2016.

³³ See Laws, R. J.; Jamieson, I. G. (2011). “Is lack of evidence of inbreeding depression in a threatened New Zealand robin indicative of reduced genetic load?” *Animal Conservation* 14 (1): 47–55. doi:10.1111/j.1469-1795.2010.00388.x, Accessed May 18, 2016; See also, Taylor, S. S.; Jamieson,

Saving lives, be they of wolves, sage grouse, New Zealand robins or of other humans, is core humanity. The data seem to bear that out.³⁴ So in terms of rewilding southwestern New Mexico with rare Mexican wolves, the U.S. Fish and Wildlife “2016 Initial Release and Translocation Plan” is determined to see a full pack (male, female, pups) “cross-fostering pups [including the two new little guys from Missouri] into five existing packs and translocating wolves for other management purposes. It’s hoped that cross-fostering will be less controversial, because it doesn’t increase the wolves’ territory.”³⁵ Of course, while it is proving difficult enough working through the tangle of issues with communities throughout the world where wolves and other top predators are being reintroduced, ultimately more and more habitat must be set aside for them; landscapes at a Texas or Alaska scale, which is precisely the goal, as will be referenced later in the book in terms of portions of Suriname and Central Brazil, as well as those ten national parks throughout the terrestrial and marine worlds that exceed 345,000 km² in size (in this case, Australia’s Great Barrier Marine Park), going to as large as 1,292,967 km², the Natural Park of the Coral Sea, surrounding French New Caledonia and established in 2012.³⁶

With respect to all those “exotic” vertebrates on private lands in Texas, Donian and colleagues remind us that some 1.5 million people visited, for example, the San Diego Wild Animal Park in 2004, more than most visitations to most national parks. People are craving to be near large mammals, most of whom were lost during the Pleistocene, whether in Siberia, where a Pleistocene Park of sorts is being initiated to restore the so-called “mammoth-steppe ecosystem,”³⁷ to the Utrecht Hills of Holland, some 20,000 acres, where the animal protection group, Alertis³⁸ has been endeavoring to eventually see European Brown bears reintroduced into the wild in Holland.³⁹

I. G.; Wallis, G. P. (2007). “Historic and contemporary levels of genetic variation in two New Zealand passerines with different histories of decline”. *Journal of Evolutionary Biology* 20 (5): 2035–2047. doi:10.1111/j.1420-9101.2007.01362.x, Accessed May 18, 2016.

³⁴ See <https://www.justice.gov/enrd/northern-rocky-mountain-gray-wolves>, Accessed March 30, 2016.

³⁵ “Wolves In, Wolves Out,” by Elizabeth Miller, SFREPORTER.COM, May 11–17, 2016, p. 9.

³⁶ See also, “Conserving New Mexico’s Wildlife For Future Generations,” <http://www.wildlife.state.nm.us/conservation/wildlife-species-information/threatened-and-endangered-species/>, Accessed May 18, 2016.

³⁷ See <http://www.pleistocenepark.ru/en/>, Accessed March 29, 2016.

³⁸ See M.C. Tobias and J.G. Morrison, *Sanctuary: Global Oases of Innocence*, A Dancing Star Foundation Book, Council Oak Books, Tulsa and San Francisco, 2008, pp. 104–111.

³⁹ For the complete interview from which these two paragraphs were taken, see “A Rewilding Mandate: A Conversation with Michael Tobias,” December 18, 2015, by Dr. Marc Bekoff, *Psychology Today*, <https://www.psychologytoday.com/blog/animal-emotions/201512/rewilding-mandate-conversation-michael-tobias>

Fig. 3.6 “European Brown Bears, *Ursos arctos arctos*, at Alertis, North of Utrecht, The Netherlands;” Photo © M. C. Tobias



While the scientific community worldwide is savvy enough and well on track to saving whatever and whoever can be saved—we basically know how to do it, whether with buffalo or California condor—that knowledge is not going to be easily translated by politicians. As policy makers work to manifest the outcomes of COP21 in Paris (signed into law during May of 2016), just take, for example, the near immediate response by Senate Majority Leader Mitch McConnell (R-Ky) to Obama’s optimism on the climate deal back in December, 2015: “The president is making promises he can’t keep, writing checks he can’t cash, and stepping over the middle class to take credit for an ‘agreement’ that is subject to being shredded in 13 months.”⁴⁰

And so it goes. More non-binding treaty congestion, while, in countries like Indonesia, the authors of **The Annihilation of Nature** predict a loss of some 40 % of all bird species by 2100, but recognize that such predictions are actually more than likely underestimates because there are so-called “zombie” populations that must be factored into projections and eco-restorative methods. We have to recognize that all those forest habitats upon which the birds know no other world are suffering from hard-to-gauge “Anthropocene defaunation;” forests that *appear* for the moment to be *healthy* but, in fact, have lost most of their ground-birds and other seed dispersers, a fact discernible by “carpets of seedlings surrounding parent trees at their bases.”⁴¹ This was very apparent in the Summer of 2011 at the Rocky Mountain Biological Laboratory in Gothic Colorado, one of the oldest continuous biological monitoring centers in the world, begun in 1928, where it is a striking sight just below timber line to see only old Douglas Firs, not a single juvenile. In

⁴⁰“A global first step on the climate,” by Alexandra Zavis, Chris Megerian and William Yardley, Los Angeles Times, Sunday, December 13, 2015, pp. A1 and A12. Accessed December 13, 2015.

⁴¹**The Annihilation**, op. cit., p. 133.

absence of any recruits, or volunteers, this spells ultimate senescence for that remaining population. Just one more disappearance that will be little noticed by humankind.

Ceballos, Ehrlich, and Ehrlich recognize that their “extinction predictions reported above may be optimistic as they do not consider the likely cumulative effects of other drivers of biodiversity change such as the increasing prevalence of huge fires in tropical forests (and other consequences of climate change), overharvesting, and invasive species.”⁴² Nor has poaching been singled out, in this instance. And with respect to overharvesting the authors of **The Annihilation** mince no words when it comes to palm oil plantations (“blood palms”). In those expanding instances, indigenous primary tropical forests have been forced into Frankenstein zoologies; “biological deserts” with “the near disappearance of the vast majority of birds, mammals, butterflies, and other animals that evolved to live in the forests.” The “greed” and the zeal of oil palm expansion “is difficult to overestimate,” say the authors, who also nail the “worldwide campaign of disinformation” intended, as with so many pernicious industries, to “increase their markets.”⁴³

Such difficulties are exacerbated by the “walking dead” phenomenon. For example, a parrot in Puerto Rico, the Iguaca, numbered some 2000 in the Caribbean National Forest but as that habitat was continually degraded, despite the mantle of assumed protection, with disappearing complex interdependent food-source ecodynamics, ultimately the populations were doomed and the numbers plunged within 60 years, to 20 individuals. On any given day, however, write Ceballos, Ehrlich, and Ehrlich, even the keenest observer might be hard-pressed to recognize the trend. “Millions of years of evolution going down the drain ...”⁴⁴

Other “overharvesting data” as recently as 2009, from the NGO Traffic, suggests more than \$300 billion in legally killed wildlife, and does not begin to account for the illegal trading. One example given, “In the once-splendid Nairobi National Park ... some 19,000 mammals are killed every year for the illegal bush-meat trade.”⁴⁵ And Kenya is a country famed for its progressive stance—thanks, in part, to the formation in 1989 by Richard Leakey of the Kenya Wildlife Service, much lauded among all the nations in Africa for its attempted tough stance on poachers, unlike the majority of African countries. The individuals caught up in this gruesome killing for human profit and in some cases subsistence—a function of absolute poverty and desperation—is bewildering, to be sure. As recently as January 2016, a helicopter pilot aiding Tanzanian anti-poaching authorities was shot dead out of the sky.⁴⁶

⁴² *ibid.*, p. 138.

⁴³ *ibid.*, p. 131.

⁴⁴ *ibid.*, p. 138.

⁴⁵ *ibid.*, p. 151.

⁴⁶ “Roger Gower: Tanzania elephant poachers shoot dead British helicopter pilot in middle of mission—A manhunt for his killer is reportedly underway,” Will Worley, 30 January 2016, <http://>

Poaching of wildlife has been portrayed as an annual business generating “\$19 billion” in profits, and resulting in the deaths of some 100 wildlife rangers throughout the world and “70 % of them were killed by poachers...” In 2015 the mortality of wildlife included “about 30,000 elephants and a record 1338 rhinos” killed in Africa.⁴⁷ And despite increasing use of drones and industrial engineering computer software being developed to collate topography and numerous tracking data for use in hand-held GPS devices for rangers in the field, one very discouraging study has shown that in Uganda, for example, a country in an all-out war to save remaining habitat and species and individuals, “an average of 42 % of households around two of Uganda’s key elephant strongholds acknowledged hunting in the parks in the last year.”⁴⁸

Fig. 3.7 “School Children See Their First Lion (Stuffed), Maputo, Mozambique,” Photo © M. C. Tobias



www.independent.co.uk/news/world/africa/british-pilot-shot-dead-in-tanzania-on-anti-poaching-mission-a6844401.html. Accessed January 30, 2016.

⁴⁷ See “A high-tech poaching deterrent,” by Ann M. Simmons, Los Angeles Times, Monday, June 13, 2016, p. A3.

⁴⁸ *ibid*, Simmons, Los Angeles Times.

Next to:

Fig. 3.8 “Marieta van der Merwe With Locals and Lion King, Harnas Wildlife Foundation, Namibia,” Photo © M. C. Tobias



In accord with such data, **The Annihilation of Nature** relays few causes for optimism, for which we are grateful: noting that there has been no fake contrition; no crocodile tears or false pretexts of hope. Rather, the clarity and urgency of medical emergencies straight from the zoological ICU and ER wards of the world. While, for now, plans for a most imprudent road that would have bisected the Serengeti has been stopped, thus inhibiting easy access to Tanzania’s coltan (columbite-tantalite) deposits, a critical ore that is then refined into tantalum and goes into most cell phones sold around the world⁴⁹—a case akin to the mining in Eastern mountain gorilla regions of Rwanda—elsewhere, in the USA for example, between “600,000 and 900,000 bats” are killed annually by wind turbines, while millions of migratory birds en-route to places like Tanzania from Scandinavia and boreal forests are slaughtered each winter from Cyprus to Albania. Moreover, at least half of all birds (more than 5000 species) are vulnerable to climate disruptions⁵⁰ One could rightly say, ‘This is too complicated’ and be nearly correct. But, ultimately, the authors make the saving of biodiversity for future generations of all species a crystal clear imperative, providing a sensible roadmap for students and educators, people of faith, of hope, of no faith, of no hope, activists, scientists, policy makers, legislators, philanthropists, and everyone else you can think of. “The only real hope is taking direct action to reduce the key drivers of extinctions and environmental degradation: overpopulation and overconsumption. The only effective measure is a rescaling of the human enterprise.”⁵¹ We could not agree more.

⁴⁹ *ibid.*, p. 154.

⁵⁰ *ibid.*, p. 159.

⁵¹ *ibid.*, p. 175.

Resolving Paradox?

How do we rescale, rewild, envision pragmatic resolutions for purposes of both human and wildlife remediation? The Anthropocene, in the context of this cumulative annihilatory pulse places the quantitative spheres of our influence in an hourglass of quandaries: how do individuals make sense of their situation, how to survive, or help others to survive, if they even have that kind of luxury of information, inspiration, time, connections, money and tenacity working for them? In biology, as in mathematics, while we are tied to every living being, as so perplexingly depicted in the early insect tessellations of the famed Dutch graphic artist M. C. Escher (1898–1972), perhaps most notably so in his very last, spectacular image of “Snakes” (1969), Escher’s 3-Dimensional illusions are challenging. They question the reality of human logic. Beyond that, his art spoke to the problem of our very mental maps, our languages of representation that so often confuse rather than clarify.

Philosophers have discussed a “language of thought hypothesis” propounded by Jerry Fodor and others. Of particular note is the furor that arose in the scientific community over Fodor’s and Piattelli-Palmarini’s book, **What Darwin Got Wrong**⁵² There the authors emphasize their belief that Darwin “underestimates the effects of endogenous variables.”⁵³ Such uncertainties are the very nature of unexpected variations, particularly behavioral vicissitudes. This suggests great potential within the biosemiotic realm precisely because Darwinian evolutionary theories had no contact, as yet, with Gregor Johann Mendel’s earliest work on biological fundamentals of inheritance (1865/1866), not to be “discovered” by European scientists before 1900. That provides powerful rationale and fitting arguments for social communication at deep ecological levels in other species as evolving in no less powerful a realm than that of humans. Indeed, if anything, there is no empiricism that can deny the premise and promise of representational thought that has been activated in other species through their phylogenetic clades and countless other connections, for tens, even hundreds of millions of years. We, who pride ourselves on “genes” and “genotypes” are utter newcomers to the field of communication. What do we really know? One thing for certain: genetics *equals* bio-communications.

There are any number of other paradox-resolution problems that parallel the biosemiotic dilemmas we have made for ourselves in presuming supremacy over, and isolation from all other species, even the ones living inside us. In the medical world, the harrowing debate over chronic malnutrition and stunting among children in countries like Malawi, where the stark realities of human health come down to persistent diarrhea, lack of electricity and safe drinking water, versus the killing of animals for protein fixes, are accessible puzzles of logic. But solutions to our mas-

⁵² Jerry Fodor and Massimo Piattelli-Palmarini, Farrar, Straus and Giroux, New York, 2010, ISBN 0-374-28879-8.

⁵³ See “Did Charles Darwin Get It Wrong?” by Peter Forbes, The Independent, January 28, 2010, <http://www.independent.co.uk/arts-entertainment/books/features/did-charles-darwin-get-it-wrong-1882253.html>, Accessed May 18, 2016.

sive destruction of habitat and the species therein appears all but inaccessible to most people.⁵⁴

In other words, we can fixate on problems, questions, solutions and answers that involve human beings. But we are locked out—by the insistence and inflexibilities of our very self-interest—of the vantage point, for example, of an eagle. The Other Minds Problem even makes it clear that we cannot see ourselves in the mirror with philosophical fixity, or anything resembling self-resolution. The temporal realm stampedes across our certitudes and Trademarks of consciousness, making it difficult enough simply to be, and survive as, a human. The challenges of thinking about ourselves, and all our difficulties as a species, has obfuscated our optics upon other species, with the exception of a few utterly devoted ethologists, like a Dr. Biruté Mary Galdikas spending more than four decades living with orangutans in Indonesian Kalimantan, Borneo.

Fig. 3.9 “Critically Endangered Female Orangutan, *Pongo pygmaeus*, Kalimantan, Borneo, Indonesia,” Photo © M. C. Tobias



Moreover, with such extremes in so many of the severely marginalized communities of economically and medically impoverished nations, humanity’s role in rectifying extinction of other species is fast becoming a mute-point.

The geographical scale of conflict, moral anxieties and the resulting survival stratagems combined, places the philosophical odds in no vertebrate’s favor. All the anthropological data in the world suggests that—like eusocial invertebrates—humans are seldom solitary. Community-driven, all of our instincts have been refined or dulled, as the case may be, against the ruthless dictates of kin altruism within spaces of large numbers. It is little surprise that protein deficiency has risen to such an epicenter of global health concerns over poverty-ridden children in a nation such as Malawi.

⁵⁴ See “The Strange And Surprising Debate Over How To Help A Malnourished Kid,” by Emily Sohn, March 13, 2016, NPR, http://www.npr.org/sections/goatsandsoda/2016/03/13/469943364/the-strange-and-surprising-debate-over-how-to-help-a-malnourished-kid?utm_source=facebook.com&utm_medium=social&utm_campaign=npr&utm_term=nprnews&utm_content=20160313

Conversely, consider the lack of sensitivity or grasp of reality by our species in the face of the graphic ecological stressors detailed in a study from the year 2000 in Kenya, and the massive predicaments facing other mammals, like orangutans, who Dr. Galdikas has clearly shown are emotionally and psychologically most like us of all the living primates. With chimpanzees there is the challenge of getting through the chimpanzee's attitude. With orangutans, their attitude is essentially our own attitude. It is a startling concept and may well apply to all species—it's just a question of getting beyond ourselves.⁵⁵ The Sumatran orangutan (*Pongo abelii*) and the Bornean orangutan (*Pongo pygmaeus*) with its three additional subspecies, together comprise the sole survivors of the Ponginae subfamily. This group once included the largest of all the apes ever known to exist (*Gigantopithecus blacki*), now extinct. The surviving *Pongo* genus is unique. Orangutans (meaning “person of the forest” in combined Malay and Bahasa Indonesia) first broke away from the African ape line and came to Asia, nearly 20 million years ago. Our mirror-image proximity to this ancient lineage has provided researchers massive insights into the possibilities for interspecies communion.⁵⁶

Fig. 3.10 “Orangutan Refuge Established by Dr. Biruté Mary Galdikas,” Tanjung Putting National Park, Kalimantan, Borneo, Indonesia, © J. G. Morrison



In the case of the aforementioned Kenyan study, the authors focused on the black and white colobus monkeys, or *guerezas* (*Colobus guereza*) in East African forests where degradation normally impacted little on their ability (social infrastructure) to locate sufficient foodstuffs from secondary growth, following upon human intervention within the primary canopies. But this was not the case, as it turned out; and significant declines in *guereza* populations were noted as human conflict with *guer-*

⁵⁵ See **Sanctuary: Global Oases of Innocence**, by M. C. Tobias and Jane G. Morrison, A Dancing Star Foundation Book, Council Oak Publishers, Tulsa OK and San Francisco, CA, 2008, pp. 254–271.

⁵⁶ See **Great Ape Odyssey**, by Dr. Biruté Mary Galdikas, Photographs by Karl Ammann, Foreword by Jane Goodall, Harry Abrams, Inc. Publishers, New York, NY, 2005.

eza habitat escalated, a crisis situation utterly emblematic of how the Anthropocene is fueled within the human matrix: “The areas of the forest that have not been cleared have been steadily degraded as: (1) trees are cut for timber and charcoal production ... (2) trees are cut for firewood, tool handles, poles, fences and other uses; (3) gold is extracted, (4) two-thirds of the people living within 5 km take their livestock through the forest to grasslands for grazing (and sometimes burn the grass and leave the fires unattended) and herd boys vandalize trees; (5) animals are poached; (6) plants are taken for food; and (7) bark is stripped for medicinal uses.”⁵⁷ And all this in a country where, as of the year 2000, “82% of Kenya’s closed-canopy indigenous forest [had] already been converted, typically to agricultural land and exotic plantation forest” with immense resulting losses across both vertebrate and invertebrate species, as well as “woody plants.”⁵⁸

Rapid predation across Borneo and Sumatra is causing similarly rapid demise of orangutan habitat, within a context of equally distracted human self-obsession and greed. Again: even in the presence of our closest relatives our species is finding it virtually impossible to step outside ourselves and communicate with orangutans, with that rare exception of a Dr. Galdikas and those too few others like her.

510 Billion Square Meters of the Earth’s Surface

Multiplying such local clashes as happens in Borneo and Kenya across the 510 billion square meters of the Earth’s surface still does not begin to account for all of the emotional, physical and behavioral relationships whose zoological volume is incalculable. We choose to focus upon human child protein deficiencies rather than orangutan medical issues. And we can adduce that this is nothing new, rendering such data within the entire timeframe of the Holocene entirely relevant. Thirteen-thousand eight hundred years ago a stone tableau discovered in 2013 near Barcelona at Moli del Salt shows what may well be the earliest known rock art depicting human huts in a community; the first, allegedly avant-garde statement of human cohabitation. “Given the social meaning of campsites in hunter-gatherer lifestyles, this engraving may be considered one of the first representations of the domestic and social space of a human group.”⁵⁹ And yet we have no clue as to its meaning. The absence of even the most rudimentary understanding of our own social and paleontological past is key to recognizing our vastly greater Barrancas del Cobre, as

⁵⁷“Population decline of the black and white colobus monkey (*Colobus guereza*) in the Kakamega Forest,” Kenya Frank A. von Hippel, Howard Frederick & Elsa Cleland, *African Zoology* (35) 1, <https://www.uaa.alaska.edu/enri/people/Fellows/vonHippel/upload/von-Hippel-2000-Pop-decline-colbus-monkeys.PDF>, p. 70.

⁵⁸ *ibid.*, p. 70.

⁵⁹“Looking at the Camp: Paleolithic Depiction of a Hunter-Gatherer Campsite,” Marcos García-Díez, Manuel Vaquero, *PLoS One*, December 2, 2015, doi:10.1371/journal.pone.0143002; <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0143002>. Accessed March 2, 2016.

it were (Mexico's Grand Canyon) whose vast rims seem to have separated *H. sapiens* from all other species. But it only seems that way.

Indeed, for years many observers assumed, in the case of America's Grand Canyon, that it was that 1.1 billion years of geology separating the north from the south rim, that engendered two separate species, the Kaibab squirrel (*Sciurus aberti kaibabensis*) and the Abert's Squirrel (*Sciurus aberti aberti*). But now it is understood that the Kaibab, through the mechanism of allopatric speciation, is actually a subspecies of the Abert's. Despite their predominant isolation from each other, they do manage to meet, come back together in certain parts of the canyon, weather and food conditions dependent.⁶⁰ Moreover, we know that speciation can happen quickly, as in the case of chromosomal fusion or rearrangement (e.g., Giant Pandas), and through adaptive radiation, as in the famed instance of finches in the Galápagos, etc. But the inner story of that acceleration is memory and vestigial connections that are biologically quite the cornerstones for all previously regarded mutualism.

Beyond the basics of genetics, there are far greater relational—emotional and psychological—complexities of fashioning some through-story that can help us to learn from history. Those complexities are not inaccessible to our thinking and behavior. We can choose to fill missing links with imaginative leaps of a generous nature. As so many disciplines converge in trying to reassemble the basics of anything remotely like a sustainable relationship between humans and the Others, these Best Qualities (read: qualia/practices) of biodiversity and its internal communication systems represent the means of overcoming seemingly unmendable zoonotic gaps. By embracing the many trans-species enigmas with senses attuned, if we are but patient, giving and observant, each of us can help rectify the fact our one species is furiously failing the dire need of collaboration and preservation. That process starts the instant one decides it is time. Other life forms are everywhere around us, waiting to be greeted courteously, lovingly; and asking the Frans de Waal question: “Are We Smart Enough To Know How Smart Other Animals Are?”⁶¹ Our answer is as follows: not even close. Is this a latter-day form of “anti-intellectualism”? Do you detect a sense of fatalism? Nihilism? The incipient belief that human beings are doomed because of our ignorance? “Yes,” to all of the above. But, “No,” to: that's it, then. There is more to this tale. Enough work to keep us busy with—just maybe—the possibility of a phrase we are intrigued by: ecological and hence, moral redemption.

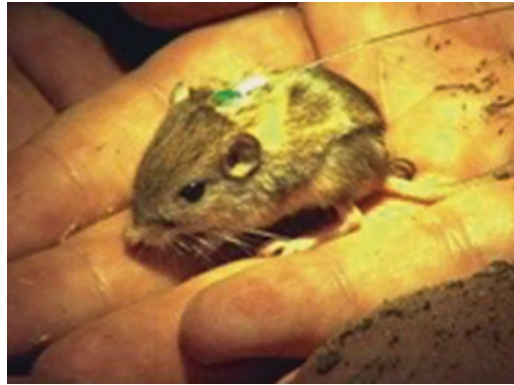
Yes, a US President has the authority, for example, under the Antiquities Act of 1906 to wake up one morning and simply sign into law a million-acre national monument on federal lands. Then come the “land-grab” lawsuits from ranchers no longer able to graze their animals, inhaling subsidies; or native Americans suddenly deprived of their ancestral hunting grounds, or real estate developers politically against that President's party. If the monument, or park, or reserve stands, then comes the onslaught of conservation debacles distancing ourselves from those spe-

⁶⁰ See “Macroevolution: Species Formation,” <http://www.sbs.utexas.edu/levin/bio213/evolution/speciation.html>, Accessed May 19, 2016.

⁶¹ W. W. Norton & Company; 1 edition (April 25, 2016).

cies we presume to protect: wolves, bighorn sheep, mountain lions, bears, bats, frogs, pupfish, or whoever they may be. And each one invariably will succumb to all of the Anthropocene variables of climate, boom-and-bust demographics brought about by poaching, drought, or some other set of factors. All the while conservation biologists and resource managers have denuded the lovely enigmas of these creatures by trapping them with helicopters, nets, hunters, by whatever means and outfitting them with VHG radio transmitters or some kind of high-tech collar that enables researchers to follow the animals 24/7 via satellite.

Fig. 3.11 “Critically-Endangered, Telemetry-Collared Pacific Pocket Mouse, *Perognathus longimembris pacificus*, Marine Base Camp Pendleton,” Photo © M. C. Tobias



There is even a social media trending euphoria that seems to track with each new technological break-through empowering our ability to break further into the private worlds of Others; to track them down, hunt them with the most photo-realistic invasiveness, reimagine the world visually, acoustically, cartographically. We follow marine mammals, seabirds, the biggest mammals, every urban carnivore we can catch, tag and release. Zoological institutions engage in such diabolical breeding methods as, for example, electro-ejaculation with gorillas; or acknowledge that they will keep Orcas in captivity for the rest of their lives, even while recognizing that it is time to change the paradigm and liberate these animals—who could easily be set free if only the corporate “stewards” would spend the money to do so. There is no question that corporations, stockholders, consumers and voters are coming of age, but sluggishly so.⁶²

Among all of the marine mammals, the 50,000 or so Orcas left on the planet have unambiguously conveyed to us among the most diverse languages and complex cultural clarities humans have every contacted and studied. The fewer than 100 Salish Sea orcas, for example, are so wedded to their own specific cultural heritage that they balk at eating “sockeye and pink salmon, which are abundant” because for

⁶² See “A Humane Revolution,” by Nicholas Kristof, May 14, 2016, Sunday Review, Op-Ed, The New York Times, Accessed May 18, 2016.

however many generations they have grown up preferring Chinook salmon, which has become scarce. They learn from their mothers, with whom they'll spend their lives, amazing lives that—in the wild—could be a century or more.⁶³ Lori Marino, who teaches cetacean neuroscience at Emory University had a pivotal role in the documentary “Blackfish” (2013). Marino has looked at the paralimbic portion of the brain of an Orca with MRI and seen that it is “much larger and more elaborate than in the human brain ... they have like an extra lobe of tissue that sort of sits adjacent to their limbic system and their neocortex ... you can infer from that. That lobe has something to do with processing emotions, but also something to do with thinking. It's very highly elaborated in most cetaceans and not at all or not nearly as much in humans or other mammals, so it suggests that there's something that evolved or adapted in that brain over time that did not occur in other mammals, including humans.”⁶⁴

For the foreseeable future, our species' relations to all those other animals, is one of eavesdropping under the pretext of protecting them in increasingly fragmented human-dominated worlds. Good motives, mixed outcomes, most fundamentally, our psychological dissociation from their Being. Not mere disruption (and likely trauma from initial collaring) but the reality of our clever investitures, the expansion of our cognitive hegemony over all others, by whatever means. The mysteries of nature become less and less; as the devaluation of the currency of those mysteries simply evaporates and we as a species take for granted an implacable sovereignty, the closing down of all territories outside our mental maps of a global human dominion.

Our priority—as conservationists—becomes one of merely saving those that can be saved, but brings us no closer to understanding them or finding ways to change the root problems causing their looming extinctions in the first place. Our efforts to keep wildlife in their own worlds are failing, as if—having reassembled the ecological components according to our time-pieces and geographical coordinates we've allowed them—we have erected walls, barriers, fences, perimeters, and negligible sottoportegos (alleys within buildings) by which we allot them their lives. Our imaginations, if not our very senses, have followed all their tracks, denatured their seed sources, unEarthed their burrows, described them, anatomized them, and secured their future only in half-hearted digital domains.⁶⁵

In the global human commons, we call this the unhappily massive invasion of privacy issue by authorities with the latest stealth technologies, and justify it, those who do so, by one word, security. The compromises are all distractions from greater,

⁶³ See “Understanding Orca Culture,” by Lisa Stifler, *Smithsonian Magazine*, August, 2011. <http://www.smithsonianmag.com/science-nature/understanding-orca-culture->, Accessed May 27, 2016.

⁶⁴ The Raptor Lab, “Inside the mind of a killer whale: A Q+A with the neuroscientist from ‘Blackfish,’” By Aviva Hope Rutkin, August 14, 2013, <https://theraptorlab.wordpress.com/2013/08/14/inside-the-mind-of-a-killer-whale-a-qa-with-the-neuroscientist-from-blackfish/>, Accessed May 27, 2016.

⁶⁵ See “The Unnatural Kingdom—If technology helps us save the wilderness, with the wilderness still be wild?” by Daniel Duane, March 11, 2016, *The New York Times Sunday Review*.

ecological crises. And there is no ecological security associated with our intensifying oversight of every square inch of the planet and her once secretive denizens. Quite to the contrary: Their lives are ever being exposed, exploited, manhandled.

And it is unfortunately consistent with a vast spectrum of other notorious practices by humans which we consider our right by way of some misconstrued privilege coming from the “the cerebellum [which] contains about 70 billion neurons—four times more than in the neocortex,” this latter portion of the human brain thought foolishly to be the supreme achievement of evolution.⁶⁶

Reproachable Pathways

Three reproachable pathways of human self-importance, emblematic of so many other zones of human exploitation of the Others shatters the window: Controlled burns, the torture of pigs, and the biomedical research on marmosets. While these three diverse sectors of human intervention are indeed far apart in specifics, a clear enough lens sees them united in their mirroring of human presumptiveness and of our dire retreat from sustainable eco-dynamics. Again, it comes down to our species supremacist notions.

In the case of fire, studies have shown that during the last half-dozen millennia, between “45% and 87.5%” of all of California would burn annually.⁶⁷ For many decades landscape managers debated whether to suppress or ignore lightning fires, and today most ecologists throughout the world have weighed in favor of embracing fire-mediated pyriscence as an important reconstruction modality in nature.

This consensus has assumed that in biomes that have devised their own complex strategies to influence seed proliferation, such as allelopathic leaf litters (chemicals within plants than can inhibit the growth of others), for example, that a multitude of plant genera and oligotrophic, low nutrient soils have evolved serotinous (seed triggering) adaptations to fire as an aid in abetting the release of seeds in spite of, or because of, constant fires. But is it humanity’s duty to mirror such regimes in the twenty-first century? Human-induced burns across countless ecosystems ignores the reality that we are, in fact, enacting a highly biased and intrusive selection of species survival rates, while also ignoring a continuing reality: the random distribution of some 100 lightning streamers (strikes from the clouds, and then from the ground up) on Earth every second—eight million per day—which does not require human meddling to work out the playing field of survivability.

⁶⁶ See “Is Cerebellum Size Linked to Human Intelligence?,” by Christopher Bergland, October 14, 2014, <https://www.psychologytoday.com/blog/the-athletes-way/201410/is-cerebellum-size-linked-human-intelligence>, Accessed May 19, 2016.

⁶⁷ Scott L. Stephens; Robert E. Martin; Nicholas E. Clinton (2007). “Prehistoric fire area and emissions from California’s forests, woodlands, shrublands, and grasslands”. *Forest Ecology and Management* 251: 205–216. doi:[10.1016/j.foreco.2007.06.005](https://doi.org/10.1016/j.foreco.2007.06.005). Accessed April 18, 2016.

Fig. 3.12 “Endangered Longleaf Pine, *Pinus palustris*, Habitat, near Douglas Georgia,” Photo © M. C. Tobias



This is the case whether in trying to redeem past wrongdoings with longleaf pine or *Sequoiadendron giganteum* habitats, as but two North American examples. Moreover, the question devolves: How will the frequency of lightning strikes increase with climate change, and the likelihood that the 2000+ thunderstorms each second could escalate in number and intensity, thus increasing the number of wild-fires than at present?

By inducing fires to accommodate our ideal ecosystems (in the best of conservation-related cases) we are, in essence, undermining nature’s own democratic votes with the heavy-handed “Super PAC” and “super delegate” methodology. Playing God, in other words. The same holds for the obsession in so many countries, such as France, with clearing away deadwood; wood which, in fact, holds the largest amount of life. In the unique forests of Bialowieza, spanning the border areas between Poland and Belarus, a late Pleistocene relic, 650 km² of surface area teeming with deadwood, has given rise to the largest aggregate in the world of concentrated species of fungi and commensalist invertebrates and vertebrates (from the Medieval Latin, commensalis, “sharing a table”). Like a few other primeval forests across Europe and Scandinavia, this deadwood is precisely the vortex in which “Entomologists have shown that 40 % of saproxylic Coleoptera species are not only threatened, but that existing populations have been reduced, fragmented and are declining.”⁶⁸ What we are suggesting is

⁶⁸ 5 mars 2011 - Numéro 03bis, Public policy and biodiversity “Making biodiversity a public problem—The case of dead wood in forests,” by Deuffic, Philippe, and Bouget, Christophe, Sciences Eau & Territoires, La revue d’Irstea, <http://www.set-revue.fr/making-biodiversity-public-problem-case-dead-wood-forests/text>, Accessed, April 19, 2016. See also, Sanctuary: Global Oases of Innocence, by M. C. Tobias and J. G. Morrison, A Dancing Star Foundation Book, Council Oak

that ecological redemption by human beings is probably best waged on the frontlines, in the case of Bialowieza and the boreal forests, of sympatric illuminations guided by nothing more complex than patience, but mostly, empathy, not hubris, or manipulation that flock addicted to these biological chess games (clever new Ph.D. dissertations), just because we can, and are driven to invent new ideas that may or may not be good for coming generations at a point in time where there is not room for error.

This lack of latitude raises, of course, a significant problem for conservation biology: Should we be endeavoring to save every last nearly doomed species and habitat? Are there ethical boundaries that should be inherent to the philosophy of eco-restoration, that protects all individuals, whether native, endemic or invasive, according to the Jain window on ahimsa, and in light of our species' all-out assaults, the war against Earth we are waging? If there are no boundaries, what are the best indicators for a biological baseline? A baseline for compassion? How do we justify positions when life and death of innocent beings are at stake? Gandhi spoke of the world being plentiful enough for human need, not greed. But Gandhi did not understand a Hitler, nor a human population of 7.4–13-billion of us.

Typically, land and wildlife managers holding to what has long been called a land ethic, invoke Aldo Leopold's famed lines, "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."⁶⁹ While we may all tend towards at least a modicum of consensus on the nature of beauty (Michaelangelo's painting of the ceiling of the Sistine Chapel, van Gogh's "Starry Night," or the final solemn celebration after the Countess Rosina Almaviva's most tear wrenching "Più docile io sono—I am more mild" in Mozart's "Marriage of Figaro," Act 4, for example), when it comes to preserving anything, let alone "integrity" and "stability" nearly everything we do as a collective flies in the face of such words, such aesthetic delectation.

Fig. 3.13 "Pig and Friend," Photo © M. C. Tobias



Books, Tulsa OK and San Francisco, CA, 2008 pp. 112–129). See also the research in Finland regarding "distinct beetle assemblages" in the deadwood. "Dead trees left in clear-cuts benefit saproxylic Coleoptera adapted to natural disturbances in boreal forest," by Lauri Kalia, Petri Martikainen, and Pekka Punttila, *Biodiversity and Conservation* 6, 1–18 (1997), <http://link.springer.com/article/10.1023/A%3A1018399401248#page-1>, Accessed June 25, 2016.

⁶⁹ *A Sand County Almanac*, Oxford University Press, New York, p. 262.

The Genus *Sus*

Consider the case of the genus *Sus*, and the more than 1.1 billion domesticated pigs—the estimated extent of the global pig population at any one moment throughout the world. Not only do we slaughter these magnificent animals of breathtaking intelligence, but ignore their capture myopathic and stress contagion factors, as we do with every animal (chickens, turkeys, cows, etc.) that we slaughter.⁷⁰ These animals have more than demonstrated that just like us they feel the massive onslaught of suffering experienced by their fellow inmates being beaten and forced down gangplanks and assembly lines to slaughter. Of course they do.

Fig. 3.14 “Cows, *Bos taurus*, In All Their Glory, in a Sanctuary;” Photo © M. C. Tobias



Anyone who considers him or herself to be a conservationist and eats animals is a preposterous hypocrite, and a dangerous one because such contradictory actions enforce a template of behavior by example that easily turns to preconception, and further ladens biological opinion with the bias of great harm. The words “pest species” and “weeds” are part of this killing syndrome that undermines any credibility within the ecological sciences. New Zealanders could long ago have resolved their bioinvasive dilemmas with a moral embrace of immuno-contraception for the Australian Common Brush Tailed Possums (*Trichosurus vulpecula*), stoats, weasels, ferrets, rats, mice, and feral cats, for example. So far, that country has utterly failed to live up to its promise in this uniquely crucial opportunity for non-violent ecologi-

⁷⁰ See “The Hidden Lives of Pigs;” <http://www.peta.org/issues/animals-used-for-food/factory-farming/pigs/hidden-lives-pigs/>, Accessed May 19, 2016; See also, **The Pig Who Sang to the Moon: The Emotional World of Farm Animals**, by Jeffrey Masson, A Ballantine Books, The Random House Publishing Group, New York, NY, 2003, <http://jeffreymasson.com/books/the-pig-who-sang-to-the-moon.html>

cal remediation. Australians, who embrace immuno-contraception throughout Australia have weighed in. Their possums are protected (though in places outnumbering carrying capacity); and somehow the Australian powers that be have gotten in their heads that even the best targeted immuno-contraception for possums in New Zealand (where they are the number one bioinvasive, after humans) could somehow cross the Tasman Sea, infecting protected possums there in Australia. It is largely science fiction and has resulted in a devastation born of stubborn, anti-environmentalism within the New Zealand government and public.

With respect to marmosets, specifically *Callithrix jacchus*, the common marmoset, some scientists have deemed this breathtaking primate to be a fine surrogate for rodents in biomedical research based upon numerous criteria that serves genomic studies and any number of explanatory pretexts (for serving humanity), without any demonstrable consensus upon the fundamental ethics of conquering the lives of a primate who will be incarcerated in the equivalent of a petri dish.

What Constitutes Being Intelligent and Is That Even a Relevant Word?

Most animal cognition and ecological studies in general, continue to base the vast majority of their models on cruelly obsolete paradigms that assume our superiority in judging and acting out those judgements by way of the inhumane manipulation or murder of other life forms. This is a vast understating of a paradigm that has witnessed no shift since the Mesolithic. We (the public, scientists, institutions, and lawmakers) remain pathologically fixated on our own eminence and ascendancy, a nominative status that seems, even today, all but fixed in the dark depths of an implacable vanity. How we arrived at this mental crisis, with little or no reflection, has much to do with our remarkably meager IQs, under any qualifiable index. There has never been a neocortex of such cubic centimeter hubris, so little endowed, deconstructed, misinformed, and stubbornly resistant to enrichment. In other words, a brain that we steadfastly insist has reached its full potential at the lowest common denominator of some social medium allowing for group coherence at variable sizes.⁷¹ This social group size versus neocortical proportion of brain and cognitive neural densities and proportions of the total brain, has also come down to us through the so-called Dunbar's Number theory.⁷² But the anatomy of the pro-isocortex and the true-isocortex—the two primary areas of the neocortex—are best summarized by the evolutionary chart of Homos, whose modern brain sizes have evolved from *H. habilis*, approximately 500 cubic centimeters, to *H. sapiens*, 1400 cm³.⁷³ We

⁷¹ See Dunbar, R. I. M. (1993). Coevolution of neocortical size, group size and language in humans. *Behavioral and Brain Sciences* 16 (4): 681–735. Accessed May 21, 2016.

⁷² Dunbar, R. I. M. (1992). "Neocortex size as a constraint on group size in primates" *Journal of Human Evolution* 22 (6): 469–493. doi:10.1016/0047-2484(92)90081-J, Accessed May 21, 2016.

⁷³ Brown, Graham; Fairfax, Stephanie; Sarao, Nidhi. "Human Evolution". *Tree of Life*. Tree of Life Project, Accessed May 21, 2016.

know that our predecessors, *Homo neanderthalensis* had somewhat larger brains than *H. sapiens*, yet they went allegedly extinct. A number of variables throws into profound doubt the meaning of cranial size in relation to IQ; IQ's bearing on biogeographic distributions, genetics, sex variation, the significance of weight in general (as concerns people versus sperm whales or elephants, to take but two mammals with the heaviest known brains), event related potential, often measured as what is called the P300, caloric intake by the brain specifically and how this has effected *H. sapiens* evolutionary specific advantages or disadvantages, and so on. Controversies over all of these anatomical, ratio/proportion driven explanations, and the very meaning of intelligence continue to rage, as they did over two decades ago with the publication of Brian Beatty's "The Bell Curve."⁷⁴

Intelligence Versus Sustainability and Compassion

Humans choose their definitions; engage in inference selection; and taint presumably neutral scientific reasoning with, alas, *human reasoning* because we apparently are incapable of knowing any other kind. This is a tautological constraint of monumental proportions in that we are blocked from any other species' vantage; self-aggrandizing as a genetic and environmental prerequisite we not only take for granted in our daily lives, but also see the world with. Our lens has been implacably polished by the very evolutionary quirks science aims to understand. Yet understanding itself is a bias we confer to *our alleged understanding* of everything. We want to believe that there is such a thing as objectivity. But can there ever be? Probably not.

Where there has been a modicum of progress, as in the occasional instance of restraint, wherein community legal standards have argued for certain constraints on the degree of manipulation of other species—the frowning, for example, in a few societies upon torture; or the Non-Human Rights Movement—America's only civil rights organization working on behalf of other species; fighting in US courts since 2013 on behalf of captive chimpanzees Tommy, Kiko, Hercules, and Leo, so that they may be given legal standing, treated as persons, just like humans—we are made abundantly aware that our long-standing school of scandal regarding other species, is not the new norm, but an ancient cumulative bias. There are avowed

⁷⁴*See "Human Intelligence," <http://www.intelltheory.com/bellcurve.shtml>, Accessed May 21, 2016; "Genetic and Environmental Impact on Intelligence," <https://www.boundless.com/psychology/textbooks/boundless-psychology-textbook/intelligence-11/introduction-to-intelligence-61/genetic-and-environmental-impacts-on-intelligence-243-12778/>, Accessed May 21, 2016; "Evolution of the neocortex: Perspective from developmental biology," by Pasko Rakic, *Nat Rev Neurosci*. Author manuscript available in PMC 2010 Aug 2, *Nat Rev Neurosci*, 2009 Oct; 10(10): 724–735. doi:10.1038/nm2719, PMID: PMC2913577, NIHMSID: NIHMS201702, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2913577/>, Accessed May 21, 2016.

alternatives. If all the world embraced Digambara Jain ethics, our human footprints and handprints would be all but benign. Alas, it is not so, and there are fewer than 100 such mendicants left across their home turf of India.

Everything That Is a Person

In the genetic realm, the US National Academies of Sciences, Engineering, and Medicine, Britain's Royal Society, and the Chinese Academy of Sciences are in sync with respect to a ban on editing the human genome.⁷⁵ That will likely change, just as the verdict on GMOs and stem cell research has changed in most countries of the world.

But for other species, there appears to be no moral inhibitor affecting our deliberate invasiveness and destructiveness; our choosing who will live, who can move about, who must die. For example, of the more than 1800 bird species (out of nearly 11,000) that migrate long-distance, at least 1620 of them are finding their crucial stop-over habitats (lakes, riparian biomes, islands, forest canopies, etc.) without anywhere near the adequate conservation protections needed to prevent such oases from being imperiled.

Fig. 3.15 "Farallon National Wildlife Refuge, California," Photo © M. C. Tobias



⁷⁵ See "Too soon for genome editing," by Melissa Healy, Los Angeles Times, Tuesday, December 8, 2015, p. A5.

That would include E7, a female bar-tailed godwit whose tracking data has shown that she has flown some 6800 miles in one flight, according to Claire Runge at UC Santa Barbara.⁷⁶

We (humans) who for thousands of years have admired migratory birds, have no clue what they are thinking; how they are responding to the rapidly disappearing migratory respites. We don't know how to ask them. At the same time, in a totally different human–non-human context, Mexican and Canadian livestock industries have won their case against the USA (potentially \$1 billion in sanctions by the World Trade Organization) for American labels revealing the geographical origins of meat being sold, a practice Mexico and Canada want to conceal for any number of reasons, all entirely suspect and contrary to the majority of international consumer demands. Entirely lacking from the conversation is the ethical essence of the debate.⁷⁷

Living Ghosts from the Middle Miocene: Cohabitation with the Most Iconic Carnivores in North America

There are enormous gaps in the causalities of the human presence with respect to all other species and habitat; those bio-landscapes which are, in and of themselves, collaborative spaces composed of vast arrays of species per square or cubic meter, depending upon which International System of Units one is focusing upon—cubic versus square meters, for example.

Some 100 dogs per day—many off leashes—systematically roam the mountains, principally when they are free of deep snow—as do fast moving mountain bikers, directly above Santa Fe, New Mexico, on the Windsor Trail #254 and Borrego Trail #150, as well as the Nordski loops. Mount Baldy (12,622') is a ski area directly above these trails and well within the southwestern portion of the Sangre de Cristo Range, as well as a major feature of the 250,000 acre Pecos Wilderness within the Santa Fe National Forest, with splendid connectivity to the Jemez Mountains to the West, Sandia Mountains to the South, and Truchas mountains to the North, all above 12,000'.⁷⁸ Fragile, skittish, at risk Black bear populations (*Ursus americanus*) within this specific area of Mount Baldy, and its ponderosa/aspen ecosystems directly beneath, are at great risk of continuous and unwanted encounters with irresponsible dog owners and bikers. The Forest Service allows dogs on many of its trails (in addition to a blanket “yes” for all service dogs, notwithstanding that under

⁷⁶*Science* 4 December 2015: Vol. 350 no. 6265 pp. 1255–1258, doi:[10.1126/science.aac9180](https://doi.org/10.1126/science.aac9180).

“Protected areas and global conservation of migratory birds,” Claire A. Runge, James E. M. Watson, Stuart H. M. Butchart, Jeffrey O. Hanson, Hugh P. Possingham, Richard A. Fuller; <https://www.sciencemag.org/content/350/6265/1255.abstract?related-urls=yes&legid=sci;350/6265/1255>

⁷⁷“U.S. faces \$1 billion in trade penalties for meat labeling,” AP, Los Angeles Times, Tuesday, December 8, 2015, p. C7.

⁷⁸See <http://www.summitpost.org/santa-fe-baldy/151395>, Accessed May 21, 2016.

the Americans Disabilities Act park employees are not allowed to inquire as to the validity of service dog licenses, many of which throughout the USA could easily be bogus). Not only may the dogs accompany their human companions on most trails (including those described above) once into a designated wilderness area, (e.g., the Pecos Wilderness in this case) they need not legally be leashed, which is utterly counterintuitive, as confirmed to us verbally by a spokesperson for the Santa Fe National Forest.⁷⁹ Sadly, the Forest Service is understaffed, with all of one person to patrol all of the trails covering well over one million acres for such infractions. Hence, a tragedy, or a plurality of incidents occasioned by the human presence will escalate, as has occurred with brown bears on trails frequented by both humans and bears in and around Anchorage, Alaska, to cite but one well-known vortex of human–bear conflicts.⁸⁰ Elsewhere, in the state of Washington, for example, authorities have closed trails to hikers on occasion in order to minimize impact to sensitive bears with cubs, the logical and easiest mitigation tool in the arsenal of human/wildlife managers. But, in fact, Washington’s North Cascades have for decades been at the center of controversy with respect to one particular species: the grizzly bear.

Fig. 3.16 “European Brown Bears,” Photo © M. C. Tobias



It is this species, perhaps more than any other which raises the bar when it comes to appreciating humanity’s struggle with wildness. If saber tooth tigers still roamed America, they, too, would instantly qualify in that stellar realm of animals that can easily kill us, and, in a rare number of documented historic and contemporary cases, have done so for all the obvious and not inappropriate reasons: chance encounters that spooked both human and bear; or the bears have been overtly threatened by hunters, it not attacked; or their habitat has been overwhelmed by large numbers of

⁷⁹ Personal phone conversation, 9:25 a.m., Mountain Time, May 24, 2016.

⁸⁰ Human–Wildlife Interactions 9(1): 132–147, Spring 2015, “Brown bear and human recreational use of trails in Anchorage, Alaska,” by Jessica A. Coltrane and Rick Sinnott, Alaska Department of Fish and Game, Anchorage, AK.

hikers; or our own domiciles erected in their path, our stubborn itineraries conflicting with their own, or their lives thought of by humans as nothing more than trophies or food, aphrodisiacs, medicinals, or clothing.

Obviously, these are the subjects—usually carnivores at some level—who have tended to be the miserable victims and ambassadors of the Anthropocene. Their lost lives are harbingers of what is to come; their declining populations tell a story that is our losing battle with a mindset born of arrogance and the belief beyond all else, in ourselves; what Alexis de Tocqueville referred to as “the tyranny of the majority” in his critique of American democracy (**Democracy in America**, 2-volumes, 1840).

This is the root sorrow of the sixth extinction spasm (not a true spasm, but protracted sapping of biological rejuvenation) and the clearest window on what it is going to take to resolve the muddle of humanity’s race towards is self-destruction. Bears are emblematic of all that. We got in their way, and continue to do so knowingly every day.

Think of the USA almost framed between these two icons, one in the northwest, the other in the southeast, along the bottomland hardwood forests of Arkansas’ 860-mile² Mississippi Delta Big Woods, largely off-the-map, and home, possibly, to the last remaining Ivory-Billed Woodpecker(s). Two species—grizzly bear and Ivory-Billed Woodpecker—who could not be more different, except by way of the exceptionally poignant crisis both face; extinctions or near extinctions fixed in that portion of the human brain obsessed with the iconic spirit of ghost species, like the Ivory-Billed (bone billed, to be precise)⁸¹ and the hoped for remaining population of salmon-eating North Cascade grizzly, genetically isolated from those across the border in British Columbia and much farther East in the Rockies. A cluster of photographs, taken by a young hiker, Joe Seville, in October 2010 on the Upper Cascade River watershed, was eventually confirmed by a dozen biologists and Dr. Chris Servheen, the USFWS Grizzly Bear Recovery Coordinator based in Montana to be the first images in half-century of a live grizzly bear in the North Cascades.⁸² The haunting photographic silhouettes on a dark ridge, glaciers in the background, underscored the excitement, frustration with red tape, and fear for the bear’s livelihoods on the part of numerous constituencies: locals, scientists, and government officials in many states torn between too many endangered species, too little money to go around to protect them all, and huge gaps in survey data. Conservation biologists must confront the many issues of population genetics, interbreeding, and the likelihood of success in jumpstarting the rebound of a North Cascades grizzly population against severe odds. These hurdles mount quickly in the minds of conservationists who consider the plight of bears in the face of an endless stream of tourists, mountain bikers and their dogs, and the piles of government paperwork that quickly translates into years of inertia, while lobbyists spread the (typically anti-bear) ideologies of their special (mostly ranching and or hiker) interests.⁸³

⁸¹ See <http://animals.nationalgeographic.com/animals/birds/ivory-billed-woodpecker/>, Accessed May 23, 2016.

⁸² “Bear seen in North Cascades last fall identified as a grizzly,” Post by Jeff Mayor/The News Tribune on July 7, 2011, <http://blog.thenewstribune.com/adventure/2011/07/07/bear-seen-in-north-cascades-last-fall-identified-as-a-grizzly/>, Accessed May 23, 2016.

⁸³ See “Grizzlies gain ground—Recovery efforts flourish, but challenges still loom.” Krista Langlois Aug. 27, 2014, High Country News, <https://www.hcn.org/articles/grizzlies-gain-ground>,

While the New Mexico Department of Game and Fish maintains an excellent website regarding *Ursus americanus*,⁸⁴ there are no more than an estimated 5000–6000 bears in the state of New Mexico, all Black Bears. Hunting permits are issued and the so-called “Sport Harvesting” statistics are deeply disquieting, in addition to road kill: 559 bears killed by humans in 2015.⁸⁵ Yet such human killing and disturbing of bears in New Mexico invited only the rarest reprisals by the bears throughout that year—three attacks on humans as of late September 2015, a fourth serious attack on a nurse caught jogging, in June of 2016. This constitutes the most number of attacks in 16 years, the human population of New Mexico having increased by approximately 250,000 during that same time period, with all of its associated water abstractions, pollution, pesticides, and development.⁸⁶

As far as brown (grizzly) bears go, the last two known grizzlies in Colorado were killed in 1951 and then another in 1979, right on the northern New Mexico border.⁸⁷

In Arizona, the last grizzly was tracked and shot either in 1933, 1935, or 1939.⁸⁸

By 1964, grizzlies in Mexico—in the Sierra del Nido Mountains (central Chihuahua)—were deemed to be extinct.⁸⁹ However, a joint US/Mexican research team in 1980 believed it had gathered striking evidence indicating that a small population of Mexican grizzlies may still exist.⁹⁰ “Over the last 200 years, the number of grizzly bears (*Ursus arctos*) has declined from an estimated 100,000 individuals in the lower 48 to around 1725+. The grizzly bear was listed as a threatened species by the U.S. Fish and Wildlife Service in 1975 and six recovery ecosystems have been established since that time.”⁹¹

But no grizzlies have been seen in New Mexico proper since a killing in the Gila Wilderness during April of 1931 near Silver City (although another source suggests the year 1917 for New Mexico’s last brown bear).

Accessed May 23, 2016.

⁸⁴ See http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5423656.pdf, Accessed May 21, 2016.

⁸⁵ See http://www.wildlife.state.nm.us/download/hunting/species/bear/Bear-Season-Harvest-Limit-Update-05_19_2016.pdf, Accessed May 21, 2016.

⁸⁶ “Bear sought in attack on Los Alamos man,” New Mexico Department of Game and Fish, September, 10, 2015: <http://www.wildlife.state.nm.us/bear-sought-in-attack-on-los-alamos-man/>, Accessed May 23, 2016.

⁸⁷ “Man Recounts A Fight For Life With Colorado’s Last Grizzly - Good Question—What happened to the last grizzly?” May 23, 2012, *<http://denver.cbslocal.com/2012/05/23/man-recounts-a-fight-for-life-with-colorados-last-grizzly/>, Accessed May 23, 2016.

⁸⁸ “AZ 101: Grizzly bears in Arizona,” Clay Thompson - Feb. 11, 2010, The Arizona Republic, <http://archive.azcentral.com/travel/articles/2010/02/11/20100211azhist0213.html>, Accessed May 23, 2016.

⁸⁹ Brown, David E. *The Grizzly in the Southwest: Documentary of an Extinction*, University of Oklahoma Press, Norman, OK, 1996).

⁹⁰ “Return of the Mexican Grizzly Bear?” The Grizzly Bear Outreach Project (GBOP), November 19, 2008, <http://bearinfo.blogspot.com/2008/11/return-of-mexican-grizzly-bear.html>, Accessed May 23, 2016). Writes GBOP (The Grizzly Bear Outreach Project).

⁹¹ *ibid.*

California, whose state mascot is the grizzly bear, saw its last one shot in 1922, and any talk of recovery efforts has been likened to bringing back a dinosaur to the Sierras. The last grizzly was shot in Oregon, in Wallowa County, in 1937; in Utah, the bear's name was given Old Ephraim and there is even a burial site. To commend what? The fact he'd been maniacally tracked by a sheepherder for 9 years prior to falling stone dead before a fanatical rally of gunshot in 1923.

The demise of American grizzly bears, and the threats to bears worldwide, is analogous to what has happened to the 12 species of wild bovines on 4 continents: two have gone extinct since 1627 when the ancestor of the majority of domestic cows, the Auroch, (*Bos primigenus*) disappeared. The remaining ten wild species are fragmented, and largely composed of ghost (genetically nonviable) populations.⁹² The same happened to the European Bison (Wisent), the Caucasian subspecies (*Bison bonasus caucasicus*) having gone extinct in 1927 when the last three were shot dead.

Writes the author for Backcountry Chronicles, "Seeing a grizzly bear in the wild is a thrilling experience, but everyone doesn't want that much excitement, especially at close range."⁹³

With rumors perpetually flying of various sightings to the south of Wyoming and Montana (an alleged grizzly spotted for six seconds in Colorado in 2001, and another in Utah in the Summer of 2013), many—particularly hunters—argue that there is a comeback of the species, and that the Feds, working with state wildlife officials, are hoping (which they are, in some cases) to relocate grizzly bears back to their former western habitats.⁹⁴ Conspiracy theories abound. Hunters are said to have the worst to fear, and many argue that grizzly reintroductions are simply bad science, following in the wake of Mexican wolf reintroductions. Emotions are heated and tense. Logic is not part of most equations.

As for the Greater Yellowstone Ecosystem grizzly population, Montana, Idaho and the Northern Rockies in general, estimates begin at 1250 individuals, less than 0.5% of their former demographic expanse and precocious civilization. This basically says it all about our priorities and levels of intolerance.⁹⁵

Dating to some 38 million years ago during the Middle Miocene, the eight living hypocarnivorous Ursidae family of flat-walking (plantigrade) Old and New World bear species are related to caniforms (carnivorous dogs), but also to Pinnipeds, in addition—in their latest taxonomic revisions—to containing the Giant Panda in their group. In other words, they cast a wide and nearly mythic behavioral net. Six

⁹² See wildcattleconservation.org, Accessed May 24, 2016.

⁹³ "Concerned about Grizzly Bears? Where They Are and Where They Ain't," <http://www.backcountrychronicles.com/grizzly-bear-distribution/>, Accessed May 24, 2016.

⁹⁴ "Wildlife Experts Warn Grizzly Threat To Southwest Not Gone," By David Bowser, www.live-stockweekly.com/papers/98/05/07/whlbowser.asp May 23, 2016.

⁹⁵ See "The Conservationist," <http://www.fieldandstream.com/blogs/conservationist/2011/11/hunting-amidst-grizzlies-always-respect-bruin-and-remember-your-bear-s> "How Three Men Survived Attacks By Grizzly Bears," by Hal Herring, Field & Stream Magazine, November 16, 2011. Accessed May 24, 2016. See also, <https://wgfd.wyo.gov/Wildlife-in-Wyoming/More-Wildlife/Large-Carnivore/Grizzly-Bear-Management>, Accessed May 24, 2016.

of the eight species are vulnerable or endangered, and a multitude of populations, particularly within the USA, have been extirpated. Given that Winnie the Pooh, and Arthur Rackham's "The Three Bears" illustrations, among so many other cultural integers, have wooed children, inspired national iconic identifications (Russia), have been tamed by saints and merged into mythologies, humanity can be said to have sustained one of its strangest love/hate relationships with this magnificent poster child of the U.S. Forest Service; who sleeps most of each winter.

Our own personal (the authors') encounters with bears have been perpetually roused by wonder and love. I (Michael) jumped off a sheer 130-ft cliff in Alaska, once (a clean free-fall, until I hit the tallus slope and bounced three times), to escape the wrath of a grizzly sow I had inadvertently frightened, along with her two cubs. I had been in the wrong place at the wrong time, with the best of intentions. I have never carried a weapon, only love in my heart. That sow and her cubs subsequently saved my life in a raging river and I would go on to spend much of a summer living with them, even, at one point, able to tickle the bellies of the cubs in a bucolic and surreal encounter, as the mother watched on, aboard a grassy perch where I had placed my tube-tent above the Grand Pacific Glacier. Twice—once on the Tibetan/Sikkimese border at night, another time behind Half Dome in Yosemite National Park—I (Michael, again) have been chased up trees by bears (in the former instance, by a Tibetan Blue Bear, and in the latter, during a drought: the mother Black bear and her cub were hungry. I had granola bars in my rucksack, and a perfectly semi-circular scar on my left arm that never healed and only betrays the mother bear's enthusiasm for granola). Another time a Black bear visited my tube-tent for the peaches and apples I gladly shared with him. Our home just outside Santa Fe is frequented by New Mexico Black Bears (*Ursus americanus amblyceps*) just down the creek from a high mountain area of energetic bear activity in the spring.

And it was up in those mountains during the late Spring of 2016 that I (Michael) witnessed a near attack by a mother bear on an illegally off leash shepherd who raced zealously towards the sow's cubs at approximately 9800 ft on the upper limits of the Borrego Trail. I found myself cornered between the dog, the cub and the sow. I'd been sojourning as silently as a silk moth, photographing the now uncommon horned toad, as well as the lovely *Nymphalis antiopa* and Yellow Swallowtail butterflies, as well as all the usual avifauna candidates, from various flycatchers and nuthatches to magpies, chickadees, tanagers and warblers. It was 3:10 p.m.

Upon sight of the cubs, I made a beeline back down the trail, jogging fast for nearly two miles, warning other hikers, then returned to our home, another 9 miles down in the river valley.

The only rational approach for the Santa Fe National Forest authorities would be to promulgate a stronger message regarding the illegality of all off-leash dogs; and to put an intense quota system on pedestrian traffic, while outlawing biking on the trails, particularly between March and November.

For myself, the hardest part of all this was the realization that—while not walking with a dog—I was, nonetheless, in the bears' territory, and in the spring. The American Black Bear is one of the most charismatic, perfect mammals in North America. Its entire biology is astonishing, senses packed with profound acuities, survival stratagem, and communication/translation prowess. The bears had come

out of their post-torpid metabolic months (quasi-hibernation for the female who gave birth during that time, as is the norm). They appeared quite robust, but also eating frantically, protein-starved and I should not have walked so nonchalantly into habitat which was their home, notwithstanding a road that bisects Hyde Park (a state park and one where children have been known to shoot off their BB guns at other people) and continues to the Santa Fe Ski Area, bisecting bear territory and thereby providing the invasive means for tens-of-thousands of humans every year.

All this is a fundamental hubris, at the heart of human development, not to mention “outdoor recreation” and, historically, every “expedition.” It is this latter reality that must pose a particular difficulty for most ecologists to absorb. How do we rethink our passion for wilderness travel, to sensibly and sensitively self-moderate. Political scientist Jack Schaar once told me, “I love the mountains. That’s why I never go there.”

Of course, this is a perfect theory that is existentially incompatible with, for example, President Obama speaking on the 100th Anniversary of the National Park Service in Yosemite Valley National Park: “Just look at this scene ... You’ve got to come here and breathe it in yourself.” And in reflecting on an earlier visit to Yellowstone, as quoted by Amina Khan in the Los Angeles Times, the President said—in reference to being “awestruck by the sight of a moose in a lake, a field full of deer, a mother bear and her cub”: “That changes you ... You’re not the same after that. And I want to make sure every kid feels that.”⁹⁶ We speak of carbon neutrality, but far more rarely designate areas of habitat incursion neutrality.

Pacific beaches, inland wetlands, uplands and indigenous coastal California habitat, within the western fringe of the 18 miles of Marine Camp Pendleton just north of San Diego, contain 16 threatened or endangered species. The US Marines have long been mandated by Congress to protect endangered species on their lands. The beaches—where, for example, the California least tern (*Sternula antillarum browni*) is Federally listed as Endangered—incubates its eggs on those white sands which are strictly off-limits to tourists. We have seen gunships traversing the beaches a short distance out in the ocean; and troops in military garb, bearing weapons and traveling in army tanks patrolling the beaches.

The same with beaches for nesting turtles in Yemen (where that nation’s former President came to save the animals personally), or a multitude of recovering floral biomes throughout the world. There are usually signs posted. In the case of the last endemic tree on Easter Island, a flowering legume family member, *Sophora toromiro*, the few surviving individuals are kept within wire hoops and protected by the Chilean military. Across the remarkable 560+ national wildlife refuges and 38+ wetland management districts, between 1 and 5% are off limits to the public, such as the dangerously fragile Farallon National Wildlife Refuge and Marine Sanctuary, with its dismal past, today made good on Teddy Roosevelt’s promise because of the absolute restriction of tourists who are not allowed to set foot on the islands, or even steer their tourist vessels very close. Parts of Bialowieza National Park are also off limits to all but a very few permitted scientists.

⁹⁶ See Amina Khan, “Obama touts the wonders of Yosemite, national parks,” Los Angeles Times, Sunday, June 19, 2016, p. B3.

Fig. 3.17 “An Endangered Wisent, *Bisus bonasus*, Bialowieza National Park, Poland,” Photo © M. C. Tobias



Human emissions translate into another reality, namely, our incursions into habitat that belongs not to us, but to all the Others. To oblige that ethical orientation, much in the manner of a Jain monk, would be to cease all exploration in the “wild”; to abnegate the by now nearly obligate belief that nearly 7.4 billion people have the same rights to coral reefs and the Amazon as do the other species who call those places home in every respect. We have exacted every invasion, irrespective of ethics or the underlying conservation ideals, hard achieved, of 765 American wilderness areas, state and national parks, wildlife refuges, wild rivers, scientific preserves; but continue to justify our actions on a myriad of grounds. One example often used by hunting lobbies and hunters themselves (who have never been qualified to make such bold calculations) is that animals are somehow out of step with intrinsic hormonal balances and overpopulate, and that it is up to us to redress those imbalances.

Other feckless arguments hinge upon such illogic as the notion that humans, too, as a species, belong everywhere we want to be, whether as indigenes sleeping in hammocks, or as back-country cowboys on noisy snowmobiles. The belief that we have always lived here; are one of the interdependent organisms who have a right, a geographic duty to be there. Or the supposition that, for example, bicycles in the wilderness are somehow commensurate with sustainability, an appropriate technological integration of human life with other life forms.

Such illogic combines to propagate an ever out-of-kilter belief system rife with ecological illiteracy.⁹⁷

Egocentric excuses for *having fun* or *doing research* or building a log cabin in the woods require questioning. These pillars of our self-directed passions are predicated on an absence of data, understanding, and mostly sensitivity. Which is why most people, including biologists, think of bears as essentially confined to half-dozen forms of verbal expression, that include roaring and barking and huffing and growling (no puffing). Says Dorothy from Kansas, “I don’t like this forest. It’s dark and

⁹⁷ See <https://www.hcn.org/articles/its-inevitable-there-will-be-bikes-in-wilderness/#comments>, Accessed May 23, 2016.

creepy Lions and tigers and bears! Oh my!”⁹⁸ There were once grizzly bears in Kansas, actually, as throughout the Great Plains. If one adds up the estimated remaining numbers for the eight known species of bears: American Black Bear, Asiatic Black Bear, Giant Panda, Malayan Sun Bear, Sloth Bear, Spectacled Bear, Brown Bear, and Polar Bear, the pace of increasing vulnerability is deeply depressing.⁹⁹ There is not even an estimate on the number of mortalities—human and bear—each year resulting from the conflict of these species. In 2014, 171 research papers were reviewed, 104 biologists contacted with questionnaires. The six bear species from 59 countries, representing the vast majority of the 65 nations where there are bear populations, were discussed. “89%” of respondents concurred that conflicts between bears and humans were on the rise, particularly “In the face of growing numbers of people, with a deepening footprint, inhabiting ever more remote areas ...”¹⁰⁰

Humans have, at best, inhabited North America, for probably fewer than 60,000 years, and during those years left a wide margin of inordinately deep midden pits, and megafaunal extinctions. We don’t even have data on the small animal and plant extinctions we inflicted, but can easily extrapolate such numbers from the results of our behavior today. What we do know with some certainty is that ethical mitigation of our behavior is at the heart of all conservation biology, obviously. More difficult will be the notion, raised above, of human incursion into bear habitat somehow being mitigated through the encouragement of interspecies communication. It is difficult to see how such relations can exist between humans and most other wild vertebrates whose habitat humans have already trespassed; hopped over the wire fences between the condo units and the forest, and then set out to chat with raccoons and bears. It just can’t work, even though we intend to go on thinking about it, writing about it in this book. The notion of “chatting with bears” requires an entirely different *Weltanschauung* of linguistic/behavioral orientation. It is not about speech per se, obviously; but relations in general; not words or sounds or calls, but our informed communion with, and geographical orientation to a wild animal; the philosophies of restraint, withdrawal, disassociation, love from a healthy distance; the sociology and cartography of biophilia.

Such deliberations are at the root of a systemic dilemma across the USA and nearly every country in the world; one that is bound to invite a retort: if you don’t go, others will, just as creeping wilderness on country roads and along freeways alike will typically be mowed annually, the rarest seedlings clinging for survival to

⁹⁸ From “The Wizard of Oz,” the film, produced by Metro-Goldwyn-Mayer in 1939, <https://www.youtube.com/watch?v=Etx-nDCZzLo>.

⁹⁹ See “Bears of the World: American Bear Association, the Vince Shute Wildlife Sanctuary (near Orr, Minnesota),” <http://www.americanbear.org/education-awareness/bears-of-the-world/>, Accessed May 24, 2016.

¹⁰⁰ “Resolving Human-Bear Conflict: A Global Survey of Countries, Experts, and Key Factors,” by Ozgün Emre Can, Neil D’Cruze, David L. Garshelis, John J. Beecham, and David Macdonald, *Conservation Letters* (Impact Factor: 7.24). 06/2014; 7(6). doi:10.1111/conl.12117, https://www.researchgate.net/publication/264750891_Resolving_Human-Bear_Conflict_A_Global_Survey_of_Countries_Experts_and_Key_Factors, Available Nov 13, 2014, Wiley Periodicals Inc., p. 1, Accessed May 24, 2016.

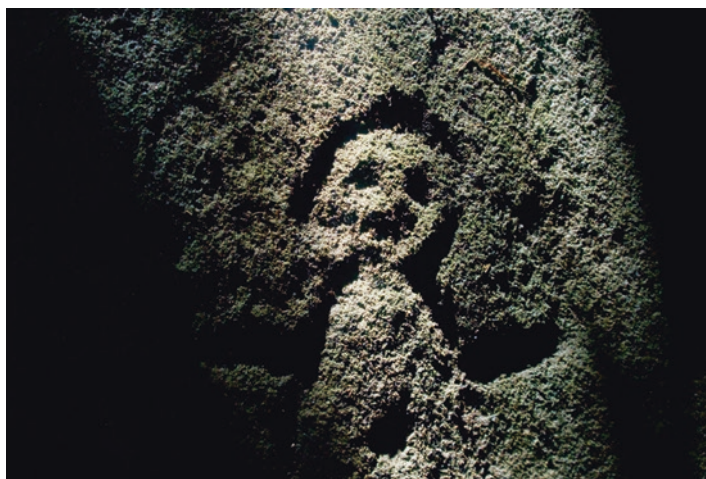
fence rails where mowers can't reach. Bulldozing, mountain clear cutting, forest felling, condo units, and convenient shopping malls all accompany our continued urban migration to the suburbs, whether in America or Malaysia or Chile, and every bear knows this to be the case.

This reality has to be recognized but sensibly assuaged. Every park and reserve manager is caught in the ethical and practical crosshairs of this tension. Every political decision, no matter how much scientific opinion buttresses it, will necessarily confront a fundamental moral prerequisite that, at its heart, involves biosemiotics.

The Anthropocene itself represents the most galling reversals of clarity: our invasion of all that is wild. Conversely, the Anthropocene is telling us in unambiguous terms what our remaining options are to prevent an all-out global collapse—not just of bears, but of nearly every species in every biome that humans are intentionally or unintentionally overwhelming.

Everything that is a person is the Anthropocene. Definitionally, a “cene,” from the Greek word *kainos*, refers to something geologically new. In this instance, the Anthropocene encompasses the Earth's crust and upper mantle, the lithosphere; the pedosphere (the soil); the hydrosphere, biosphere, and atmosphere, thus outlining that sphere of all life forms and their habitats. These inextricable combinations were codified under the Anthropocene heading with the full imprimatur of the Geological Society of America in 2011 when their annual meeting was entitled “Archean To Anthropocene: The Past Is The Key To The Future.”¹⁰¹

Fig. 3.18 “5000 Year-Old Petroglyph from the Werehpai cave, Southern Suriname,” Photo © M. C. Tobias



¹⁰¹ See <http://www.geosociety.org/meetings/2011/Accessed> February 25, 2016.

Bio-Etymologies

The Anthropocene etymology is obtuse and invokes numerous scientists and scientific theories in a dizzying array of fields. It has been suggested, for example, that even 8000 years ago, with a limited human population, roughly 4000 years after the beginnings of the Holocene, we were already exerting enough impact as a species to register as a kind of planetary, geological force.¹⁰² Paleoclimatologist William Ruddiman has suggested that it was the mid-Holocene agrarian revolutions which first induced the continuing course of high atmospheric concentrations of greenhouse gases,¹⁰³ another way of saying that the industrial revolution long predates the conventional ascription of that period commencing roughly in the year 1760 and continuing into the mid-1800s, with vast transformations in the use of steam, coal, the production of iron and any number of machines to induce greater human productivity, all with serious chemical and landscape-altering affects. In the textile industries alone, two developments—the power loom¹⁰⁴ and cotton gin each resulted in vast escalations of the human ability to increase productivity—at least 40-fold, and extract seeds from cotton by a factor of 50.

But every linchpin of the human trespass—her rapacious ingenuity in terms of machine tools, metallurgy, chemistry, macadamized roads, railway, and urbanization itself, with the exploitation of child labor, all added up, hour by hour, day by day. Some researchers look to the Trinity Blast—the code name of the first nuclear weapon detonation by the US Army on July 16, 1945 as the official Anthropocene Day of Reckoning; others consider stratigraphy and the fossil record to be most relevant to its definition; and others still look at the 40% reduction during the last century of marine phytoplankton throughout the oceans of the world, as the single most critical indicator of the health of the planet and humanity's deleterious effects in that regard.¹⁰⁵ Earlier, we have referenced data indicative of Anthropocenic effects being directly felt as early as 50,000 years ago wherever the human shadow enacted megafaunal extinctions, from continent to continent.

¹⁰²Certini, G. and Scalenghe, R. (2015). "Holocene as Anthropocene". *Science* 349: 246. doi:[10.1126/science.349.6245.246-a](https://doi.org/10.1126/science.349.6245.246-a). Accessed February 24, 2016.

¹⁰³Ruddiman, William F. (December 2003). "The anthropogenic greenhouse era began thousands of years ago". *Climatic Change* 61: 261–293.

¹⁰⁴Ayres, Robert, 1989. "Technological Transformations and Long Waves" (PDF): 16–17; Roe, Joseph Wickham (1916), *English and American Tool Builders*, New Haven, Connecticut: Yale University Press, LCCN 16011753. Reprinted by McGraw-Hill, New York and London, 1926 (LCCN 27-24075); and by Lindsay Publications, Inc., Bradley, Illinois, (ISBN 978-0-917914-73-7).

¹⁰⁵"Ocean greenery under warming stress—A century of phytoplankton decline suggests that ocean ecosystems are in peril." by Quirin Schiermeier, 28 July 2010, *Nature*, doi:[10.1038/news.2010.379](https://doi.org/10.1038/news.2010.379); <http://www.nature.com/news/2010/100728/full/news.2010.379.html>, Accessed March 4, 2016; See also: Proceedings of the National Academy of Sciences (PNAS) study titled "Changing recruitment capacity in global fish stocks." the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO), "The Plankton 2015 Report" (PDF).

Sometime in 2016, The International Commission on Stratigraphy, the oldest group within the International Union of Geological Sciences is slated to make its own determination as to the character of the Anthropocene—whether or not it deserves to be recognized as a geological epoch or not.¹⁰⁶

Why epoch? What is so important about a large slice of time in which, by definition, rocks are laid down or exposed by new forces at work? It does not easily comport, such rocks, with beetles, Bengal Tigers, penguins, or acacia trees beneath Kilimanjaro. But, in fact, stratigraphy is to biodiversity what a good time piece is to human behavior throughout one's lifetime, expanded to encompass the entire history of biological events. It can tell you, in the case of the Precambrian eon when eukaryotes emerged, the first multicellular organisms. Such geology also corresponds with the three divisions—Paleo, Meso, and Cenozoic, these in turn comprising at least fourteen well-described periods. Devonian: think the earliest amphibians and sharks, for example. Carboniferous=reptiles, flying insects. Triassic=mammals and dinosaurs. Jurassic and Cretaceous periods=the first, then vascular (flowering) plants and snakes. Following the fifth massive extinction event some 65–67 million years ago, dinosaurs were largely replaced with most of the large animals now remaining on the African Continent, a period known as the Paleogene (more than likely that period during which warm blooded birds emerged in great number and diversity). By some 24 million years ago, the Neogene, spanning nearly 22 million years shed light on bovines, marine mammals and the first primates, dogs and the largest number of birds, even, near its zenith, Australopithecus. By the Quaternary, beginning 1.8 million years ago, we (humans) had all but arrived.¹⁰⁷

But to study a billion years of that geology, say, from the North or South Rim of the Grand Canyon—twice the time-frame of the Phanerozoic Eon, while oxygen was still building a chemical architecture to harness the possibilities of the first mature multicellular organisms—is not going to yield anything quite as vivid and evocative as a painting by Thomas Moran, but only because we are still largely primitive organisms, we *H. sapiens*. Moran exemplified, to be sure, one of the most vivid approaches to characterizing geological temporal realities, like a gorgeous chocolate layer cake, as seen from a point on the South Rim today named after the great artist.

But we remain inescapably biased and unclear in terms of denominating other life forms inhabiting the walls of that 1.1 billion years of the Grand Canyon, such as the great pack-rats (White-throated woodrats, *Neotoma albigula*), who have been fashioning their nests along insets in the cliffs for at least 50,000 years. Pieces of native American sandals and obsidian from ancient human culture tool use, have been found in such nests. Those indigenous peoples of the Grand Canyon and the pack rats lived side-by-side for thousands of years, and continue to do so; just as there have been hundreds-of-billions of human/non-human encounters throughout our short history. Since the time Carl Linnaeus began categorizing genera and

¹⁰⁶“Commission on Quaternary Stratigraphy,” <http://quaternary.stratigraphy.org/workinggroups/anthropocene/>, Accessed May 22, 2016.

¹⁰⁷Read more at <http://www.geologyin.com/2014/12/geologic-time-scale-major-eons-eras.html#t36VIFqSiEXdDvCu.99>, Accessed February 27, 2016.

species, and we witnessed in both Eastern and Western cultures a renaissance of natural history expeditions and artistic expressions, we can adduce hundreds-of-thousands of specific human/other-than-human relationships—paintings, pieces of music, poetry, scientific observations, domestic farming and companion animal anecdotes. The footnotes are illimitable. In just one book, **God’s Country: The New Zealand Factor**¹⁰⁸ we cited at least 3000 such encounters, a collective of data both inspiring and enraging.

Fig. 3.19 “Expedition Within the Nilgiris Biosphere Reserve, Tamil Nadu, India,” © M. C. Tobias



In one newspaper of one day, Independence Day, 2016, Los Angeles Times, deeply depressing tales of the last wolves in America; of a coyote shot in the head and left wandering blind in Santa Barbara County, where it tumbled into a pit, was miraculously rescued by a heroic wildlife rehab expert, while the desperate animal was having a heart attack. The coyote survived, made international news upon delivering a litter of pups in captivity, only to be euthanized; and the tragic tale of one of only approximately 300 remaining wolverines in the contiguous North America, M(male)56, who had been trapped, radio-tagged, and released years before, gone silent, only to be discovered dead by biologists, shot through the back of the head by a rancher who insisted the fur-bearing (32 lb) animal was harassing his cattle. As of this day the U.S. Fish and Wildlife Service has still not enlisted legislation to have the snow-dependent wolverines who are quickly losing out to climate change, Listed as an Endangered Species.¹⁰⁹

¹⁰⁸ Dancing Star Foundation, Los Angeles, CA 2010, by the authors.

¹⁰⁹ See “A wolverine’s mysterious journey,” by William Yardley, Los Angeles Times, July 4, 2016, pp. A1, A10.

Such lonely, desperate encounters have been embraced by every discipline, from exobiology to paleontology; archaeological, historical, scientific, medical, psycholinguistics, anthropological, and neurological documentation; every field of the social and natural sciences; the arts and humanities. There is no area of the history of ideas, of philosophy, metaphysics, anatomy, geopolitics, chemistry, physics, math, engineering, technology, civil life, jurisprudence, or spirituality that does not come into direct contact with other species. There are not enough words or encyclopedias or exabytes to even begin to encompass the anecdotal repository of relationships between humans and other species, known and unknown.

Instead, we are left with poetic overviews, like Moran's great paintings of sites like the Grand Canyon, or Yellowstone; or Corot's more intimate but equally expansive *Ville D'Avray*, or some of the late nineteenth century panoramas captured by painter Henry Kirkwood in what was to become New Zealand's Fiordland National Park, or American luminist George Inness' portraits of New Jersey, Massachusetts, and Floridian forests.

What we can suggest, by way of a primer for an otherwise all but indecipherable code, is to highlight a number of prominent and emblematic windows on the rich and sublime and obscure experiences of the human mind; of human ethics, or lack thereof; of a few of those working languages and modest insights that have accumulated over time among individuals and cultures to shed light on one architectural blueprint for the present and near future, in hopes of raising, even by miniscule notches, our respect, admiration, and hopefully awe of all those we name the Others.

Fig. 3.20 "Doubtful Sound," New Zealand, Original Oil by Henry Kirkwood, early 1900s, Private Collection, Photo © M. C. Tobias



Chapter 4

The Conative Spectrum of Other Species

Fagan Bonds

In an essay in his *Psychology Today* column, Dr. Marc Bekoff provides a perfect overview of the fast changing nature of neurobiology as it continues to reveal fundamentals about other species that are critical to anthrozoology for the twenty-first century, minds that act upon thoughts and feelings.¹ The key is that all other species are now seen to possess the brain neurophysiology (those species that have brains) endowing them with the same preconditions for consciousness as we think of it among humans. This is, indeed, a game changer; our own doors of perception being blown wide open. Sea snails, which frequently live but one year, have demonstrated that in their old age some can become senile and their nerves have been studied which suggest precisely where senescence—perhaps with analogies to humans—is centered. They were actually “trained” by scientists (harassed with electric shocks and poking would be a better description of the training) to move their tails, and the reflex movements were measured according to the increasingly sluggish responses, deemed to translate into the onset of senility. Moreover, Giant California black sea hares, a cousin of sea snails weighing up to 30 lbs, have shown other evolved skills: ejection of ink-like clouds filled with amino acids that detract hare predators, like spiny lobsters, for a long enough duration to enable the hares to escape.²

¹ See <https://www.psychologytoday.com/blog/animal-emotions/201512/animal-minds-are-richer-science-once-thought>, Accessed March 15, 2016.

² “Senile sea snails are helping us understand memory loss,” by Robert Gebelhoff, *The Washington Post*, July 31, 2015, <https://www.washingtonpost.com/news/speaking-of-science/wp/2015/07/31/old-slimy-sea-snails-are-helping-us-understand-memory-loss/>, Accessed April 27, 2016.

Fig. 4.1 “Endangered Proboscis Monkey, *Nasalis larvatus*, Borneo,” Photo © M. C. Tobias



There is no quadrant of life, from a drop of Turfan Depression water and pinch of Boreal soil, to the deep ocean vents or even, bacterially, atop K2 that does not open up windows on the staggering intelligence and sensitivity of all life forms; not one of which ever discovered is so simplistic that we can create it ourselves. At the high altitude basecamps across the Himalayas, Karakoram and Hindu Kush, the life forms measure up in the millions of species, if not more, from Tahr (Asian wild goats), hemlock, poppy, snow leopard, and yak, to the millions of microbe species therein.

Cloning such creatures is an entirely different story of accounting and fixing the numbers: we’re basically just manipulating what is already there. But put all the Nobel Prize winners together throughout time, and they could not build anything that is alive which wasn’t already alive. Synthesis is no surrogate. Effects and consequences differ altogether from origins. Our thoughts and emotions respond to pre-existence. They cannot—in their wildest imaginative, emotional, and creative flights—invent it.

Brian Fagan’s book, **The Intimate Bond—How Animals Shaped Human History**³ opens with what may be the divining rod shaping the entire panoply of his (largely paleontological and archaeological) analysis of certain key species that went extinct and/or were domesticated instead by humans, shedding fascinating light on some of those otherwise obscured keyholes in the history of science. Fagan quotes from A. A. Milne’s **Winnie-the-Pooh**, “Some people talk to animals. Not many listen though. That’s the problem.”⁴ Chief Dan George (1899–1981) a leader

³ Bloomsbury Press, New York and London, 2015.

⁴ See <http://www.goodreads.com/quotes/29556-some-people-talk-to-animals-not-many-listen-though-that-s>, Accessed March 18, 2016.

of the Tsleil-Waututh Nation, of the Coast Salish band, said something similar: “If you talk to the animals they will talk with you and you will know each other. If you do not talk to them you will not know them, and what you do not know you will fear. What one fears one destroys.”⁵

In his “Chronological Table,” Fagan’s fascinating overview contains numerous highlights of the transformational relations between Ice Age cultures and wild horses, the first domestication of dogs, probably 15,000 years ago or so; 5000 years later, the domestication of animals like sheep and goats and pigs, bovines around 9000 BC, burros by 4500 BC, horses perhaps 500 years after that and within a 1000 years (3600 BC) the Botai peoples of southern Eurasia’s eastern Urals “almost certainly” were riding horses. By the time of Homer, data reveals that there were multiple “Assyrian donkey caravans” throughout the Levant; then camels were domesticated and eventually, in the Andes, Llamas, as well.⁶

With respect to dogs a recent finding by a large cohort of researchers investigating the origins of dogs determined they split off from wolves approximately 33,000 years ago in Southeast Asia.⁷ Others have argued, 8000 years ago. And yet another group of specialists, utilizing DNA markers, have ambiguously declared that dogs either originated in Europe or in China. If in China, then they probably migrated back to Europe with human companions “between 4000 and 11,000 years ago.” Given the estimated 1 billion dogs in the world, 750-million of whom are living without companion humans, so-called strays, the ones who “haunt the garbage dumps and neighborhoods of most of the world,” countless morphological and ethical issues arise when we speak of “man’s best friend.” A friend who, unlike wolves, does not regurgitate its food for its pups, and, according to studies by canine experts Ray and Lorna Coppinger, tend to choose which people, or person they will associate with, not the other way around.⁸

However one adjusts the approximate data sets, this all means that by 15,000 years ago the dogs, who evidently were in Europe within another 5000–10,000 years, could turn in to man’s loyal companion during extraordinarily low density relations with *H. sapiens*. The implications are important, though defy any easily established baseline that might predict mitochondrial versus genomic DNA and their relationships in terms of the evolution, not only of a species, but of its propensity for communion with another species; except to reiterate the basic difference: mtDNA, which manufactures its own tRNAs, passes down matrilineal ancestral information, which

⁵ Cited by Carol Santora in her essay, “Speaking for the Animals Lost and Threatened,” <http://mahb.stanford.edu/blog/animals-lost-and-threatened/>, Accessed March 31, 2016.

⁶ op.cit, Fagan, pp. 3–4.

⁷ Cell Research, Cell Research advance online publication 15 December 2015; doi:[10.1038/cr.2015.147](https://doi.org/10.1038/cr.2015.147); “Out of southern East Asia: the natural history of domestic dogs across the world,” Guo-Dong Wang, Weiwei Zhai, He-Chuan Yang, Lu Wang, Li Zhong, Yan-Hu Liu, Ruo-Xi Fan, Ting-Ting Yin, Chun-Ling Zhu, Andrei D Poyarkov, David M Irwin, Marjo K Hytönen, Hannes Lohi, Chung-I Wu, Peter Savolainen, and Ya-Ping Zhang, Accessed December 24, 2015.

⁸ See “Don’t Call Them Strays,” by James Gorman, ScienceTimes, The New York Times, April 19, 2016, pp. D1 and D6.

can be compared and contrasted with the greatly expanded nuclear DNA. In humans, for example, mtDNA has one chromosome, nuclear DNA has 46-23 from the male, 23 from the female.⁹

As with a proposed scenario relevant to the Canidae family lineage of 33,000 years ago, once again, today, we are seeing the split of canids throughout much of eastern North America, into such (awkwardly denominated) beings, as the coywolf.¹⁰ Once again, there is no predicting whether coywolves might succumb to any level of human domestication. If anything, experience is showing us that other predators venture near humans at their peril.

Fagan traces the evolution of interspecies relations, the many details, cruelties, mass hunting technologies (for example, the first established archaeological confirmation of rope “bits” and “bridles” used for conquering horses from between 3500 and 3000 BC; by 1200 BC bits of metal).¹¹ While Fagan systematically reveals how “the communication between hunters and animals goes back into deep time”¹² there is little to distinguish countless episodes that we might read into as shamanic trances (such as those rock paintings by the San peoples of the Drakensberg Mountains in South Africa) from sheer cruelty. Consider Fagan’s description of the following occurrences: “Until recently, San in the Kalahari Desert in Botswana still danced next to the carcass of a freshly killed eland. As they activated their potency, the medicine men (shamans) trembled, then sweated and bled from their noses. A dying eland trembles, sweating profusely, with melted fat gushing like blood from its wide-open mouth. Perhaps the San compared the human trance with the trauma of an eland in its death throes.”¹³ And while the British anthropologist E.E.Evans-Prichard was enthralled by the intimacy displayed by the Nuer peoples of the Nile in the southern Sudan towards their life-sustaining cattle¹⁴ whom they largely treated like royalty; or the fact that from primeval (what is today) Kentucky to ancient Egypt dogs and cattle were buried with ritual sobriety, or Alexander the Great’s horse, Bucephalus, treated (no surprise) like a King himself; that philosopher Michel de Montaigne (1533–1592) believed “that animals were more rational than people,”¹⁵ these rarely exhibited sentiments or waves of enthusiasm devolved,

⁹ See “Tracing Ancestry with MtDNA,” by Rick Groleau, NOVA, <http://www.pbs.org/wgbh/nova/neanderthals/mtdna.html>; see also, The Scientist, “Mitochondria Versus Nucleus Disruptions in the interaction between nuclear and mitochondrial DNA can lead to deficiencies in the mitochondrial energy-generating process, affecting fitness.” By Juliet Ash | February 15, 2013.

¹⁰ “Coywolves are Taking Over Eastern North America,” Marissa Fessenden, Smithsonian.com, November, 2, 2015; <http://www.smithsonianmag.com/smart-news/coywolves-are-taking-over-eastern-north-america-180957141/?no-ist>, Accessed November 28, 2015.

¹¹ *op.cit.*, Fagan, p. 141.

¹² *ibid.*, Fagan, p. 11.

¹³ *ibid.*, Fagan, p. 10.

¹⁴ *ibid.*, Fagan, pp. 82–83.

¹⁵ *ibid.*, Fagan, p. 207.

ultimately, into such countering institutions as the slaughter houses in London. By 1750, according to Fagan, “at least 74,000 cattle and 570,000 sheep passed through the city’s Smithfield meat market alone that year.”¹⁶ A century later, “two hundred twenty thousand head of cattle and 1.5 million sheep now perished at Smithfield annually.”¹⁷

James Watt did not just invent a steam engine, but developed the measure of power according to “horsepower” and that entailed his experimenting with dray horses in a factory and pushing them so hard that he was eventually able to come up with his calculation, namely, that one horsepower was the equivalent of “4562 kg m (33,000 ft pounds) a minute.”¹⁸ But if all that sounds grim, consider Fagan’s description of London’s early nineteenth century so-called “Menageries,” like the one at London’s Bartholomew Fair, where “one collection of the large cats even allowed visitors free admission if they brought a dog or cat: they would watch it being fed to lions.”¹⁹ Such horrors have been inflicted in today’s world, to the alleged amusement for tourists sitting in buses in Harbin China as young calf are marched out to be devoured by tigers; to Copenhagen’s Zoo, where a healthy giraffe was shot so that four lions could eat it in front of visitors. And this is the madness in a city, Copenhagen, and a country, Denmark, revered by environmentalists for its largely green practices.

Now consider the scene in Icelandic Nobel Laureate Halldór Laxness’ **Independent People** (1934–1935)²⁰ wherein the young newlywed, Rosa slaughters the gimmer (a young sheep) at their home, Summerhouses. It is an indelibly gruesome scene; a heartless act of endless brutality that conjures millennia of some glaring truth beneath the scenery of rural life; the baleful pathology of human nature. When we turn towards that hope of true communion across species boundaries, we realize at once that the very formation of those walls and obstacles are surely more complex than all of our philosophies, psychoanalyses, and physics can demonstrate.

¹⁶ *ibid.*, Fagan, p. 217.

¹⁷ *ibid.*, Fagan, p. 217.

¹⁸ *ibid.*, Fagan, p. 242.

¹⁹ Fagan, p. 253.

²⁰ First published in two volumes in 1934/35; Halldór Laxness, *Independent People*, trans. by J.A. Thompson (London: Harvill Press, 1999).

Fig. 4.2 “A Starving Dog in St. Petersburg, Russia,” Photo © M. C. Tobias



A single week across the USA as documented by PETA best illustrates in word and pictures the landscape of a bereft humanity, as illustrated in the “Excerpts Cruelty Investigations Department—Week of June 13–17, 2016,” sent out on the 17th, Father’s Day in America. The “National Emergency Response,” as PETA calls it—exactly “200” incidents, each one more gruesome and outrageous than the next, encompassing species as diverse as cows, dogs, crows, cats, rabbits, ducklings, and many more: emaciated, trapped, tortured, in the unending abyss of deliberate human infliction.²¹

And one must not forget that 70 National Park “units” allow hunting.²² Moreover, many National Parks allow hunting right up to its borders, as if the animals are reading the signs.²³

²¹ Personal email from Ingrid Newkirk, President and Co-Founder of PETA, “Please don’t miss any of these mind boggingly sad cases in just one week,” 12.40 p.m., June 17, 2016.

²² National Parks Conservation Association US, “Hunting in the National Park System?” Blog Post by Jennifer Errick, April 25, 2012, <https://www.npca.org/articles/57-hunting-in-the-national-park-system>, Accessed June 17, 2016.

²³ National Park Service: Frequently Asked Questions: Firearms in National Parks, <https://www.nps.gov/mora/learn/management/upload/FirearmsPublicFAQs.pdf>, Accessed June 17, 2016.

Quantum Anthrozoology

In their endlessly fascinating study of quantum biology, Johnjoe McFadden and Jim Al-Khalili initiate the reader with something Einstein believed to be impossible but turns out to be true, namely “that quantum particles really can have instantaneous long-range links.”²⁴ With so much subatomic particle physics constantly making news, this should not come, necessarily, as a surprise. What was surprising, say McFadden and Al-Khalili was that in 1976 it was proved that the European robin possessed a rare navigational skill known as “magnetoreception,” and based upon the recognition that somehow “the angle of dip of the Earth’s magnetic field could be detected within an animal’s body,” or at least that of the European robin’s.²⁵ “Spooky connections,” and “the weird quantum property of entanglement.”²⁶ or, for short, “that spooky entangled connection that Einstein couldn’t accept.”²⁷ That same entanglement (also known as “nonlocality”), was shown in 1997 to enable rainbow trout in New Zealand (where the fish are nonnatives) to also utilize magnetoreception, and it was discovered how (at least in that species) they can “smell the direction of the Earth’s magnetic field.”²⁸

The authors explore the fact Plato had recorded Socrates as identifying that which separated inanimate nature from animate, in other words, that spooky thing which separates an allegedly lifeless grain of sand from a whale. It was “a soul” according to Socrates.²⁹ And, in the words of McFadden and Al-Khalili, something else: “proton tunneling in enzyme reactions” at the heart of all bio-molecules and hence of all life; “the discovery that some, and possibly all, enzymes work by promoting the dematerialization of particles from one point in space and their instantaneous materialization in another ...”³⁰

One fascinating glimpse into the potential resonance of such a concept is referenced by way of a particularly compelling discovery about the Orkney Island voles. They would go nowhere near a trap that had been baited with the scent of a predator that had not, in fact, ever stepped foot on the Orkneys for five millennia, namely, stoats.³¹ That level of olfactory sensitivity is only the beginning of the complexities and sophistication of species sensory acuities that go well beyond anything a primate, for example, might ever grasp, even in the annals of fiction, or so we assume.

If whatever borders constraining life remain to be better ascertained, so much more so the interrelatedness of all those life forms whose numbers, as sampled

²⁴ **Life on the Edge—The Coming of age of Quantum Biology**, Crown Publishers, New York, 2014, p. 15.

²⁵ *ibid.*, McFadden and Al-Khalili, p. 6.

²⁶ *ibid.*, McFadden and Al Khalili, p. 15.

²⁷ *ibid.*, McFadden and Al Khalili, p. 17.

²⁸ *ibid.*, McFadden and Al Khalili, p. 174.

²⁹ *ibid.*, McFadden and Al Khalili, p. 28.

³⁰ *ibid.*, McFadden and Al Khalili, p. 94 and p. 97.

³¹ *ibid.*, McFadden and Al Khalili, p. 139.

earlier, may come close to 10 to the 40th power of individuals. If we are to thoroughly gauge some level of the relational sensory intersects between them, incalculable as that task will forever be, imagine the more complicated scenarios before us at the cellular or atomic levels. Then add the barriers of the Anthropocene by which we have so demonstrably intervened, and the hurdles to understanding—while there is still time to even gather a hint of all that data—becomes a true race against time. One region, one country, one example.

The Many Glitches of Fairyland Zoology

Millions of gallons of toxic water burst from their containment at an iron ore mine in Brazil in November, 2015, polluting 300 miles of the Rio Doce river, leading into the Atlantic, an area already within the heart of the Mata Atlantica terrestrial biological hotspot (some 95% of the original forested habitat—gone), but in this case a river with a known 90 fresh water fish species, of which eleven had already been identified as verging on extinction. More than a dozen people have died and, as one reporter for the Los Angeles Times wrote, “With Brazil’s level of biodiversity, the die-off is likely to include an untold number of species that have yet to even be discovered,” some probably like the aggressive brain-eating amoebas, *Naegleria floweri*, that can cause the usually deadly Primary Amebic Meningoencephalitis in humans, and found in fresh-water lakes and rivers of South Carolina, among other places.³²

Our barriers to understanding the sphere of contact, of communications, are enshrined in the continuous catastrophes we unleash. But often, of course, there is no blame. Blame is a strange word, when coupled with nature. But that there has been no surcease in documented memory of such devastations, like that occurring throughout the 400 hundred years of human European occupation of the Mata Atlantica (the only South American region that was formally established as the capital of a European monarchy, ungainly Portuguese settlers who had no idea how to approach Amazonian indigenous wisdom with respect to *terra preta*, human-created black, sustainable soil) escalates the biospheric stakes in ways we cannot divine.

Even where the cascade effects, multiple levels of trophic collapse and interdependent vulnerabilities are fairly straightforward, as across Madagascar’s orphaned forest habitats, we are still left with vast gaps, in more ways than one. A recent study by Sarah Federman of Yale University’s Donoghue Lab and colleagues³³ showed

³²“As Brazil mine spill reaches ocean, its catastrophic extent becomes clear,” by Vincent Bevins, Monday, December 21, 2015, L.A. Times, <http://www.latimes.com/world/brazil/la-fg-brazil-spill-20151220-story.html>, Accessed December 21, 2015.

³³“Implications of lemuriform extinctions for the Malagasy flora,” Proceedings of the National Academy of Sciences of the USA. Federman S, Dornburg A, Daly DC, Downie A, Perry GH, Oder AD, Sargis EJ, Richard AF, Donoghue MJ, Baden AL. 2016, PubMed, See: “Lemur extinctions in Madagascar leave behind doomed orphan,” by Fred Pearce, New Scientist, 11 April 2016, <https://www.newscientist.com/article/2083800-lemur-extinctions-in-madagascar-leave-behind-doomed-orphan-trees/>, Accessed April 27, 2016.

very clearly that with the extinctions of “17 species of fruit-eating lemurs in the past few centuries ... many trees are now entirely dependent on the two largest surviving lemur species, the black-and-white ruffed lemur (*Varecia variegata*) and the red ruffed lemur (*Varecia rubra*).” And those two lemur species, upon whose robust fruit seed dispersal most of Madagascar’s 33 species of *Carnarium* hardwood depend, are themselves in rapid decline, extinction looming. When they’re gone the whole primeval system will collapse. We’re seeing this in region after region. And one cannot simply blame it on poverty, as much as we could easily blame everything or nothing concerning the lives of Others on poverty.

In places like South Carolina, poaching of endangered native plant species, particularly orchids, even in protected areas like the Francis Marion National Forest close to Charleston, has reached epidemic proportions, driving many plants—like the high mountain white fringeless orchid—to near extinction. It’s not just the plants that are illegally stolen, but giant areas of soil containing species-specific nutrients and dormant seed source that can be revived because most of the seized plants themselves will die.

The poachers—375 of whom were arrested in the first 9 months of 2015 in various parks just in the state of South Carolina—know all about the soil, the seeds, and the law.³⁴ These defiant criminals are not impoverished Malagasy trying desperately to feed their families with the proceeds of bush-meat. These are intangible, much vaunted *middle class* Americans.

Flawed Algorithms and Interpolations

Our interpolations are inevitably our own algorithms, our own sciences, whether we follow in the fashion of a Darwin or Lamarck, Buddha or Mahavira, Christ or Shakespeare, Raphael or Jan Van Eyck. It matters not. We are merely guessing like dowsers with forked sticks. We speak of clades and synapomorphies—the shared behavioral traits of a monophyletic common ancestor in the case of all the species of foxes, as well as all of the more than billion sheep, 1.2 billion captive pigs, 1.2 billion domesticated bovines, 600 million captive turkeys, 40 million+ captive burros, etc. But we are not capable of entering into their worlds, whether wild, captive, or domesticated. Even our companion animals who we love, often more than other humans, are mysteries to us. Day and night.

In 2005, one of scores of articles began to question the intelligence of cows and chickens and all the other “Animal Farm” characters.³⁵

³⁴See “Poachers seizing rare ‘on the brink’ native plants,” by Bo Peterson, The Post and Courier, September 26, 2015. <http://www.postandcourier.com/article/20150926/PC16/150929512/1005/poachers-seizing-rare-x2018-on-the-brin-x2019-native-plants>. Special thanks to Dr. Melanie DeVore. Accessed April 27, 2016.

³⁵“The secret life of moody cows,” Jonathan Leake, Science Editor, The Sunday Times, Published: 27 February 2005, http://www.thesundaytimes.co.uk/sto/news/uk_news/article100199.ece,

“Once they were a byword for mindless docility. But cows have a secret mental life in which they bear grudges, nurture friendships and become excited over intellectual challenges, scientists have found,” writes Jonathan Leake. And he reports on one scientist, Christine Nicol, a professor of animal welfare at Bristol University, who he says describes the fact that “even chickens may have to be treated as individuals with needs and problems. Remarkable cognitive abilities and cultural innovations have been revealed.”³⁶

Fig. 4.3 “Hen and Human Friend,” Photo © J. G. Morrison



Epiphanies at the Boundary Level

The epiphanies we feel in the company of wild, or companion animals—a joyous realm, to be sure—nonetheless makes the “planetary boundaries” all the more troubling. This is a concept, best realized by way of a recent compilation by Johan Rockström and Matthias Klum, which, with Peter Miller³⁷ defines both present and extrapolated end-of-the-century scenarios for nine such boundaries: “Climate change; Stratospheric ozone depletion; Rate of biodiversity loss; Chemical pollution; Ocean acidification; Freshwater consumption; Land-use change; Nitrogen and phosphorus pollution; and Air pollution or aerosol loading.”³⁸ Among the scenarios are a potential 4°C (7.2°F) increase in global temperatures by 2100, accompanying carbon dioxide concentrations of 560 ppm with the present loading of nine billion tons of carbon annually³⁹; the fact our species has already “undermined 60 % of key

Accessed April 2, 2016.

³⁶ *ibid.*

³⁷ **Big World Small Planet—Abundance Within Planetary Boundaries**, Yale University Press, New Haven and London, 2015.

³⁸ *Ibid.*, Rockström et al., p. 67.

³⁹ *ibid.*, Rockström et al., p. 39 and 54.

ecosystem services in support of human wellbeing;⁴⁰ “local-to-regional scale thresholds” which, in other words, fall under the radar of global data and in innumerable ways go far towards further undermining the resiliency of the biosphere. Write the authors, “there’s ample evidence that gradual changes in key variables such as biodiversity, harvesting of biomass, soil quality, fire, water flows, or nutrient cycles can trigger abrupt changes when critical thresholds are crossed in ecosystems such as lakes, forests, or coral reefs.”⁴¹ Such bottom-up, as opposed to top-down planetary boundary impacts have inordinate sway over the entire life force of Earth, and come down to two “core boundaries,” namely “climate and biodiversity.”⁴² Underscoring the climate crisis in a perspective hard to turn away from, the authors point to the following: During all of 2 weeks in July 2012, Greenland’s ice went from bright and reflective, to darker and absorbing; from net cooling to net heating, such that it released “300 exajoules (EJ), (10 followed by 18 zeros) of energy into the atmosphere” which is half of the world’s entire annual energy use.⁴³

The prospects for assuring temperance within the boundaries is all but shot. If, as Rockström, Klum, and Miller indicate, we must maintain at the very least 85 % of all tropical and boreal forests, and at least 50 % of temperate forests⁴⁴ then the chances of preventing total biological collapse have already passed us by, with some one third of all tropical forests gone, and nearly 50 % of all trees on Earth, gone. Extinctions cannot be remedied once their preconditions have been concretized. Hence, the ethological sciences are in so fragmented a state as to leave only traces of what is possible, at the planetary level. By 2009, the authors suggest humanity had already broken through a third of the nine planetary boundaries, including “climate change, rate of biodiversity loss, and the global nitrogen cycle.”⁴⁵ These barrier breaks have been economically analyzed by a number of assessment strategies including the UN Millennium Ecosystem Assessment, and the Economics of Ecosystems and Biodiversity (TEEB) studies. Three barrier breaks are equivalent to about 23 % of the planetary (human) GDP, but applying economics to this crisis is not our goal, nor is it remotely realistic. We simply cannot possibly grasp true biological value and those village microcosms and city sectors that have been applauded for their noteworthy wildlife and carbon-free resiliency experiments cannot remotely mirror a world of nearly 7.4 billion people, 95 % of whom are meat eaters and energy consumers. Some 50 % of those slaughtered animals end up as waste—they are not even eaten—150 kg (330 lb) per person in Europe.⁴⁶ Measuring such nonlinear correspondences between human demographics, consumption, extraction and biodiver-

⁴⁰ *ibid.*, Rockström et al., p. 43.

⁴¹ *ibid.*, Rockström et al., p. 69.

⁴² *ibid.*, Rockström et al., p. 71.

⁴³ *ibid.*, Rockström et al., p. 81; See also, “The NOAA Annual Greenhouse Gas Index (AGGI),” by James H. Bulter, and Stephen A. Montzka, Earth System Research Laboratory, Updated Spring 2016, <http://esrl.noaa.gov/gmd/aggi/aggi.html>, Accessed May 27, 2016.

⁴⁴ *ibid.*, Rockström et al., p. 76.

⁴⁵ *ibid.*, Rockström et al., p. 88.

⁴⁶ *ibid.*, Rockström et al., p. 184.

sity loss will surely be improved by the Global Observation System of Systems (GEOSS)⁴⁷ but the data does not begin to penetrate the communication shields. We can't see or hear or read what's actually happening. Communion data between species is so biased on so many human-induced levels as to be little more than a tease.

What we can see and hear involves morphology and field work. Back in the lab, we come upon the classic dilemmas of biodiversity research: ontogeny (the individual organism's development) versus phylogeny, the species' evolution, involving phylogenetic inferences that encompass traits that can be passed down. Phenetics looks for similarities between species. The systematics of the phylogenetic trees involve both cladistics and what is known as evolutionary taxonomy, wherein the differences between the evolution of an individual and of the species are merged to the extent methodically possible. Definitions are stifling and biologists continue to grapple in their search for more enlivening and tactical strategies for the meaningful naming of living organisms. By doing so, our various approaches to taxonomy enable us to come closer to recognizing the extent of these planetary and core boundary regions and their inhabitants, and, hopefully, finding socially accepted means of reconciling our species with as many others as possible. The great scientific tease made exponentially more frustrating. It is a daunting task, as underscored most recently in the treatise, "Avoiding collapse: Grand challenges for science and society to solve by 2050," with its extensive bibliographical record that firmly establishes highlights of humanity's awareness of the aforementioned challenges.⁴⁸

Imagination That Translates into Biological Success

Across the dizzying array of anthrozoological challenges, the key, we believe, to unlocking all of the daunting challenges that have backfired on human arrogance and arrogation, fundamentally addressed by our very inchoate natures, is that realm of human predilections that are, quite simply stated, *interested* in Others. An imaginative need that is akin to the chief precondition for true engagement, authentic collaborative virtue, biophilia. That means continuing to strive to understand the Others: Those whom naturalist George Ord first named the "terrifying bear" (*Ursus horribilis*) in 1815, referring to all of America's *U. arctos* spp.; but it also means the ravens in Bhutan (that nation's national bird) and Beatrix Potter's Flopsy Bunnies. The primary task of our human generation—other than to survive—is to imagine the infinite imaginations of our fellow species. We may never achieve fluency in any other animal or plant language, but we are coded in our own ineffable mysteries and this unreachable design quality of our own dreams, reveries and cognition is mirrored in the same qualia that is that of all Others. Hence, a common language of the

⁴⁷ *ibid*, Rockström et al., pp. 155–156.

⁴⁸ By Anthony D. Barnosky, Paul R. Ehrlich, and Elizabeth A. Hadly, *Elementa: Science of the Anthropocene*, doi:10.12952/journal.elementa.000094, <https://elementascience.org/articles/94>, Accessed March 24, 2016.

unknowable. That is, in and of itself, sufficiently relatable, the pensive prowess of all species. This inwardness sweeps the biochemical world and we are free to peruse it, not under any duress but for the bountiful poetry that is rewarded those who attempt the transactions and metaphysical transports between species.

In examining, for example, “large-brained social animals such as corvids,” scientists have realized extraordinary truths regarding “convergent evolution” as more and more species, in orienting to the massive planetary boundaries outlined above, find themselves developing a common currency of response strategies to ecological stress imposed by humans. Some species will be successful in doing so; many will not. Imagine, for example, if climate change were to utterly obviate the biological preconditions for all mammalian hibernation. What then? Would squirrels fare better than bears?

The more than 120 species of the Corvidae family have mental repositories encompassing “causal reasoning, flexibility, imagination, and prospectation”—the clear ability to think into the future.⁴⁹ That Black-Billed magpies (*Pica hudsonia*) recognize themselves in a mirror, and one would surmise California Yellow-Billed Magpies (*Pica nuttalli*), as well⁵⁰; that Caledonian crows (*Corvus moneduloides*) use at least two kinds of tools (curved sticks for probing).⁵¹ These are merely minute components of a vast revolution in our understanding of Others pressing hard for new, revitalized views regarding the future of taxonomy that levels the playing field according to violence, nonviolence, success and failure—not reproductive success, but durability as an organism against the onslaught of ourselves.

How we *choose* the criteria; methodologies of inquiry; yardsticks of measurement; self-effacement for purposes of negating bias, will be critical in formulating detours in our itineraries and ethical boundaries between *in vivo* and *in vitro*. Outright *discussion* with Black Bears—as we think of the term—in the circumstances described earlier, will be all but impossible. Nor can we build scientific understanding on simulated encounters, or the accumulation of anecdotes derived from individuals who have survived some form of attack of a predator and are in the process of being rushed to ER. This is tricky business. There are guidelines—breached by the very prisons themselves—within biomedical labs. Out in the wild, common sense etiquette and humility must dictate the terms of engagement. Many people will have little guidance in navigating such critical waters, and this is a big problem for biosemiotics.

Ultimately, achieving some kind of revelatory basis for claiming knowledge gains suggests that true biological success involves a working imagination. Is there

⁴⁹ See “The Mentality of Crows: Convergent Evolution of Intelligence in Corvids and Apes,” by Nathan J. Emery and Nicola S. Clayton, *Science* 10 Dec 2004. Vol. 306, Issue 5703, pp.1903–1907, doi:[10.1126/science.1098410](https://doi.org/10.1126/science.1098410), Accessed January 9, 2016.

⁵⁰ Excerpt, “The Thing With Feathers; The Surprising Lives of Birds and What They Reveal About Being Human,” by Noah Snyder, March 26, 2014, Audubon, <http://www.audubon.org/news/excerpt-thing-feathers-surprising-lives-birds-and-what-they-reveal-about-being>, Accessed May 21, 2016.

⁵¹ See <http://www.sciencemag.org/content/297/5583/981.short>, Accessed January 10, 2016.

a jumping spider, an octopus, a Borneo leopard who has what Mozart had? We think, absolutely “yes.” But by what tests, or rules of the game, or philosophical outlines do we establish reliable baselines for such *eurekas*? And, more importantly, who is counting? We wouldn’t be obsessed with measurements à la an Eratosthenes’ sieve, Ptolemy’s **Almagest**, an Archimedes’ “Sand Reckoner,” Newton’s Unit (Second Law of Motion), Planck or Einstein (1) if we weren’t a curious organism and (2) if we weren’t concerned about the causes and consequences of our ecological behavior as a species as it affects all others. That so many people do care conveys the hope of a human conscience and its prospects in a wounded world. And so we try to save frogs and trees, and keep the water clean, against odds—the number of human consumers on the planet—that are daunting.

Take, as but one cautionary example, the whistling, burrowing Mozart (*Eleutherodactylus Amadeus*) and Hispaniolan Ventriloquial frogs (*Eleutherodactylus dolomedes*). Both species were long thought to be extinct within Haiti’s Massif de la Hotte and Massif de la Selle, mountain regions rising above the southern coastlines near Les Cayes, the French community within Saint-Dominque, now known as Haiti, where John James Audubon was born in 1785 and spent his first 6 years.⁵² These two frog species were rediscovered as a result of a determined expedition by Conservation International’s Amphibian Group, led by specialist Dr. Robin Moore in partnership with Dr. Blair Hedges of Pennsylvania State University. They actually rediscovered a total of six allegedly lost amphibian species. Was this kind of expedition noninvasive, ethical by the best anthrozoological practices, such as we have been intimating/proposing? Particularly in a country with much more on its mind than lost frogs, following the devastating 2010 earthquake? Probably, yes. Forty-eight native Haitian amphibians were assessed by the expeditions and, ultimately, would help substantiate high rates of Hispaniolan endemism (a hotspot within the Caribbean hotspot); and thus the critical importance for galvanizing support of the nation’s first national park, Pic Macaya, a 150-km² heaven that, in re-stabilizing the watersheds and extending intergenerational ecotourism jobs and revenues for a deeply economically marginalized population of several hundreds of thousands of Haitians, could only be viewed as a winning combination of solutions.

⁵²Conservation international, “Mozart and Ventriloquial Frogs Sound A Note Of Hope And Warning For Haiti’s Recovery,” 1/11/2011, http://www.conservation.org/NewsRoom/pressreleases/Pages/Mozart_Ventriloquial_Frogs_Hope_For_Haiti.aspx. Accessed May 21, 2016.

Fig. 4.4 “Pic Macaya National Park, Southwestern Haiti,” Photo © M. C. Tobias

The park comports with habitat, wildlife and human needs—needs of good family planning, medical care in general, education, jobs, safe drinking water—while also recognizing and satisfying ancestral spiritual traditions of communal commons and sacred trees within the circumspection of local Haitian Vodou. Those are some of the key cornerstones of any conservation balancing act. Haitian national park protocols are a good template for the rest of the world (as are those of Easter Island’s Parque Nacional Rapa Nui). In both cases, scientists, community leaders and policy experts are starting from enormous ecological deficits and trying to rebalance the biological budgets. So here are two telling case studies in defining ethical boundaries within responsible contexts. Most other countries in the world are commencing higher up on the scorecard of sustainable ground-rules.

In terms of the specific language-processing, interspecies communication data streaming from the re-discovery of these Haitian species, the very decision to attribute Mozart’s name, enlivens the science, the interest, the imaginative quest to restore ecological balance to whatever extent in the southwestern wilds of a country that has lost the vast majority of her primary canopy.⁵³

⁵³ See <http://www.haitian-truth.org/how-a-single-national-park-might-help-transform-a-nation-haitis-pic-macaya/>, Accessed May 21, 2016.

Fig. 4.5 “Pigeons and Humans in a Mexican Plaza,” Photo © M. C. Tobias



The Pigeon Test

Another way to assess the extent to which humanity is making strides in formulating protocols that are ethical is to consider our relationship with an easily observed group of birds who seem to have forgiven *H. sapiens* our past transgressions, namely, the family known as Columbidae, with its approximately 310 species of pigeons and doves. While their history has been celebrated, humans eat them, destroy them by any number of means, and have fashioned entire industries to “control” them. Yet it is estimated that there are probably no more than 400 million pigeons left in the world today.⁵⁴ That is a shockingly low number, considering that in mid-nineteenth century America, there were billions of just one of those many hundreds of species, the Passenger Pigeon (*Ectopistes migratorius*) and we assiduously made sure she went extinct by 1914, just in time for us to kill 17 million and injure and maim another 20 million of ourselves in World War I.

Pigeons, like hens, chickens and roosters, display astonishing diversities, behavior, social bonds, language and song, as well as beauty in most human’s eyes, certainly all those who delight at St. Mark’s Square in Venice and, before the laws

⁵⁴ See <http://ovocontrol.com/pigeons/pigeons/>, Accessed May 22, 2016.

turned squeamishly anti-pigeon, Trafalgar Square in London.⁵⁵ That same zoophobia can be seen in laws against feeding birds from Paris to Pasadena.⁵⁶ Ironically, it is in England's National Gallery, abutting Trafalgar, that the British Empire keeps one of its most touching and important works of art—along with a vast litany of paintings depicting horses, cows, sheep, and any number of other animals, both dead and alive—but, in this stated instance, we are referring to Titian's "Boy With A Bird,"⁵⁷ circa 1520s.

Pigeons have been awarded medals of heroism in war. One pigeon, Cher Ami, saved the 77th Division in the Battle of the Argonne in the autumn of 1918. One would hope such commendations might gain traction in a "general election" favoring pigeons; that a pigeon test might be employed to determine the humanism of any town, with its plaza; of any city and her denizens; of any country and the citizenry who either love, or, at worst, ignore pigeons. We have seen similar celebratory status granted monkey and rat temples in Nepal and India, Australia's Norfolk Island given over to cows, a cat island (Tashiromima), rabbit island (Ōkunoshima) and dragonfly parks in Japan, protected dogs and cows across the roadsides of Bhutan, revered Marsh Rabbits in the Florida Keys, Pig Island in the Big Major Cay (Bahamas), Ilha de Queimada Grande, the Snake Island off the coast of Brazil (teeming with Golden Lancehead Vipers), the U.S. Fish and Wildlife Refuge, the Farallon Islands, 28 miles west of the Golden Gate Bridge, Wrangel Island in Russia, between the Arctic Ocean's Chuckchi and East Siberian Seas, the rhesus monkeys on Cayo Santiago in Puerto Rico, the wild horse island (Assateague, in Maryland), live butterfly pavilions in London and Los Angeles, and gardens—everywhere, Beatrix Potter's house, and the outer green corridors of Kyoto being the historic global epicenters of this ancient human–nature affiliation.⁵⁸

⁵⁵ See Pigeons: The Fascinating Saga of the World's The Naturalist's Library: Ornithology. Vol. V. Gallinaceous Birds, Part III. Pigeons, William Jardine and Prideaux John Selby, Most Revered and Reviled Bird, by Andrew D. Blechman, Grove Press, New York, NY, October 10, 2007. See also: Published by W.H. Lizars, Edinburgh (1835); and es Pigeons. KNIP, Antoinette Paulette Jacqueline (1781–1851)—TEMMINCK Conrad Jacob (1778–1858). Published by Paris: Mame for Mme Knip and Garneray, [1808–] 1811.

⁵⁶ See <https://www.cabq.gov/environmentalhealth/urban-biology/pest-management/pigeons>; <http://www.dailymail.co.uk/news/article-394624/Pensioner-fined-50-feeding-pigeons.html>; <http://blog.sfgate.com/stew/2013/07/25/feeding-sf-seagulls-illegal/>; <http://www.woking.gov.uk/planning/envhealthservice/pest/pigeon>, Accessed May 23, 2016.

⁵⁷ NG933.

⁵⁸ See Atlas Obscura, "Animal Islands: Seven Islands Ruled by Creatures Great and Small," by Allison Meier, November 18, 2013, <http://www.atlasobscura.com/articles/guide-to-animal-islands>, Accessed June 4, 2016).

Fig. 4.6 “Visitors Meditating on the World’s First Signed Sand Garden, Ryoan-ji, Kyoto,” Photo © M. C. Tobias



UNESCO’s Creative Cities Network, founded in 2004, has 116 city members from dozens of countries, the idea being to nurture creative and sustainable urban environments.⁵⁹ The European Wilderness Society has developed its own Pan-European Green Corridor Network⁶⁰ There are humane networks throughout the world⁶¹ and greening trends everywhere—from cities with the most animal-friendly hotels, vegetarian-only condo complexes in Mumbai, to animal-friendly airlines. All of this should make a pigeon test a rather basic requirement for any Metropolitan Statistical Area (any urban conurbation with a minimum of 50,000 human residents).

When a village or city celebrates an animal, or identifies with a species, people take note. Explorer Ruth Harkness brought the first Giant Panda to the USA in 1936 and a contagion of celebrities and the public far and wide came to visit the bottle-fed Su Lin at the Brookfield Zoo outside Chicago.⁶² A Cephalopod, Inky the Octopus, plotted and successfully executed his own “Great Escape,” (the movie was in 1963) playing the roles of Steve McQueen, James Garner and Richard Attenborough, along with Director John Sturges all in one, the night he slipped through a labyrinth of constraints at the National Aquarium in Napier, New Zealand, successfully disappearing back into his home, the Pacific Ocean, having gotten through drain pipes and racing crossing many floors. Another Octopus named Paul picked all the winning teams in advance of Germany’s 2010 World Cup in South Africa, making quite a

⁵⁹ See <http://en.unesco.org/creative-cities/home>, Accessed May 22, 2016.

⁶⁰ See <http://wilderness-society.org/pan-european-green-corridor-network/>, Accessed May 22, 2016; See also, **Global Green Infrastructure: Lessons for Important Policy-Making, Investment and Management**, by Ian Mell, Taylor and Francis Group, 2016.

⁶¹ For one example, see <http://humanenetwork.org/>, Accessed May 22, 2016.

⁶² Harkness, Ruth. **The Baby Giant Panda**, 1938. New York: Carrick & Evans. p. 36.

name for himself; while many other Octopoda have lent glory to their urban captors by simply escaping human confinement.⁶³ These are all very sick kinds of enthusiasm, which should, in a logical world, put a mirror to just what is actually going on.

How can we feel confident of the Mozart frog analogy? Why must we be certain? “Certainty” would prove nothing; facts can be feckless in their influence; nor would some ecological “Day the Earth Stood Still”⁶⁴ or “The Voice of the Dolphins”⁶⁵ necessarily change the politics of our relations with other species. This is **Animal Farm**⁶⁶ writ on a planetary level where the ramifications of our acquired wisdom and religion have never consistently granted relations between people, let alone those causes and effects engulfing people in their orientations to personages of other species, any peace of mind.

Regardless of the measures likely to be enacted or not by our ever involving research into the minds of our fellow creatures on this planet, there is a fast-looming reality: we are most certainly newcomers to a biosphere buzzing with intelligence, wit, playfulness, imaginative solutions to problems, and creative juices, so to speak. This is the reality, a remarkable discovery in our backyards that changes everything—or it should; a backyard, in the most sublime sense, that will be examined later on this work.

Fig. 4.7 “Burro and Young Lady,” Late 19th century Anonymous Photograph, Private Collection, Photo © J. G. Morrison



⁶³ See “Octopus Escapes From an Aquarium in New Zealand,” by Dan Bilefsky, *The New York Times International*, April 14, 2016, p. A8.

⁶⁴ Twentieth Century Fox Corporation, 1951 based upon the novel, *Farewell to the Master*, [from *Astounding Stories* by Harry Bates, October 1940], Screenplay by Edmund H. North, Directed by Robert Wise.

⁶⁵ **The Voice of the Dolphins and Other Stories*, by Leo Szilard, Stanford University Press, Palo Alto, CA 1961.

⁶⁶ *Animal Farm: A Fairy Story*, by George Orwell, Secker and Warburg, London, UK, 7 August 1945.

Animal Intelligence That Challenges Our Own

Rex Harrison, as the character of Dr. Dolittle, declares that Polynesia, his companion Blue and Gold Macaw, must start teaching his languages to Dolittle at 7 a.m. the following morning. Singing Harrison, “If I could talk to the animals! Just imagine it ...”⁶⁷ Dr. Onur Güntürkün, a Professor of Biological Psychology in the Department of Neuroscience at the Ruhr-Universität Bochum⁶⁸ has been in the forefront of shaping that volition, confirming that the absence of laminated brains in birds, unlike the evolution of the brain in mammals, has not disadvantaged them. Rather, they have achieved a similar range of what is generally thought of as human “cognitive competence.”⁶⁹ This would not have surprised Hugh Lofting, author of the 22 Dr. Dolittle books, between 1920 and (posthumously) 2000, nearly 2500 pages of deliriously ethological meditation.⁷⁰

Says Güntürkün, “corvids use just 8.5 g of brain, whereas chimps need 400 g or more.”⁷¹ In accord with a wave of recent data suggesting that “birds may have miniaturized their brains to the extent that they have much smaller and much more densely packed neurons,” says Güntürkün, pigeons, to take yet another species example, have “ended up with a brain that has the same molecular mechanisms, the same kind of internal connectivity and organization, and the same kind of thought as a mammal’s brain, with high cognitive abilities, including self-recognition.”⁷² Such revelations go well beyond the state-of-the-art presumption of a decade ago regarding the allegedly superior evolution of the mammalian brain.⁷³ In those epiphanies was put forth the hypothesis that “a new layer of granule cells, giving rise to the laminated isocortex”—as projected to being necessary “to support fine topography in their [mammalian] sensory maps”—was analyzed.

More recently much weight has been added in favor of a new and necessarily transformative taxonomical perspective, coming out a whole wave of “sentience” studies. The emergence of the journal, “Animal Sentience: An Interdisciplinary Journal on Animal Feeling,”⁷⁴ a publication of the Humane Society Institute for Science and Policy, premiered its first issue, of 2016, in which the first published

⁶⁷Lyrics/Music: Leslie Bricusse / Album: “Dr. Dolittle,” Publisher: 20th Century Fox/Hastings (1967) ASIN: B001THI2RQ, <https://www.youtube.com/watch?v=tOvIKgoeP4s>, Accessed May 23, 2016.

⁶⁸See <http://www.rd.ruhr-uni-bochum.de/neuro/index.html>, Accessed January 27, 2016.

⁶⁹See <http://www.sciencemag.org/content/306/5703/1903>, Accessed January 28, 2016.

⁷⁰See **The Metaphysics of Protection**, by M. C. Tobias and J. G. Morrison, A Dancing Star Foundation Book, Waterside Press, 2014, pp. 62–84.

⁷¹See “‘Animals do think’—surprising insights into the evolution of cognition and communication,” by Marilyn Larkin, 19 December 2013, pp.4–5, Neuroscience, <https://www.elsevier.com/connect/story/scientific-discovery/neuroscience>, Accessed December 25, 2015.

⁷²*ibid.*, Larkin, p. 5.

⁷³See, for example, “The evolution of mammalian cortex, from lamination to arealization.” Montagnini A., Treves A., *Brain Res Bull.* 2003 May 30;60(4): 387–93, PubMed.gov; <http://www.ncbi.nlm.nih.gov/pubmed/12781326>, Accessed February, 3, 2016.

⁷⁴See <http://animalstudiesrepository.org/animsent>, Accessed March 2, 2016.

essay by Steven Harnad concerns “Animal sentience: The other-minds problem,”⁷⁵ its Abstract commencing with something of a credo: “The only feelings we can feel are our own. When it comes to the feelings of others, we can only *infer* them, based on their behavior—unless they tell us. This is the ‘other-minds problem.’” In Donald M. Broom’s essay, “Considering animals’ feelings—Précis of Sentience and animal welfare,”⁷⁶ the scope of his concerns encompasses much of the periphery-free expanse of this new taxonomic topography. Broom includes such pivotal challenges to researchers as the declaration that “major change in attitudes regarding awareness and feelings in human and other animals has occurred as studies of behavior have become more detailed.” The fact that “Sentience implies having a range of abilities, not just feelings” and that one of those abilities could be construed as “moral behavior [as] a successful strategy used by both human and nonhuman individuals”; that “estimates of brain sophistication should take account of function rather than anatomy alone because animals vary in the parts of the brain that have complex analytical functions” all, in turn, segues into the (not surprising) embrace of the fact that “spiders have substantial cognitive ability and perhaps executive awareness”; that “there is clear evidence for aspects of a pain system in gastropod molluscs, such as snails, slugs, and swimming sea slugs”. In fact, says Broom, “All vertebrates, including fish, as well as some molluscs and decapod crustaceans, have pain systems.” And he is ultimately compelled to speculate, “Are there any solely human qualities?”⁷⁷

Fig. 4.8 “Nephilia Orbweaver in southern Suriname,” Photo © M. C. Tobias



⁷⁵ Animal Sentience 2016.001, <https://isc.uqam.ca/en/component/savrepertoireprofesseurs/ficheProfesseur.html?mId=ZOAHV0jyfrM>, Accessed March 6, 2016.

⁷⁶ Broom 2014, Centre for Anthrozoology and Animal Welfare, University of Cambridge, Animal Sentience, Issue Number 5, Accessed March 6, 2016.

⁷⁷ *ibid.*, Broom.

When one comes upon a bird like the Brown Thrasher (*Toxostoma rufum*), Georgia's State Bird, in the Mimidae Family, along with Mockingbirds, and the two New World catbirds, the Gray and Black, a serious problem arises as an example of how little we know, in answering that question. While the Brown Thrasher was first recognized by Mark Catesby in his monumental **Natural History of Carolina, Florida and the Bahama Islands** (the first such biological account in North America, published between 1729 and 1747), and subsequently identified (though named differently) by Audubon, the primary difficulty in grasping the eloquence and complexity of the Brown Thrasher is in its communication/musical skills. This largely monogamous species (surrounded by a complex of 171 protected species in Georgia [read: species that are vulnerable to extinction])⁷⁸ is, in essence, one of the Mozarts of North American birds, from what has thus far been heard: between 1100 and approximately 3000 *different* songs. The red-eyed Vireo sings as many as 20,000 songs per day, and much of that music has been thought of by people as if this elegant little songbird is perpetually asking questions and finding the answers, musically. The great North American tenor, Plácido Domingo is known for a repertoire of at least 150 works, in six languages. Comparisons are difficult. Friedrich Schiller, who wrote the poem "Ode an die Freude" ("Ode to Joy") in 1785⁷⁹ and from which Beethoven borrowed the text for his final movement of the Ninth Symphony, is said to have lamented the fact that this poem was somehow not in touch with reality. So something else was going on in the author's mind. And as for Beethoven, deaf to the music of birds by the time of his monumental composition, slowly dying, in part, from lead poisoning, relying on pre-acoustical memory, we will never be able to decipher that mystical genius that was able to adopt a depressed poet's words into so sublime a context. But if an indecipherable Viennese composer could do it, imagine what Brown Thrashers and red-eyed Vireo's are doing.

This is why anthrozoology is particularly an esoteric science: we simply know very little about our fellow life forms. Indeed, we know little about the "Beethovens" in ourselves. This craving across the blurred abyss of species is certainly elicited in such musical passions as Bach's wonderful Cantata, "Hertz und Mund und Tat und Leben" ("Heart and mouth and deed and life"), BMV 147, ten parts, first performed July 2nd, 1723. By those four parts, we have a gorgeous Oratorio, suited to every Christmas and must surrender to enjoyment, as opposed to analysis. Fortunately, with Bach, as with Domingo, and the Brown Thrasher, it is easy to do so, as has been the perennial case with the argument in countless guises for biophilia, and for such Big Categories as Faith, Hope, and Love.

Recently, Helen MacDonald, author of "**H is for Hawk**" penned an essay, "Why Do We Feed Wild Animals?"⁸⁰ in which she referenced a brief history of the wild animal feeding passion, including mention of the nineteenth century children's

⁷⁸ See <http://www.georgiawildlife.com/node/1366>, Accessed March 30, 2016.

⁷⁹ See <http://lucare.com/immortal/ode.html>, Accessed June 17, 2016.

⁸⁰ Helen MacDonald, The New York Times Magazine, January 6, 2016.

Dicky Bird Society whose pledge involved a love of other creatures, and the leaving of food for any number of vertebrate species, not just birds. In his landmark essay, “On the semiosphere,”⁸¹ the late Estonian, Juri Lotman (1922–1993) who taught at the University of Tartu, wrote, “Meaning without communication is not possible. In this way, we might say, that dialogue precedes language and gives birth to it.”⁸² By this wonderfully ecstatic prelude he edges into the notion (or “phenomenon” as he likens it) of “texts within texts”⁸³ and concludes, “After all is said and done, we can reduce these two axes to one: the development of right-left; that which, from the genetic-molecular level to the most complex information processes, forms the basis of dialogue—the basis of all meaning-making processes.”⁸⁴

Fig. 4.9 “Cecina River Valley, Tuscany, Italy,” Photo © M. C. Tobias



And

⁸¹ First published in Russian in 1984—*O семииосфере*—, translated by Wilma Clark and published in 2005 in *Sign Systems Studies*, 33(1): 205–229 in 2005.

⁸² *ibid.*, Lotman, p. 218.

⁸³ *ibid.*, Lotman p. 225.

⁸⁴ *ibid.*, Lotman p. 225.

Fig. 4.10 “Pool Frog in the Cecina River Valley, Tuscany, Italy,” Photo © M. C. Tobias



The Semiosphere

These linguistic implications for ethology of a planet-wide semiosphere are stunning. They enshrine the presupposition that our connection to all those Others is comprehensive: a full-body, mind, spirit, emotional, and psychological confluence that defines the biosphere. By that we are suggesting that there are illimitable interdependencies, prior to, during, and presumably well beyond the words and music we employ to grapple with this endlessly engaging choreography of living beings, ancestors, and future generations. The semiosphere is that world of passing signals emitted and received at every conceivable and inconceivable level, from subatomic motion and formation to electrical and magnetic conductivities; from psychic nuances to sensory confirmations. The cognitive mirrors that we perpetually gaze into, whether subliminally, or in the acutely present; whether as a subconscious reflection of our entire phylogenetic ancestry or in those premonitions which both haunt and look forward to communion with other species, are fundamental to our survival and self-appraisals.

Since the time of Don Griffin’s book, **The Question of Animal Awareness** (1976) “consciousness” in other species as been largely accepted by the zoological

community as a given.⁸⁵ Bees have most assuredly been perceived as having minds of their own. But this is not only obvious but beyond all species barriers, from invertebrates to viral, bacterial and prion species. As we have written elsewhere, between our (Jane and Michael) 206–270 bones and some 100 billion neurons in each of our brains, we weigh between us approximately 4480 ounces, whereas the average fly weighs in at 0.00035th of one ounce. Now, consider this premise: If we giants are not willing to spare a fly, what is the prognosis for a blue whale? The question is germane to the noösphere, that conceptual/spiritual realm in which the sum of our thousands of genetic generations are challenged to adopt a *new nature* that rises above self-importance, embracing instead both the fly and the blue whale. This is anthrozoology in its purest doctrine.

Albrecht Altdorfer's painting "The Battle of Alexander at Issus" of 1529 reveals what most military historians believe to have been between 25,000 and 108,000 soldiers. Between 1580 and 1590 the Flemish engraver Jan Sadeler, in his epic seven works, "Creation of the World," specifically Day Five, also populates his little piece of paper (7.7×8.8 in.) with hundreds of creatures, intimating tens-of-thousands of others. They have been squeezed by human conscience into artistic harmony that fully abides by some underlying unanimity such as Max Planck envisioned: a golden age, or Renaissance *aetas aurea* of consciousness even at the subatomic particle level, which Planck called a "constant" and for which, under different characterizations he won the Nobel Prize in 1918. As indicated earlier, all these numbers have biological significance that should not be underestimated. The brilliant spasm of Phanerozoic adoptions of hardened shells and vertebrate life forms (the last 542 million years of biological evolution encompassing the Paleo, Meso, and Cenozoic eras—*Era* from the Greek meaning "make life appear")—represents a protective legacy that is driving all forms of safe harbor today, from the deep-sea octopus (*Graneledone boreopacifica*) who nurtures some 160 eggs for up to 4 1/2 years, to the 590 day maximal limit of gestation for a Humpback Whale (*Megaptera novaeangliae*). Protection, *Aegis* in ancient Greek, is the key to such anatomical predilections and communication, by every conceivable means, that transpire between mother, father and offspring. It is emblematic of a semiospheric potential which we take to be—not a barrier between species, but the point of contact, or biological edge, where anything is possible, every gaze a valuable precursor to co-imagination and co-amelioration. Because remember, our hopes to assuage the pain in other species, the goals of ahimsa, or nonviolence, is a reciprocal promise.

⁸⁵New York: Rockefeller. University Press, 1976.

Fig. 4.11 “Bhutanese Schoolchildren,” Photo © M. C. Tobias



This is a crucial departure from the Darwinian blockades erected ideologically between species for purposes of delineating reproductive capacities. Even among whales, there have been at least a dozen recorded hybridizations between fin and blue whales. Christian de Duve has written, “there is no such thing as the living cell. There are only living cells . . .”⁸⁶ Think of this as: in biology the idea of a barrier is a very tenuous one, and certainly no ideal. There may be reflexive *default buttons* in the behavioral delineations, but that is not destiny.

Similarly, and with deeply added behavioral nuance, the biologist Theodosius Dobzhansky, in reflecting upon natural selection said that “a really solitary animal is a rare phenomenon” and that “the fittest may also be the gentlest.”⁸⁷

Whatever states of being and information processing evolution is actually revealing to our lenses of perception, the blur between individuals connotes a commensalism of thought without limit. We know this to be true instinctively. It is instinctive in humans to make connections, not breaches; to form bridges rather than chasms. It is easier for us to add than to subtract; to construct rather than deconstruct. Such potential favors species collaborations, not disassociation. Conversely, when Picasso completed his perfect sketch of a bull, the result of 11 lithographs in 1945 and 1946, each rendering with fewer strokes, he is famously quoted, “A picture used to be a sum of additions. In my case a picture is a sum of destructions.” His de-construct-

⁸⁶ **A Guided Tour Of The Living Cell**, Volume One, Illustrated by Neil O. Hardy, Scientific American Library, New York, N.Y. 1984, p. 1.

⁸⁷ **Mankind Evolving—The Evolution of the Human Species**, Yale University Press, New Haven Connecticut, 1962, pp. 132–136.

tionist point alludes to a profound ambiguity in all translations: we can describe them as simple or as complex. Add meaning, or suggest meaning through minimalism. John Ruskin worried that the emergence of the new world of photography would kill the art of landscape painting. But we have learned over time that details are infinite and so are the opportunities for greater and greater understanding, compassion, and the celebration of that which we *don't* know or understand. At some point we must surrender to joy.

When answers to questions are not forthcoming; when responses from other species confuse us, cannot be sorted out, reject our version of story-telling and logic, as they almost entirely do, we fill the dystopian abyss with our singular hubris. We feel our profound isolation. As the only entirely arrogant species we can be certain that this attitude of Self, this quality of mind that rejects distribution of individuality throughout our families and communities has resulted in a massive restriction. We have restricted the boundaries of our concessions to the Others, but there can be no doubting the contributory elements inherent to the biospheric processes that give rise to species deeply choreographing their relationships in real-time, for purposes that obviously must perpetuate diverse life forms, attachments between and betwixt species—we've known this for at least 200,000 years—born of shared habitat and desire and curiosity. In other words, the intransitive in all linguistics, that which has no object, cannot come to closure, remains a biological hope. It is overflowing with such hopes. Investigators like Thales, Lao-Tzu, Mahavira, Buddha, Aristotle, the Essenes, the Van Eycks, Dürer and Savery, Jan Van Breughel and Francis Bacon, Linnaeus, Buffon, Darwin, and Wallace et al. merely catalogued diminutive emblems of these hopes; named small and imaginative examples, postulated elegant if basic formulations, only to witness every generalization dashed by astonishing anomalies and more inventive approaches by life, with each passing generation.

Fig. 4.12 “A Moai on Rapa Nui (Easter Island), Chile,” Photo © M. C. Tobias



Sentience is not in that category of hope: it zooms in without debate or delay onto the hot mantle of our feelings. But questions and answers are definitely lodged in our cognitive inwardness, blocked, though by no means forever, not necessarily so. Every question we may ever pose is pinioned on the very real potential for breakthrough.

Hence, when we speak of the genetic distinctions, for example, between sea slugs, land snails, bananas, pocket mice and primates, including ourselves, we see that the pantheistic embrace of their relative equality comes down to what it is they occupy in order to survive; the eco-niche and the behavioral downstream effects of that environmental constraint and/or liberation. The evolution of plants—gymnosperms, angiosperms—devolves to naked, or sheathed seeds, and what this says about other boundaries, or lack of boundaries in the communication process.⁸⁸ While botanists would view this as a largely reproductive and distribution of genes issue, within that causal universe it is an information-based reality. Heredity, the broadcasting of seed, the perpetuation of a species against all odds, is as much about evolution as it is communication. This is a challenging notion because it begs the issue: who is speaking to whom, and by what means, in what languages, and how can we humans be sure of anything, let alone take part in the conversations?

With respect to the earlier referenced American Black Bear (*Ursus americanus*) the 16 subspecies can all converse, mate, consume similar diets and, most importantly, they communicate verbally, nonverbally, but also via a written record, leaving marks on trees (senior males leaving their marks the highest on both hard and soft mast-bearing trees). These elevated hieroglyphics also convey scents, something the Egyptian litterateurs and chroniclers never considered. Also thoroughly communicative about those 16 subspecies, each has evolved slightly different coloring, from all black in places like Michigan, to brown or cinnamon in the Rockies, to pure white, the *Ursus americanus kermodei* of British Columbia. A continental-wide series of manifested communiques in living color.

The Disambiguation of Ethics

As recently as 25,000 years ago, different *Homo* species were mating. The blur is ongoing between species, calling into question the taxonomic verities that have been continuously re-evaluated. So what we call a species is, in fact, a unit of information that is open to re-definition. Our keynotes and stanchions all hinge upon our ideas of nature. Pillars of physiological investiture that are vulnerable to a multitude of variations. As Einstein so famously indicated, we cannot possibly solve problems by relying upon the same modes of thought and expression in which those very problems are couched to begin with. We have to think beyond. Moreover, at the level Einstein was contemplating, we know today that six elements have disappeared from nature (numbers 95–100 on the periodic table) and can only be resurrected

⁸⁸“The Gymnosperm Database,” <http://www.conifers.org/zz/gymnosperms.php>, Accessed June 17, 2016.

(300,000 atoms being the microscopic threshold for observation) in a laboratory.⁸⁹ For the comparative ethologist, this, in turn, obliges us to prepare for anything, in terms of what might be possible between all species (known and unknown). In fact, it re-assembles all the traditional conventions of species definitions, as well as almost daily exobiological discoveries of other inhabitable planets; and seeks to promulgate new assessments for what “life form” ultimately means; and why it is so important we humans take an interest.

Most importantly, the numbers, ideas, preconceptions and what we think of as fundamental scientific truths fall sway to ethical deliberations in our time that must recognize differentiation throughout the biological Kingdoms, but even more so, similarities that are the precursor for meaning, as cognized by the aforementioned Juri Lotman when he wrote of “dialogue,” “meaning,” “communication,” and the making of meaning. Every anatomy ushers in behavior. The interdependency of ecosystems encompassing species and individuals guarantees that evolution is simply another word for communication: dialogue at every level of ontology, phylogeny, and the vast loom of genomes craving their moment in the sunlight or the darkness. To grasp this precocious chat-room of species is to acknowledge from the outset that there are psychological, emotional, psychic, and trans-species energetics which necessarily incite both silent and loquacious appeals to relational points-of-view and direct contact between individuals.

These myriad of personages are, from the human vantage point, ambassadors of tens-of-millions of language groups, if we can understand language as a semiotic outpouring commensurate with survival of individuals whose species are driven to encourage them and their loquacity for purposes of perpetuation, but also, for the multiple contacts—not unlike any social media network—that irresistibly craves the companionship instantly discernible in every biome. Interestingly, in John 1:14, “the Word Becomes Flesh.”⁹⁰ That flesh has undergone speciation, the term evidently first applied by an American botanist, Orator Fuller Cook (1867–1949) to distinguish cladogenesis from phyletic evolution within lineages.⁹¹ When 135 distinct Mexican bird species were analyzed recently, new overlays for phylogenetic and evolutionary species definitions were applied, resulting in a very different number of taxa. Indeed, 122 of the species were suddenly viewed in a revived, vigorous light, suggesting that they were not what they have previously been thought of and, indeed, were new species altogether, under new prevailing definitions.⁹²

⁸⁹ See Emsley, J. (2011). **Nature's Building Blocks: An A-Z Guide to the Elements** (New ed.). New York, NY: Oxford University Press; See also, Silva, Robert J. (2006). “Fermium, Mendelevium, Nobelium and Lawrencium”. In Morss, L.R.; Edelman, N.M.; Fuger, J. **The Chemistry of the Actinide and Transactinide Elements** (3rd ed.). Dordrecht, The Netherlands: Springer Science + Business Media.

⁹⁰ See <https://www.kingjamesbibleonline.org/John-1-14/>, Accessed March 20, 2016.

⁹¹ Cook, O. F. (1906). “Factors of species-formation”. *Science* 23 (587): 506–507, doi:[10.1126/science.23.287.506](https://doi.org/10.1126/science.23.287.506). PMID 17789700. Accessed March 3, 2016.

⁹² “An Alternative Species Taxonomy of the Birds of Mexico,” by Adolfo G. Navarro-Siguënza and A. Townsend Peterson, *Biota Neotropica* vol.4 (no.2) <http://www.biotaneotropica.org/br/v4n2/pt/abstract?taxonomic-review+BN03504022004>, Accessed December 20, 2015.

Consider that a pig in 1266 at Fontenay-aux-Roses, was tried and sentenced to death while in 1750 a female donkey (a jenny) was acquitted in a court of law, witnesses attesting to the donkey's virtue. Not the same outcome for an endangered Western Lowland Gorilla at the Cincinnati Zoo over Memorial Day, 2016, shot dead by zealous zoo emergency response who killed the 17-year-old Harambe, a demonstratively affectionate individual who was, by most eye witness accounts, protecting the little boy who had crawled through the enclosure, then fell 15 ft into a shallow moat and there met the gorilla. Rather than tranquilize the magnificent and magnanimous ape, he was murdered. 140,000+ protestors signed a petition that the zoo and parents should be charged with Harambe's death.⁹³ All survivors were rightly (in our view) acquitted. The tragedy cannot be undone. The lesson harkens back to the ambiguity referred to above, with respect to Picasso's "Bull" and how it is that humans over evolutionary time come to view other life forms.

History casts different spotlights on animal rights and human wrongs. The point to be followed is that historically we have provided proxy legal settings for other species which inherently signals in the human spirit a latent if not entirely activist lure towards the company and collaboration of non-humans. It is a biological absolute: we cannot live without them. We seem inherently to recognize that we are all one, and that the taxonomic differences devolve to a langue scientifically self-important but which may, in fact, have little to say to those of us who identify entirely with other species. Eye to eye. In other words, there is a clear and continuous blurring, throughout human history, of natural selective borders between species.

Equally blurred is human perception of the remarkable proliferation of species. Sharks, for example. Humans kill well over 100-million of them per year, and most of their great diversity is heading towards Threatened and Endangered categories; while they harm a miniscule number of humans annually. Now, Port Jackson sharks in Australia—the most common in the waters of that continent—have been re-examined with a keen eye towards their penchant for socializing and friendliness, so contrary to the conventional notion of perfectly evolved robotic-like killing machines. "If you grab them, they tend to be passive. Kind of like a pet." According to a lead scientist for an ongoing study, Dr. Culum Brown at the Behavior, Ecology and Evolution of Fishes Laboratory at Macquarie University suggests that "the sharks liked to dine together."⁹⁴

We arrive upon the great unraveling of the crucial global (our multiple hominid) evolutionary gap and consequent outrage—and expressly, our great human foible—which has singularly precluded us from grasping a spectacular fact: Every other species has achieved both it's voice and it's ear, as it were, accommodating the biotic transitions from the Antarctic to Inhaca; from Yasuní to the Galápagos; from the Las

⁹³*"Gorilla shot dead at Ohio zoo after dragging four-year-old boy who fell into enclosure," John Minchillo, The Associated Press, National Post, May 29, 2016, <http://news.nationalpost.com/news/world/gorilla-shot-dead-at-ohio-zoo-after-dragging-four-year-old-boy-who-fell-into-enclosure>, Accessed May 30, 2016.

⁹⁴ p. D6, "The Friendly Side of Sharks," by Laura Parker, The New York Times, January 12, 2016. Accessed January 12, 2016.

Tres Marias in Mexico’s waters (later to be discussed in detail) to New Zealand’s Ulva Island within the Rakiura archipelago. Like the invisible newly hypothesized ninth planet, this ninth Symphony is invisible only to our species. Though we do have the astonishing capacity to console ourselves with Beethoven’s Ninth, he like several other hugely sensitive and evolved humans absolutely confirms the theory: we talk to the animals but refuse to listen to them. The seeming complexity it is not: no algorithm is necessary to compute the great gap waiting to be closed. Human violence in all its forms (“progress, civilization, superego”) also obfuscates the transmission of languages between every species and that of humans, if not the outright folding of the proteins to predispose our genetic phylogeny and 22 amino acids to turn away from that which we dimly conceive to be all too real: an holistic living biosphere whose purpose we do grasp by way of our enthrallment at her beauty.

Fig. 4.13 “Two Friends” Photo © J. G. Morrison



Despite there being over 6090 spoken human languages,⁹⁵ countless more dialects (165 indigenous languages just in North America) and many more in our collective global past⁹⁶ Arik Kershenbaum⁹⁷ of the National Institute for Mathematical and Biological Synthesis has suggested that “The problem for scientists is that no one

⁹⁵ **Ethnologue**, 19th edition, by Gary Simons, February 22, 2016, <http://www.ethnologue.com/ethnblog/gary-simons/welcome-19th-edition#.V00tgiMrLX8>, Accessed May 30, 2016.

⁹⁶ “How many languages are there in the world?” by Stephen R. Anderson, With Contributions from David Harrison, Laurence Horn, Rafaella Zanuttini and David Lightfoot, Linguistic Society of America, 2010.

⁹⁷ See http://www.nimbios.org/personnel/pd_Kershenbaum, Accessed May 30, 2016.

knows how language evolved.” Of course, there have been thousands of theorists weighing in on this topic. “Oddly enough,” Kershenbaum continues, “there don’t seem to be any transitional proto-languages between whale and bird songs—said to be the most sophisticated animal calls—and our own speech.”⁹⁸ Employing a mathematical repetition Markov model (predictable events in array predicated upon immediately preceding short-sounds, calls, alarms, etc), with the presumption that “there is a defined window of [read: linear] history that can be used to predict what happens next,” Kershenbaum writes, “What makes human language special is that there’s no finite limit as to what comes next.”⁹⁹ With that presupposition fixed and arguably core to the global semiotic database, Kershenbaum’s research utilized the recordings of “wild rock hyrax, a small and furry rabbit-like critter that grunts, wails, whistles, and barks, along with calls of free-tailed bats, Carolina chickadees, Bengalese finches, orangutans, pilot whales, and killer whales. [And] For comparison, he also threw in the text of Shakespeare’s “Hamlet” as a sample of human language.” Kershenbaum and team found for each species studied under this straight forward (and simplistic, mechanical) guise, that nothing made sense (any wonder?); those animals studied each went far beyond simple Markovian predictions.¹⁰⁰ None of this should come as a surprise. Comparing Hamlet to hyrax or, for that matter, Wittgenstein to a whale, must necessarily make for the scratching of heads. Most notably, with regard to the former, the poignant declaration at the conclusion of his **Tractatus Logico-Philosophicus** (1922), “He must surmount these propositions; then he sees the world rightly./Whereof one cannot speak, thereof one must be silent.”¹⁰¹

But without fully engaging the language of that colossal quantum of aesthetics and the ethically sublime, nor its nullity in silence, we are like, perhaps, the burning remedy that intercedes between our stunned silence (inwardness) and hope to reconnect with the Others—and there is little time left to activate it. And just possibly all this is not so much a question of biomechanics, as of some generalized linguistic philosophy that can rewrite the code of human etiquette. Like the young scientist, Mingming Yang, who was deeply involved in the search for the Higgs boson subatomic particle, and on a journey to southeastern Alaska, to focus on “compassion,” and “humanity as a whole,” said, “I am often asked, ‘What is the use of the Higgs boson?’” To which she replied, “I want to say, ‘It is not to make use of.’”¹⁰² This level of humanity and humility, in turn, might start (and rapidly) to influence our behavior towards Others. We need to dispense with obsolete linear presumptions, taking our cue from the wind through, say, an Aspen grove; glean the infinite, yet clonal reactive sounds; that indescribable bliss of a million leaves chiming in the

⁹⁸ See http://www.nimbios.org/personnel/pd_Kershenbaum, Accessed May 30, 2016.

⁹⁹ *ibid.*, Kershenbaum.

¹⁰⁰ “Chirps, whistles, clicks: Do any animals have a true ‘language’?” by Meeri Kim, August 22, 2014, <https://www.washingtonpost.com/news/speaking-of-science/wp/2014/08/22/chirps-whistles-clicks-do-any-animals-have-a-true-language/>, Accessed May 30, 2016.

¹⁰¹ **Tractatus Logico-Philosophicus**, by Ludwig Wittgenstein, With an Introduction by Bertrand Russell, Harcourt, Brace & Company, Inc., New York, 1922, p. 189.

¹⁰² “Scientific pursuit: A detour,” by Sonia Luokkala, Los Angeles Times, June 1, 2016, p. A2.

brightness of daylight; an eternal, if ephemeral ballet that admits to know analysis for which we should ever dare claim responsibility. Rather, let us be assured that language transcription is simultaneously engaging and jettisoning life particles into the wind; accessing individual trees from both the inside and outside. We, who hear it, marvel at it, already possess the same “Airs on a G-string” (from J. S. Bach’s 3rd Orchestral Suites or Overture No. 3 in D major) in ourselves.¹⁰³

We have it in ourselves as much as it exists in the living world. Yet, despite it being on our *inside*, most of us, we imagine, fail to actually *listen* to it, the way we would listen to Vivaldi’s “Le Quattro Stagioni” (“The Four Seasons”), or to a waiter reeling off the delicious specials of the day.¹⁰⁴

Yet, stubbornly, our inchoate music of the spheres and languages of nature on our *inside* are fully predisposed to engaging every dissonance and harmony, yet resist hearing it—thus precluding it—the infinite Vivaldi’s and Handel’s of the natural world—from being made accessible to those human disciplines that so impact all that lives. The true origin of species is the creation of beautiful meaning. That restless music is ongoing. We know this to be true from an infinity of glimpses out every window of the human soul. But we fail to embrace the code that would enable us to achieve universal harmony; that codex, the many psalters, bestiaries, missals, enchiridions and Books of Common Prayer that have been calling to us since our morphological inception. We have cracked the code: it’s all in how we phrase the question and what we expect the answer to achieve. Humility—unsettling and breathtaking humility—can biologically emerge under great stress. Such has always been the case from the first Archaea, including the prokaryotic thermophiles, halophiles, acidophiles, and methanogens, creatures of extreme environments (by human measure) who must be saying and singing of life eternal; of fiery spectacles and interstellar-like nuance.¹⁰⁵

Their bacterial endospores, surviving for millions of years, even upon meteorites, have long been studied and are testimony to a life force that has little reason to be interested in primates like us. But we should be interested in them. Imagine the rudiments of a translation algorithm between humans and even a single species of bacterium?

They teach us that friction, stress, working through hardship, and ultimately, collaboration, is at the root of every evolutionary force we think of as successful.

In sum, we believe we’ve reached the tipping point enabling the code to which we’re referring to become manifest. We hope to thoroughly examine and elucidate this cipher so that other humans can appreciate, if not engage in it outright. Our fellow creatures deserve nothing less and there’s no more time to waste.

¹⁰³ See <https://www.youtube.com/watch?v=GMkmQlfOJDk>, Accessed June 17, 2016.

¹⁰⁴ See *A Vision Of Nature—Traces of the Original World*, by M. C. Tobias, Kent State University Press, Kent, Oh, London, UK, 1995, Chapter 5, pp. 121–130; See also, Everett, Paul (1996). **Vivaldi: The Four Seasons and Other Concertos, Op. 8**, Cambridge: Cambridge University Press.

¹⁰⁵ See <http://webprojects.oit.ncsu.edu/project/bio181de/Black/single-cells/single-cells.html>, Accessed May 15, 2016.

Ecological Communion

An example from one hour ago. I (Michael) was out walking along the slightly flooded 220-mile long Oconee River (named after the now extinct Hitchiti, a language group of the Muskogean family which includes Choctaw and Creek-Seminole, among others) as it flows past the “Greenway” of Milledgeville, Georgia. The river has high levels of point and non-point pollution, but there are large wild regions of swamp and heavy concentrations of birds, as many as 422 known to exist in the whole state of Georgia. I was alone on a dirt trail a few feet above the fast moving high green water, which stretches several hundred feet across, merging eventually with the Ocmulgee into the Altamaha, eventually spilling into the Atlantic some 51 miles south of Savannah. Among the dozens of rare, threatened, and endangered species is a vascular plant named *Franklinia alatamaha* discovered in 1765 by William Bartram, but virtually never seen since. As described by the Georgia Conservancy, “... a multitude of creeks, sloughs and oxbow lakes, are refuges for alligators, wood ducks and wild turkey. At least 125 species of rare or endangered plants and animals exist along the Altamaha River. Birds such as the bald eagle and swallow-tailed kite, soar above its banks. The shortnose sturgeon and the manatee swim through the Altamaha’s lazy meanders. The gopher tortoise and the eastern indigo snake coexist among its sand ridges, and the sandbars and sloughs are home to seven species of pearly mussels that live nowhere else in the world.”¹⁰⁶

But on this Thursday afternoon, at 1:12 p.m. I found myself face to face for over 15 minutes with the closest living visual relative of the virtually extinct Ivory Billed Woodpecker—a large male *Dryocopus pileatus*, the Pileated Woodpecker. Considered to be “Uncommon” but of “Least Concern ver 3.1” by the IUCN, given its relative abundance throughout North America.¹⁰⁷ It was not the first time I had seen this largest of all known living woodpeckers of North America in the wild, but it was the longest encounter I’d ever had with a member of this species in so undisturbed and solitary a location. In observing each other—and it was a mutual observation fest—I came away wanting to know everything about this gorgeous being. One goes immediately to resources provided by the Cornell Ornithology Laboratory.¹⁰⁸

Essentially, the mates are loyal, they will not leave their territory, their cavity nesting provides subsequent homes for other vertebrates, and their vocalizations are deemed to be frequent but limited in range. Their coloring, reproductive rates, and requirements for large sized mature forest species are part of their increasing rarity, as old forests get destroyed.

There he was searching for beetle larvae, possibly other insects, but mostly resting and keeping an eye on me. Our communion was more than just the two of us. Rather, I found myself encountering one of the last wild rivers and surrounding

¹⁰⁶ See <http://www.georgiaconservancy.org/diy/paddle-the-altamaha.html>, Accessed February 24, 2016.

¹⁰⁷ See <http://www.iucnredlist.org/details/22681363/0>, Accessed June 17, 2016.

¹⁰⁸ Bull, Evelyn L. and Jerome A. Jackson. 2011. Pileated Woodpecker (*Dryocopus pileatus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/148>; <http://bna.birds.cornell.edu/bna/species/148/articles/introduction>, February 25, 2016.

forests in all of the southeastern USA and this resident avian was my momentary guide to that far-reaching habitat. Riparian biomes that included “bottomland forests, cypress and mixed cypress-hardwood swamps, hardwood hammocks, pine flatwoods, pine forests bordering riparian areas, freshwater and brackish marshes, wet prairies, sloughs, and pastures.” Ideal habitat for not only the woodpecker, but also Mississippi and the quite beleaguered Swallow-tailed kites.¹⁰⁹

The question hinges on the Other: his mind, his spirit, his intentions, his life-cycle, and the great dream that might encompass something beyond my own thoughts; allowing for a reciprocity that would enrich my life, and his. This is at the heart of any anthrozoological significance, let alone purpose.

I could not help but relate the Georgian pileated—whose language this day in Milledgeville confounds me in stymied bliss—to that of the California acorn woodpecker’s prodigious elocutions; *Melanerpes formicivorus*, with whom, when in California, I hear and see daily: 65–90 g, 13–15 cm wing length. There are no acorn woodpeckers east of California that we know of, but that’s a whole other story. Much like the geographical isolation of the “Tennessee Walkers” of South America, Maned Wolves.¹¹⁰ Yuan Yao describes how “waka calls” “were *individual-specific* in the acorn woodpecker.” In Yao’s research, the differences between waka calls from different individuals were sufficient to allow individual identification of at least 11 birds at a fairly high accuracy (94.1%) ... The waka call, says Yao, is “the most common vocalization in the acorn woodpecker”¹¹¹ and he also recognizes that “The social system of the acorn woodpecker is among the most complex of any bird.”¹¹² Yao’s impressive analysis “implied that both [of the birds] may contain individual cues that could be perceived and responded [to] by other distant individuals” and that the “syllables, *wa* and *ka*, contributed to the individuality of waka calls.”¹¹³

Early on, Yao distinguishes between calls and songs, suggesting that “vocal communication may be the main form of social communication in the acorn woodpecker, and particularly important for understanding its social complexity.”¹¹⁴ All of this analysis suggests a highly sophisticated polymathic capacity which, in fact, is pervasive throughout the biosphere. Now, consider, by comparison, the size of the pileated woodpecker: average adult weight, 300 g, 11 ounces, and wingspans of 40–49 cm.¹¹⁵ For the

¹⁰⁹ See http://www.georgiawildlife.org/sites/default/files/uploads/wildlife/nongame/pdf/accounts/birds/elanoides_forficatus.pdf, Accessed February 25, 2016.

¹¹⁰ “Studies of Vocal Communications in Cooperatively Breeding Acorn Woodpeckers (*Melanerpes formicivorus*,” Dissertation by Yuan Yao, UCLA, 2008, UMI Number: 3356519; Copyright 2009 by ProQuest LLC, Ann Arbor, MI, p. 105, 5.1.1 “Vocal individuality in acorn woodpeckers,” Accessed February 26, 2016.

¹¹¹ *ibid.*, p. 6.

¹¹² *ibid.*, p. 3.

¹¹³ *ibid.*, p. 105.

¹¹⁴ *ibid.*, p. 120.

¹¹⁵ Woodpeckers: An Identification Guide to the Woodpeckers of the World by Hans Winkler, David A. Christie & David Nurney. Houghton Mifflin (1995); See also: “The Ecology of the Pileated Woodpecker,” Sally F. Hoyt, Ecology Vol. 38, No. 2 (Apr., 1957), pp. 246–256, Published by: Ecological Society of America, doi:10.2307/1931683, Stable URL: <http://www.jstor.org/stable/1931683>, Accessed February 26, 2016; See also Cornell’s All About Bird recordings https://www.allaboutbirds.org/guide/Pileated_Woodpecker/sounds, Accessed February 26, 2016.

Pileated Woodpecker their complex music (and/or language) is characterized in a series of recordings dating to the early 1950s which include: slow and fast “Wuk” series calls, “Waa” and “Wok” (sic) calls, “various calls by juvenile,” “Begging calls of nestlings” and “Drum,” “Drum with double-tap,” and “Tapping.” Listening to tapping in a cooperative breeding species, is inherently a magnificent preoccupation. Focusing upon a bird’s song, not for a second or two, but in earnest, is the ecstasy of learning and speaking a new language. The bird’s genius summons all of our physiological acumen. It is preconditioned because it co-evolved for tens-of-millions of years hearing other avifauna, presumably at one point, the acorn woodpecker. Hence, my inevitable comparisons.

There is a woodpecker envy inevitability within our co-creative aptitudes. This would explain why at least 60 million Americans listen to bird calls; are stupefied by avian language as it alliterates, transliterates and helps us to slip into that deep trance-like state accompanying the human enlistment of pleasure and contemplation. It is the acoustical gaze that is our joy and inspiration and assuredly arises in tune with our listening to a fine symphonic composition, performed flawlessly, as if a chord, a harmony had continued unabated, abetted by manifold echoes in a great Medieval cathedral; a primordial cave, the Chartres of all cochlea and auditory nerves. The woodpecker, this day, is both a visual sensation, brilliant, directed eye-flow, peering right at me with a gunner’s precision, but also arousing in me a medley of ossicle motion, those three bones in my middle ear which ultimately connect with the nerves responsible for my brain picking up every possible sound wave this enormous bird is conveying.

Fig. 4.14 “Victoria Crowned Pigeon, *Goura victoria*, New Guinea,” Photo © M. C. Tobias



But in both the Acorn and Pileated Woodpecker analysis and recordings, what is entirely absent, in our opinion, is corresponding research into the all-important subjective realm, the attitudinal realm of human response. This is key to bypassing the

science and focusing upon unconscious delectation that equates with identification of one on one; human and woodpecker. This is the missing link that goes to the core of all our scientific objectification of language in other species. It misses, in other words, the real opportunity to become part of the semiosphere and thereby gain altogether different understandings. Subjective anecdotes have more cumulative weight of science than science herself. Emily Dickinson's 14 acres of botany, her gardening, was possibly more important to her understanding and expression of poetry, than the poems themselves.¹¹⁶

Devolving from fact to feeling is key to breaking the barrier codes of interspecies communication. Writes Ferris Jabr, "She [Dickinson] meticulously dried and flattened a wide range of species—chestnut, dogwood, poppies, lilac, nasturtiums, even a couple of algae—and artfully fixed them to paper, christening many with the appropriate Latin names In her 1789 poems, Dickinson refers to plants nearly 600 times and names more than 80 varieties, sometimes by genus or species." More than 350 of those plants were flowers. She was, according to Jabr, disinterested in going to Church after the age of 38 "because she had found her personal Eden in her gardens."¹¹⁷ Dickinson's family's property, called Homestead, had a greenhouse completed in 1855 and from her devoted explorations and nurturance emerged a pressed book, now at Harvard containing "more than 400 plants."¹¹⁸

The late Alexander Skutch estimates he studied over a period of 60 years, mostly in Costa Rica, the life histories of some 200-bird species but never banded or collected them. He simply knew them, including one of his personal favorites, the Golden-naped Woodpeckers, because the male and female always slept together.¹¹⁹ Skutch also loved hummingbirds, of which he was probably the world's leading expert. But he also delighted in Laughing Falcons, particularly the communication specifics between the male and female when a male would bring his mate an acquired snake for a meal and the ten minutes of discussion typically attended upon their dinner preparations. Gruesome from our animal rights perspective, but real.

Skutch, not unlike Thoreau and Dickinson, defies the scientific method, which is precisely where we believe zoosemiotics must focus if it is to be, ultimately, relevant to the crisis of the Anthropocene. One example of language usage among humans may suffice to intimate the breadth of this proposition and it comes from a remarkable book, **Beethoven And His World**¹²⁰ In one essay, by Tilman Skowronek, "Keyboard

¹¹⁶ See <https://www.emilydickinsonmuseum.org/landscape>, Accessed May 15, 2016.

¹¹⁷ *ibid.* See also, "The Lost Gardens of Emily Dickinson," by Ferris Jabr, *Science*, *The New York Times*, May 13, 2016, http://www.nytimes.com/2016/05/17/science/emily-dickinson-lost-gardens.html?&moduleDetail=section-news-1&action=click&contentCollection=Science®ion=Footer&module=MoreInSection&version=WhatsNext&contentID=WhatsNext&pgtype=article&_r=0, Accessed May 20, 2016.

¹¹⁸ *ibid.*, Jabr. See also, MS Am 1118.11. Houghton Library, Harvard University. Herbarium, ca. 1839–1846.

¹¹⁹ See "An Interview with Dr. Alexander F. Skutch," by Richard Garrigues, <http://www.angelfire.com/bc/gonebirding/skutch.html>, Accessed March 3, 2016.

¹²⁰ Edited by Scott Burnham and Michael P. Steinberg, Princeton University Press, Princeton NJ, 2000.

Instruments of the Young Beethoven,” the author concludes, “Consequently his sometimes extreme musical notation from this period may be seen as a faithful reproduction of what was possible for Beethoven the pianist on the instruments of the day, rather than as idealistic, visionary, or transcendent transcriptions of musical ideas (impossible to be performed literally by *any* pianist).”¹²¹ Later, Skowronek adds, “Only the most exuberant (poetic would be the term in the early nineteenth century) text, by [Ignaz von] Seyfried, comes to the point of stating that the ‘stoutest structure (of the instrument) scarcely could withstand’ Beethoven’s ‘forceful utterances.’”¹²²

In context, both Beethoven and the woodpeckers have everything in common. Next time you find yourself wandering in central Georgia, keep that in mind.

Comparative Sentience and Sapience

In 2009, a provocative study was published in *Bioacoustics*, *The International Journal of Animal Sound and its Recording*.¹²³ The concept collectively defined was deceptively commonsense. Write the authors, “Individual recognition of animals from their vocalizations would enable researchers to better understand ecological and behavioral interactions. If animals have the ability to recognize individuals of their own species from their sounds, then there ought to be ways of classifying such sounds as belonging to certain individuals.”¹²⁴ In establishing a base-line of research, the authors reference assessments of language-making (in addition to what must be characterized as sophisticated calls, or telling songs) that go with the “Yellow-bellied Marmot *Marmota flaviventris*,” “Eagle Owl *Bubo bubo*,” “Piping Plover *Charadrius melodus*,” “Gunnisons Prairie Dog *Cynomys gunnisoni*,” “Zebra Finch *Taeniopygia guttata*,” and “Indigo Bunting *Passerina cyanea*.” In each instance, different methodologies, including “fuzzy logic” had been employed by the many researchers cited, leaving an impression of essentially an endless series of tactics that could be strategically applied towards an empirical outcome or outcomes.¹²⁵

The *Bioacoustics* international journal has been in publication since 1988. In the most recent 2015/2016 issues, species-specific research has included such features as “Syntax of complex bird song in the large-billed reed warbler (*Acrocephalus orinus*),” “Differences between male, female and juvenile haddock (*Melanogrammus aeglefinus* L.) sounds,” “Handling dolphin detections from C-PODs, with the development

¹²¹ *ibid.*, Skowronek, p. 177.

¹²² *ibid.*, p. 192.

¹²³ See [https://www.researchgate.net/profile/Alexander_Kirschel/publication/235457987_Using_songs_to_identify_individual_Mexican_Antthrush_\(Formicarius_moniliger\)_A_comparison_of_four_classification_methods/links/004635284d0e6b2d3a000000.pdf](https://www.researchgate.net/profile/Alexander_Kirschel/publication/235457987_Using_songs_to_identify_individual_Mexican_Antthrush_(Formicarius_moniliger)_A_comparison_of_four_classification_methods/links/004635284d0e6b2d3a000000.pdf), 2009, Vol. 19, pp. 1–20; See also, “Using Songs To Identify Individual Mexican Antthrush *Formicarius Moniliger*: Comparison of Four Classification Methods,” by Alexander N. B. Kirschel, Kent A. Earl, Yuan Yao, Ivan A. Escobar, Erika Vilches, Edgar E. Vallejo and Charles E. Taylor, © 2009 AB Academic Publishers.

¹²⁴ *ibid.*, Kirschel et al.

¹²⁵ *ibid.*, Kirschel et al., pp. 1–2.

of acoustic parameters for verification and the exploration of species identification possibilities,” “Variabilities in the performance of the spectrogram correlation detector for North-east Pacific blue whale calls,” and “Distribution of sound pressure around a singing cricket: radiation pattern and asymmetry in the sound field.”¹²⁶

In one recent study vocalizations of seven widely distinct taxa were examined.¹²⁷ Write the authors in the opening of their Introduction, “Some species have vocal repertoires of tens or even hundreds of discrete elements; others have only a handful but use them to generate a wide variety of combinations ... An individual mockingbird *Mimus polyglottos* can mimic over 100 distinct song types of different species, and combine them into diverse sequences. Even the rock hyrax *Procapra capensis*, using no more than five discrete vocal elements, creates long vocal sequences that are rarely the same on repetition.”¹²⁸

And continuing: “Thus, even species with few vocal elements can sometimes generate an apparently unbounded range of possible combinations. Such varied vocal behaviour raises the question of the role and origin of complexity in animal vocal communication, and the comparison of vocal complexity across taxa, including human speech.”¹²⁹

The precursor to such revelations hinges, in this research piece on a few key suppositions: (1) that “human language uses ‘context-free grammars’ (CFGs) that are capable of generating recursive sequences and unbounded correlations”; and (2) that a “Markov chain” is “the most common model used to examine animal vocal sequences” (referring to the fact that any syllable B used in a language utterance must be determined by a previously used syllable A).¹³⁰

Andrey Andreyevich Markov, mentioned earlier in this book, was a Russian mathematician (1856–1922) whose work on stochastic processes has been adopted in numerous disciplines, including linguistics. In the study of animal languages, it is disingenuously didactic and reductionist in that its sole basis for probability interpolations hinges upon what happened in a linear, previous occurrence, and can thereby predict what will happen next. There is no margin of error, no coda at the conclusion of a sonata form¹³¹; no latitude for creativity, whimsy, or the unpredictable. It is, in other words, a cold calculus akin to machine memory and prediction, like Morse Code.

¹²⁶ Taylor & Francis Online, http://www.tandfonline.com/loi/tbio20?open=1&repetition=0#vol_1; See <http://www.tandfonline.com/action/showAxaArticles?journalCode=tbio20>, Accessed March 3, 2016.

¹²⁷ “Animal vocal sequences: not the Markov chains we thought they were,” by Arik Kershenbaum, Ann E. Bowles, Todd M. Freeberg, Dezhe Z. Jin, Adriano R. Lameira, and Kirsten Bohn, *The Proceedings of the Royal Society of London B: Biological Sciences*, 20 August 2014, doi:[10.1098/rspb.2014.1370](https://doi.org/10.1098/rspb.2014.1370), Accessed March 3, 2016.

¹²⁸ *ibid.*, Kershenbaum, et al.

¹²⁹ “Animal vocal sequences: not the Markov chains we thought they were,” Arik Kershenbaum, Ann E. Bowles, Todd M. Freeberg, Dezhe Z. Jin, Adriano R. Lameira, and Kirsten Bohn, *Proc Biol Sci.* 2014, Oct 7; 281(1792): 20141370, doi:[10.1098/rspb.2014.1370](https://doi.org/10.1098/rspb.2014.1370), PMID: PMC4150325, p. 1, <http://rspb.royalsocietypublishing.org/content/281/1792/20141370.full>

¹³⁰ *ibid.*, paragraph 3, of Introduction, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4150325/>

¹³¹ See **Sonata Forms**, by Charles Rosen, W. W. Norton & Company, 1988.

Despite these simplistic problems, it has been manifest in much research concerning other minds and other languages. In the case of the mockingbird, and those species studied by Kershenbaum and colleagues¹³² the authors concluded that despite the application of non-Markovian approaches to understanding other animal communications, “To the best of our knowledge, no extant species other than humans have a true language, with an unlimited ability to communicate abstract concepts.” And they go on to declare, “Although many non-human animal species have essential precursor abilities, such as vocal production learning, contextual reference and non-semantic syntax, only humans have a grammatical structure that is sufficiently complex for true linguistic potential. Since no non-human species demonstrate proto-linguistic grammars, proposed mechanisms for the evolution of language in humans remains speculative.”¹³³ However, of great interest, the authors also posit “a convincing and evolutionarily plausible mechanism that could explain the qualitative gap between the regular grammar of animal communication and the CFG [context free grammar] of human language.”¹³⁴ They cite one fascinating example: “Recent work has indicated that complex syntax can develop as the result of simple neurological changes; for example, in Bengalese finches, which have syntax qualitatively more complex than their wild ancestors.”¹³⁵

If ecological stressors induced by *H. sapiens* results in even minute transformations in the communications among other species, than we shall have ample reason to recognize, and work to amend out presence in a manner that more faithfully acknowledges our compatriots in other species here on Earth, and cedes our own sense of superiority at the level of scientific enquiry. That would, in essence, have the appearance of a heathen’s concession, its peer review given over to a new kind of pluralism that has forsaken the idolatry of Self in favor of the Other. A jail escape, in other words, from Plato’s Cave. Nothing could be more welcome. That cave echoes in every human definition of human language. It is, thereby, a tautological abyss, a black hole from which no word or concept can ever hope to be liberated into the outer language spheres of other species where reunion triumphs over words and thoughts and feelings might gain mutualistic pleasure and enlightenment.

In his overview of human linguistic diversity, for example, W. Tecumseh Fitch writes, “Although all animals communicate, and all vertebrates (at least) have concepts, most animal communication systems allow only a small subset of an individual’s concepts to be expressed as signals (e.g. threats, mating, food or alarm

¹³² op.cit., Meeri Kim; and Kershenbaum et al.

¹³³ Kershenbaum et al., *ibid.*, p. 9.

¹³⁴ *ibid.*, p. 10.

¹³⁵ *ibid.* Kershenbaum et al., p. 10, citing Katahira K, Suzuki K, Kagawa H, Okanoya K. 2013 A simple explanation for the evolution of complex song syntax in Bengalese finches. *Biol. Lett.* 9: 20130842 (doi:10.1098/rsbl.2013.0842).

calls, etc.).”¹³⁶ Yet it is well known that Mustached bats, for example, have at least 33 syllables that are composited in language—imagine their number of consonants? And then compare that linguistic sum with the earlier referenced theory that the first speaking Homos employed no more than three vowels.¹³⁷ That baboons recognize both faked words and specific letters.¹³⁸ That various species of dolphins, prairie dogs, whales, and sea lions have syntax in their languages, meaning phrases, precise association, manipulation, and sentence construction using a combination of linguistic elements meaningful to those individuals rendering an articulation, as well as to their target listeners. In other words, a most sophisticated communication, at the very least, according to a human’s grasp of the concept. Caribbean reef squid, bonobos, and elephants have each shown communication traits that can be readily disentangled (by human bystanders) from any other possible explanation of successfully transmitted codes and modalities of speech and other expression signifying intended and specific meaning.¹³⁹

¹³⁶“Unity and diversity in human language.” *PhilosTrans R Soc Lond B Biol Sci* 366 (1563): 376–88. doi:10.1098/rstb.2010.0223. PMC 3013471. PMID 21199842, p. 377. <http://rstb.royalsocietypublishing.org/content/366/1563/376.full#ref-list-1>; Accessed March 14, 2016.

¹³⁷Kanwal, J. S.; Matsumura, S.; Ohlemiller, K.; Suga, N. (1994) “Analysis of acoustic elements and syntax in communication sounds emitted by mustached bats”. *Journal of the Acoustic Society of America* 94 (3): 1229–1254. See also, *Hear Res.* 1990 Dec;50(1-2):259–73. Cochlear resonance in the mustached bat: behavioral adaptations. PubMed, Henson OW, Koplas PA, Keating AW, Huffman RF, Henson MM. <http://www.ncbi.nlm.nih.gov/pubmed/2076977>, Accessed June 26, 2016.

¹³⁸Haghighat, Leila. “Baboons Can Learn to Recognize Words”. *Nature: International Weekly Journal of Science*, April 12, 2012.

¹³⁹See “The Secret Language of Elephants,” Dec. 26, 2010, <http://www.cbsnews.com/news/the-secret-language-of-elephants2/>, Accessed March 14, 2016; “The Secret Language of Dolphins,” National Geographic Kids, by Olivia Bluejay, 14 October 2012, <http://kids.nationalgeographic.com/explore/nature/secret-language-of-dolphins/#dolphin-communication.jpg>; Cloney, R.A.; Florey, E (1968), Accessed March 14, 2016. “Ultrastructure of cephalopod chromatophore organs: *Zeitschrift fur Zelforschung und mikroskopische Anatomie* (Vienna, Austria: 1948)” 89 (2): 250–80. doi:10.1007/BF00347297. PMID 5700268; Byrne, R.A., U. Griebel, J. B. Wood & J.A. Mather 2003. “Squids say it with skin: a graphic model for skin displays in Caribbean Reef Squid ((*Sepioteuthis sepioidea*),” http://www.geo.fu-berlin.de/geol/fachrichtungen/pal/eigenproduktion/Band_03/05.pdf. PDF (3.86 MB) *Berliner Geowissenschaftliche Abhandlungen* 3: 29–35, Berlin 2003, Accessed March 14, 2016; See also, Savage-Rumbaugh, E. S.; Fields, W. M. (2000). “Linguistic, cultural and cognitive capacities of bonobos (*Pan paniscus*)”. *Culture and Psychology* 6 (2): 131–154. doi:10.1177/1354067X0062003; See also, Holder, M. D., Herman, L. M. & Kuczaj, S. III (1993). “A bottlenosed dolphin’s responses to anomalous gestural sequences expressed within an artificial gestural language,” in H. R. Roitblat, L. M. Herman & P. E. Nachtigall (Eds): *Language and Communication: Comparative Perspectives*, 299–308. Hillsdale, NJ: Lawrence Erlbaum, Accessed March 14, 2016.

Fig. 4.15 “Peter’s Epauletted Fruit Bats, *Epomophorus crypturus*, Echolocating Diurnally, Isle d’Inhaca, Mozambique,” Photo © M. C. Tobias



The work of Caitlin O’Connell’s study of African male elephant rituals, hierarchy and astonishing communication mechanisms comes to a magical close near the conclusion of her book **Elephant Don—The Politics of A Pachyderm Posse**.¹⁴⁰ O’Connell describes “elephant songlines,” the male’s apparent attempts to align themselves with “compass directions,” relating her observations to studies of magnetic sensitivities in other mammals—dogs and cows, for example—and she summons remarkable insights as to how the elephants she observed were engaged in “synchronizing behavior,” “coordinated infrasonic energy in both the air and ground,” a pachyderm communication system utilizing seismic detection, trunks to the ground for an hour at a time, looking for sounds, contents, communication from their peers, sending out “seventeen-meter long soundwaves,” even using their “front and back feet as sense organs to quadruple the distances between sensors” while “searching for seismic signals.”¹⁴¹

As early as 2005, in examining several whale species, using an underwater Sound Surveillance System and global acoustical maps, Christopher Clark, Cornell University’s I.P. Johnson Director of the Bioacoustics Research Program, working with U.S. Navy researchers Chuck Gagnon and Paula Loveday, had recognized what Clark called “ocean-based” geographic scale for sending and receiving song that can travel “thousands of miles of ocean.”¹⁴²

¹⁴⁰ University of Chicago Press, 2015.

¹⁴¹ *ibid.*, pp. 231–232.

¹⁴² “Secrets of whales’ long-distance songs are being unveiled by U.S. Navy’s undersea microphones—but sound pollution threatens,” by David Brand, <http://news.cornell.edu/stories/2005/02/secrets-whales-long-distance-songs-are-unveiled>, Accessed April 29, 2016.

A Ménage à Trois in the Sea of Cortez

In the late 1990s (Michael) was swimming miles from shore far out in the Sea of Cortez, naked and alone, when I was accompanied by two whale sharks (*Rhincodon typus*) on either side of my astonishingly tiny body, by contrast with my new friends. I had been down there helping to make a film on whale sharks, many years before this region would be protected officially by Mexico.¹⁴³ We communed in a timeless séance that forever transpires in my memory as multiple eternities of feeling and conveyance. I don't know how many minutes or hours we were together—but it was a significant period of time. From what I could discern, they each weighed over 30,000 lb or more. Swimming along their entire lengths, measuring their distance (using my shoulder to finger tips of my right arm as a ruler) from their five gills to their dorsal and pectoral fins to their tails, I estimated 35–40 ft in length, each colored in their unique Matisse royalty. As the three of us doddled like an easy, quiet Chopin Nocturne, atop the warm luscious waters, my eyes touched their respective eyes. Their skin, so smooth and elegant. They moved almost motionlessly, eyes sparkling with, well, it had to be love, joy, innocence. At one point an explosion of Bottlenose Dolphins and Heermann's Gulls nearby caught their attention (certainly mine) but only as a brief distraction, for I was their focal point. The three of us had met, exchanged every curiosity and curtesy, and finally went on our separate ways, but not before I had come to know them. They were a couple, he with clasper, she (ovoviviparous) with cloaca. I was fortunate they did not try to mate in my presence. Being larger than school buses, I would have been perilously in the way. Our eye contact said it all, at least for me. If this world, or the Creation, as some think of her, has ever tested nonviolence in the largest fish in the seas, then these two regal, silent *Rhincodon typus*' proved unequivocally that day that gentleness is the reigning paradigm on Earth.¹⁴⁴

There are no boundaries for communication, other than those humans themselves impose on a world we do not understand. But a large cadre of animal and plant communication researchers give us every reason to turn about, as we have endeavored to intimate, thus far. And so does the amazing history of human aesthetics, as it correlates with the annals of science, geopolitics, and environmental sociology, which we will now, albeit in a passing manner, consider.

¹⁴³ See http://www.imdb.com/title/tt0795991/fullcredits?ref_=tt_cl_sm#cast

¹⁴⁴ The Whale Shark is hunted in parts of the world, but still only listed as “Vulnerable,” Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) as of 2003, Accessed June 26, 2016.

Chapter 5

Arcadian Connections

Jungles on an Existential Planet

In charting an itinerary of the anthrozoological concept, namely, how one person relates to an individual or population of a different species, it is obviously important to acknowledge strange and dazzling connections over time. They inhabit a profusion of the unexpected.

Fig. 5.1 “Moss Monastery in Kyoto, Japan,” Photo © J. G. Morrison



It was, of course, Aristotle (384–322 BC) who not only conceived of scientific method per sé, but conceptualized the spatial, and philosophical divide connoting species versus individuals, defined as “Categories,” collectively known in his erratic

genius as the works of the Predicamenta: particulars and universals. Such biological quanta were, said of, not said of, part of, not part of, primary substance, not primary substance, secondary substance, or not, inculcating attributes or not. In other words, Aristotle jumpstarted a scientific method that was subjective, and that is the key. Subjectivity. Such Subjectivity was a victim of the twentieth century, and no more so than by means of modern Continental Logic. That was the deceptively broad-minded substratum of all those quirks in humanity that were more about grammar than existence. Aristotle's syntax and disambiguation comprise a vague and understandably deficient depersonalization of the more than 500 approximate species he identified, giving over to mankind a soul, on top of a vegetative spirit, with a sum-mital rationality that differentiated us from all other beings.

Such Aristotelian primacies can be said to have been the most compelling bifurcation in all of natural history, setting a dangerous precedent that declared: somehow nature herself has insisted upon Nature elevating human beings to a superior position, both by morphology but also by our allegedly unique thinking mechanisms.¹

The vast significance of such sentiments, in Aristotle's case, for subsequent philosophical and to some extent scientific enquiry would not actually resurface in so stark a taxonomic tyranny until the early botanical manuscripts of Carl Linnaeus (1707–1778).²

Linnaeus, like Aristotle, made certain instructive mistakes, as we look back at his astounding observations and rigors. For example, the young Swedish polymath attributed something akin to sex to rocks; and mistook a rhino for a rodent. Nonetheless, his nomenclature remarkably remains to this day as a steadfast scientific fixture, just as Adam and Eve cognitively enter art history in their endeavors to name the animals; an episode that remains glued to all hagiography and exegesis. Aristotle had stated so rightly that “we should approach the inquiry about each animal without aversion, knowing that in all of them there is something natural and beautiful.”³

But it was also Aristotle, the great primatologist Frans de Waal reminds us, who envisioned an implacable hierarchy assigning “all living creatures on a vertical Scala Naturae, which runs from humans (closest to the gods) down toward other mammals, with birds, fish, insects and molluscs near the bottom.”⁴

Far removed from Aristotle's inner conflicts—the interest in individuals but far heavier emphasis upon the superiority of people—and emerging more than a century

¹For a fascinating tour of Aristotelian zoological issues see **The Species Problem: A Philosophical Analysis**, by Richard A. Richards, Cambridge University Press, Studies in Philosophy and Biology, New York, NY, 2010.

²See The Linnaean Society of London, “Linnaean Manuscripts Cataloguing,” <https://www.linnaean.org/library-and-archives/projects-and-resources/linnaean-manuscripts-cataloguing>, Accessed June 17, 2016.

³See **The Heretics Feast: A History of Vegetarianism**, by Colin Spencer, University Press of New England, Lebanon, New Hampshire, 1995, cited in the International Vegetarian Union (IVU) site, www.ivu.org/history/greece_rome/aristotle.html, Accessed February 11, 2016.

⁴“What I Learned From Tickling Apes,” by Frans de Waals, The New York Times, Sunday Review, Op-Ed, April 8, 2016, http://www.nytimes.com/2016/04/10/opinion/sunday/what-i-learned-from-tickling-apes.html?_r=0, Accessed March 8, 2016.

prior to Aristotle, Jain ecological thinking across Western India encompassed a credo for Asiatic biological sciences summed up in the Gujarati phrase, “Parasparopagraho jivanam,” which translates roughly, “Souls render service to one another.”⁵

Contrary to Aristotelian logic—moving fast-forward to **Principles of Biology** (1864), the remarkable Herbert Spencer (1820–1903) would be celebrated, then all but forgotten by the scientific community for his daring to conjoin natural selection with morality, leaving open that possibility for equalities between humans and other species. He suggested such relations in his pangenesis theories that encompassed not only biology, but cosmology and current sociological trends. In a Utopian world of the nineteenth century, that would obviously include all those that one society after another has oppressed; the workers-proletariat, their unions, the life-blood of a functioning society. The same oppressed Lithuanian workers in the Chicago slaughterhouses that Upton Sinclair (1878–1968) would chronicle in his novel, **The Jungle** (1906). Perhaps it is no coincidence that Spencer’s tomb in Highgate Cemetery (North London) faces that of Karl Marx.

Spencer’s radical theses encompassed the same vast landscape of biological juxtaposition at the basis of so much Renaissance iconography and literature addressing paradise as a viable concept. Aristotle had thought of it as *eudaemonia*, happiness or welfare. But it was just as easily made over from science into Utopian literature, perhaps best exemplified in John Salkeld’s **A Treatise of Paradise** published in 1617; in Maria Sibylla Merian’s **Metamorphosis insectorum Surinamensium** of 1705; the entomological illustrations in George Adams’ **Essays on the Microscope** (1787); and the everlasting upstream reflections in Isaiah 11:6, wherein “The wolf will live with the lamb, the leopard will lie down with the baby goat. The calf and the yearling will be safe with the lion...”⁶

Fig. 5.2 “A Lamb, *Ovis aries*, in Southern England,” Photo © M. C. Tobias



⁵ See Jainworld.com, <http://www.jainworld.com/book/jaindecl/ch2.asp>, Accessed June 18, 2016.

⁶ Biblehub.com, <http://biblehub.com/isaiah/11-6.htm>, Accessed June 18, 2016. There have been numerous translations of this famed phrase, most notably that of the King James Version, <https://www.kingjamesbibleonline.org/Isaiah-11-6/>, Accessed June 18, 2016.

We have it on Upton Sinclair's own authority that such a Utopia is not easily created. He had tried throughout the latter half of 1906 (with income generated by the success of the publication of his **The Jungle**) to engender the agrarian paradise of Helicon Home Colony in Englewood, New Jersey, about an hour's drive out of Manhattan. Sinclair, who decades later would run for the Governor of California on a socialist platform in 1934 (he lost), was the janitor for the community. But the whole thing collapsed in failure and burnt to the ground. It must be noted that this was no vegetarian's paradise. Meat was to be produced on site, although a meat packer in New York also wanted to get involved.⁷

Art as Interspecies Immanence

These have been so many transfigured paradises, arcadian languages, in other words, throughout the whole history of art. We especially recommend to readers three demonstrably evocative works: Phillip Gilbert Hamerton's **Landscape**,⁸ Birket Foster's **Pictures of English Landscape**⁹ and **Landscape Painting—A History**, by Nils Butner¹⁰

By the time of the Great Depression, Spencer had been all but forgotten, while Darwin and Wallace were embraced by economists who saw the brutality of nature expressing its genetic and selective truths from the battlefields of World War I, to the Dust Bowl, to the bread lines. A world more closely aligned with that brutality articulated by a Thomas Hobbes, or the Reign of Terror in France, resulting in the beheading of Louis XVI, than with strategies of survival motivated by less ruthless designs. To be genetically fit, in other words, was stripped by science of ethics, which Spencer had attributed to it. The new cold calculus, particularly in the wake of World War I and the collapse of the Versailles Treaty left little chance for any zoosemiotic approach to the world.

Yet, forgetting Hobbes and history, two wild wolves were photographed in a forest just 40 miles from Paris in October 2014¹¹ and there are said to be some 300 wolves throughout France at this time. Not surprisingly, culling of the wolves has been ordained by the Minister of the Environment (Ecology) Ségolène Royal, a tragic throwback to middle-ages thinking, and a pathetic concession to sheep farmers, while so many alternatives for coexistence are at their doorsteps. But throughout Europe, North America, Asia, indeed, everywhere with few regional exceptions, the onrush of modernity has pivoted upon efficiency, profit, colonialism, and productivity, not some notion of "paradise." Few Utopian words were ever uttered on an

⁷"SINCLAIR EXPLAINS HIS HOME COLONY; 300 at His Meeting to Applaud Anti-Worry Syndicating. 100 FAMILIES ARE READY Doesn't Want All Socialists—Meeting Favors Co-operation in Child Raising." *The New York Times*, July 18, 1906, <http://query.nytimes.com/gst/abstract.html?res=9F03E7D8113AE733A2575BC1A9619C946797D6CF&scp=45&sq=%22upton+sinclair%22&st=p>, Accessed June 18, 2016.

⁸London: Seeley & Co., 1885.

⁹India Proofs, Engraved by the Brothers Dalziel, With Pictures in Words by Tom Taylor, London: Camden Press, 1881.

¹⁰Translated by Russell Stockman, Abbeville Press Publishers, New York and London, 2000.

¹¹See <http://www.telegraph.co.uk/news/worldnews/europe/france/11141987/Wolves-at-the-gates-of-Paris.html>, Accessed February 11, 2016.

assembly line. No birds fly there. And Spencer’s audacious belief system in a natural selection of morality has failed to captivate a twenty-first century audience.

Today, it must be remembered that the word “arcadia,” encompasses a city, Megalopolis, as it did in 371 BC when a rusticated region of Greece was urbanized. Nonetheless, thanks to such writers as Sir Philip Sydney¹² and John Oswald¹³ the arcadian passions are at the anxious heart of anthrozoology. The battlegrounds between art, science and politics have never been more intense, the stakes so bewilderingly high.

In Yasuní National Park, a UNESCO World Heritage Site, the most biologically diverse spot on the terrestrial planet, with 655 native tree species per every 2.4 acres (one hectare) of Amazonian rain forest and an estimated 30,000–60,000 invertebrates per same hectare, oil drilling has begun. It commenced when the price of a gallon of gas at the pump was more than twice what it was in January 2016. The economics are chilling; the biological stakes heartbreaking. And the majority of Ecuador’s 15.74 million citizens are opposed to the drilling, but the nation’s President suggests that oil drilling is less damaging than agricultural denudation in the Amazon.

Fig. 5.3 “Capped Heron, *Pilherodius pileatus*, Yasuní National Park, Ecuador,” Photo © M. C. Tobias



The politics of human affairs haunt the future of anthrozoology in ways that are not easily imagined out of existence, threatening to undermine all interspecies communication. We sense existentially, from the great writer Flannery O’Connor, for example, as she wrote in her first novel, **Wise Blood**, the nihilistic character of Hazel Motes speaking: “Nothing outside you can give you any place ... You needn’t look at the sky because it’s not going to open up and show no place behind it. You needn’t to search for any hole in the ground to look though into somewhere else. You can’t go neither forwards nor backwards into your daddy’s time not your children’s if you have them. In yourself right now is all the place you’ve got.”¹⁴ But if

¹² **Countess of Penbrokes Arcadia**, Sir Philip Sydney. Introduction by Carl Dennis, Published by Kent State University Press, 1970, ISBN 10: 0873380444 ISBN 13: 9780873380447.

¹³ **The Cry of Nature; or, An Appeal to Mercy and to Justice, on Behalf of the Persecuted Animals**, by John Oswald, Published by London: Printed for J. Johnson, 1791.

¹⁴ Harcourt, Brace and Company, New York, 1952, p. 165.

we succumb to such fatalism—as with O’Connor, and equally in Jean-Paul Sartre’s first novel, **La Nausée (Nausea)** with the character of the 30-year-old Antoine Roquentin in the fictional town of Bouville, confronting the chestnut tree (allegedly *Castanea sativa*) and losing his entire compass reading of his place on the planet, we, too, might well be lost forever given the dimensions of the anthropocene.¹⁵

If we can retain existing and restore some previously compromised corridors and microcosms of ecological sanity, integrity, then the human-received data that is driving new questions and revelations about other species and their own cognitive and emotional genius might yet invite positive mutualistic realms. We will see. In the meantime, researchers, all those who revere wild beings continue to rejoice and explore the possibilities for rewilding, for communion with Others, for that place most famously revered by Shakespeare in his “Richard II,” Act ii. Sc. 1, and always worth reciting, a “sceptered isle ... This other Eden, demi-paradise/This fortress built by Nature for herself. Against infection and the hand of war ... This blessed plot, this Earth, this realm, this England.”

The history of such rejoicing, in spite of the darkness, we call the many Arcadian connections that define so much of the human spirit.

The examples are obviously legion. Tens-of-thousands of books have been devoted expressly to this topic so our intention is to simply scan a few critical highlights especially relevant to biosemiotics; to intimate only a sampling of the truly great poetic insights, those windows on co-nurturance, defining moments of such primal connection.

We’ve seen this England, both in the National Trust properties today that derive much of their extraordinary impetus from the earliest twelfth century protected woodland (northern London’s 6118 acre Epping) in human history¹⁶; but also in the sweeping panoramas of zooglyphic conscience so prominently figured across the cave walls of the Aurignacian and Magdalenian (Upper Paleolithic).

Fig. 5.4 “5000-Year-Old Rock Art Depicting Unknown Species of Viper, Sierra Madre Oriental,” Photo © M. C. Tobias



¹⁵ Copyright Librairie Gallimard, Paris 1938.

¹⁶ See <http://www.friendsofeppingforest.org.uk/aboutus.htm>, Accessed June 19, 2016.

In that span we are virtually overwhelmed by a human conscience in tune, fully in accord with Others. We look to the brothers Hubert and Jan Van Eyck's "Adoration of the Mystic Lamb" completed in 1432 at the Cathedral of Saint Bavo in Ghent, Belgium; and certainly across the full-bodied and vivacious naturalisms of Albrecht Dürer's 1501 engraving of "The Eustachium," after the 1432 oil painting by Pissano, "The Vision of St. Eustace" that hangs in London's National Gallery; the many paradise scenes of Jan Breughel the Elder and Roelant Savery, and the animal-scapes of Albert Cuyp and Paulus Potter. In addition to the work of countless monks, animal scenes, and paradise vales of the great Renaissance families of engravers, the Sadeliers and Wierx's.

Equally, a cumulative precursor to Humboldt, Wallace, and Darwin, is Attâr's 1177 epic poem, "The Conference of the Birds," in which the Hoopoe (*Upupa epops*) is the God, conveys an arcadian language, accessible by anyone who can see and read, and has the wherewithal to appreciate naturalistic parables. Just a few years prior to Attâr's masterpiece was the creation of the famed **St. Albans Psalter**, thought to have been illustrated at the Abbey of St. Albans during the residency of Geoffrey de Gorham sometime between 1119 and 1146: 40 book-sized works of art depicting the life of Christ among other Old and New Testament legacies. On page 56 of the 71 pages of ornately painted vellum is a magnificent painting of King David as Orpheus playing upon his three-stringed rebeck (viol) for a goat and a sheep, and depicting a pigeon mid-flight stopping to whisper something into the King's ear.¹⁷

A near contemporary of the painter(s) of the Psalter as well as the great Persian poet, was the Hohenstaufen Holy Roman Emperor Frederick II (1194–1250) who probably conducted more well-financed natural history experiments than anyone in history, formulating more scientific theories than either Darwin or Leonardo. His experiments included notorious attempts to raise children in complete isolation to see if they would, by nature acquire some original language spoken by Adam and Eve. It is believed that most of his child subjects perished by their second year.

Sometime between 977 and 1010 CE Iran's national poet, Ferdowsi wrote the epic Persian **Shahnameh**, or "Book of Kings." In the early 1520s, the "Leonardo of Persia," Sultan Muhammad, provided the finest illustrations ever conceived of Ferdowsi's masterpiece within Tabriz, the first capital of the Safavid Dynasty (1501–1736). Among Muhammad's images were those of an unprecedented (near perfect) paradise, and of the human contradictions of good versus evil, depictions that are deeply resonant for all of posterity.¹⁸

Sultan Muhammad's stunning contemporary, the short-lived Albrecht Dürer (1494–1528) not only engraved his own astonishing version of "St. Eustace" at the moment of a man's conversion from deer hunter to believer in the sanctity of all life, but he also made a watercolor of the "Virgin Among A Multitude of Animals" in 1503 which nearly a century later would be engraved by Aegidius Sadeler (c.1570–1629), Imperial Printmaker for the Holy Roman Emperor Rudolf II in Prague.

¹⁷ See <https://www.abdn.ac.uk/stalbanspsalter/>, Accessed June 19, 2016.

¹⁸ See "The Shahnama of Shah Tahmasp," The Metropolitan Museum of Art, Heilbrunn Timeline of Art History, http://metmuseum.org/toah/hd/shnm/hd_shnm.htm, Accessed March 3, 2016.

Fig. 5.5 Albrecht's Dürer's "Virgin Among A Multitude of Animals," by Aegidius Sadeler, State 1, ca. 1597, Private Collection, Photo © M. C. Tobias



Dürer himself had been converted in another way: to the world of insects, which he deftly observed and obviously loved. His 1495 engraving of "The Holy Family with the Mayfly," often mistaken for a butterfly or locust, shows his enamored of the life-cycles—with their obvious morphological analogies to resurrection—of this vast group of ancient species, more than 3000 known today, all members of the order Ephemeroptera. Not to mention his identification of the more than 310 species of pigeons and doves (Columbidae family) with God, who looks down on Mary, the Christ child, and the mayfly to their lower left, on the ground facing them.

Two hundred years later still, an original print of this animal kingdom steeped in a profusion of languages back and forth among species; an historical zoosemiotic turning point, was executed by Aegidius Sadeler's older brother Jan Sadeler, one of his seven Days of the "Creation of the World." An original copy of this was donated

to the British Museum by its own Keeper of Prints and Drawings, mostly old masters. That Keeper, Campbell Dodgson, was a cousin of Lewis Carroll. Such arcane connections—this brief history of humanity’s love affair with nature, populated by a stunning constellation of mysterious beings—have their own wonderful itinerary that is beyond the scope of this schematic to belabor.¹⁹

Fig. 5.6 “Maarten de Vos and Jan Sadeler 1, ‘Seven Days of Creation,’ 1587,” Private Collection, Photo © M. C. Tobias



However, it must be added that anyone who has perused however cursorily the fixation with flowers and insects by painters throughout the European Renaissance knows precisely how this passion played out, from Ambrosius Bosschaert’s (1573–1621) “Still-Life of Flowers” (1614) to Jan van I Kessel’s (1626–1679) “Butterflies and other insects,” (1661), not to mention later paintings by such butterfly-intoxicated geniuses as Pierre-Hippolyte Lucas’ (1814–1899) masterpiece, **Histoire Naturelle Des Lepidopteres exotiques**.²⁰

But to step back, briefly. In 1544, one William Turner made the first comprehensive catalogue of all the known birds in the world. His zeal for naming the animals

¹⁹See Tobias and Morrison, **The Metaphysics of Protection**, Waterside Press, Cardiff, CA, A Dancing Star Foundation Book, 2014.

²⁰Paris, F. Savy, Libraire-Editeur, Avec 80 Planches Representant 400 Sujets Peintes D’Apres Nature, auquet, Bibliothèque Zoologique, 1835.

after Aristotle and gauging more recent insights, would be followed by such great passions of a man as the Swiss Conrad Gessner's **Historiae animalium** of 1556; Pierre Belon's **Histoire de la nature des Oyseaux** (1555); John Latham's 7-volume late eighteenth century **A General Synopsis of Birds**, and M. Le Comte Buffon's nearly 40-volume work on natural history. In 1791 William Bartram, son of John, who fashioned the first arboretum in America within Philadelphia's confines, published his exquisitely lyrical **Travels**, the result of 4 years in eight southeastern colonies of North America, beginning in 1773, and leading him close by the very site of Flannery O'Connor's 544 acre farm known as Andalusia, and today a sanctuary/Foundation.

Fig. 5.7 "Flannery O'Connor's Andalusia Farm," Photo © M. C. Tobias



Of Birds and Dreams and Flannery O'Connor

Like Emily Dickinson, who referred to birds 222 times in her poetry²¹ William Butler Yeats and D. H. Lawrence each immortalized a peacock in their writing, while Krishna Lal, far more recently, devoted a book to the **Peacock In Indian Art, Thought and Literature** (2006).²² The list of literary ornithological connections goes on in endless iterations, often obscure, but always revelatory. In 2002, at the International Conference on "The Chicken: Its Biological, Social, Cultural, and

²¹ **A Spicing of Birds: Poems by Emily Dickinson**, by Emily Dickinson, Jo Miles Schuman and Joanna Bailey Hodgman, Editors, Wesleyan University Press, Middletown CT, 2010.

²² Abhinav Publications, New Delhi, India 2006.

Industrial History,” convened at Yale University, Karen David, Ph.D., presented her paper, “The Dignity, Beauty, and Abuse of Chickens: As Symbols and in Reality.”²³ Like the great dream many of us have harbored of those legendary plains of Cervantes’ *La Mancha* in Spain where his *Don Quixote* tilted at windmills, Spain has also engendered other dreams of Andalusia—mountainous, agricultural, abutting the Mediterranean and alive with its legends of lions and Hercules and calls for agrarian reform (“tierra y libertad”) and—insidiously—the “Kingdom’s” continued bullfighting at the Seville Spring Fair and nearly 70 other animal-abuse venues.

But the other Andalusia (not the normally spelled Spanish *Andalucía*), Flannery O’Connor’s family’s farm in Milledgeville Georgia, where Ms. O’Connor spent more than half of her evanescent life, invites a very different dream, and one that is certainly no wishful thinking: namely, the importance to the artistic spirit in humanity of birds.

It is a matter of record that Ms. O’Connor surrounded herself with birds, spoke to them, as we all do our companions of other species, from her childhood in Savannah, continuing that passion at Andalusia where, prior to my (Michael’s) own first visit less than 2 years ago, I had viewed the famed British Pathé News footage with its wonderful fleeting scene of the 5-year-old child, O’Connor with two chickens in her arms. “Do You Reverse?”(1932)²⁴ (with its vaudeville music track and opening script, “Here’s an odd fowl, that walks backward to go forward so she can look behind to see where she went!”) Little wonder that the British news gatherer’s very logo was that of a proud biologically in-sync rooster amid his cock-a-doodle-do.

We can only imagine the ephemeral joy this piece of footage must have brought all those millions of people suffering during the Great Depression (and about to be plunged in to World War II) who would have likely viewed with a smile the young O’Connor and her cochin Bantam, which adds an uplifting poignancy to O’Connor’s own oft’cited admission that “I was just there to assist the chicken but it was the high point in my life. Everything since has been an anticlimax.”²⁵

After reading Margaret Eby’s “Flannery O’Connor and Her Peacocks”²⁶ it was just a matter of time before we could track down an original copy of O’Connor’s astonishing September 1961 essay “Living With A Peacock” (later renamed “King of the Birds”) in *Holiday Magazine*²⁷ in which the author described how that “Pathé man” had manned to stir in her “a passion, a quest. I had to have more and more chickens.”

Later in this astonishing piece of writing—comparable in many respects to Ralph Waldo Emerson’s obituary in *The Atlantic Monthly* of Henry David Thoreau,

²³ See <http://www.upc-online.org/thinking/dignity.html>, Accessed March 11, 2016.

²⁴ See <https://www.youtube.com/watch?v=dtmV-iD2QII>, Accessed March 11, 2016.

²⁵ O’Connor, Flannery; Rosemary M. Magee (1987). *Conversations with Flannery O’Connor*. p. 38. ISBN 0-87805-265-8), Accessed March 11, 2016.

²⁶ Eby, <http://www.nydailynews.com/blogs/pageviews/flannery-o-connor-peacocks-blog-entry-1.1640856>; <http://www.nydailynews.com/blogs/pageviews/flannery-o-connor-peacocks-blog-entry-1.1640856>, March 11, 2016.

²⁷ See <https://holidaymag.wordpress.com/2012/03/30/living-with-a-peacock-by-flannery-oconnor-september-1961/>; <https://holidaymag.wordpress.com/2012/03/30/living-with-a-peacock-by-flannery-oconnor-september-1961/>, Accessed March 11, 2016.

published almost precisely 99 years earlier than O'Connor's.²⁸ O'Connor turns her attention to peacocks with that remarkable statement, "Many people, I have found, are congenitally unable to appreciate the sight of a peacock. Once or twice I have been asked what the peacock is 'good for'—a question which gets no answer from me because it deserves none."²⁹ Near the end of her memorable *Holiday Magazine* meditation on birds, O'Connor writes, "Lately I have had a recurrent dream: I am 5 years old and a peacock." And subsequently concludes, "I intend to stand firm and let the peacocks multiply, for I am sure that, in the end, the last word will be theirs."³⁰

As writers, but also ecologists, we respond to O'Connor's love of chickens and peacocks as having added significant weight to the infectious constellation of data (arcadian languages), but equally potent, linguistic ignorance that we acknowledge when it comes to America's very different kind of love affair with chickens, and the world's—with peacocks.

We digress into no small horror.

The USDA³¹ reveals that 104,519,000 chickens were slaughtered in the US in 2014 and this number does not account for the total of approximately nine billion so called "broiler" chickens slaughtered each year, just in the USA, and an estimated 50 billion worldwide.³²

And yes, if you browse the Internet you will also find sites suggestive of the fact that peacocks are also eaten at the dinner table, around the world and in the USA. In Southern California peacocks have ignited the wrath of some of the residents of the wealthy Rancho Palos Verdes community where the city council's plan to release 150 individuals so as to replenish their population prospects was met with bizarre controversy: "the colorful peafowl have been blamed for scratching cars, leaving large droppings on driveways and awakening residents with their high-pitched screams."³³ One would be ill-advised to even mention such a heresy in India, where the peacock (*Pavo cristatus*) is the national bird, protected under Section 51 (1-A) of the Wildlife Protection Act of 1972. The bird's fat and feathers are believed by some within India to cure arthritis but the Government certainly doesn't buy that and

²⁸"Thoreau: "The country knows not yet, or in the least part, how great a son it has lost." Ralph Waldo Emerson, <http://www.theatlantic.com/magazine/archive/1862/08/thoreau/306418/http://www.theatlantic.com/magazine/archive/1862/08/thoreau/306418/>, Accessed March 6, 2016.

²⁹op. cit., O'Connor, "Living With A Peacock" ["King of the Birds"].

³⁰ibid., O'Connor.

³¹US Department of Agriculture "Poultry—Production and Value 2014 Summary", published April 2015, <http://www.usda.gov/nass/PUBS/TODAYRPT/plva0415.pdf>; <http://www.usda.gov/nass/PUBS/TODAYRPT/plva0415.pdf>, ISSN 1949-1573, p. 11, Accessed March 14, 2016.

³²See the following five websites: <http://www.animalethics.org.uk/image-bites.html>; <http://www.upc-online.org/chickens/chickensbro.html>; <http://www.upc-online.org/chickens/chickensbro.html>; <http://www.aspc.org/animal-cruelty/factory-farms/animals-factory-farms>; <http://www.aspc.org/animal-cruelty/factory-farms/animals-factory-farms>; <http://www.farmsanctuary.org/learn/factory-farming/chickens/>; <http://www.farmsanctuary.org/learn/factory-farming/chickens/>; <http://www.peta.org/issues/animals-used-for-food/factory-farming/chickens/>, Accessed March 14, 2016.

³³"Peacock proliferation," by Jason Song, Los Angeles Times, June 1, 2016, p. B3.

those caught harming the peacock risk 6-years imprisonment and a 25,000 rupees fine. Peafowl in India are still considered of “Least Concern” under IUCN criteria.³⁴ But the closely related Green Peafowl is “Endangered”; and the Congo Peafowl is listed as “Vulnerable,” as a result of hunting and habitat fragmentation pressures.³⁵

Such data altogether underscores the very brutal truths on so many levels that O'Connor herself mastered in her unique craft and manner of deeply troubling, ironic storytelling.

I (Michael) had the good fortune to be able to hasten to Andalusia in time to meet Manley Pointer prior to his death one bitterly cold January, and also to read the astonishing 2015 obituary by Kay Powell³⁶ which reminded us of an obituary in Wellington in 1939 of a national celebrity, the wild Airedale terrier, Paddy, who wandered the docks of New Zealand's capital, keeping company with all of his buddies, the adoring longshoremen and, after his death, the whole nation of New Zealand, that was in mourning for the beloved canine.³⁷ Just months after O'Connor's chicken became famous, the New Yorker writer E. B. White's dog, Scott Daisy³⁸ was run over by a taxi cab and White published an obit that read, “She never grew up, and she never took pains to discover, conclusively, the things that might have diminished her curiosity and spoiled her taste. She died sniffing life, and enjoying it.” As Kay Powell describes Manley Pointer's funeral at Andalusia, “News of his death drew 8000 views on social media. A coterie of young mourners met through social media, dressed in black, and attended the sunset funeral at Andalusia Farm.”³⁹

We know that more than a few peacocks ended up being embalmed in pyramids with Pharaohs. They were worshipped and venerated and painted throughout Ancient Egypt, Syria, and the Roman Empire.

When the last Passenger Pigeon, Martha, died in 1914 at the Cincinnati Zoo, she, too was the subject of a funeral, and national news, as well as a sobering centennial documentary. While Audubon painted birds in all their glory, he typically employed dead specimens. No one other than Ms. Flannery O'Connor has ever described a bird—one of her own beloved peacocks—quite like “That rascal [who] could outrun a bus.”⁴⁰ In our minds, Flannery O'Connor is something of a national environmental hero.

Most recently (late February 2016) we noticed Manley Pointer II and a companion enjoying the onslaught of an extremely balmy early summer, out at lovely, expansive thought-provoking Andalusia.

³⁴ See <http://www.iucnredlist.org/details/22679435/0>, Accessed March 4, 2016.

³⁵ See <http://animals.mom.me/endangered-peafowl-5258.html>; <http://animals.mom.me/endangered-peafowl-5258.html>, Accessed March 4, 2016.

³⁶ “A Death Among Flannery's Peacocks,” by Kay Powell, “Photos by John Ward II”: <http://bit-tersoutherner.com/obituary-for-flannerys-peacock/#.VuDuF4wrK2x>, Accessed March 4, 2016.

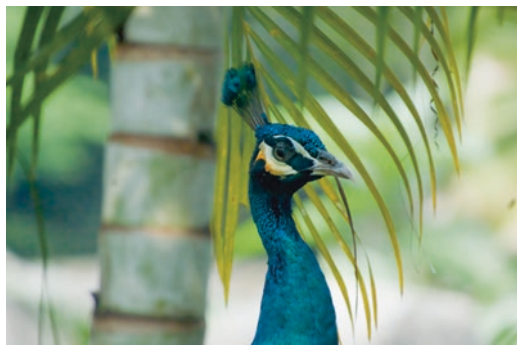
³⁷ See <http://www.nzhistory.net.nz/page/death-paddy-wanderer>, Accessed March 4, 2016.

³⁸ See <https://www.brainpickings.org/2013/09/16/e-b-white-dog-obituary/>, Accessed March 4, 2016.

³⁹ *op. cit.*, Powell.

⁴⁰ *ibid.*, Powell.

Fig. 5.8 “A Peacock, *Pavo cristatus*, in Thailand,” Photo © M. C. Tobias



This foregoing is all material of anthrozoologically critical news. In no less a manner than the zoological renaissance of Leicester Square, London, during the entire late eighteenth and most of the nineteenth century. Dozens of major biologists concerted their collections, energies and enthusiasm at Leicester, and the revelations were all a precursor, without any doubt, to the notable writings—internationally celebrated—of Hugh Lofting after World War I, and his memorable character of Dr. Dolittle, modeled after the real British veterinarian, John Hunter, whose equine practice was not 30 miles away from Maidenhead, Berkshire, where Lofting spent his early years. Hunter was one of many who would flock to Leicester Square and pursue countless enquiries during the last few decades of the eighteenth century; observing wolves, martins, birds, even the sense of hearing in fish.⁴¹

None of these historical snippets were empirically sufficient to fully elucidate the linguistic enigmas attendant upon all other species, even the human species. Broca’s and Wernicke’s areas of the brain, the Primary Auditory Cortex and Supramarginal Gyrus, our acoustic sensitivities, morphological, ecological, and emotional exigencies, all combine to overwhelm any General Theory of Language amongst the millions of other species with whom we are essentially one. The seminal Rumanian philosopher, Emile Cioran, once invoked a fascinating concept: that we do not inhabit countries, we inhabit languages. This suggests travel. Our thinking in words, our dreams, our incessant predilection for chatter at once defies our abilities to engage other species in language, unless, somehow we figure out how to *travel* there.

Of course, it is frustrating to the extreme, if we let it be. But fortunately, art, and artistic commerce, exchange, collections, connoisseurship and general celebration have consecrated our undimmed passions for nature in a community of languages unto themselves: museum cultures and hybrid love affairs.

In addition, there is another culture, as traditionally defined anthropologically—that of the Jains, whose prescience has documented a fantastic opportunity for compassion that has entered the mainstream of philosophy, politics, art, ethics, and activism.

⁴¹ See **The Metaphysics of Protection**, by Michael Charles Tobias and Jane Gray Morrison, Waterside Press, Cardiff, CA, A Dancing Star Foundation Book, 2014, Chapter Three.

Chapter 6

The “Other Minds” Challenge

Jain Bioinformatics

While philosophers from vastly different orientations have sought to comprehend the problems inherent to postulating the reality, content, and significance of “other minds,” from John Stuart Mill (1806–1873) and A. J. Ayer (1910–1989) to John Wisdom (1904–1993), countless other substantive perturbations of thought have clued in to the many mysteries in nearly every domain of metaphysics, neurophysiology, psychology, philosophy, and natural history. Their multidisciplinary enigmas remain among the most daunting and alluring challenges in the history of science and human cultures—the thought processes and world views of other species.

Fig. 6.1 “Mahavira and Disciple,” from mid-14th Century Svetambara Kalpa Sūtra Manuscript, Rajasthan, India, Private Collection, Photo © M. C. Tobias



Vardhamana, known in Jain tradition as Mahavira (599–527 BCE), devoted his life to disseminating a vision of nonviolence, or ahimsa, in Sanskrit, that is key to the more than ten million Jain adherents today. Jain scholarship throughout millennia and the most recent centuries pivots upon vegetarianism and a deep psychoanalysis of violence that rejects—on the basis of pragmatic idealism and unconditional love—any harm to all 2, 3, 4, and 5 sensed organisms. In the Jain system of Earthly beliefs, there are nonmobile (one-sensed organisms or jivas) and mobile—all the others, with senses encompassing the five that we are acquainted with. Even consumption on the dinner plate of one-sensed organisms is an act of regret, but acknowledged necessity, unless one is prepared to commit *sallekhana* (or *Sanyasana-marana*), the ultimate abnegation, suicide. Mahatma Gandhi spent much time during his youth with a Jain tutor who would have carefully elucidated for Gandhi many of the basics:

“(1) Two sensed beings (*Beindriya Jiva*): Two sensed beings have the senses of touch, and taste. e.g. shells, worms, insects, microbes in stale food, termites, etc. (2) Three sensed beings (*Treindriya Jiva*): Three sensed beings have the senses of touch, taste, and smell, e.g. bugs, lice, white ants, moths and insects in wheat and other grains, centipedes, etc. (3) Four sensed beings (*Chaurindriya Jiva*): Four sensed

beings have the senses of touch, taste, smell and sight, e.g. scorpions, crickets, spiders, beetles, locusts, flies, etc. (4) Five sensed beings (Panchendriya Jiva): Five sensed beings have all the five senses of touch, taste, smell, sight and hearing e.g. human beings, cow, lions, fish, birds, etc.”¹

Jains have long acknowledged 8.4 million species in the world, and most of them are completely off-limits to human consumption. The key tenet of Jain ethical realism is nonviolence, as most demonstrably demonstrated in a complete renunciation of harm to other life forms, to the extent possible. The Jain tragedy is its inability to impede others from acting out *their* daily violent schemes. While this reality does not take away from Jain idealism, or the staying power and potential traction of those lofty visions, it does inject into the conversation a challenge that remains daunting: humanity’s incessant harm to nearly all Others, at the same time as at least some of us aspire to know them. The fact that the Jains consider dewdrops, clouds, mud, thunderstorms, and sand to be no less alive than human teardrops adds an additional and colossal burden to the Jain ethical universe, to everyone’s.²

Fig. 6.2 “Hyena, *Hyaena hyaena*, Caged in a Yemen Zoo,” Photo © M. C. Tobias



Himsā, Violence Towards the Others

Himsā reflects in Sanskrit the striking out at others resulting in pain and injury. Its opposite, ahimsa, as earlier discussed, has been at the forefront of Jain, Buddhist, Taoist, Quaker, and scores of other ethical systems throughout time and practiced by

¹ See <http://www.umich.edu/~umjains/jainismsimplified/chapter03.html>, Accessed January 28, 2016.

² See **Life Force—The World of Jainism**, by Michael Tobias, Jain Publishing Company, Fremont CA, 1991.

individuals, communities, and cultures on every continent, including Antarctica, where Polish scientists at the base named after the first Polish explorer to spend two winters in Antarctica (1897–1899), Henryk Arctowski, maintain a greenhouse for resident vegetarian researchers. We visited that base in 1986 in the company of the Argentine Minister of Defense. It is located in Admiralty Bay on King George Island just off the Western Peninsular coastline and represents a fitting metaphor for an absolute polarity in attitudes about science and other species. Back then, at some Antarctic bases, cruise ships dumped their toxic bilge tanks into the open water; scientists would still eat penguins, though their far more normal penchant was to study the early warning signs of ozone depletion and climate change and its effect on krill.

But even on the last, highest driest continent, generally speaking, the onus of harm caused to others was and remains most manifest in the carnage occasioned by our kind as seen from tourists inching up too close to birds and marine mammals for “selfies,” stepping on the “redwoods of Antarctica,” the lichens, or nefarious base operations, like the open burning at garbage dumps at the American base at McMurdo (which once, in violation of the Antarctic Treaty of 1959, maintained a nuclear power plant which had to be dug out and carted away) as well as the pollution of McMurdo Sound, what one senior scientist likened to pollution levels in Chesapeake Bay.³ These remote trouble spots (notwithstanding the inviting Polish alternative, at Arctowski) are emblematic of the vast criminal cruelties at the core—distributed throughout the whole spectrum of human communities, however far-flung—and never ceasing to disappoint the truth of a deeply ill human nature, all the hate crimes and triage against nature that are discernible at the watering holes comprising the Anthropocene. The sore-point of massive ecotourism to Antarctica underscores our inability collectively to control our appetite for adventure and disruption.

The multitrillion dollar ecotourism industry sees such ruination dating back to the earliest insect tourism provided by the Māori Chief Tane Tinorau and his wife Huti on the North Island of New Zealand at the Waitomo Glowworm Caves, the endemic species being *Arachnocampa luminosa*, first surveyed in 1887 by Tane and an English colleague by candlelight on a raft underground.⁴ Two years later, tourism was encouraged to the beautiful limestone grottos, but with the eventual rash of vandalism, the government stepped in to protect the caves in 1906. In 1886 the local North Island Māori clan, Ngāti Tuwharetoa iwi, had surveyed several sacred mountains within the Tongariro area of the North Island and, again—with the escalating farming incursions by foreigners onto the volcanic rich soils of the mountains’ slopes—wisely saw what was coming and, on the condition of strict protection, turned over the area, including mount Ruapehu, to the Crown in 1887. It would be New Zealand’s first National Park.

Back and forth, from profiteering, kneejerk reactionary hatred of other species, oblivious exploitation of habitat, to its exact counterpoints: a history of protective mechanisms and networks. These two simultaneous responses to nature by humans define our disease but cannot explain it, absent actual transcripts—à la a transcendentalist Walt Whitman’s “Song of Myself” (1855) within his bountiful **Leaves of**

³ See “Antarctica: The Last Continent,” a KQED/PBS film, by Michael Tobias and Jane Gray Morrison, 1986.

⁴ See <https://www.youtube.com/watch?v=rtWbJQLhcjY>, Accessed June 19, 2016.

Grass publication (1855).⁵ Therein, such ecstatic prosody that leaves no doubt that human beings are capable of articulating friendly, even decisive song and lyricism, standing beside and caring for others, pantheistically, being part of those indigenous Kingdoms of Loquaciousness, as advocated by the Jains.

Conflicted Advocacy: When Poetry and Song Fail to Impress

All of the Walt Whitman's and Jains combined have not dampened humanity's ever-growing consumptive panic. Within a single year, as many as 120 billion cultured (grown) fish, 2.7 trillion wild fish, and at least 63 billion mammals are slaughtered.⁶ Moreover, with respect to aquaculture, the oft-cited "world's fastest growing means of food production," which is currently responsible for producing "more than 66 million metric tons of seafood each year," University of Melbourne graduate student Tormey Reimer and her colleagues have recently been studying farmed Atlantic salmon in Norway only to realize "that hatchery-raised fish were ten times more likely to have otolith deformities than wild ones. And the pattern isn't limited to Norway. The researchers observed similar patterns among salmon in Australia, Scotland, Canada, and Chile." Otolith sensitivity refers to a fish's capacity to detect both acoustic movement and gravitational information to enable their own navigational needs. Hence, such a deformity would be monumental, certainly contravening "animal welfare guidelines [that] are organized around the so-called 'five freedoms,' which specify that animals ought to live free of discomfort, pain, injury, disease, and fear, and that animals ought to be free to exhibit normal behaviors." But a huge percentage of the "more than two million metric tons of salmon [that] are farmed each year, with more than a billion individual fish harvested" are going deaf because of the nature of the aquaculture industry, and this in turn has clearly affected their ability to "communicate acoustically."⁷

And all of this human consumption and destruction of communication nodes in the oceans does not even begin to take into account global marine and terrestrial infractions of CITES and the Pelly Amendment P.L. 95–376 (92 Stat. 714) involving illegal fisheries and attempted imports to the USA of illegally caught species. Add to this the tally of global roadkill. Or US Animal Control killings of millions of so called "pest animals" annually, and their equivalents in nation after nation, particularly within island countries like New Zealand, with its predator control industries far advanced, if unevolved. Then compute the additional billions of other animal victims, as documented by the United Nations Food and Agriculture Organization. That would include the hundreds of metric tons of marine mammal slaughter in Denmark's ill-named "protectorate," the Faroe

⁵ James and Andrew Rome, Fulton Street, Brooklyn, NY, July 4, 1855.

⁶ See **Rewilding Our Hearts: Building Pathways of Compassion and Coexistence**, by Marc Bekoff, New world Library, 2014, p. 39.

⁷ See "Half of the world's farmed fish could have hearing loss," Jason G. Goldman | 08 June 2016, Source: Reimer, Dempster, Warren-Myers, Jensen, & Swearer. (2016). "High prevalence of vaterite in sagittal otoliths causes hearing impairment in farmed fish." *Scientific Reports* 6, 25249. doi:10.1038/srep25249; <http://conservationmagazine.org/2016/06/half-worlds-farmed-fish-hearing-loss/>, Accessed June 8, 2016.

Islands, where 30,000 or so inhabitants pay little heed to the international condemnations that have zeroed in on the “protectorate’s” killing of whales or the onetime capturing of Sea Shepherd wildlife conservationist Captain Watson who had tried to intercede in such killing within the Faroes territorial waters.⁸ Nor do the numbers begin to account for an estimated one million private slaughterhouses in India, and an even greater number in China; nor the household slaughters across Africa and other parts of the world. *H. sapiens* exemplify a far greater threat to the biosphere through direct slaughtering of innocents than through, as one of the other most diabolical exemplifications, our greenhouse gas emissions, or introduction into the environment of synthetic chemicals, plastic, and tens of thousands of other adulterants.

Of course, within the human compass reading, this is by no means a well-distributed culpability. As Ian Angus recently wrote, “In 2015, the richest 1% of the world’s population owned as much as the remaining 99% combined; and just 62 individuals owned more than the poorest three and a half billion people on earth.”⁹ Such disparities and inequities among our own kind must be accounted for and resolved with a level of justice and compassion commensurate with all our calls for a deep ethological approach to other species. Otherwise, a humane, all senses-on-deck common approach to the world will necessarily continue to be undermined, our best intentions collapsing into an “every man for himself” type of brutality, which will certainly preclude the meaningful zoological renaissance we have been describing.

Fig. 6.3 “Pigs On the Way To Slaughter Outside Shanghai,” Photo © M. C. Tobias



⁸“Wanton Waste and Suffering Suffuse Faroe Islands Drive Hunts,” AWI Quarterly, Fall 2013, Vol. 62, Number 4, p. 19, n.a.

⁹“Planetary Crisis: We are not all in this together,” Climate and Capitalism, May 25, 2016, <http://climateandcapitalism.com/2016/05/planetary-crisis-we-are-not-all-in-this-together/>, Accessed June 6, 2016.

Those disparities are stark, though in the following we are simply gauging our entire species as a singular phenomenon, not differentiating at the many levels of economic marginalization and ecological injustices against the poorest segments of every society. But as measured in billions of pounds of live weight, there is widespread evidence pointing specifically—within the USA—at those states most heavily engaged in the killing of animals.¹⁰ While US food libel laws in 13 states and Ag-Gag laws in many others have sought to shut down free speech, notwithstanding the US First Amendment, or such famed cases as *The New York Times Co. v. Sullivan*, 376 U.S. 254 (1964) which established ground rules for malice, states and corporations cannot censor the scientific and sociological studies surrounding the food issues and resulting animal suffering, as much as they try to do so. Nor can the industries that engage in such killing hide the majority of numbers of slaughtered pigs, chickens, turkeys, cows, and so forth, or their profits. But if it were not for such organizations as PETA (People for the Ethical Treatment of Animals) and the Humane Society, the general public would largely be in the dark as to what actually is happening: the war against nature waged in slaughterhouses no different from Auschwitz.

Our recourse against ongoing holocausts is dependent upon consumers. Education. Moral leadership. For now, progress remains fragile.

Fig. 6.4 “A Happy Pig In A Sanctuary,” Photo © M. C. Tobias



With respect to the wanton slaughter in the oceans, a recent study suggests that human plundering of fish stocks is far worse than even the UN Food and Agriculture Organization data has recognized. The new study is led by Professor Daniel Pauly at the University of British Columbia and published in the journal *Nature Communications*.¹¹ The study employs a “catch reconstruction” modality that covered the world’s primary Exclusive Economic Zones from 1950 to 2010, accounting for every fishery (a massive project), and found that the FAO had underestimated the peak,

¹⁰ See <http://www.usatoday.com/story/money/business/2015/04/15/247-wall-st-states-killing-animals/25807125/>, Accessed June 6, 2016.

¹¹ “Catch reconstructions reveal that global marine fisheries catches are higher than reported and declining,” Daniel Pauly and Dirk Zeller, *Nature Communications* 7, Article number: 10244, doi:10.1038/ncomms10244, 19 January 2016; <http://www.nature.com/ncomms/2016/160119/ncomms10244/abs/ncomms10244.html#auth-1>, Accessed January 20, 2016.

and the current rapidity of declines. The FAO said catches peaked at 86 million tons in 1996, but Pauly and Zeller state it was actually 130 million tons, and that since 1996 the world’s populations of fish (read: “fisheries data”) have been in a far more rapid decline than the FAO has given voice to, by a threefold factor. The variance, predicated on 44 million tons of allegedly underreported fish, is telling, against the first estimates of a total oceanic biomass of between 800 million and 2 billion tons.¹² That tonnage encompasses all life in that marine expanse covering more than 70% of Earth. Yet, adding oceanic to terrestrial plant and microbial growth gives Earth an estimated 560 billion live tons per year of biomass, as defined by organically bound carbon.¹³

By far the largest life fractions in the oceans are found among 13,000 or so known species of Copepods,¹⁴ a minute subclass of crustaceans shaped like a teardrop, with one or two eyes and two antennae, and certainly one of the most multitudinous creatures on the planet; as well as the cyanobacterial, micrometric photosynthetic, unicellular bacterium, *Prochlorococcus*. Both astonishingly vast groups of creatures are profoundly essential as providers of oxygen, as well as sinks for carbon. *Prochlorococcus* divides approximately one time per day and have some 1100 genes, a combining of qualities that clearly lends them something akin to what vertebrates would consider as clear levels of intelligence and feeling.

Similarly, with Copepods, well-known video of 38 mm size juvenile herrings feasting on the minute but clearly visible creatures shows Copepods successfully escaping from being consumed, a behavioral trend clearly indicative of no less a need, desire, and/or foreknowledge of coming pain.¹⁵

All of these Jain-described Jivas, the countless souls inhabiting the Earth, have feelings. We can see it. More importantly, we, as mammals, can intuit it. We share those feelings.

In the most blatant of instances, where we are the killers communicating our intentions out into the open, the cybernetics of causality require no special science to interpret the universal laws which propel all creatures, great and small—to seek to avoid suffering.

In pushing for a new level of appreciation for the universality of sentience, as well as sapience, studies otherwise reserved for human beings dealing with trauma and post-traumatic stress syndrome can suddenly be considered in a new if as yet uncertain light of what other individuals of all the tens of millions of other species are going through.¹⁶

¹²Wilson RW, Millero FJ, Taylor JR, Walsh PJ, Christensen V, Jennings S and Grosell M (2009) “Contribution of Fish to the Marine Inorganic Carbon Cycle” *Science*, 323 (5912) 359–362, Accessed January 20, 2016.

¹³Groombridge B, Jenkins MD (2000) **Global biodiversity: Earth’s living resources in the 21st century** page 11. World Conservation Monitoring Centre, World Conservation Press, Cambridge, UK.

¹⁴See <http://www.st.nmfs.noaa.gov/copepod/>, Accessed February 19, 2016.

¹⁵See <https://en.wikipedia.org/wiki/EcoSCOPE#/media/File:Cc3s.gif>, Accessed February 19, 2016.

¹⁶For just one such recent study in humans, see: *Nursing Research and Practice*, Volume 2013 (2013), Article ID 417010, 10 pages, <http://dx.doi.org/10.1155/2013/417010> Review Article, “Epigenetic Mechanisms Shape the Biological Response to Trauma and Risk for PTSD: A Critical Review,” by Morgan Heinzelmann and Jessica Gill, National Institute of Nursing Research, National Institutes of Health, Bethesda, MD 20814, USA, <http://www.hindawi.com/journals/nrp/2013/417010/>, Accessed March 13, 2016.

With terrorism and economic inequity infecting the entire *human* world, the intense level of our painful distractions will make it very difficult for governments, communities, and philanthropic organizations to persuade consumers and constituencies hardened by fear of other humans to replace that despondency and shuttering, bereavement for loved ones, fundamental anxiety over the future, with love of other species.

State Sanctioned Torture of the Innocents

Yet, in moments of quiet, most people cannot turn away from horrors that we inflict on the Others. This is the prevailing dialectic: fear of human enemies (gun violence, the NRA, ISIS, hate crimes of all persuasion, crime in general) and deep vulnerability to our own irreplaceable empathy for other animals we are able to personally relate to. There could be no greater challenge than this dialectic.

Now consider what may constitute the most protracted torture of any mammal in the USA: a quagmire of medieval mentalities if one extrapolates towards sanity using as an index America's unfathomable, continued use of steel jaw leghold traps, which are banned in over 85 other nations. In 2011, the most recent year with even quasi-reliable mortality statistics, a minimum of 6.8 million mammals were killed in such traps just in the USA, as reported by the Association of Fish and Wildlife Agencies. But that Association relies on data arbitrarily submitted, if at all, by state game agencies who are under no compulsion to submit any of their statistics.¹⁷ Where cruelty, torture, killing, and government agencies or corporations are involved, the numbers are systematically obfuscated. Those in charge of submitting such data either feel personally ashamed, horrified, or simply benumbed to the realities sweeping over their desk jobs.

Such numbers, whether referring to animals killed as so-called "pests" or by-kill and roadkill, animals with no legal standing whatsoever in consumable markets, or those who are simply lost in the corporate agro-business systems—what has been described as the "cold systemic evil," a massive form of domestic terrorism that most citizens choose to ignore¹⁸—translate into those same beings all trying to escape suffering. If we were only willing to listen to them. The problem, fundamentally, is that "listening to them" evokes the history of a science in a manner largely alien to the very concept of interspecies relations at any level that might seem to compromise human greed and avarice.

And even *with* a heightened sensitivity to the reality that "those animals are us," as PETA (People for the Ethical Treatment Of Animals) President and Cofounder Ingrid Newkirk has so long reminded every conceivable constituency, ethology, biosemiotics, and anthrozoology are new sciences which, at their core are interdisciplinary, obscure, up against the bias of many centuries where the empiricism rarely bends to either the theoretical or the experiential.

¹⁷"While The World Moves On, U.S. Still Caught In Its Traps," AWI Quarterly, Fall 2013, Vol. 62, Number 4, pp. 20–23. n.a., Accessed March 2, 2016; See also <https://www.thedodo.com/miracle-dog-expose-trap-horror-1022299525.html>, Accessed March 2, 2016.

¹⁸See "Mad Cowboy—The Feature Documentary," KQED/PBS, August 6, 2006, <http://www.kqed.org/tv/programs/archive/index.jsp?pgmid=14409&date=20060801>, Accessed March 14, 2016.

Fig. 6.5 “Native Reptiles Stuffed In A Natural History Museum in East Africa, Some Taxons Up For Debate,” Photo © M. C. Tobias



Variable Data Sets

On top of these human psychological impediments to a more genuine pantheism, science itself is hard-pressed to resolve differing data sets. For example, in the UK, the total number of threatened avifauna is either 27 or 52 species, depending upon scientific definitions.¹⁹ Taxonomic variations have induced strident debate since long before Linnaeus attempted to imprint the vegetative kingdoms, initially, with a systematic binomial (or binary) nomenclature that could easily categorize similarities and differences as they pertained to reproductive characteristics. In 1966 Michael T. Ghiselin published an essay of considerable import, “On Psychologism in the Logic of Taxonomic Controversies.”²⁰ Therein he elucidated a fundamental difficulty, namely, that the “definition of words is confused with identification of things.” While this might seem like some minor, easily rectifiable anomaly, it in fact touches upon every aspect of communication and translation; of science and sensibility; and most importantly, of

¹⁹ See *The Metaphysics of Protection*, by Michael Charles Tobias and Jane Gray Morrison, Waterside Press, Cardiff, CA, A Dancing Star Foundation Book, 2014, p. 126.

²⁰ Oxford Journals, Life Sciences, Systematic Biology, Volume 15, Issue 3, pp. 207–21, <http://sysbio.oxfordjournals.org/content/15/3/207.abstract>, Accessed February 10, 2016.

the difference between individuals, species, populations, and the other hierarchically ascribed rankings that are—for better or worse—still fundamental to modern zoology, namely, the ICZN Code, or International Commission on Zoological Nomenclature.

The brief history of this institutionalized approach to classifying the biosphere has its most recent origins in the British Science Association, established in 1831 as a kind of Everyman's alternative to the Royal Society which had been ordained (chartered) in 1660 by King Charles II and today remains the UK/Commonwealth Academy of Science. But it was a BSA committee that in 1842 formally established the rules and priorities for naming taxons according to the Principles of Priority which to this day guides the ICZN, borrowing from the work of Hugh Edwin Strickland (1811–1853), the British ornithologist whose own code was looked favorably upon by Darwin.²¹ From the first International Zoological Congress in Paris in 1889, then Moscow in 1892, to more recent meetings throughout Europe, a nomenclatural Esperanto has always been preferred to the proliferation (however inevitable) of that passion for naming plants and animals which appears inherent to our species (certainly, one may adduce, since the days of Genesis 2:19–20).²² Very specific rules apply to what is valid and what is invalid, and the codes are threefold nomenclature for animals, for plants, and for bacteria.²³

Objectivity versus subjectivity has huge roles to play in this science of naming things, such that there is a gradation of “subjectively invalid names” as well as “potentially valid names.” These include such abstruse yet somehow mainstream categories as “junior subjective synonyms” and “junior secondary homonyms.”²⁴ The system has vigorously held up, abetted by the revolutions in the more than dozen mainstream genetic markers for identifying both individuals and species, as well as a proliferation of subspecies: the “nominotypical subspecies” of animals²⁵

²¹ See International Commission on Zoological Nomenclature, International Code Of Zoological Nomenclature, Fourth Edition [Incorporating Declaration 44, amendments of Article 74.7.3, with effect from 31 December 1999, and the Amendment on e-publication, amendments to Articles 8, 9, 10, 21, and 78, with effect from 1 January 2012], <http://www.nhm.ac.uk/hosted-sites/iczn/code/index.jsp>, Accessed February 10, 2016.

²² See <http://creation.com/how-could-adam-have-named-all-the-animals-in-a-single-day>, Accessed February 10, 2016; See also: <http://www.accuracyingenesis.com/eagle.html>, Accessed February 10, 2016.

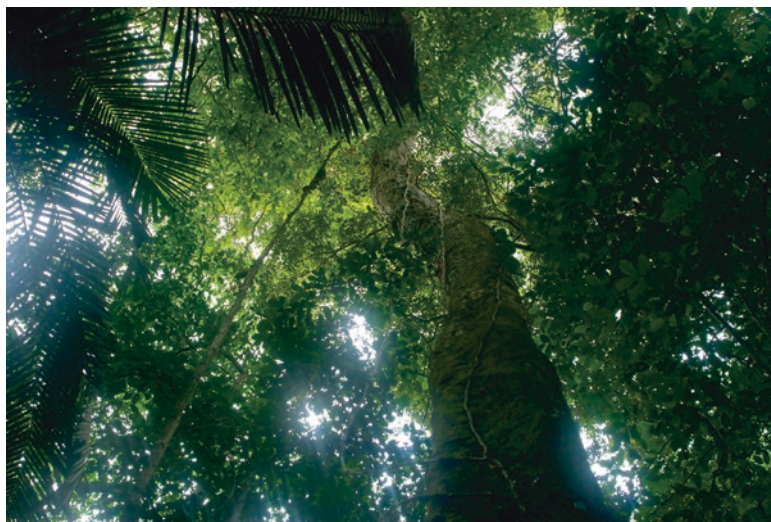
²³ See Hamish Robertson. “How animals are given scientific names.” Biodiversity Explorer, Iziko Museums of Cape Town, http://www.biodiversityexplorer.org/animal_nomenclature.htm, Accessed February 10, 2016.

²⁴ See ICZN Code—“Glossary,” <http://www.nhm.ac.uk/hosted-sites/iczn/code/index.jsp?booksection=glossary&nfv=true>; The International Commission on Zoological Nomenclature, Accessed February 10, 2016.

²⁵ See <http://www.nhm.ac.uk/hosted-sites/iczn/code/index.jsp?nfv=true&article=47>) and the “autonomous subspecies” of plants. McNeill, J.; Barrie, F.R.; Buck, W.R.; Demoulin, V.; Greuter, W.; Hawksworth, D.L.; Herendeen, P.S.; Knapp, S.; Marhold, K.; Prado, J.; Prud'homme Van Reine, W.F.; Smith, G.F.; Wiersma, J.H.; Turland, N.J. (2012). International Code of Nomenclature for algae, fungi, and plants (Melbourne Code) adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011. Regnum Vegetabile 154. A.R.G. Gantner Verlag KG., Accessed February 10, 2016.

Long before Andreas Cæsalpinus’ **De Plantis** of 1583 and even prior to Aristotle’s astonishing grasp of zoology and his reliance on the empirical fieldwork of the Milesian, Anaximander (c. 610 BC–c. 546 BC), as well as the subsequent botanical insights of Aristotle’s acknowledged successor, Theophrastus (371–287 BC), as well as a history of taxonomic endeavors dating back to Egyptian hieroglyphics and ancient Chinese medicinal texts²⁶, all of these diverse initiatives have rendered permanent our passion for *natural classification*. But only since the input of stratigraphy and paleontology, with the efforts of the young Danish polymath Nicholas Steno (1638–1686), did an all-important *time frame* other than that codified in a single day in Genesis enter into the biological equation, with apparently unlimited peripheries and energies of diversification. The Tree of Life had indeed become an ungraspable forest, layer upon layer of limb and lichen, moss and insects, mast, flowers, bird nests of every variety, co-symbionts, and worlds within worlds growing up amidst a profound series of geological shifts and proliferating soils over millions of years.²⁷

Fig. 6.6 “Deep Forest in Southern Suriname,” Photo © M. C. Tobias



Every zoologist recognizes the challenges imposed by evolutionary time in terms of coming to grips with an individual or a species. In a more accessible parlance, that means that biochemistry and geology are curious partners in defining evolution. Could there be a third partner, a fourth?

²⁶ See Mariette Manktelow, Dept of Systematic Biology, Evolutionary Biology Centre Uppsala University, Sweden, http://atbi.eu/summerschool/files/summerschool/Manktelow_Syllabus.pdf n.d., Accessed March 10, 2016.

²⁷ See “Evolution and the Fossil Record,” by John Pojeta, Jr., and Dale A. Springer, http://www.agiweb.org/news/evolution/paleo_geo_evol.html, Accessed March 10, 2016; See also, http://evolution.berkeley.edu/evolibrary/article/history_04, Accessed March 10, 2016.

DNA and BioCommunications

The answer is, “Yes,” both: evolution = genetics = interspecies communications.

Some form of communication is inherent to all evolution. This is self-evident, to those who care. What remains to be learned about this remarkable propensity is nearly everything. The global network beyond our ken. We speak only one language, that of humans.

The revelations of DNA have vastly compounded the perplexity of populations. Consider for a moment the proliferation of codes within zoology that must necessarily contemplate phylogenetic particulars involving any number of life force-driven scenarios: “shared ancestry between lineages,” all speaking, emanating, psychically connecting²⁸; monophyletic taxa, one or more populations (consider a near infinity of populations) that share derived characteristics from a common ancestor; polyphyletic taxa that do not necessarily have anything in common with their ancestors but nonetheless show certain similar traits (e.g., life itself); paraphyletic taxa, a population or species whose individuals or groups all descend from largely the same ancestor but may not share all of those traits. And then there are all the clades. Scientific proponents of this zoological story line uphold a vision that commends common ancestry lines of thought with such vigor as to have harbored a new taxonomic system entirely, the PhyloCode.²⁹

This vast simplification is intended only for purposes of understanding a fundamental gap in our rage for order, namely, the quintessence of what it is we are trying to describe. The philosophical, emotional, psychological, and countless behavioral nuances and linguistic and melodic ranges of these multitudes are far beyond our taxonomic grasp. In morphologically cementing groups together, calling them what we will as part of the Tree of Life impetus (a classification system initiated by Aristotle) in science, we’ve arrived at the Three-Domain System, Archaea, Bacteria, and Eukarya.³⁰

But who are all these creatures we are naming? What are they actually about? How can we know them? Most names are just names, like names in the White Pages of a massive city. Meaningless. Put a specific face and home to a

²⁸ See http://evolution.berkeley.edu/evolibrary/article/evo_05, Accessed March 11, 2016.

²⁹ See <https://www.ohio.edu/phylocode/>, Accessed March 12, 2016.

³⁰ Proc. Nati. Acad. Sci. USA Vol. 87, pp. 4576–4579, June 1990 “Evolution Towards a natural system of organisms: Proposal for the domains Archaea, Bacteria, and Eucarya (Euryarchaeota/Crenarchaeota/kingdom/evolution),” Carl R. Woese, Otto Kandler and Mark L. Wheelis, <http://www.pnas.org/content/87/12/4576.full.pdf>, Accessed March 11, 2016; Kingdom, Phylum, Class, Order, Family, Genus, Species, Sub-Species, etc.—we have also recognized special problems, which micro- and macrotaxonomy has acknowledged for many decades. * Mayr, E. (1982). “Chapter 6: Microtaxonomy, the science of species”. **The Growth of Biological Thought: Diversity, Evolution, and Inheritance**. Belknap Press of Harvard University Press.

name, and suddenly by exponential volumes of sensory input we have advanced the argument for getting closer to that vague morphological Other. All those trillions of individuals whose relatedness in temporal and morphological terms we have represented in so many antiquated natural history museums by engaging the chemicals and tools of taxidermists, pinning thousands of butterflies and brilliantly shiny beetles to boards; bottling vipers; freeze drying, mounting, skinning, and tanning specimens that have been measured and shelved, or cast out into silly dioramas for the entertainment of school groups and their desperately compromised adult minders. Usually these great halls of all the museums in the world are loud with the echoes of giddy shouting children who haven’t the slightest clue about what horrors have actually transpired prior to their arrival on any given day. That lovely tree of life, portrayed in so many guises throughout the history of religion, art, and science, has been utterly obscured, even as we nurture a young generation of students whose very lives utterly depend upon a thorough rethinking of our relationship to the natural world and how we must urgently go about conveying the truth of humanity amid the tumult we have unleashed, not least, all of those brilliant butterflies pinned to the walls. It is heartbreaking to contemplate this natural history museum syndrome—capturing, killing, studying, then pinning on walls or putting in jars—the butterflies. Typically, the apology for pinning and jarring comes from the perception that, well, they only live a week, a month, or—in four stages (four individuals)—for a year.³¹ And that without killing them we can’t definitively identify them or do genetic research. So? Can we intelligently address our life span of, say, 80 years, versus 1 week of a butterfly’s? No, we cannot. The most popular movie in the history of cinema (“Avatar”) highlights the killing of the Tree of Life on another planet. How should we think about that? What does it really tell us, shed of all the digital effects, about today’s global human cultures?

The Smithsonian National Museum of Natural History, as part of its U.S. National Entomological Collection, has within its Lepidoptera section (out of 35 million insect specimens) “over 4 million [butterfly and moth] specimens, occupying over 30,000 drawers and 3000 alcohol jars. It includes 25,000 primary types. The collection has the most complete representation of both larvae (123,000 specimens) and adults in the Western Hemisphere.”³²

The more than 20 superfamilies of Lepidoptera, some 20,000 species of butterflies, and more than 130,000 species of moths³³ recently made news with the discovery,

³¹ See <http://www.monarch-butterfly.com/life-span.html>, Accessed June 2, 2016.

³² See http://entomology.si.edu/Collections_Leps.html, Accessed June 3, 2016.

³³ See http://www.lepsoc.org/frequently_asked_questions.php, Accessed June 2, 2016.

after 10 years of tracking it down by assiduous, intuitively brilliant researchers, of the “cortex” gene in the 45+ species of the neotropical *Heliconius* embodying over “400” colored wing patterns—clearly, evolutionary communication at its most elegant and (as humans might describe it, aesthetic) summation. Says Smithsonian Tropical Research Institute coauthor of the recent discovery, Owen McMillan, “Essentially, we are visualizing evolution on the wing.”³⁴ That evolution, those gorgeous colors, translates into behavior, which is communicative, starting, in the case of Lepidoptera, sometime between 40 and 50 million years ago, the mid-Eocene Epoch, when the butterflies we all profess to love originated.

Fig. 6.7 “Malaysian Butterfly, Common Tree Nymph (*Idea stollii logani*),” Photo © M. C. Tobias



Ignoring or Embracing the BioCommunicative Challenges?

One of the most telling examples of the challenge confronting humans and their orientation to the very prospect of being open to communicating with other species, and the nearly complete blurring into disregard so representative of the disservices to the Others we as a species have persistently propagated, attends upon America’s castigation of one of its most sterling, elegant, and lovely large mammals, *Equus asinus*.

These wild burros, despite alleged protection under the Wild Free-Roaming Horses and Burros Act of 1971, have been confined to a total of 31 Herd Management Areas (HMAs), under deeply troubling official data pertaining to scientifically dubi-

³⁴ EurekAlert!/AAAS, Publis Release: 1-JUN-2016, “Evolution painted onto butterfly wings—Gene that helps butterflies stand out also helps moths blend in,” Smithsonian Tropical Research Institute, http://www.eurekalert.org/pub_releases/2016-06/stri-epo060116.php, Accessed June 2, 2016.

ous perceived carrying capacity criteria, numbers on a trans-regional cartography that bear no resemblance to, nor harbor feelings for, the animals whose overall condition equates thoroughly with *H. sapiens*' national ecological footprint going back in time. One of the best current indicators of these CCCs (Carrying Capacity Criteria) is the Global Footprint Network³⁵ from which one can assess human intervention and trespass at every salient intersect of species and habitat.

These same burros were enshrined in the Renaissance iconography that depicts “The Flight into Egypt,” a poignant motif in which Mary holding the Christ child is on a very burro making her way to Egypt following warnings that King Herod was determined to kill all infants in Jerusalem in order to eliminate the “King of the Jews” (the Christ infant) who he believed threatened his throne (Gospel of Matthew 2:13–23). But this is an American burro, and a country that makes much of God and religion and Judeo-Christianity among countless other religious, ethical, and indigenous traditions. Rising out of this spiritual consortium is someone by the name of “Brighty,” as written about in the Grand Canyon by Marguerite Henry in 1953.³⁶ There is the book by the same name—**Brighty of the Grand Canyon**—wherein it is recalled, “Long ago, a lone little burro roamed the high cliffs of the Grand Canyon and touched the hearts of all who knew him; a grizzled old miner, a big-game hunter, even President Teddy Roosevelt...”³⁷ That much is true. But even more by turns compelling and disturbing is the fact that worldwide, over 40 million burros/larger donkeys are tortured slowly by humans, a number borne of that estimate of *E. asinus* subjugated under conditions of hard labor—draught, traction, “beasts of burden”—by largely marginalized economic communities. Which makes their need for true sanctuary, as wonderfully pictured here in New Mexico, a truly pressing, international, ecological priority.

Fig. 6.8 “Wild Burros, New Mexico,” Photo © M. C. Tobias



³⁵ See <http://www.footprintnetwork.org/en/index.php/GFN/>, Accessed February 27, 2016.

³⁶ Rand McNally, New York.

and

Fig. 6.9 “Wild Burros, New Mexico,” Photo © M. C. Tobias



Has science or ethology given them their due? Has linguistics taken up with sobriety the language of donkeys, or eco-psychologists and biologists the mind of donkeys?

Fig. 6.10 “Two Rescued Donkeys In Deep Discussion, Dancing Star Foundation, Coastal California,” Photo © J. G. Morrison



³⁷ *ibid.*, p. 127.

³⁸ See **Donkey: The Mystique of Equus Asinus**, by M.C. Tobias and J. G. Morrison, A Dancing Star Foundation Book, Council Oak Publishers, Tulsa OK and San Francisco, CA, 2006.

The question does not weigh heavily on the tapestry of other priorities that swarm the human realm—climate change, job and health-care security, college debt, international terrorism, Wall Street versus Main Street, political campaign reform, gender bias, racism, pandemics, to name just a few. Except in the rare research instance, like so many multispecies relations, the answer—politically, economically, and culturally—is almost entirely “No.”³⁸

Chapter 7

A Prolegomena of Human Conscience

Bambi and Beyond

First, Flannery O’Conner’s pet Colonel Eggbert, and then tens of billions of such chickens grotesquely murdered and forced to suffer annually; the tens of millions of benighted Brighty’s; and how many Bambi’s murdered by an impulse synonymous with cowardly insanity by our species each year? A number approaching the unimaginably insane arithmetic of Holocaust victims, over six million; 140–155,000 annually just in the state of Minnesota; a massive killing of the innocents that has been celebrated, even taken for granted, by both Republican and Democratic candidates for the Presidency in early 2016 when the Governor of Maryland chimed in on gun control and said that he had never met a “self-respecting deer hunter who needed an AR15” to kill a deer, as his two Democratic competitors on stage smiled. All three avowed, in so many inferences and concessions, the old American tradition of slaughtering Bambi.¹ The original novel, **Bambi—Lebensgeschichte aus Dem Walde**, by Felix Salten² was composed in the Vienna of the 1920s, in the heart of an artistic renaissance that was a near immediate precursor to the rise of Nazism. Salten, a true ambassador for deer, wrote of Bambi in the same Viennese Woods of the 19th District where Beethoven had composed his Pastoral (6th) Symphony. The same Vienna, and time in history, that nurtured Gustav Mahler, Stefan Zweig, Martin Buber, Sigmund Freud, Elias Canetti, and Theodore Herzl, the latter endeavoring to gain support for a Palestinian homeland for the Jews. The fact that Walt Disney chose, in his 1942 film version of “Bambi”—when the fate of the Jews was already well known—to refrain from showing the actual killing of Bambi’s mother on screen is a story that has been well documented.³

¹ See <https://www.minnpost.com/data/2015/11/how-many-deer-do-minnesota-hunters-harvest-each-year-and-where-do-they-find-them>, Accessed March 14, 2016.

² Verlag Ullstein, Vienna, 1923, and then by Simon & Schuster, New York in 1928.

³ See Ralph H. Lutts, **The Trouble with Bambi: Walt Disney’s Bambi and the American Vision of Nature**, and Ollie Johnston and Frank Thomas, **Walt Disney’s Bambi: The Story and the**

At the same time in America and Canada, the remarkable Ernest Thompson Seton (1860–1946) was observing nature and writing prolifically—in his more than 75 books—about wild nature. He had his own issues when it came to a consistency of what would be perceived today as physiolatry, the ancient Greek word for the worship of nature. In his attempt to move from field research and observations to the actual attempted translation of other animal languages into his books, Seton was engulfed in what became known as the “nature fakers” debate in the early 1900s. It drew such figures as John Burroughs, Jack London, and President Teddy Roosevelt into public discord that was highly exacerbated by articles published against the romancing of nature in *The Atlantic Monthly*, and a *New York Times* piece entitled “The War of the Naturalists.”⁴ Yet, today, with the exception of the learned and prolific Seton putting words in the very mouths of the wolves he admired (and in one notorious case, Lobo, shot), there is little by way of unanimous passion and sentiment to separate the combatants in what was, ultimately, an instructive, if nasty exchange of honest disagreements regarding the role of art versus conservation. After all, Burroughs (1837–1921), often cited as a successor to Thoreau, wrote in an entirely romantic vane about maples, squirrels, birds, poets, apple trees, a camping trip with President Roosevelt, about locusts, harvests, and **The Breath of Life** (1915). Yet, Burroughs thought nothing about killing fish in the role of “angler” (trout grabbed from innocent streams across the Catskills where Burroughs lived being one of his passions), but he was also a student of bird migrations and wrote essays about everything in nature he could put his mind to.

The vast contradictions of our relations to other species, whether whales, chickens, deer, wolves, fish, or donkeys—and in the case of a Teddy Roosevelt, vast numbers of larger mammals, trophies after he had finished with them—defy the beauty and solemnity of those last words of Crowfoot (ca. 1830–1890), known in Blackfoot as Issapoomahksika, chief of the Siksika First Nations in what is Canada; a declaration said to have echoed as follows: “What is Life? It is the flash of a firefly in the night. It is the breath of the buffalo in the winter time. It is the little shadow which runs across the grass and loses itself in the Sunset.”⁵

Film, New York: Stewart, Tabori & Chang, 1990, pp. 170–175.

⁴Jones, Manina. (Fall 2008). “Wildlife writing? Animal Stories and Indigenous Claims in Ernest Thompson Seton’s **Wild Animals I have Known**” (1898). *Journal of Canadian Studies*, 42(3). Accessed February 20, 2016.

⁵Quoted in **Sacred Legacy—Edward S. Curtis And The North American Indian**, Photographs by Edward S. Curtis, Foreword by N. Scott Momaday, Essays by Christopher Cardozo and Joseph D. Horse Capture, Afterword by Anne Makepeace, Edited by Christopher Cardozo, Verve Editions, Ltd., and Cardozo Fine Art, 2005, p. 29. Accessed August 15, 2015.

Reverence for the Individual

Several key philosophical and scientific issues confront our ability or willingness to consider the uniqueness, the consciousness, the importance and singularity of individuals, whether of our own, or of other species. These considerations are inherently biosemiotics related, arising as significant problems of intense gravity concerning “other minds and other feelings,” “consciousness and sentience in other species,” the reality of pain across the entire zoological spectrum of beings, and, ultimately, the question of what to do about the reality of Others who are not merely biologies, but biographically unique individuals, organisms who have true identity, purpose, and autonomy in a world where the alliteration of aliveness must translate into a vast and complicated mutuality of respect, tolerance, and cohabitation.

This challenge is all the more taxing when we consider without the least doubt, averred objectively, that our one species is annihilating so many other species without the slightest hint of guilt or hesitation or even concern. Customary, everyday carnage in spite of our awareness indicts us but has not yet impeded our behavior or shone the least favorable light upon human super-awareness.

If the spate of data—new and old—regarding consciousness, feelings, apperception, and communication skills among other species were to be viewed as equal to, or even of a more comprehensive nature than those of human beings, would members of our species act differently towards those we have generically named the Others? We don’t know the answer to that, but it is surely obligatory that humanity gain as much sense of those Others as possible in order to hopefully enlist our best instincts and behavior towards them. We are giving this proposition a benefit of the doubt, namely, that we are not inclined by nature to murder simply because we can. If this proposition is flawed, then those with whom we are constantly in touch - psychologists, historians, scientists, philosophers and artists among them - many of whom consider human extinction a great and urgent necessity, must be said to confront the overall biological renaissance we are proposing with an equally challenging fatalism.

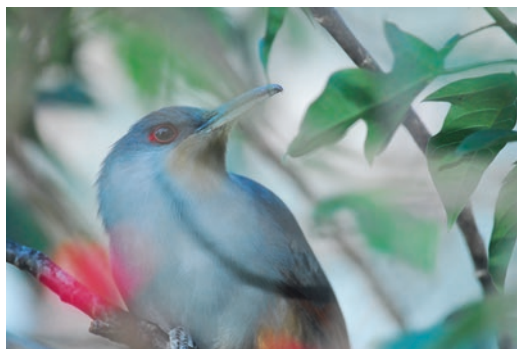
This perceived renaissance comports with an exhilarating new development in the multidisciplinary sciences involving language construction, syntax, all the rules, complications, specialties, and assumptions that moderate our use and formation of sentences, then paragraphs, subsequent to whole bodies of meaning we call prosody, or everyday speech, or literature. This sustained infrastructure of human communication pathways has long been assumed to be a uniquely human feature of language complexity, separating us from all other sentient and cognitive beings. No longer. Indeed, the “network analysis” of songbirds, and countless other groups of organisms, has revealed complexities akin to those same “small world” neural efficiencies we manifest in our own human languages.⁶

⁶See, for example, Humphries MD, Gurney K (2008) Network ‘Small-World-Ness’: A Quantitative Method for Determining Canonical Network Equivalence. *PLoS ONE* 3(4):e0002051. doi:[10.1371/journal.pone.0002051](https://doi.org/10.1371/journal.pone.0002051), Accessed March 1, 2016.

Small-World-Ness

Such networks as small-world-ness are essentially maps, or topologies (interrelations of parts) for better gauging real-world dynamics, whether in ecology, neurophysiology, or even in tracking epidemics. Small-world-ness invites a mathematical consideration for grasping connectivity among any number of possible, computable entities, whether understory that has not burnt in 70 years (like the June 2016 Calabasas Fire in southern California) or the firing of neurons in the brain of a snowy owl. And it is highly abstract, randomness being key to its language of abstruse nodes, vertices and edges, clustering coefficients, neighbors, middle grounds, edge densities and the well-known (to mathematicians) Watts–Strogatz and Barabási–Albert models of defining small-world and other computational networks. This is not one’s normal “bird-watching” parlance, but it does—at important theoretical and possible real-life moments—provide various computer graphs of the distribution of probabilities. In the case of small-world dynamics with reference to the neural circuitry of a vertebrate’s brain—a bird, a human, as two examples—that implies “coherent rapid-processing capabilities”⁷ which, in turn, could translate into higher and ever more sophisticated language and consciousness capacities.⁸

Fig. 7.1 “Hispaniolan Lizard Cuckoo, *Coccyzus longirostris*, Massif de la Hotte, Haiti,” Photo © M. C. Tobias



Which returns us to the astonishing world of songbirds, and one recent study in particular in which the authors in their Abstract, after having studied 180 songs per each of 19 individual males of the *Luscinia megarhynchos* species (the common nightingale), write, “This complexity has inspired inquiries into similarities of bird song to human language...”⁹ The methodologies utilized by the researchers

⁷“The brainstem reticular formation is a small-world, not scale-free, network” by M. D. Humphries, K Gurney, T. J. Prescott, Published 22 February 2006. doi:[10.1098/rspb.2005.3354](https://doi.org/10.1098/rspb.2005.3354), Accessed February 22, 2016.

⁸ *ibid.*

⁹“The use of network analysis to study complex animal communication systems: a study on nightingale song;” Michael Weiss, Henrike Hultsch, Iris Adam, Constance Scharff, Silke Kipper, Published 7 May 2014. doi:[10.1098/rspb.2014.0460](https://doi.org/10.1098/rspb.2014.0460), Accessed February 3, 2016.

encompassed “network measures” that have now become standard pattern recognition modalities among a variety of researchers in numerous fields. These include “small-world” characteristics, “vocal leadership” roles among various protagonists being recorded, and in the case of songbirds, their age, wing length, “feather features,” time of arrival at breeding sites, and the confirmation of “large repertoires” as measured and modeled against existing catalogues of songs (in the case of the common nightingale, a total of “623 different song types of 96 different males recorded from the years 2002–2011”¹⁰ in addition to “patterns of song-type transitions”).¹¹ Writes Ann Warde, a Cornell University-trained acoustic analyst who was not part of the study but carefully examined the results, “It’s derived from computer science... I think it’s a very interesting approach because it seems to begin to get at a deeper level of complexity—in terms of the ways sequences of sounds occur—than the somewhat more straightforward but simpler method of stringing together categories of sounds and trying to find meaningful patterns that way.”¹²

Combinative Linguistic Capacities

As early as 1986, one of the primary focal points of what allegedly separates human language from all other species communications was shattered by studies of the Black-capped Chickadee, *Parus atricapillus* and the fact that this one particular species showed “limited combinatorial characteristics in vocal signaling.”¹³ It has long been presumed that one of the essential differentiators between the vocalizations of other species and human language is the combinatorial factor inherent to human meaning: intention-times-clarity that presumably stems from communicative volitions that subsume evolutionarily efficient trajectories—in other words, efficacious expression, meaning or articulate whimsies, conjurations, and artistic tests. Whether for primates or avifauna in general, the study reveals one of its more astonishing mechanisms and/or outcomes (for we are not yet capable of assessing the evolutionary when’s, why’s, and wherefore’s), and that is the fact that “a small set of phonemes generates a huge set of morphemes, which in turn are grouped to make higher lexical units.”¹⁴ In 1994, M. Ficken, J. Hailman, and Elizabeth D. Hailman escalated

¹⁰ *ibid.* p. 19.

¹¹ *ibid.*, p. 21.

¹² Personal communication with Dr. Warde, February 6, 2016.

¹³ Jack P. Hailman, Millicent S. Ficken (1986), “Combinatorial Animal Communication with Computable Syntax: Chick-a-dee Calling Qualifies as ‘Language’ by Structural Linguistics.” *Animal Behaviour*, Volume 34, Issue 6, pages 1899–1901. (PsycINFO Database Record © 2012 APA, all rights reserved), doi:[10.1016/S0003-3472\(86\)90279-2](https://doi.org/10.1016/S0003-3472(86)90279-2), Accessed February 4, 2016.

¹⁴ *ibid.*, 1986.

their data considerably with the publication of “The Chick-A-Dee Call System of the Mexican Chickadee.”¹⁵

In that study, the researchers concluded, “Outside of human language, this is the second truly combinatorial system of vocal communication found in animals, the first being chick-a-dee calls of the Black-capped Chickadee. This study provides the first data substantiating quantitative differences in calls from different contexts, an important step toward understanding what kinds of information combinatorial chick-a-dee calls encode.”¹⁶ If you’ve ever spent a few minutes in Maine, or Massachusetts (where the Black-capped Chickadee is, in both cases, the state bird) or nearly anywhere else across the northern portions of the USA, from coast to coast, and actually stood still, sat down, closed your mind to all else, and deeply *listened* to the Black-capped Chickadee, you can easily distinguish its call from any other. It is remarkably complex yet understandable (or so we like to think). In summer, when this beautiful bird agilely hops along branches looking for mostly caterpillars, eating them, or hiding them like squirrels in well-remembered caches, the lovely bird emits two notes, one atop the other, as well as its literal chick-a-dee-dee-dee, unless there is a threat nearby, in which case the “dee” is accelerated. This bird does not care for pygmy owls or owlets and has been known to utter 23 frantic “dees” when aware of a potential predator nearby. Owls, unlike most of us, think Chickadees are more than just lovely to behold.¹⁷

These three species, the common nightingale (*Luscinia megarhynchos*), the Black-capped (*Poecile atricapillus*), and Mexican Chickadees (*Poecile sclateri*), are considered by the IUCN of “Least Concern.” However, in the UK, the most northerly reach of the nightingale, it is in the “amber” category of the RSPB¹⁸ meaning it is in noticeable decline, up to as much as 49% of its territories and/or actual numbers possibly having been lost, among numerous other heightened threat contingencies. Among the Black-capped Chickadees across Europe, there are still estimated to be between 3 million and 7.5 million individuals, placing it within the IUCN Least Concern ver. 3.1 category, meaning that the species “does not approach the thresholds for Vulnerable under the range size criterion (Extent of Occurrence <20,000 km² combined with a declining or fluctuating range size, habitat extent/quality, or population size and a small number of locations or severe fragmentation).”¹⁹ In parts of Alaska, however, the Black-capped Chickadee is one of several bird

¹⁵The Condor 96:70–82, © The Cooper Ornithological Society, 1994, <https://sora.unm.edu/sites/default/files/journals/condor/v096n01/p0070-p0082.pdf>, Accessed February 6, 2016.

¹⁶ibid., p. 70.

¹⁷Templeton, C. N.; Greene, E.; Davis, K. (2005). “Allometry of alarm calls: black-capped chickadees encode information about predator size”. *Science* 308(5730):1934–7. doi:10.1126/science.1108841. PMID 15976305, Accessed February 6, 2016.

¹⁸See http://www.rspb.org.uk/discoverandenjoynature/discoverandlearn/birdguide/status_explained.aspx, Accessed February 7, 2016.

¹⁹*Parus atricapillus*, <http://dx.doi.org/10.2305/IUCN.UK.2012-1.RLTS.T22711716A38469640.en>; <http://www.iucnredlist.org/details/22711716/0>, Accessed February 7, 2016.

species in which an as yet undiagnosed beak deformity is occurring with alarming increase.²⁰

And in the case of the Mexican Chickadee, there is concern that “It may be vulnerable to loss of habitat in Mexico.”²¹ Among the aforementioned 60 million estimated bird-watchers/listeners, just in the USA, Chickadees are famed for their insatiable curiosity, beauty, and amazing number of vocalizations. We say bird-watchers, not birders, in much the same manner that Jonathan Rosen, in a penetrating review of the movie “A Big Year,” employed the term. Wrote Rosen, “Crudely put, bird-watchers look at birds; birders look for them... Birding is like competitive meditation.”²²

Research Dialectics and Triage During Real-Time Crises

The dialectic that torments this generation of environmentally aware humans can be defined according to very ascertainable divisions: those focusing upon self-impact, self-interest, and those who are deeply concerned about all (or at least some of) the Others. People who think in terms only of themselves and immediate family and friends, versus those focusing upon whole habitats, populations, and species, and ultimately those who are desperate to prevent harm to individuals, of any species. People believe there is still time to put a sufficient number of biotic and abiotic components back into some sustainable biological balance, advance the science, do the fieldwork, and discuss options; but there also many who are all but overwhelmed by the pressing daily angst that declares: there is not a second to waste, the house is burning down, and we simply do not have the luxury of time for such fieldwork.

A chasm also opens amid those focusing on politics and economics and human disparities, and those who have all but given up on our species. These are real categories of thought, hope, intention, and behavior cutting through the heartland of the human experience, the many angles of conscience gripping this generation.

The gulfs of intention versus reality become even more complicated in ecosystems (particularly isolated ones, such as islands) where rare, vulnerable, and endangered species are pitted against bioinvasives that are tactically eliminated by government officials in the interests of preserving native and/or endemic species, and the time frames in which such often colossal edifices of killing take place, never without ethical and biological collateral damage.

One classic example comes from the Channel Islands National Park off the coast of southern California in which thousands of sheep and pigs and rats and hundreds of turkeys were exterminated down to the very last one, and a few dozen golden

²⁰ See http://alaska.usgs.gov/science/biology/landbirds/beak_deformity/index.html, Accessed February 7, 2016.

²¹ See <https://www.audubon.org/field-guide/bird/mexican-chickadee>, Accessed February 7, 2016.

²² “The Difference Between Bird Watching and Birding,” by Jonathan Rosen, *The New Yorker Magazine*, October 17, 2011; <http://www.newyorker.com/books/page-turner/The-Difference-Between-Bird-Watching-And-Birding>, Accessed February 8, 2016.

eagles and rare island horses relocated to the California mainland, all to service the needs of a very few endemic island foxes, and shrubbery. Animal rights activists tried without success to surreptitiously provide Vitamin K-rich food sources for the rats to negate the anticoagulant poisons broadcast across a key island target within the National Park's archipelago. One of the government officials involved in the large-scale eradication declared to a reporter that if he were to actually focus on all the killing of individual animals, he'd "go insane."²³

Fig. 7.2 "Stuffed Endangered Giant Kangaroo Rat, *Dipodomys ingens*, Central California," Photo © M. C. Tobias



More than 700 islands like those in southern California have been invaded by bioinvasives and subsequently by conservationists attempting to redeem humanity's skewing of the way things used to be, by killing mice, rats, mustelids, and omnivores like the (Common) Brush-tailed Australian possum across New Zealand. The largest such eradication occurred recently on South Georgia Island, a British Territory, during the summer months commencing in 2011, prior to the onset of subantarctic winter. The eradicators used helicopters to dump the 183 tons of Brodifacoum, one of the world's most widely used poisons whose toxicology is chilling: the 4-hydroxycoumarin acts for up to 4½ months on the target organism, inhibiting the animal's ability to synthesize prothrombin which is crucial to a mammal's blood-clotting mechanisms. By disrupting that, Brodifacoum causes the animal—in this case, rodents—to hemorrhage internally to death, over a period lasting as long as 9 days. 224 miles² (580 km²) of South Georgia were aerially saturated with the poison. Computerized grids triggered the calibrated and computerized rotation of buckets carrying the pellets from the choppers. The vectors are precise, if the weather is relatively stable. The efficacy of this approach on South Georgia, thus far, seems to have taken effect, making it the largest such eradication anywhere in the world (i.e., for nonhuman mammals). Eradication equals *Holocaust* for non-target species. The stakes were as follows: try to save the last remaining burrowing birds,

²³"The Last of the Channel Island Turkeys," by Alastair Gee, February 4, 2016, *The New Yorker*, <http://www.newyorker.com/tech/elements/the-last-of-the-channel-island-turkeys?intcid=mod-yml>, Accessed February 6, 2016.

such as storm and cape petrel, Antarctic prions, as well as pintails, from millions of rats, introduced more than a century ago by whale and seal plunderers (seamen) who visited the island and turned it into their own mammalian bloodbath. Said Professor Tony Martin, director of the recent eradication team involved in the nearly US\$12 million endeavors, mostly funded by private foundations, “Probably less than 1% of the original population of burrowing seabirds remains...Invasive animals are really crucifying the world’s biodiversity.” Interestingly, the large numbers of the island’s penguins and seals were unaffected by either the rats or mice, or the poison being dropped.²⁴

Aside from intense ethical considerations, there are equally practical ones inherent to such operations that have occurred everywhere from the subtropical Australian Lord Howe Island, to Ecuador’s Galápagos, to the Haida Gwaii islands off British Columbia, and throughout New Zealand’s offshore, as well as mainland islands.²⁵ In the case of South Georgia, the syndrome of eradication is a blunt and brutal response to climate change, as the rapid recession of glaciers is opening up new territories for successor generations of rats to find new homes. Those new generations require but one pregnant rat, a stowaway, for example, on a tourist ship or fishing boat, as happens perpetually on islands that have seen reinvasion, particularly in popular human destinations like the Hawaiian Islands, biological hotspots whose continuing devastation has been nearly impossible to deter.

From our own experience in New Zealand’s third largest island, we can scientifically attest to the fact that once one embarks upon the route of trying to return native habitat to its prehuman conditions for endemic wildlife, the best intentions of conservation are at once held permanently hostage to the realities of the old saying “A weed is only a misplaced plant (or flower).” As a child I (Jane) remember sitting at a dinner party in a fancy mansion where the daughter had a pet rat, pure white, silky hair, who sat on her shoulder throughout the meal gently nibbling on little tidbits of mashed potato, corn, or whatever was served her way, with only a show of slightly amused interest by the other dinner guests. Yet, memorably, not one person left that meal without attempting successfully to pet the adorable mammal.

Keep in mind there are numerous domestic rat breeds and breeding has been occurring for over a century. “The Rat and Mouse Club of America identifies four main varieties of rats: standard, rex, hairless and tailless. In addition, the American Fancy Rat and Mouse Association recognizes satin and dumbo rats. The National Fancy Rat Society recognizes many varieties, but it has banned tailless and hairless rats from exhibition in the United Kingdom,” states the “Different Breeds of Domestic Rats” website.²⁶

²⁴“World’s largest rat extermination returns South Georgia to its bird life,” by Karl Mathiesen, July 4, 2013, *The Guardian*, <http://www.theguardian.com/environment/2013/jul/04/worlds-largest-rat-extermination>, Accessed February 9, 2016.

²⁵See “How man bringing rats spelled disaster for wildlife on islands the world over,” by Karl Mathiesen, July 4, 2013, *The Guardian*, <http://www.theguardian.com/environment/blog/2013/jul/04/rats-islands-wildlife-south-georgia>, Accessed February 9, 2016.

²⁶See <http://animals.mom.me/different-breeds-domestic-rats-2891.html>, 2016 Whalerock Digital Media, LLC. All Rights Reserved, Accessed June 8, 2016.

“Qualia” Beneath Seemingly Scientific Chaos

Such contradictory behaviors of the human species, as applied to conservation and ethics, invoke that setting of subjective experience that was universalized by philosopher Clarence Irving Lewis (1883–1964) in a word he first utilized in 1947, *qualia* (after the Latin referring to “of what kind,” or what condition), which has gone on to become a much debated theory of subjective knowledge, insight, epistemology, and experience. “The facts are not in and for the time being we have to be content with speculation,” wrote Leopold Stubenberg in his book **Consciousness and Qualia—Advances in Consciousness Research**.²⁷ He was speaking in a chapter devoted to “The Allure of Introspectionism” and the discussion of animal consciousness, and as to whether a human could possibly imagine what another animal of some other species was thinking, by the conviction that other species are endowed with qualia in the same manner that humans are. And that all of these qualia somehow are able to relate to one another, to impart and receive revelations that are real.

Australian philosopher Frank Jackson tells of a most fitting knowledge-based analogy to the apprehension and universality of qualia, in an essay entitled “Epiphenomenal Qualia.”²⁸ In this instance, Jackson proposed a theoretical woman (Mary) who knows absolutely everything about the physics of light, of human perception of color, nanometers, wavelengths, everything. Yet, she is kept in a room her whole life, with only a black and white monitor allowing her to see the world (a version of Plato’s Cave). When she one day is liberated, she truly sees color—the color red—and knows instantly that all her previous knowledge lacked the true qualia of understanding the *experience* of red.

Numerous philosophers, mathematicians, and scientists have chimed in on the topic of qualia, but the famed physicist Erwin Schrödinger perhaps took this complex problem to its simplest expression when he wrote, in the same vein as Jackson, “The sensation of color cannot be accounted by the physicist’s objective picture of light-waves. Could the physiologist account for it, if he had fuller knowledge than he has of the processes in the retina and the nervous processes set up by them in the optical nerve bundles and in the brain? I do not think so.”²⁹ Stated expressly with respect to other animals, philosopher Thomas Nagel wrote in his essay “What Is it Like to Be a Bat?”³⁰ that it is impossible for us to ever know. But in his famed 1976 book, *The Selfish Gene*, Richard Dawkins suggested that “The evolution of the capacity to simulate seems to have culminated in subjective consciousness. Why

²⁷ John Benjamins Publishing, 1998, p.126.

²⁸ Jackson, Frank (1982), “Epiphenomenal Qualia”, *Philosophical Quarterly*, 32, 127–36.

²⁹ Schrödinger, Erwin (2001). **What is life? the physical aspects of the living cell** (Repr. ed.). Cambridge [u.a.]: Cambridge Univ. Press., p. 154.

³⁰ Thomas Nagel, “Ch. 12 What is it like to be a bat?” **Mortal Questions**, Cambridge University Press, Cambridge UK, 1991.

this should have happened is, to me, the most profound mystery facing modern biology.”³¹

This facet of Dawkins’ famed Darwinian Coda, so to speak, was not part of the overall thesis toppled by E. O. Wilson, Martin Nowak, and Corina Tarnita in 2010 when they suggested that “inclusive fitness theory” or “kin selection theory” was wrong, both in terms of the math and the genetics.³² In applying “subjective consciousness” to any kind of statistical randomness would be a normal approach of the theoretical sciences, which have long embraced the so-called null hypothesis in which $H=$ zero, meaning neutral, unless empirical evidence contradicts or illuminates, somehow, that neutrality. One of the most effective statistical hypothesis testing rules—was there an instant of illumination?—is that of the KS test, named after the Russian mathematicians, Andrey Kolmogorov (1903–1987) and Nikolai Smirnov (1900–1966). The KS tests the relationships of data as depicted on graphs that track statistical probabilities of things happening and of subsets in quantitative trajectory, quanta moving furtively or blatantly, numbers that verge upon space (numbers that represent, e.g., speech patterns, or the conductivity of nerve impulses on the axons in the brain of a Ten-Lined June Beetle), or a measurement within any experiment involving surveys, or statistical extrapolations.³³ The KS is a pragmatic but limited one-dimensional approach to solving potentially unknown arithmetic nuances in science, and statistics, but, again, in one-dimensional space and time. Applied to such utterly unknown entities as qualia and consciousness, the KS range of probability, let alone a moment of exactitude, can be expected to collapse. No known proof of its working at the psychological level has yet been validated. This gap renders our ability to know, measure, or grasp in any profound or counterintuitive manner the inner being of another species all but impossible, regardless of how perfect the KS interpolation. In one dimension, we are trapped in the Solipsistic Fallacy, apperception presuming false positives predicated on the confirmation bias of Self.

The Logic Trap

This lack of authentic fixity in grasping the Other is the cul de sac of all logic whose laws are those of the human Self, grasping to understand nonhuman selves. The logical flow is broken, falling back into the realm of the Other Minds Problem, that ether of the ineffable, unknowable, unshakeable sense that there is a reality there, we just can’t touch it or even effectively describe it, no matter how sophisticated our algorithms, heuristic methods approaching optimal solutions, zen spaces, regression

³¹ **The Selfish Gene**, Oxford University Press, first published in 1976, 30th anniversary edition, 2006, p. 59.

³² Aug 26, 2010. “The evolution of eusociality”. *Nature* 466: 1057–1062. doi:[10.1038/nature09205](https://doi.org/10.1038/nature09205), Accessed February 10, 2016.

³³ See <http://www.physics.csbsju.edu/stats/KS-test.html>, Accessed March 21, 2016.

data, or hyper-models: all incapable of actually substituting for another Consciousness or Language. We can *count* the (human recognizable) words a pigeon or parrot or dog seems to know, but this enumeration - like sports scores - is pointless and leads nowhere. It is the false positive mentioned above, giving us to believe that our logic is the same for other species. That their tabulations, temporality, and design instincts should be somehow crazily like our own. Even our most combinatorial algorithms, immense data compression, and cryptography have failed to discern even a single glance in the mirror that we can truly understand of another species. Our data passes over a blank stare.

So that when an E. O. Wilson takes on a Dawkins regarding genes, selection theory, altruism, and inclusive fitness—individual or group—the stakes are huge, but in the end, there is no end—because it is all happening through the lens of our present, mathematically isolated lives. This is the catchall ethical dilemma enshrouding conservation biology, animal rights, and anthrozoology in general: we think and act according to our information base, and/or our impulses and reflexes, innate predilections, and/or our tenacious convictions. There is neither predictability nor precision in these flawed circumstances of behavior. During the Viet Nam War, American soldiers often reported moving from the insane battlefields, napalmed villages, and forests, seeing up close children and mothers burnt alive, to seemingly becalmed Vietnamese marketplaces where they would see cage after cage, block after block, of live dogs, desperate, waiting to be sold and eaten. This was more than a double-bind schizophrenic context, as the late Gregory Bateson might have described it. This was the insanity of being contextually trapped. Interestingly, Brigadier General S. L. A. Marshall's book *Men Against Fire* (1946), based upon interviews with post-combat World War II veterans, showed a vast propensity of troops to restrain from firing on others. Nearly 80% of active duty men never used their weapons. They were more afraid of hurting someone than of being hurt. Sadly, this double-bind does not work in favor of other species. Humans have shown little restraint in killing them.

To take another example, some half of all consumers of poultry in China kill the desperate birds themselves because many Chinese are uneasy, or fear outright the consumption of frozen foods.³⁴ That includes, for the year 2010, over 3.2 million tons of ducks alone in China, translated into roughly 1.6 million tons of live animals slaughtered usually at a family's home.³⁵ In 2012, add to that over 3.4 billion chickens, also probably slaughtered at homes.³⁶ Then there are the quail, the geese, not to mention pigs. The numbers so rapidly escalate in human arms as to quash any sense of so-called qualia, or philosophical reconciliations. This is all out war: a Holocaust of human addictions. To adduce some kind of metaphysical communion among

³⁴“What you get when you mix chickens, China and climate change,” by Sonia Shah, Feb. 5, 2016, *The New York Times*, http://www.nytimes.com/2016/02/07/opinion/Sunday/what-you-get-when-you-mix-chickens-china-and-climate-change.html?emc=eta1&_r=0, Accessed February 5, 2016.

³⁵See <http://www.thepoultrysite.com/articles/2644/global-poultry-trends-2012-asia-china-dominant-global-duck-and-geese-meat-production/>, Accessed March 9, 2016.

³⁶See <http://www.animaethics.org.uk/i-ch7-2-chickens.html>, Accessed March 9, 2016.

such statistics is to dive headlong into utter despair. Especially in light of the renaissance that students of ethology, noöspheric sentience, zoosemiotics, and anthrozoology in general think (hope) they are witnessing. Hope can be elusive, from individual to culture.

The Relativity of Neurons

Neither Michel Montaigne (1533–1592) who so uniquely for his time would focus upon “man’s self-orientation” nor Aristotle (384–322 BC), writing on numerous topics of human-like thinking in other species, throughout his biological studies, as organized in his *Corpus Aristotelicum*, most notably the *Parva Naturalias*, as per his nineteenth-century editor, Immanuel Bekker’s numeric system,³⁷ had the advantage of today’s neural correlate research, nor would they have necessarily concurred with the current notion of NCC—neural correlates of consciousness theories—that seek to establish rules, boundary layers, and preconditions for conscious experience in ourselves and other species.³⁸ Indeed, Montaigne demanded our ethical appreciation of arthropods, and Aristotle conferred meta-consciousness upon other life forms, the Greek hylzoistic extension from matter. We didn’t have time zones until it became of commercial interest to do so in the late nineteenth century. But we have for thousands of years maintained consciousness zones.³⁹ While debates rage across the neurosciences, as they always have, regarding consciousness and to what extent human consciousness is different from that constellation of reflection, intentional and experiential processes of mind experienced by Others, 2012 saw major progress with the “Cambridge Declaration on Consciousness” wherein a consensus of delegates were in concurrence that “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.”⁴⁰

Some scientists and philosophers argue that a neuron is nothing more than a neuron. Of course, this is strictly semantics, the futile extension of which would logically hold that the study of the human cerebrum cannot possibly account for the sum total of epiphenomena that distinguish each and every living human. The same goes for every other organism. The thesis contends that any and all absolutes

³⁷ **Aristotelis Opera edit Academia Regia Borussica**, Berlin, 1831–1870, 486a–715a.

³⁸ See Nature Reviews Neuroscience Review “Neural correlates of consciousness: progress and problems,” Christof Koch, Marcello Massimini, Melanie Boly and Giulio Tononi, *Nature Reviews Neuroscience*, 17, 307–321, (2016), doi:[10.1038/nrn.2016.22](https://doi.org/10.1038/nrn.2016.22), <http://www.nature.com/nrn/journal/v17/n5/full/nrn.2016.22.html>, Accessed June 20, 2016.

³⁹ See Leiber, Justin, ““Cartesian Linguistics?”” *Philosophia*, 118(1988):309–46.

⁴⁰ Low, Philip et al., The Cambridge Declaration on Consciousness Publicly proclaimed in Cambridge, UK, on July 7, 2012, at the Francis Crick Memorial Conference on Consciousness in Human and non-Human Animals, Accessed March 5, 2016.

attached to the long-alleged supremacy of primates with a neocortex are fictions against a critical mass of more finely nuanced insights stemming from, in some cases, the most ancient metaphysical, spiritual, and ethical traditions among humans.

Timo Maran, Dario Martinelli, and Aleksei Turovski render this powerful dichotomy with a vivid example when they write of the human perception of a wooden table versus that of the “larvae of longhorn beetles *Cerambycidae*,” pointing out that “the human subject and the wood-worm are looking at the same entity, apparently sharing the same environment, they are in the same part of the planet Earth and are surrounded by the same quantity and quality of matter and molecules... The wood-worm, because of its physical constitution, its modes of perception, its experience, and in relation to what is *necessary* and *interesting* to its existence, interprets the surrounding environment in a totally different way that humans do.”⁴¹

This should come as welcome news to most residents of Raleigh, North Carolina, for example, where scientists looking at 50 houses published data recently indicating that the average household contained not only humans but at least 100 other species (not including those species inhabiting humans themselves—billions of bacteria, millions of follicle mites, etc.). One of the “579 different morphospecies... from 304 different families” of minute organisms, like booklice, that was common to every home, was the gall midge, each approximately “four one-hundredths of an inch” in length.⁴²

There is an impressive literature, dating to pre-Socratic Greece and the sixth century BC in Jain annals, regarding pain, cognition, consciousness, community structure and dependencies, and the problems of survival that have given rise in insects and spiders to significant vulnerabilities to suffering.⁴³ So what, precisely, is the relationship between neurons and suffering, intelligence and sensory acuties? No one has the slightest clue. But there is a plenitude of hunches. Neurobiologist Nicholas Strausfeld at the University of Arizona Tucson has suggested that insects, particularly the multitudes of “cockroaches, water bugs, velvet worms, brine shrimp, and dozens of other invertebrates” he and his students have researched for more than three decades have “the most sophisticated brains on this planet,”⁴⁴ approximately one million brain neurons, versus 85 billion in humans, 23 billion in an elephant, seven billion in a chimpanzee, one billion in a house cat, and 75 million neurons in the brain of a mouse. Of course, those 85 billion pale in comparison with

⁴¹Timo Maran, Dario Martinelli, Aleksei Turovski (Eds.), *Readings In Zoosemiotics*, De Gruyter Mouton, © Waltr de Gruyter GmbH & Co. KG, Berlin/Boston, 2011, p.11.

⁴²See “The Bugs Sharing Your Home [Get Out a Calculator],” by Sindya N. Bhanoo, January 25, 2016, *The New York Times*, <http://nyti.ms/1Pgu0SR>, Accessed January 25, 2016.

⁴³“Do Bugs Feel Pain?” by Brian Tomasik, last edited 18 May 2015, <http://reducing-suffering.org/do-bugs-feel-pain/>, Accessed January 25, 2016.

⁴⁴“Consciousness in a Cockroach: The insect nervous system provides clues to attention, consciousness, and the origin of the brain,” By Douglas Fox, January 10, 2007, http://discovermagazine.com/2007/jan/cockroach-consciousness-neuron-similarity#.UNd_DbZ8OF4, Accessed January 25, 2016.

the nearly 38 trillion cells in *H. sapiens*. We are stuffed with ourselves.⁴⁵ In insects and spiders there is apparently no lamination, no myelinated axons, nor neocortical subdivisions that in humans have given rise to four primary differentiated lobes in our 2-to-4 mm thick cerebral cortices, embryogenetic germ layers with their multiples of convolutions and columns, supporting what we consider dear: a so-called triploblasty of thought, memory, and creative expression. But, in late 2014, it was discovered that Long-Finned Pilot Whales have more cortical neurons than humans⁴⁶ and research on Bottle-Nosed Dolphin communication, intelligence, and creativity infrastructure, not to mention the actual importance of the encephalization quotient in cetacea, particularly Blue Whales, probably the largest animal that has ever lived, is still up for intense debate.

Fig. 7.3 “Odonata Species, Brunei,” © J. G. Morrison



The fact that insects and birds both are able to optimize the utility of densely packed neurons in powers-of-ten of compression compared with all mammals throws into doubt our criteria for assessing fundamental brain power, and what this rather lame phrase actually refers to, if anything. And that particularly must include our reconsideration of the brilliance and *qualia* of all invertebrates.

To suggest that a sponge, which apparently shows no neurons whatsoever, is without a certain gift of endurance, life force, and enthralling sensibilities, however little we may perceive or understand them, is simply nonsensical. Similarly, the positively gorgeous roundworm, *Caenorhabditis elegans*,⁴⁷ viewed under a microscope, with its barely 300 neurons and more than 7000 synapses, is clearly a primordial survivor who has experienced everything—a survivor of at least five global extinction events, including the Chicxulub impact in what is the Yucatan 66 million

⁴⁵About Health, “How Many Neurons Are In The Brain?” by Kendra Cherry, Updated September 25, 2014, Accessed January 25, 2016.

⁴⁶Mortensen HS, et al. (2014) “Quantitative relationships in delphinid neocortex.” *Front Neuroanat* 8:132. doi:10.3389/fnana.2014.00132. PMC 4244864. PMID 25505387, Accessed January 26, 2016.

⁴⁷See <http://wormclassroom.org/short-history-c-elegans-research>, Laboratory for Optical and Computational Instrumentation at the University of Wisconsin-Madison, Accessed June 20, 2016.

years ago. All one million species or so—some parasitic, most not, of the Phylum Nematoda—the round worms, as well as the 17,000 species of larger, segmented Annelids (most of the world’s other worms) have turned the soils; provided hospice, template, and nurseries for soil nutrients; converted a contagion of biomass into more efficient recyclable biological “stuff;” and basically enabled forests to grow and every other major terrestrial biome to thrive. Imagine what those involved in these great transformations are perpetually “discussing” with one another?⁴⁸

Measuring Survival Within the Context of Intelligence

Other survival statistics—which can be adduced to comport with a level of experience mammals have no basis for comprehending—have been attributed to those groups of organisms, including the cockroach and an ancient family of parasitic wasps, the Braconidae. Among several others, such as *Thermococcus gammatolerans*, *Deinococcus radiodurans*, and the famously “cute” water bears, *Milnesium tardigradum*, they have been shown to be able to withstand vast doses of radiation. That has to be intellectually challenging.⁴⁹

Invertebrates may, in fact, have a far more effective monopoly on the fundamentals of consciousness—and certainly survival—than *H. sapiens*. And they have it across a constellation comprising many hundreds of trillions of individuals. Mammals and birds are believed to have genetically separated over 300 million years ago, evolving separate morphological means of achieving supra-cognitive capacities that defy any single definition of relevancy, articulation, or prowess. A far earlier separation from a deep-lineage global ancestor known as Urbilateria occurred between one billion and 600 million years ago. According to brain researcher Heinrich Reichert at the University of Basel in Switzerland, Urbilateria gave rise to all bilaterally symmetrical organisms,⁵⁰ 99% of all known animals, the rest—like starfish or sea anemone—being radially symmetrical. The phylogenetic hypotheses associated with Urbilaterian reconstruction are contested, given the absence of early fossils. Only around 570 million years ago are trace fossils to be found of these curious creatures in Ediacaran sediments.⁵¹ If, indeed, there was this Urbilaterian ancestor of most of the world’s invertebrates and vertebrates we see today, then issues of consciousness and pain presumably share that same set of biotic components, completely humbling, if not stripping altogether, the human notion of dominance.

⁴⁸ See Actforlibraries.org, <http://www.ucmp.berkeley.edu/phyla/ecdysozoa/nematoda.html> <http://www.ento.csiro.au/education/allies/annelida.html> <http://cas.bellarmine.edu/tietjen/images/platyhelminthes.htm>, Accessed June 8, 2016; See also, <http://www.ncbi.nlm.nih.gov/books/NBK20086/>, Accessed March 21, 2016.

⁴⁹ “Survive the Fallout From A Nuclear,” <http://morgana249.blogspot.com/2014/08/6-organisms-that-can-survive-fallout.html>, Accessed March 14, 2016.

⁵⁰ *ibid.*, p. 1 of 3.

⁵¹ See Shen, Bing; Dong, Lin; Xiao, Shubai; Kowalewski, Michal (2008). “The Avalon Explosion: Evolution of Ediacara Morphospace”. *Science* 319(5859): Bibcode:2008Sci...319...81S. doi:10.1126/science.1150279. PMID 18174439, Accessed March 3, 2016.

More importantly, the potential avows that awareness and pain are essentially universal, quotients that are less and less variable the more ancient their supposedly singular ancestor.

In Urbilateria we see a postmodernist cockroach, a neural prodigy in the European magpie, a deeply angst-ridden mountain gorilla, a virtuoso pianist touring the world's concert halls, a polar bear hoping to hibernate, all equal in their own ways. They are all part of the same outmigration of this thing below, above, all around and inside, conscious being. Charles Darwin intimated this similitude with greater insistence in his 1872 publication of **The Expression of Emotions in Man and Animals** than his far more lionized 1250 copies *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*, published November 24, 1859, by John Murray in London.

Fig. 7.4 “Skull of a Murdered Endangered Coimbra’s *Callicebus coimbrai* Titi Monkey, Sergipe State, Brazil,” Photo © M. C. Tobias



Most importantly, despite existing correlations between IUCN Red Listed mammals and relative encephalization measurements, 7.4 factor of brain size to body size in average humans versus 5.3 in chimpanzees,⁵² it is clear that the Anthropocene is bringing out ancestral and primordial resources and stratagem for survival that transcend our very limited and self-serving definitions for what truly constitutes intelligence. In a fascinating study by Harry J. Jerison, probably the leader in the field of encephalization studies in mammals going back to the early 1970s, he writes near the opening of a recent essay, “Identifiable neocortex is a feature of the external morphology only of mammalian brains, but neural structures with similar functional significance have also evolved in birds and reptiles.”⁵³

⁵² See Abelson, E. S. (2016) Brain size is correlated with endangerment status in mammals. *Pros R. Soc. B.* 283(1825). doi:10.1098/rspb.2015.2772, Accessed March 7, 2016.

⁵³ See hjerison.bol.ucla.edu/pdf/neocortex.pdf/ Accessed October 22, 2016; See also Butler & Hodos, 2005—Butler, A. B. and Hodos, W. (2005). *Comparative vertebrate neuroanatomy: Evolution and Adaptation*. New York, Wiley-Interscience; Karten, 1997—Karten, H. J. (1997). Evolutionary developmental biology meets the brain: The origins of mammalian cortex. *Proceedings of the National Academy of Science*, 94:2800–2804; Reiner, Yamamoto & Karten, 2005—Reiner, A., Yamamoto, K., & Karten, H. J. (in press). Organization and evolution of the avian forebrain. *Anatomical Record, Part A.*, Accessed March 7, 2016.

Fig. 7.5 “South African Crowned Hornbill, *Tockus alboterminatus*,” Photo © M. C. Tobias



“Avian and reptilian brain structures homologous with mammalian neocortex must first have appeared in the common amniote ancestor of these classes of vertebrates, but fossils are unlikely to be helpful in identifying these earlier ancestral connections,” he writes.⁵⁴ In past decades, research on reptiles may well have simply gotten it totally wrong, testing for modalities appropriate to mammals, rather than for cognition in cold-blooded animals. Now, experiments and presuppositions among human researchers have improved. Writes PETA, in its Animal Rahat summary of initiatives during 2015/2016, “Herpetologist David Holtzman, who has spent years studying spatial learning and memory in snakes, has found that the reptiles possess a remarkable aptitude for learning. He reports, ‘The bottom line is that when tested in a biologically meaningful way, snakes exhibit spatial learning that rivals the learning abilities of birds and rodents.’”⁵⁵

In recent studies of monitor and *Anolis evermanni* lizards as well as red-footed tortoises, problem-solving tasks at increasing levels of complexity, demanding memory and acute observation, were quickly discerned within laboratory settings.⁵⁶ The barriers deriving from assumption are fast breaking down as we realize that what we think of as “intelligence” is, in fact, everywhere across the biological worlds.

The point then, whether with respect to EQ in the fossil brain or surrogate endocasts of the earliest Triassic mammals, for example, or with respect to studies of the allometric (body size and other morphological criteria in relation to the animal’s

⁵⁴“What Fossils Tell Us about the Evolution of the Neocortex,” January 2007, <https://www.researchgate.net/publication/253515319>; for a complete list of Jerison’s extraordinary work in this field, see, https://www.researchgate.net/profile/Harry_Jerison/publications, Accessed March 7, 2016.

⁵⁵ See <http://www.animalrahat.com/the-hidden-lives-of-snakes/>, Accessed March 30, 2016.

⁵⁶“Coldblooded Does Not Mean Stupid,” by Emily Anthes, November 18, 2013, The New York Times, By Emily Anthes, November 18, 2013, http://www.nytimes.com/2013/11/19/science/cold-blooded-does-not-mean-stupid.html?_r=0, Accessed March 30, 2016.

behavior), or isometric (proportional body sizes over time) scaling of organisms, there are huge and inexplicable knowledge gaps, as well as meaningful contemporary discrepancies that cannot adequately explain or account for qualitative differences in what humans are prone to terming “intelligence.” It clearly does not correlate with any level of survivability, as intimated above. There is biological obfuscation of true acuity, intellect, sensibility, feelings, consciousness, and qualia that results from any number of misunderstandings on our part. If the mammalian brain is theorized to date back 225 million years, which appears to be most likely the case, then clearly the brain itself and all of its (its?—again, what, semiotically speaking, is “it”?) allegedly advanced accumulation of folds (expanding surface area and neuronal infrastructure) that has accrued over evolutionary time are not commensurate with behavioral categories of survival, insight, intuition, instinct, or any of the other countless qualia that help to better characterize the brilliance of any organism.

Of course, “brilliance” is simply a human word for a human quality, and its homologous incarnation in Others may be an entirely misleading provocation that overstates on one hand, while doing a disservice to Others simply by dint of incorporating their incontestable powers and integrity within the humanly perceived umbrella, a divisive flaw, breaking boundaries that weren’t intended to be broken, inherent to all human communication and studies.

Fig. 7.6 “What Sick Pleasure in Tormenting this Agamidae Family Lizard?” Thailand, Photo © M. C. Tobias



Chapter 8

Experiential, Empirical, and Disturbing Anthrozoologies

Interspecies Altruisms

In March of 2016, E. O. Wilson published his book **Half-Earth: Our Planet's Fight for Life**,¹ in which, in his Prologue he speaks of the “fever swamp of dogmatic religious belief and inept philosophical thought through which we still wander” and added that “Unless humanity learns a great deal more about global biodiversity and moves quickly to protect it, we will soon lose most of the species composing life on Earth.” Wilson concludes this chilling paragraph by suggesting, “I am convinced that only by setting aside half the planet in reserve, or more, can we save the living part of the environment and achieve the stabilization required for our own survival.” That half-Earth is approximately the portion of the wild world—in total—that thrived prior to the onslaught of *H. sapiens*, he reads us. Wilson acknowledges Tony Hiss for suggesting the term “half-Earth”.² Hiss himself acknowledges that “a version of this idea has been in circulation among conservationists for some time,” a key factor, under any number of guises and common denominators; of growing the “rewilding” movements and TransBoundary conservation efforts throughout the world, protected corridors from the Yukon to Yellowstone, to those efforts to save the longleaf pine forests now “reduced by 97%” throughout the American Southeast. There is a tremendous effort underway to rescue longleaf habitat, an attempt by a close friend of Wilson’s, M. C. Davis³ to buy up vast tracts of the southeast and create what he’s

¹ W. W. Norton & Co., Inc., New York; see also Wilson’s essay, “The Global Solution to Extinction,” *The New York Times Sunday Review*, March 12, 2016, http://www.nytimes.com/2016/03/13/opinion/sunday/the-global-solution-to-extinction.html?emc=eta1&_r=0, Accessed March 12, 2016.

² “Can the World Really Set Aside Half of the Planet for Wildlife? The eminent evolutionary biologist E. O. Wilson has an audacious vision for saving Earth from a cataclysmic extinction event,” by Tony Hiss, *Smithsonian Magazine*, September 2014 <http://www.smithsonianmag.com/science-nature/can-world-really-set-aside-half-planet-wildlife-180952379/>, Accessed March 12, 2016; see also, <http://www.pps.org/reference/thiss/>, Accessed March 12, 2016.

³ See Hiss, *ibid*.

called “Nokuse,” a protected series of connected corridors meaning “bear” in the indigenous Muskogee language and said to be “the biggest private preserve and biggest restoration project east of the Mississippi.”⁴ Hiss discusses the Wildlands Network out of Seattle with its “Western wildway” initiative, that would span areas from Mexico to Canada to Alaska, thereby, in combination setting the ecological pre-conditions for what Hiss describes as “Long Landscape parallels ...” encompassing interconnected areas on all sides of north America, “a reimagining of the possible.”⁵

Fig. 8.1 “Milford Sound, Fiordland National Park, New Zealand,” Photo © M. C. Tobias



From rewilding efforts across Europe⁶ to the Pleistocene Ark and North-East Scientific Station near Sakutia Siberia,⁷ large-scale habitat ecological restoration plans involving governments and public-private partnerships at all levels and scales of collaboration are in various phases of implementation in many nations; each heeding the summons of the likes of E. O. Wilson at Harvard University, Paul and Anne Ehrlich at Stanford University, Russell Mittermeier at Conservation International and many others, like the young King, Jigme Singye Wangchuck, who once decreed (with its legacy lasting to this day) that Bhutan would retain at least 60% of her primary canopy; and that the nation would embrace a new economic indicator, namely, Gross National Happiness.⁸

⁴ See Hiss, *ibid.*

⁵ Hiss, *ibid.*

⁶ See <https://www.rewildingeurope.com/tag/european-habitat-forum/>

⁷ See <http://www.pleistocenepark.ru/en/>, Accessed October 5, 2015.

⁸ See <http://www.nsb.gov.bt/publication/files/pub0ha5269tp.pdf>; See also <http://www.forbes.com/sites/michaeltobias/2011/10/26/the-last-shangri-la-a-conversation-with-bhutans-secretary-of-the->

Fig. 8.2 “Dr. Paul R. Ehrlich and Dr. Anne H. Ehrlich at the Rocky Mountain Biological Laboratory, Gothic, Colorado,” Photo © M. C. Tobias



Fig. 8.3 “Dr. Russell Mittermeier Atop the Volksberg, Suriname,” Photo © M. C. Tobias



Fig. 8.4 “Her Majesty Ashi Dorji Wangmo Wangchuck, First Wife of the Fourth King of Bhutan,”
Photo © J. G. Morrison



Between 2008 and 2015 the New Zealand Prime Minister John Key created a Marine Reserve in his country’s northern waters the size of France.⁹ In fact, during that 7-year time-span, five other immense marine reserves—the largest in the world—were passed into law by the French, British, Australians, and Americans. Also between 2008 and 2015 the number of protected areas on the planet rose from approximately 120,000 to over 208,000, including 5000 national parks, a robust beginning, considering, for example, there are only 48 national parks in all of Russia. The 5000 number includes the extraordinary 17.8 million acres of the Southern Suriname Conservation Corridor, now in the hands of approximately 3000 indigenous Trio and Wayana Indians, an area of essentially 100% forest-cover four times the size of New Jersey, and second only in expanse to the Kayapo indigenous reserve in Brazil.¹⁰ Meanwhile, IUCN, initiated by UNESCO Director General Julian Huxley in 1948, today works with over 11,000 scientists and has a membership exceeding 1200 government and nongovernmental organizations. Their goal: to save as much life as possible.

That a few good people can effect enormous change mirrors what a few bad people can do. There are no simple generalities in the Anthropocene, except to recognize that our species is indeed the culprit, notwithstanding more than a few good people working hard to remedy biological crises. Consider, among the endless possible examples of noteworthy compassion in action, the 30 dogs rescued by the San Diego Humane Society from a grotesque dog meat market in South Korea.¹¹

⁹ See <http://www.bbc.com/news/world-asia-34387945>, Accessed October 3, 2015.

¹⁰ See <http://blog.conservation.org/2015/04/new-conservation-corridor-latest-environmental-triumph-for-suriname/>, Accessed October 5, 2015.

¹¹ “30 dogs are rescued,” by Debbi Baker, Los Angeles Times, Saturday, February 27, 2016, p. B.4, Accessed February 27, 2016.

Such interspecies altruism, one wishes, could be deemed the new norm. But when, famously, the former US Ambassador to the Soviet Union, George Kennan, wrote in his essay “A Modest Proposal,” (1981) “Adequate words are lacking to express the full seriousness of our present situation,”¹² he was well past such pacifistic or ecumenical precedents as that of the great Dutch lawmaker Hugo Grotius (1583–1645), the father of the first international peace treaty in the world, the 1648 Peace of Westphalia ending the Eighty as well as the Thirty Years wars; a generous doctrine to the extreme (by human standards at that time) based upon his vision of *natural law*, as first outlined in his book **De jure belli ac pacis, On the Law of War and Peace** (1625).

In 1976 Kennan had described in an interview what he believed to be a basic flaw of US foreign policy—and by implication, foreign policies from nation to nation; namely, public opinion, “a force,” as he enumerated it, “that is inevitably unstable, unserious, subjective, emotional and simplistic.”¹³ Kennan was concerned, of course, about nuclear war, thousands of warheads which today remain the gravest threat of all to the full richness of the remaining biosphere. But by interpolation, his fears have direct ecological implications in terms of the planet being able to cope with a crisis of imbalance: those relatively few scientists, engineers and innovators, government leaders, lawmakers, and individuals with great financial leverage who are devoted to impeding further planetary biological ruination, versus the vast majority of a struggling and fast self-propagating humanity.

Yes, the UN General Assembly’s adoption of 17 Sustainable Development Goals on its 70th anniversary represents great progress for the alleviation of such human ills as poverty, and child mortality.¹⁴ But at the same time, since its formation in 1945, the UN has also seen the human population grow by 300%. Nor are all scientists encouraged by the Paris climate talks (COP21) in Nov/Dec., 2015. Australia, a nation increasingly desiccated, has moved to virtually gut its climate research, cutting budgets and staff of its Commonwealth Scientific and Industrial Research Organization (CSIRO) that had been in part devoted to monitoring climate change. According to many researchers, COP21 “is not remotely ambitious enough to forestall a significant melting of Greenland and Antarctica ...”¹⁵ There remains a widespread syndrome now widely known as “treaty congestion.”¹⁶ In Harvard Professor Lawrence

¹² See <http://www.nybooks.com/articles/archives/1981/jul/16/a-modest-proposal/>, Accessed October 7, 2016.

¹³ George Urban, September 1976, “From Containment to Self-Containment: A conversation with George Kennan”. *Encounter*, p. 17, Accessed October 8, 2016.

¹⁴ “World leaders set sights on sustainable development,” by Noam N. Levey, *Los Angeles Times*, September 23, 2015, p. A3, Accessed September 24, 2015.

¹⁵ “Greenhouse Gas Linked To Floods Along U.S. Coasts—Worsening A Certainty—Research Team Reports Fastest Sea Rise in 28 Centuries,” by Justin Gillis, *The New York Times*, pp. A1 and A10, February 28, 2016.

¹⁶ Donal K. Anton, “‘Treaty Congestion’ in International Environmental Law,” *International Law Reporter*, January 24, 2012, <http://ilreports.blogspot.com/2012/01/anton-treaty-congestion-in.html>, Accessed January 24, 2016.

Susskind's groundbreaking 2008 essay, "Strengthening the Global Environmental Treaty System" he made it clear that "Despite the huge media attention environmental treaties receive, the system of making and implementing them is barely functioning." Susskind concluded his essay by declaring, "Today, there is no official body with responsibility for improving the global environmental treaty-making system."¹⁷ As The Guardian's environment editor, John Vidal, has written, "The trouble is, it's not in the interests of most governments to change the status quo."¹⁸ Others have called this *reality resignation*; one form of burnout or compassion fatigue. Candidates who vied for their parties' nominations for the US Presidency, according to one journalist relying on the "Flesch-Kincaid grade-level index" which "measures sophistication by syllables per word and words per sentence" were determined to have been speaking at the level of between the fifth and ninth grades.¹⁹ Such communication compromises may, in part, account for the buyer's regret sentiment that swept over millions of UK voters regarding Brexit, with its own implicit ecological treaty implications.

There are between 500 and 900+ international environmental treaties, depending upon one's definition or classification of binding and non-binding two+ party governmental agreements; thousands of environmentally relatable pieces of legislation within nations. But despite these advances in human self-protection and community altruism, as well as to a certain degree, sheer love of, interest in, and empathy for Nature, our Green Revolutions and fertility success as primates has backfired, engendering this Anthropocene Epoch, with its 35 (as many as 43) terrestrial biological hotspots, and innumerable coldspots—countless other ecosystems rich with biodiversity but as yet only recognized, not codified for purposes of legal protection; over 11,000 Important Bird Areas recognized by BirdLife International, 200 critical Global Ecoregions identified by the World Wide Fund for Nature, and at least 595 priority sites described by the Alliance for Zero Extinction.

¹⁷Lawrence Susskind, "Strengthening the Global Environmental Treaty System," *Issues in Science and Technology*, Volume XXV, Issue 1, Fall 2008, <http://issues.org/25-1/susskind/>, Accessed January 24, 2016.

¹⁸John Vidal, "Many treaties to save the Earth, but where's the will to implement them?": <http://theguardian.com/environment/blog/2012/jun07/Earth-treaties-environmental-agreements>, The Guardian, Thursday, June 7, 2012, Accessed January 24, 2016.

¹⁹"Donald Trump's 'Captain Underpants' Campaign," By Dana Milbank, Opinion Writer, The Washington Post, February 26, 2016, https://www.washingtonpost.com/opinions/donald-trumps-captain-underpants-campaign/2016/02/26/17749fa2-dc46-11e5-891a-4ed04f4213e8_story.html, Accessed February 26, 2016.

Fig. 8.5 “U.S. Fish and Wildlife Service Researchers Working to Monitor and Save From Extinction the Kittlitz Murrelet, *Brachyramphus brevirostris*, Southeastern Alaska,” Photo © M. C. Tobias



The USA and Canada are intent upon increasing the volume of protected areas in their respective countries, principally in support of COP21, but also to increase habitat protections by escalating the geography of safeguards terrestrially by 17 % and marine protections by 10 % as of 2020.²⁰ On March 10, 2016 US President Barack Obama and Canada Prime Minister Justin Trudeau published their “U.S.-Canada Joint Statement on Climate, Energy, and Arctic Leadership.”²¹ But if they are serious, then those same countries must pledge to phase out the killing of animals throughout the endless labyrinths of their agribusiness styles of ecocide.

As early as 2006 the popular press²² had reviewed the 400-page FAO document, “Livestock’s Long Shadow” which implicated cow eructation as contributing 18 % of all climate change. Those numbers since then have increased as the human population’s ever growing rapacious appetite for dead animals continues to wreak havoc on the environment (just in the Huff Post, there have been at least six articles about “cow burps.”) Killing animals for food injects a much heftier load of greenhouse gas damage to the global environment than automobiles, for example.

²⁰ See <https://www.whitehouse.gov/the-press-office/2016/03/10/us-canada-joint-statement-climate-energy-and-arctic-leadership>, Accessed March 10, 2016.

²¹ See <http://mahb.stanford.edu/author/mahbadmin2/>, Accessed March 10, 2016.

²² For example: <http://www.independent.co.uk/e...>, Accessed March 12, 2016.

If the admirable goals of the US and Canadian administrations working together on their various Arctic models of protection are to succeed, they need to add deeply weighed considerations of all the scientific data that has unambiguously come forth in support of phasing out Concentrated Animal Feeding Operations (CAFO), the “growing” of vertebrates (especially members of the Bovidae family—whether in corporate or family farm so-called “free range” operations) and the subsequent supply chains of corpses fueling the heating up of Earth.²³

Aspirations to the increase of habitat protection—terrestrial and marine—are indeed admirable and long overdue and we assuredly applaud the respective US and Canadian governments’ initiatives. This will slow down the Anthropogenic effects on Arctic wildlife and the deleterious impacts upon ecosystems and the peoples of the First Nations who depend on such biomes, to be sure.

Fig. 8.6 “Mt. Saint Elias, 18,008 ft, in the Heart of the Largest National Park in the U.S., Wrangell-St. Elias National Park & Preserve,” Photo © M. C. Tobias



²³ See <http://www.cafothebook.org/>, Accessed March 22, 2016.

But unless multinational agribusiness is invited to participate in global warming mitigation at fundamental levels—viewing the reduction in the killing of animals as a great opportunity for the amelioration of suffering, but also as an economic incentive for backing R&D into benign alternative meat production (artificial meat, research for which has been thus far funded by NASA, PETA, and even a cofounder of Alphabet, and promises eventual windfalls in commercialization)—we will not solve the problem of climate change.²⁴

Big Farma, as many term it, must come to view the slaughter of some 70 billion+ terrestrial vertebrates²⁵ (not to mention nearly two trillion wild and farmed riparian and marine vertebrates and invertebrates) annually, as senseless. We urge all corporations to zealously embrace nonviolence towards humans and all other species with the same zeal and understanding in terms of economic theories and opportunities that would guarantee a final twenty-first century blow to the obsolete “broken window fallacy” (Frédéric Bastiat’s 1850 essay “Ce qu’on voit et ce qu’on ne voit pas,” [That Which Is Seen and That Which Is Not Seen]).²⁶ Stakeholders in these thousands of multinationals and smaller companies should view their investments in nonviolence as totally commensurate with a commitment to alternative energy. In as much as these companies already enjoy the legal benefits in many countries of “corporate personhood” then let them and their shareholders start “feeling” like real persons. Let them be imaginative, creative, and serve as true stewards for their children and grandchildren.

We cannot save the planet by killing her ecological citizens—wild and domestic life (who are the same—emotionally, spiritually and physically). And, as Ms. Ingrid Newkirk has eloquently declared for decades: “Kindness, Kindness, Kindness”²⁷

²⁴For a good summary of artificial meat substitutes, and their environmental consequences, see “The Better Meat Substitute—Can new and improved meat analogues help us control our damaging desire for animal flesh?” by Glenn Zorpette, June 3, 2013, IEEE Spectrum, <http://spectrum.ieee.org/energy/environment/the-better-meat-substitute>, Accessed March 22, 2016; See also, “The (Fake) Meat Revolution,” by Nicholas Kristoff, Sunday Review, The New York Times, September 19, 2015, http://www.nytimes.com/2015/09/20/opinion/sunday/nicholas-kristof-the-fake-meat-revolution.html?_r=0, Accessed March 22, 2016.

²⁵ See http://www.carnism.org/who%20we%20are*, Accessed March 23, 2016.

²⁶ See <http://www.libertarianism.org/people/frederic-bastiat>, Accessed March 23, 2016.

²⁷ See “State of the Earth,” Three Hour Dancing Star Foundation Series, www.dancingstarfoundation.org/state_of_earth.php; See also, “Mad Cowboy,” feature documentary, KQED/PBS, 2005.

Fig. 8.7 “Ms. Ingrid Newkirk, President/Cofounder of PETA, People for the Ethical Treatment of Animals,” Photo Courtesy of Ms. Newkirk/PETA



This cultural and corporate shift is inevitable, just like the “Square-Cube Law” of expansive mitigation, in this instance.²⁸ Until such time as we culturally embrace nonviolence against other animals, we cannot possibly succeed at anything serious, substantive, virtuous or long lasting. If the status quo prevails amid our agricultural extractive methods and mindsets, this and future generations will view our alleged commitment to saving the Earth from climate change as sheer hypocrisy compounded by our blind-spots concerning other fellow denizens of Earth; and we will but continue to flood the atmosphere with methane, the most aggressive of all known greenhouse gasses (GHGs), and one with the most potentially damaging synergistic biochemical effects. To make matters worse, farmed “cows on antibiotics release more methane” in their dung (1.8%) than those that are not fed the antibiotics (which have numerous other deleterious impacts on the environment, as well).²⁹

On top of climate change: Our species—as of the mid-1980s—has far exceeded the appropriation of more than 40% of all the products of photosynthesis on the planet, NPP or Net Primary Production.³⁰ That percentage would include the more than 50% of all known forests on Earth, or 3.4 trillion individual trees, cut down by

²⁸David H. Allen, *How Mechanics Shaped the Modern World*, Springer International Publishing Switzerland, 2014, p. 176.

²⁹See Hammer T. J., et al. (2016) Treating cattle with antibiotics affects greenhouse gas emissions, and microbiota in dung and dung beetles. *Proceedings of the Royal Society B*. doi:10.1098/rspb.2016.0150. Accessed June 8, 2016.

³⁰“Human Appropriation of the Productions of Photosynthesis,” by Peter Vitousek, Paul R. Ehrlich, Anne H. Ehrlich and Pamela Matson, mahb.stanford.edu/wp-content/uploads/2012/02/1986_Vitousek.pdf 1986, Accessed March 2, 2016. See also: http://Earthobservatory.nasa.gov/GlobalMaps/view.php?di=MOD17A2_M_PSN), Accessed March 2, 2016.

our species since the origin of all human civilizations.³¹ But the tally does not begin to include the aforementioned more than three trillion (combined) vertebrates and invertebrates that humans aggressively kill and/or consume annually, on a map of what the authors have delineated as “the cartography of pain points.”³² One way of even trying to grasp that amount of pain and cruelty is to envision the fact that humanity, at present—roughly 7.4 billion humans—weighs about 300 million tons, whereas the remaining weight of wildlife is well under 100 million tons, but the weight of all those animals we are slaughtering exceeds 700 million tons, annually.³³

Fig. 8.8 “A Concentrated Animal Feeding Operation (CAFO) in the U.S.” Photo © M. C. Tobias



Ecological Dichotomies

The moral and computational tensions arising from these catastrophic ecological dichotomies challenge our rational capacities and very interior dimensions. Population expert Robert Englemen, Senior Fellow at the Worldwatch Institute in

³¹ See <https://www.inside.com/science/u607m/Researchers-estimate-there-are-3-4-trillion-trees->, Accessed September 4, 2015; See also <http://sciencenordic.com/there-are-now-304-trillion-trees-Earth>, Accessed September 4, 2015.

³² See M. C. Tobias and J. G. Morrison, **God’s Country: The New Zealand Factor**, A Dancing Star Foundation Book, Zorba Press, Los Angeles CA and Ithaca, NY, 2010.

³³ Yuval Noval Harai, The Guardian, <http://www.theguardian.co/books/2015/sep/industrial-farming-one-worst-crimes-history-ethical-question>, Accessed September 26, 2015.

Washington D.C., published an extensive analysis of African population trends in the February 2016 issue of *Scientific American*³⁴ in which his opening statement was that “By 2100 Africa’s population could be three billion to 6.1 billion, up sharply from 1.2 billion today.” This, from the continent with the largest remaining numbers of Other vertebrates (other than human). Such demography spells doom for such already seriously encroached-upon biodiversity. All of the talk about conservation corridors, against such a tapestry of human demographics, is so much white noise. Moreover, if the worst of Engelman’s predictions were to come about, it would easily overwhelm the high-end population figures E. O. Wilson predicts in a conversation for the *New York Times* about his book, **Half-Earth**, in which he credits demographers who suggest the human population could stabilize at between 10 to 11 billion by 2100, now taken to be the conventional wisdom, when, just 5 years ago, that upper ceiling was 9–9.5 billion.³⁵ If Africa hits six billion, with another four billion+ between China and India, there is still the rest of the world to figure in. Such human numbers, at least at the high end of predictions, do not favor even half-of-the-Earth left untouched scenario, taking on a global triage characterization that resembles the mathematics of the succession of Bubonic Plagues between Iceland and India during the centuries leading to and throughout the Renaissance.³⁶ Had there been a continuation of such mortalities of those Plagues, humanity might well have hit upon a genetic squeeze not unlike the Toba Supervolcanic catastrophe of some 75,000 years ago, when the total human population might have plummeted to as low a number as 10,000 breeding pairs.³⁷ Our ethical paradigms are hard-pressed to navigate these rough waters: human numbers, what history teaches us, the many “what ifs?” and the nature of pain.

And then, turning back to biological health itself, we must add to these difficult data sets the rapid decline of pollinators worldwide (among them more than 20,000 species of wild bees whose services help account for a portion of the “35 % of global crop production volume”³⁸ according to the first report of its kind from the Fourth Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, comprised of 124 countries.³⁹ The picture gets far murkier still. If we take in to account the migration to urban environments of the majority of human beings, the agricultural situation does not show any level of improvement. Studies have been conducted throughout cities in the USA.⁴⁰ In the moisture and

³⁴“Africa’s Population Will Soar Dangerously Unless Women Are More Empowered,” http://www.scientificamerican.com/article/africa-s-population-will-soar-dangerously-unless-women-are-more-empowered/?WT.mc_id=SA_ArtPromo_Engelman, Accessed March 6, 2016.

³⁵“A Conversation With E. O. Wilson: A Plea, While There’s Still Time,” by Claudia Dreifus, *The New York Times*, Tuesday March 1, 2016, p. D5, Accessed March 1, 2016.

³⁶See Ole J. Benedictow’s description, at: <http://www.historytoday.com/ole-j-benedictow/black-death-greatest-catastrophe-ever>, Accessed March 24, 2016.

³⁷See <http://toba.arch.ox.ac.uk/>, Accessed March 24, 2016.

³⁸See “Decline of Pollinators Poses Threat to World Food Supply, Report Says,” by John Schwartz, February 26, 2016, *The New York Times*.

³⁹www.ipbes.net, Accessed January 26, 2016.

⁴⁰See http://www.psrc.org/assets/9757/REPORT_AssessingUrbanAgriculture_final.pdf?processed=true, Accessed January 26, 2016.

soil-blessed northwestern states, according to one report, “If every homeowner in Seattle ripped up their lawn and replaced it with edible plants, the resulting crop production would be enough to feed just one percent of the city’s residents.”⁴¹

Couple that depiction with the very extinction of microbial species and genes in our bodies which, as adults contain some “3 lb of bacteria, our forgotten organ” because of our rapid evolutionary selection for an ever-shrinking range of food types containing fiber.⁴² Another looming prospect stemming from dense human megacities under enormous ecological stress might well be the escalation of zoonotic transmissions between species in the name of cancer. Long deemed a non-issue, the contagion of cancer has come increasingly into focus, among the marsupial Tasmanian devils (*Sarcophilus harrisi*), as well as the case of metastasized tapeworm cells having infected a human. “Nature is infinite in its surprises,” writes George Johnson.⁴³

The ethical quandaries commensurate with the logic and appeal of the “half-Earth” scenario ramify and suggest only rough waters ahead for all of us. The threatened California endemic freshwater ray-finned Santa Ana sucker fish (*Catostomus santaanae*) sees its very life blood—water—shut off regularly by one state agency, while its very existence is mandated by another, such that endangered species regulations run up against Clean Water Act regulations, and the gorgeous 4-to-6-in. fish species is the victim of an absurdist human conflict.⁴⁴ As humans play god, they contemplate delisting previously threatened endangered Santa Cruz Island foxes (*Urocyon littoralis santacruzae*) from the Endangered Species List, following upon decades of the slaughter of other innocents there, including thousands of sheep and wild boar; and, elsewhere, culling what National Park Service authorities are saying are too many bison on the northern rim of the Grand Canyon. In old growth forests of Oregon, sharpshooters are killing barred owls (*Strix varia*) for the sake, they say, of the far more endangered spotted owls (*Strix occidentalis*), both species victims yet again of human fragmentation of vast areas of avian habitat. How many deaths are justified in large-scale species management programs? At some point “the ethical calculation would tip the other way: All those deaths would overwhelm the good they were trying to create” says William Lynn, a research scientist, and specialist in public policy and ethics⁴⁵ who was taken on board by the U.S. Fish and Wildlife Service to literally help scientists wend their way through the dark labyrinth of choices.⁴⁶

⁴¹“This Is Why Cities Can’t Grow All Their Own Food,” Sarah DeWeerd | January 26, 2016, Conservation Magazine, Source: Richardson J. J. and L. M. Moskal. “Urban food crop production capacity and competition with the urban forest.” *Urban Forestry & Urban Greening*, doi:[10.1016/j.ufug.2015.10.006](https://doi.org/10.1016/j.ufug.2015.10.006), Accessed January 26, 2016.

⁴²See “The extinction inside our guts,” by Erica Sonnenburg and Justin Sonnenburg,” Los Angeles Times, Thursday, February 25, 2016, p. A.13, Accessed February 25, 2016.

⁴³“Scientists Ponder Contagious Cancer,” George Johnson, The New York Times, Tuesday, February 23, 2016, p. D3, Accessed February 23, 2016.

⁴⁴“Stream Sequence,” by Louis Sahagun, Los Angeles Times, February 26, 2016, pp. B1, B7, Accessed February 26, 2016.

⁴⁵See <http://www.williamlynn.net/>, Accessed February 4, 2016.

⁴⁶“A Shot in the Dark—In Hopes of saving one owl species, scientists are killing another,” by Brooke Jarvis, The California Sunday Magazine, February 4, 2016, pp. 14–17, <https://story.cali->

Such ethical bio-computing is less ambiguous when it comes to America's subsidizing of ranchers by way of the cumulative massive killing of native predators. "A USDA program that tortures dogs and kills endangered species," as Christopher Ketcham of MIT's Knight Science Journalism program described the office of Animal Damage Control (more recently known as Wildlife Services, a linguistic spin that cannot undo the reality of what Ketcham characterizes in his title as "the rogue agency," in a Report for Harper's Magazine⁴⁷ makes for thorough-going nausea in reading the statistics: "Since 2000, Wildlife Services operatives have killed at least two million native mammals and 15 million native birds."⁴⁸ That includes, just for the year 2014, "322 wolves, 61,702 coyotes, 2930 foxes, 580 black bears, 796 bobcats, five golden eagles, and three bald eagles."⁴⁹ The cruelty and evident insanity of this government subsidizing of cattle ranching, we had hoped would wind down over the years. We first investigated this all but inaccessible branch of the U.S. Fish and Wildlife Service in 1998 for our book **Nature's Keepers: On the Frontlines of the Fight to Save Wildlife in America**.⁵⁰ Since that time, the situation has not improved, only become more obstinate, obtuse, and morally conflicted.

Fig. 8.9 "American Bison, *Bison bison*, Near Carrizo Plain, California," Photo © M. C. Tobias



forniasunday.com/barred-owl-removal.

⁴⁷ March 2016, p. 38.

⁴⁸ Ibid., p. 39.

⁴⁹ Ibid., p. 39.

⁵⁰ John Wiley and Sons, New York, 1998.

Such management practices, particularly as they involve the massive slaughter of, or scorched Earth equivalencies, e.g., the sterile insect technique, first utilized on the 176-square mile island of Curaçao during a short period in 1954 to save indigenous goat populations from the predatory screw-worm fly (*Cochliomyia hominivorax*), has touched other nerves, not merely ethical sensibilities. Practically speaking, all native species were once invasives, and in the case of screw-worms, their Genus (*Cochliomyia*) is actually a native throughout the Caribbean so that their eradication on Curaçao was an instance of treating goats in the same manner as humans, confronted by the approximately 3500 Anopheles mosquito malaria vectors; or the hundreds of diseases and disorders in humans (routine visitors to the ecosystem of *H. sapiens*), that are combated with antibiotics.⁵¹ Not to mention the lingering controversy over the near extinction of the Variola virus responsible for the ravages of Smallpox but still preserved in vitro at two known research sites.⁵² So far, the US Congress has failed to agree on a \$1.8 billion package to help impede the continuing spread of *Aedes aegypti*, the mosquito vector for yellow fever but also the Zika virus.

Clearly, there are two conversations going on here: one between the mosquitos, the other between people. This is a clear instance where a vertebrate species has only one thing in common with the insect: its blood. End of conversation, short of the kind of research and action that the President of the Entomological Society of America, May Berenbaum has called for.⁵³ Climate change forces countless species into exile, whereby they cross over into other taxonomic territories. Numerous scenarios have been proposed to cope with ecological flux, the acceleration of evolutionary strategies, but all such prospects, possible or doomed, harbor equally uncertain prospects for all concerned. It would be difficult, for example, to simply “move” Yellowstone National Park farther north.⁵⁴

However, there *are* intriguing examples of community translocations. 130 Jacob sheep, a rare breed from Biblical times, are being enthusiastically relocated from British Columbia back to their geographical origins in Israel. “It’s a Jewish value to conserve animals, repair the world and bring back this lost heritage to the Jewish family,” said Gil Lewinsky, who, with his wife Jenna had raised the nearly extinct sheep and lobbied the Israeli embassy (which was happy they were sheep and not

⁵¹ See <http://www.ranker.com/list/diseases-treated-with-antibiotic/reference?&var=3>, Accessed March 24, 2016; See also, 52.

⁵² “Let’s finally condemn the smallpox virus to extinction,” by Gareth Williams, New Scientist Magazine 2969, 17 May 2014; and, <https://www.newscientist.com/article/mg22229694-800-lets-finally-condemn-the-smallpox-virus-to-extinction/>, Accessed February 13, 2016.

⁵³ See “Zika virus won’t respect borders,” by May Berenbaum, Los Angeles Times, March 21, 2016, p. A13, Accessed March 21, 2016.

⁵⁴ The Wilderness Society, “Study: ¼ of national park land vulnerable to climate change shifts,” by Max Greenberg, <http://wilderness.org/blog/study-14-national-park-land-vulnerable-climate-change-shifts>, Accessed March 24, 2016.

“crocodiles”) to acknowledge the importance of returning the ancient line of ruminants to the Holy Land.⁵⁵ In some US western states non-native eucalypts and tamarisks have proved highly beneficial for many other native species, and there are endless case studies to support the unavoidable realization, as Ralph Waldo Emerson wrote, “What is a weed? A weed is a plant whose virtues have not yet been discovered.”⁵⁶

⁵⁵ See “Biblical Nomads Will Return to the Holy Land (Thank a Canadian Farm),” by Dan Levin, *The New York Times*, Friday, March 4, 2016, p. A4, Accessed March 4, 2016.

⁵⁶ Emerson, *Fortune of the Republic*, 1878, p. 3, cited from <http://landscaping.about.com/od/galleryoflandscapephotos/ig/Plant-Pictures/Weed-Pics.htm>, Accessed March 24, 2016; See also, “A Plant Whose Virtues Remain Undiscovered,” 1/4/2012, By Jason Akers, <http://www.motherEarth-news.com/organic-gardening/a-plant-whose-virtues-remain-undiscovered.aspx>, Accessed March 24, 2016.

Chapter 9

Epiphanies of the Biosemiosphere

Our Embrace of Life

In verse 118 of the famed biography of the most notable of Jain holy men, or Tirthankaras, Mahavira (599–527 BC), the **Kalpa Sūtra**, believed to have been composed by the later famed teacher, Bhadrabahu (c. 433–c. 357 BC), a lyrical portrait of Mahavira reveals the wandering sky-clad (naked) ascetic communing with all other species in a state of pure equanimity throughout his life. He, like all subsequent Jain monastic disciples, followed 28 vows, or vratas, the first being ahimsa, translated, as earlier described, from the Sanskrit as nonviolence in thought and action towards any and all living beings.¹ Key to Mahavira's, and all of Jain beliefs, is the notion of "Parasparopagraho Jīvānām (All life is bound together by mutual support and interdependence)," referenced repeatedly in this book, and as described and translated by the late Laxmi Mall Singhvi, one of India's great constitutional lawyers, in his "Jain Declaration of Nature."² Said Singhvi, "It defines the scope of modern ecology while extending it further to a more spacious 'home'. It means that all aspects of nature belong together and are bound in a physical as well as a metaphysical relationship. Life is viewed as a gift of togetherness, accommodation and assistance in a universe teeming with interdependent constituents."³ Equally vital to understanding this underlying philosophical basis

¹Jacobi, Hermann [1884] (ed.) F. Max Müller, ed. *The Kalpa Sūtra. Sacred Books of the East*, Volume 22, Part 1 (in English: translated from Prakrit). Oxford: The Clarendon Press. Republished by Motilal Banarsidass Publishers in Delhi in 1989.

²See https://www.researchgate.net/publication/265157480_The_Jain_Declaration_on_Nature, Accessed March 24, 2016.

³Singhvi, L. M. 2006. In Christopher Key Chapple's *Jainism and Ecology: Nonviolence in the Web of Life*. New Delhi: Motilal Banarsidass Publishers, p.217.

for ahimsa is the first of the two Srutaskhandas, or ancient books in the Ardahagadhi Prakrit Indic language. The oldest of all Jain agams, the original discourses of the Tirthankaras, both spiritual and practical texts⁴ known as the “Acharanga Sutra,” includes the following text, beautifully translated by Surendra Bothra in his book, **Ahimsa—The Science of Peace As Developed by Jain Thinkers**⁵ (albeit truncated herewith): “... all the omniscients of all times, state, speak, propagate, and elaborate that nothing which breathes, which exists, which lives, or which has essence or potential of life, should be destroyed or ruled over, or subjugated, or harmed, or denied of its essence or potential ... as sorrow or pain is not desirable to you, so it is to all which breathe, exist, live or have any essence of life. To you and all, it is undesirable, and painful, and repugnant. That which you consider worth destroying is (like) yourself ... That which you consider worth subjugating is (like) yourself. The result of actions by you has to be borne by you, so do not destroy anything.”

Fig. 9.1 “Dr. Biruté Mary Galdikas With Orangutan,” Orangutan International Foundation, Central Kalimantan, Borneo, Indonesia, Photo © M. C. Tobias



⁴See Paul Dundas, **The Jains**, Second edition, Routledge (2002) George Routledge, Abingdon, UK, ISBN 0-415-26605-X.

⁵Prakrit Bharati Academy, Jaipur, Rajasthan, India 2009.

Fig. 9.2 “Jain Children in Prayer, Vegetarian City of Pushkar, Rajasthan, India,” Photo © M. C. Tobias



In early March 2016, a Tibetan Buddhist teenager studying in northern Indian, Dorjee Tsering, died through self-immolation out of protest against China’s continued subordination of Tibet.⁶ The same week, in Honduras, a leading environmentalist, Berta Caceres, winner of the 2015 Goldman Environmental Prize for assiduously endeavoring to prevent the building of the Agua Zarca Hydroelectric project on the Gualcarque river, which “would have cut off the water supply, as well as access to food and medicine, to hundreds of indigenous people” the Lenca of the Rio Blanco community, was assassinated.⁷

These human tragedies and rash of life and death imperatives, underscore how serious the human debacle is. It always has been a pivotal story. Historians from Thucydides, Herodotus, Pliny the Elder and Edward Gibbon to Arnold Toynbee, John Keegan, Clarence Glacken and one of the founding intellectual patron/historians of ethology, Irenäus Eibl-Eibesfeldt—among countless others—have weighed

⁶“Tibetan in India Dies Days After Setting Himself on Fire to Protest China,” by Nida Najar, March 4, 2016, <http://www.nytimes.com/2016/03/05/world/asia/india-tibet-dorjee-tsering-immolation.html?ribbon-ad-idx=3&rref=world/asia&module=Ribbon&version=context®ion=Header&action=click&contentCollection=Asia%20Pacific&pgtype=article>, Accessed March 4, 2016.

⁷See “Prize-Winning Environmentalist Murdered In Her Home In Honduras,” by Marlene Cimons, March 3, 2016, Climate Progress, <http://thinkprogress.org/climate/2016/03/03/3756409/berta-caceres-murdered/>, Accessed March 3, 2016) Throughout 2015 according to the London-based Global Witness, “Brazil topped the 16-country list with 50 environmental defenders slain in 2015.” “Killings of activists up nearly 60%.” In World Briefing, n.a., Los Angeles Times, Tuesday, June 21, 2016, p. A4.

in on these battlegrounds. That would include the clash of titans on cosmic killing fields emblematic of the rise and fall of civilizations, or invisible wars waged by those of any microorganism; the death throes of a blue whale or the concentration of contaminants in the moss upon certain trees of Portland Oregon tainted with toxic levels of heavy metals from nearby industrial congeries.

Most people are unlikely to precisely emulate the wanderings or ethical strictures of a Mahavira, whose absolute purity provides an essential anthropological window on the capacity of human beings to behave as the proverbial but ultimate Saint. The above referenced basis for ahimsa is very much alive and well throughout the human species. We just have to dwell upon it, as opposed to cynically discounting its very real potential for lasting traction. From culture to culture, time and geography will consistently dictate levels of nobility, extended altruism, of suffering and martyrdom, of success and failure; of people of high character and motives, and of outstanding community initiatives. Humanity-while it needn't be so - is on a "tightrope," as Paul Ehrlich and Robert Ornstein aptly described the human condition.⁸

In proposing and seeking to predicate theory on actual experience; hypothesis on direct personal involvement; to integrate abstractions and visions of great virtue with a pragmatic idealism, our goal remains the purposeful juxtaposition of human self-perception with all that incoming data about other species that has left us stranded in an empirical ivory tower, but one nearly smothered in luxuriant green liana. We are everywhere surrounded by the temptation to be generous in our attributions regarding other life forms; to confirm the best in our childhood memories of other plants and animals and build up an argument that could attest to fantastic arcadias—the ones painted throughout history and fashioned into beguiling literary fancies too often cast off as mere "children's literature"—that very paradise every thinking, feeling being senses about the Earth, at one point or another. Of this we can be certain. It was Dostoevsky who said we live but 5 minutes in our life, typically in childhood. And then we spend our entire adult days trying to re-capture those magical moments.

One significant overarching problem with these nostalgic arcadias of childhood is the very ecological deficit disorder afflicting not only children but their parents. The issue itself was well highlighted in David W. Orr's important book **Ecological Literacy: Education and the Transition to a Postmodern World**.⁹ Since that time, a huge amount of research has been conducted worldwide. In 2009 in the UK, an important series of international surveys were collated into a seminal document that examined the amount of quality time afforded children outdoors, and the many knowledge gaps pertaining to their grasp of environmental-related experiences, information and direct contact. "In a survey of 1600 children, researchers found 37% of youngsters aged between five and ten didn't know what a bee looked like ..."¹⁰ Hence, the wisdom of Microsoft's television ads, "You put a big bug in kids hands and change their worldview."

⁸ **Humanity on a Tightrope: Thoughts on Empathy, Family, and Big Changes for a Viable Future**, Rowman & Littlefield Publishers, Lanham MD, March 16, 2012.

⁹ Suny Series in Constructive Postmodern Thought, State University of New York Press January 1992.

¹⁰ Children & Nature Network, "Children's Nature Deficit: What We Know—and Don't Know," by Cheryl Charles, Ph.D., and Richard Louv, September 2009, p. 28. <https://www.childrenandnature.org>.

Our species has never doubted miraculous capacities exhibited by other species. A single bird flying overhead should suffice to humble us. Or the fact some common moss species in the genus *Sphagnum* project their microscopic spores for purposes of sexual dissemination up to 8 in. above ground level at an unfathomable speed that is 36,000 times that of g , the Earth's gravitational acceleration constant.¹¹ In a study of 400 burying beetles, German researchers recently published data indicating that “when the immature, wingless beetle larvae are most dependent ... the mother stops producing eggs and releases a chemical that functions as an anti-aphrodisiac. The father gets the message through his antennae. Both parents then hunker down for the species-preserving imperative.”¹²

Recently, Dr. Maria Sagi, chief scientist for the Club of Budapest spoke to the intelligence of a paramecium, when “Incompatible resonances provoke the paramecium to perform a fleeing motion. The experiment demonstrates that even the simplest form of life, a single cell animal, already has a communication system. This is already an intelligent structure capable of processing information ... The capacity for self-defense is defined by the body of information stored on the electro-magnetic and quantum level within the organism; the most important elements of which are encoded in geometric forms.”¹³

Humanity's orientation to the natural world in which it is more disastrously intertwined than any other species, is difficult to generously characterize. The theory and practice of ahimsa aside, we worship and destroy the environment. Our countless toxic throw weights—using the term in its most expansive and inferential sense, including the estimated 16,300 remaining nuclear weapons,¹⁴ our human population explosion, consumer havoc, internecine conflicts, our many vast distractions from the central survival criteria for any species challenged with maintaining equilibrium within its psychological and biochemical carrying capacities, all combine to leave us marooned in an ecological frenzy of our own making, a human-wide solipsism. The effort to transcend this juggernaut of self-importance *H. sapiens* have cumulatively embraced over many millennia is the only relevant challenge facing our humanity at this environmental threshold; what the philosopher Ervin László has likened to a “breakthrough versus a breakdown.”¹⁵

[org/wp-content/uploads/2015/04/CNNEvidenceoftheDeficit.pdf](http://wp-content/uploads/2015/04/CNNEvidenceoftheDeficit.pdf), Accessed March 12, 2016.

¹¹ See Johan L. van Leeuwen (July 23, 2010). “Launched at 36,000g.” *Science* 329(5990):395–6. doi:[10.1126/science.1193047](https://doi.org/10.1126/science.1193047). PMID 20651138, Accessed February 28, 2016.

¹² See “Beetle Moms Send a Chemical Signal: ‘Not Tonight, Honey;’” by Jan Hoffman, March 22, 2016, *The New York Times*, Accessed March 22, 2016.

¹³ See Maria Sagi (2016): *The New Homeopathy: A New Paradigm in Information Medicine*, World Futures, DOI: [10.1080/02604027.2016.1143292](https://doi.org/10.1080/02604027.2016.1143292); <http://dx.doi.org/10.1080/02604027.2016.1143292>, World Futures The Journal of New Paradigm Research ISSN: 0260-4027 (Print) 1556-1844 (Online) Journal homepage: <http://www.tandfonline.com/loi/gwof20>, pp. 9–10, Accessed March 17, 2016 on receipt from Dr. Sagi.

¹⁴ 16 June 2014: Nuclear forces reduced while modernizations continue, says SIPRI,” the Stockholm International Peace Research Institute, http://www.sipri.org/media/pressreleases/2014/nuclear_May_2014.

¹⁵ Personal discussion, September, 2015, at Montescudaio, Italy, for forthcoming book, *The Tuscany Dialogues*, by Ervin László and Michael Charles Tobias, See <http://dancingstarnews.com/index.php/2016/05/16/in-conversation-ervin-laszlo-and-michael-tobias-2/>, Accessed June 20, 2016.

Fig. 9.3 “Female Orangutan, Tanjung Puting National Park, Central Kalimantan, Borneo Indonesia,” Photo © J. G. Morrison



In seeking to be liberated from our own systematic blind-spots, the emergence of zoosemiotics, and the numerous disciplines crucially bonded to it, challenges key paradigms of future life on Earth. The most seminal collection of essays to date tackling the many issues inherent to the language and communication barriers between species is a remarkable assemblage of carefully selected writings, entitled **Readings In Zoosemiotics**, many highlights of which deserve and require close examination.¹⁶

Fig. 9.4 “A Yak, *Bos grunniens*, in Northeastern Bhutan,” Photo © M. C. Tobias



¹⁶ **Readings In Zoosemiotics**, Edited by Timo Maran, Dario Martinelli, and Aleksei Turovski, in the series entitled “Semiotics, Communication and Cognition 8,” Editors Paul Copley and Kalevi Kull, Walter De Gruyter Mouton GmbH & Co., KG, Berlin/Boston, © 2011.

This important work in many ways represents the culmination of centuries of deep reflection and research by scientists, particularly those in the ethological arena, philosophers, linguists, and sociologists all concentrating on aspects of human thought and communication and the reciprocal prospects among other species.

Attendant upon that variously proposed reciprocity potential—what we denote as the RP Theory—between species is the inherent notion of duties, obligations and behavioral changes that human civilization must take seriously if it is to entertain a remotely hopeful scenario of co-existence with other life forms as the Anthropocene only worsens dramatically for all concerned. The undermining of all life-support systems is accelerating at such a rate that humanity must undertake every conceivable approach that might empower forgiveness, and a far more benign collective footprint. Because each individual is inseparable from that collectivity, there exists exigent possibilities; opportunities for great pause, for unobtrusive and humble observation, respectful silence. Beyond that, with ultimate discretion in mind, there may well be valid degrees of noninvasive interaction or—if unambiguously welcomed and encouraged by all parties to an encounter, various nuances best summarized as *communication*. And a most important point: *Anyone* can do this.

Fig. 9.5 “Marieta van der Merwe, Founder of Harnas Wildlife Foundation, With Young Cheetah, Namibia,” Photo © M. C. Tobias



Perchance, unpredictably, there might be the actual co-involvement of participatory exchanges—as humans and their companion animals and plants have become accustomed over thousands of years; interlinking curiosities of linguistic, nonverbal, hormonal, emotional, psychic, spiritual and other, indescribable modes of transaction or language-making. It is already there, of course. We simply abuse it with our power. This realm of possible positive relations has enormous potential for unleashing a revolution of creative harmonies between species, beginning with each one of us. How to do it? We all know how. Such obvious insights and activities might well constitute the most effective of preconditions for our solving the crisis

of the Anthropocene. Thomas Paine's **Common Sense** (1775/1776) is said to have been (by proportion of total readership, that body politic interpreting a dream, from the Old English) the best-selling work of non-fiction in the history of North America. It too—in Paine's case in reliance upon Biblical allusions and the form of an uncanny sermon—unleashed a revolution. We feel strongly the most common sense behavior our species can adopt at this point in time, to avoid a far greater "crisis" than that of which Paine spoke, would be to open ourselves, in the most immediate, generous, virtuous, self-humbling, gentle, and curious of manners, to the global environment—the biosphere.

Chapter 10

Evolutionary Biographies and the Enigma of the “Other”

Beyond Solitude

With the emergence 400 years ago of Cervantes’ **Don Quixote**, fiction has lent so much perspective to our solitary selves that there is every reason to believe in such causes as giving; to a Commons; to communities, kin altruism, empathy and even, to the Other.¹ By chronicling a world split between oneself and everyone else, all disciplines, lenses, and lense-craft are encompassed by a plethora of reassurances. The nature of solitude, for all of her attractiveness at times, leans toward warm chocolate croissants, coffee houses, and conviviality; towards that intersection of wild creeks and unmanaged forests, adjoining the posture of a buttressed domicile replete with any and all comforts of home.

¹See William Egginton’s, **The Man Who Invented Fiction: How Cervantes Ushered in the Modern World**, Bloomsbury Publishing, New York, 2016, <http://www.bloomsbury.com/us/the-man-who-invented-fiction-9781620401767/>, Accessed March 23, 2016.

Fig. 10.1 “Gustave Doré’s Illustration of Don Quixote, 1863,” Photo © M. C. Tobias



Between these two worlds, of course, is politics, economics, fiction and non-fiction, a multitude of languages and the cumbersome rites of translation. Put a Nuer shepherd of Sudan beside an eastern Bhutanese Brokpa for 5 min, neither speaking the other’s language—outside of their familiar turfs—and there is likely to be little accomplished, in human terms. But allow them time together in a meadow, together with their Abigars and yaks, and they will invariably speak alternative but understandable languages to one another—yak and Abigar whisperers sharing their notes—that optimize the reality of something quite other than fiction, or politics or economics.

Instead, a kind of species transduction—the linguistic commons accompanying a level of articulate companionship that transcends all boundaries of immediate bloodline. Humans can speak among themselves, however different our personal, family and community histories. This is a power of sharing that overwhelmingly derives from the companionship of true relational parliaments within the overall biosphere. In other words, in absence of all the other species with whom we commune at some level, known but mostly unknown, or certainly the vast majority of them for what can be thus far ascertained, we would be enfeebled. Had we no bellwethers, like the ocean’s temperature, or state of the world’s pollinators, availability of safe drinking water, or the number of remaining African lions, we would be the ultimate solipsists, lost and digging our own graves. This is a biological reality.

But of course, the premise is outlandish because we would never have arrived at our contemporary crisis without our fellow creatures—which makes the paradox all the more philosophically remarkable but terribly risky and complicated in terms of future coevolution.

An Overview of “Readings in Zoosemiotics”

The remarkable collection of essays in **Readings in Zoosemiotics**, edited by Maran, Martinelli, and Turovski² provides a keel, as it were, for the wings of thought in this embrace of a planet swarming with tens-of-trillions of conscious, feeling beings who communicate with each other. From the Editors’ opening description of Friedrich S. Rothschild’s usage of the word “biosemiotics” in 1962³ to Thomas Albert Sebeok’s use of “zoosemiotics” a year later in his Review in the journal, *Language* (39:448–466), and in which the notion that “communication and representation” occurs “within and across animal species,”⁴ the Fourth Wall, as dramatists think of it, had been breached. Except with a huge distinction: this was no fictional intimation of a character. Rather, the invitation to consider the biological world of which we are apart in a new, deeply meaningful manner, with endless dramatic portent, and an infinite cast of characters. The words “zoopragmatics,” “zoosyntactics,” and “zoosemantics” become part of a much more enduring, inviting, and astonishing glossary of culture and nature as their reciprocity and inherent similitudes continue to gain traction the closer our species comes to the edge of ecological ruination. How ironic.

The biosemiospheres revealed within **Readings in Zoosemiotics**, encompass such pronouncements as the declaration that “we must also bear in mind the possibility that some aspects of song variation [in birds] are a manifestation of some kind of primordial exercise in aesthetics.”⁵ Thomas Sebeok would devote an elaborate essay to this topic, particularly with research with orangutans and capuchin monkeys, that summarized four key aesthetic elements discernible in other species: “(1) kinesthetic signs, (2) musical signs, (3) pictorial signs, and (4) architectural signs.”⁶ Sebeok added to this pillar of pellucid insight research by the primatologist Martin Moynihan with respect to the titi monkey *Callicebus moloch*, who, suggested Moynihan, had at least 19 known “‘compound’ songs.”⁷ Sebeok added to his

² Edited by Timo Maran, Dario Martinelli, and Aleksei Turovski, in the series entitled “Semiotics, Communication and Cognition 8,” Editors Paul Cobley and Kalevi Kull, Walter De Gruyter Mouton GmbH & Co., KG, Berlin/Boston, © 2011.

³ Maran et al., *ibid.*, p. 3.

⁴ Maran et al., *ibid.*, p. 1.

⁵ Maran et al., *ibid.*, p. 10, quoted from Peter Marler and William J. Hamilton III, *Mechanisms of Animal Behaviour*, John Wiley & Sons, New York, 1966, p. 446.

⁶ Sebeok, Thomas A. 1979. “Precognitions of art.” *Semiotica* 27(1–3): 3–74. *ibid.*, **Readings in Zoosemiotics**, p. 201.

⁷ Maran et al., *ibid.*, p. 213, from Moynihan, Martin, 1966. “Communication in the Titi Monkeh, *Callicebus*,” *Journal of Zoology* 150, 77–127.

central premise of multi-species aesthetics and their communication, reference to the zoologist D’Arcy Thomson’s work **On Growth and Form** (1945) (“the basis for beauty in numberless exquisite structures produced by the plant and animal worlds”);⁸ as well as pointing to studies by that great student of bower-birds, Alexander J. Marshall who, in 1954 had written after 20 years researching these New Guinea marvels, “I see no reason, provisionally, to deny that bower-birds possess an aesthetics sense ...”⁹

Jakob von Uexküll, an early leader in the semiotics movement, opens his essay entitled “The Theory of Meaning” with the received impression that the world of “winged insects ... reawakes in us the impression that the whole world lies open for these enviable creatures.”¹⁰ While Uexküll then revises this sense of euphoria to acknowledge ecological “limits” within the biological “labyrinth,” he later reasserts tellingly that “Nature offers us no theories ...”¹¹ and highlights the teeming and quizzical intelligences throughout the biosphere by recourse—along with so many of the authors compiled within **Readings in Zoosemiotics** of such diverse species and their behavioral genius as derived from the life cycles of a fresh-water fish, the “male bitterling,”¹² an “eagle-owl” and its caretaking of ducklings,¹³ etc. Each of these species—a core theory of Uexküll’s legacy, is that they inhabit their own marvelous “Umwelt” which he defines as “subjective universe.”¹⁴ From grazing cows, to an octopus; from gray-geese to bumble bees; from bats to blind ticks; long-tailed crabs and linden trees ... each have their own specific “Lebensbühne” which represents “the state on which it plays its life-roles.”¹⁵

What is poignantly clear about the multiplicity of characters we call life is that we have certain information, as humans; data that excites us, but lack the real story behind all those data reams, much like the situation that confronts the paleontologist who knows that Neanderthal and *H. sapiens* coexisted and mated at least 100,000 years ago in Asia, but we do not know how, or when *H. sapiens* must have migrated to Asia from Africa. The back-stories are missing in action. But, as with music, argued Uexküll, the “theory of counterpoint,” the notion that “at least 2 tones are needed to make harmony” is a sensational prelude to his belief that all else follows, namely, “meaning-carriers to the subject.”¹⁶

⁸ Maran et al., *ibid.*, **Readings in Zoosemiotics**, p. 225.

⁹ Maran et al., *ibid.*, **Readings in Zoosemiotics**, p. 217, from Marshall’s book, **Bower-Birds: Their Displays and Breeding Cycles**. Clarendon Press, Oxford UK.

¹⁰ Uexküll, Jakob von 1982. The meaning-carrier; The theory of the composition of nature; in, “The Theory of Meaning,” *Semiotica* 42(1):27–33:52–59. *ibid.*, Maran, Martinelli, Turovski, p. 62.

¹¹ Maran et al., *ibid.*, p. 67.

¹² Maran et al., *ibid.*, p. 70.

¹³ Maran et al., *ibid.*, p. 71.

¹⁴ Maran et al., *ibid.*, p. 64.

¹⁵ Maran et al., *ibid.*, p. 65.

¹⁶ Maran et al., *ibid.*, p. 67.

In Sebeok’s essay “‘Talking’ with Animals: Zoosemiotics Explained,”¹⁷ such harmonies engender “intraspecific and interspecific” communication systems, from fish to the “flash code” used in beetles, such as the lightning bugs of the Lampyridae family, part of one of the world’s most enormous Orders, that of Coleoptera. But, said Sebeok, since “reproduction is itself a matter of communication ... the molecular code is apparently the same in all terrestrial organisms.”¹⁸ He masterfully invites contemplation of what he called “a repertoire of signs ... in biological parlance, species-specific.”¹⁹ From there, all things are possible and Sebeok elaborates upon his famed list of six examples that include the masterful cephalopodic control of its own color switches; of the fact that since “male grasshoppers are known to double their rates of singing for every 10 degree Centigrade rise ... if the female recognizes the species solely on the basis of the number of pulses per unit of time, which she does, the code, inherent in her nervous system, must allow for temperature differences to enable her to locate the male.”²⁰ Or, the fact that in 1926 it was discovered “that horses are capable of detecting movements in the human face of less than one-fifth of a millimeter” (0.0394th of an in.).²¹

Such revelations in the twentieth century history of ethology resulted in three eminent scientists involved in the general discussion receiving together the Nobel Prize in Physiology (or) Medicine, namely, Karl von Frisch, Konrad Lorenz, and Nikolaas Tinbergen for their modestly described “discoveries concerning organization and elicitation of individual and social behaviour patterns.”²² Such patterns are everywhere around us: the bumble bee’s magnificently complex tail-wagging dance to the exquisite nature of imprinting of geese on humans, most remarkably portrayed in film director Carroll Ballard’s “Fly Away Home” [1996], a symbiosis not without love and one that was first explored and documented by nineteenth century British biologist Douglas Spalding with chickens. Reflecting back on their Nobel Prize nearly two decades later, Tinbergen, whose groundbreaking 1951 book **Studies in Instinct**²³ had paved the way for a better grasp of the latitude in evolutionary behavior among all species, had rather whimsically alluded to the fact that three men had merely revived an approach that was basically nothing more than “watching and wondering” (about other animals) and reflecting upon the common wisdom that this approach “could indeed contribute to the relief of human suffering.” What a testimony to the entire realm of anthrozoology, and our species’ most affirmative prognoses with respect to research, contemplation, and collective action henceforth.²⁴

¹⁷From: Sebeok, Thomas A. 1990. ‘Talking’ with animals: Zoosemiotics explained. In: Thomas A. Sebeok. **Essays in Zoosemiotics** (Monograph Series of the TSC 5), 105–113. Toronto Semiotic Circle; Victoria College in the University of Toronto, *ibid.*, p. 87.

¹⁸Maran et al., *ibid.*, p. 87.

¹⁹Maran et al., *ibid.*, p. 88.

²⁰Maran et al., *ibid.*, p. 93.

²¹Maran et al., *ibid.*, p. 92.

²²See http://www.nobelprize.org/nobel_prizes/medicine/laureates/1973/, Accessed March 3, 2016.

²³Clarendon Press, Oxford University, UK.

²⁴Tinbergen, N. “Ethology and stress diseases.” *Physiology or Medicine: 1971–1980* 19711980, 113, 1992.

The obsolete viewpoints that “man is language,” as if to consolidate a mindless monopoly excluding every other species; that animals speak no language, are machines, have no expressly communicative skills on a par with *H. sapiens*—sprouted in any number of guises—culminated most graphically in the madness of René Descartes (1596–1650).²⁵ That mindset has continually ignited ripple effects, as in such statements as “It would be astounding to discover insects or fish, birds or monkeys, able to *talk to one another* ... [because] Man is the only animal that can talk ... that can use *symbols* ... the only animal that can truly *understand* and *misunderstand* ...”²⁶ In a much more optimistic vein, we must emphasize that such windows on that “Lord Man,” as John Muir referred to the syndrome, fortunately exerts less and less affiliation in the minds of twenty-first century researchers and students of nature. Indeed, the thorough repudiation of what we earlier referenced, by way of a great tragedy, of our “species’ solipsism” offers remarkable avenues of ethology and zoosemiotics, among the many tides of change sweeping over neurophysiological and molecular biological studies, to help provide a powerful way out of the reigning cul de sac that has so predisposed one human civilization after another to ruin. Post-modernist aesthetics is all about environmental impact, and the human conditioning that has afforded, until quite recently, only the most modest considerations of Others. We have endeavored to elaborate upon some of the luminaries who have helped paved the way for a true biospheric communion among all kinds. That renaissance is here, is now. We trust that such epiphanies of the biosemiosphere, as offered up in **Readings in Zoosemiotics**, and throughout this modest treatise on Anthrozoology in general, will shed ample light on the exhilaration now emerging at the intersection of the many sciences, expeditions, technology innovations, and illuminations across the broadest spectrum of the arts and humanities. They are all converging as collaborative change agents for what is really the first great step outwards into a new world of ontological literacy.

To better gauge the breadth of this renaissance, as we liken it, let us look at those catalysts of research and experience that have found points of communion through communicative exchange. By that we do not ignore viral exchange, which, certainly, poses philosophical paradox and makes an equal playing field, so to speak, more challenging indeed for those in the trenches of illness. We are not suggesting that nature lacks for predation and pain. Obviously. And anyone, for example, who has read George Schaller’s description of a lion killing a wart hog, savagely wrestling the desperate *Phacochoerus africanus* from its huge burrow over the course of some nine agonizing moments is duly reminded that for every manger there is a massacre.²⁷ Although we would preface that by pointing to observations over extended research visits to Amboseli National Park (Kenya) in which our findings suggested,

²⁵ **Cartesian Linguists**, Harper & Row, New York, 1966.

²⁶ Maran et al., op.cit., **Readings in Zoosemiotics**, p. 344, from Donald R. Griffin’s essay, “Is Man Language?” in which he cites M. Black, **The Labyrinth of Language**, Praeger Publishers, New York; Griffin, Donald R. 1981. “Is man language.” In: Donald R. Griffin. **The Question of Animal Awareness: Evolutionary Continuity of Mental Experience**, 73–85. New York: Rockefeller University Press.

²⁷ See George Schaller, **The Serengeti Lion: A Study of Predator Prey Relations**, University of Chicago Press, Chicago, Ill., 1972, p. 245.

among vertebrates an approximately 4000-to-1 ratio of herbivores to carnivores. This survey excluded all avifauna, naturally. This is significant in what is unquestionably the most congested (hence behaviorally intensified and constrained) epicenter for large vertebrates in the world.²⁸

In his essay “Is Man Language?”²⁹ this leader in animal cognition studies (Donald R. Griffin) proposes extraordinarily provocative questions. For example, in reviewing the long-standing bias favoring “the view that insects are genetically programmed automata,” given the revelations by Frisch, he is led to suggest that: “The very fact that we would readily accept the bee dances as evidence of intentional communication if they had been discovered in primates, rather than in insects, should warn us that our frame of reference may not be sufficiently flexible to take advantage of truly revolutionary new discoveries.”³⁰ And quoting data by C. G. Beer from 1975, Griffin cites, that “Beer believes that some calls used by gulls are ‘semantically and pragmatically open.’”³¹

Fig. 10.2 “Western Gulls, *Larus occidentalis*, Farallon Islands National Wildlife Refuge,” Photo © M. C. Tobias



²⁸Tobias, Michael C. **World War III—Population and the Biosphere at the End of the Millennium**, Preface by Jane Goodall, (Editor, J. G. Morrison), 2nd Edition, Continuum Books, New York, 1998; See also, **Hope on Earth: A Conversation**, by Paul R. Ehrlich and Michael Charles Tobias, University of Chicago Press, Chicago, Ill., April 2014, p. 77.

²⁹op. cit., Maran, et al., **Readings in Zoosemiotics**, p. 351.

³⁰Maran et al., *ibid.*, p. 348.

³¹Beer, C. G., “Multiple Functions and Gull Displays,” In: Baerends, G., Beer, C.G., and Manning, A. (eds.) **Essays on Function and Evolution in Behaviour: A Festschrift for Professor Niko Tinbergen**. Clarendon Press, Chapter 2, Oxford University, UK.

In an equally penetrating essay, by Tim Ingold, he cites Charles Darwin’s experiments “that conclusively demonstrated the existence of quite advanced learning capacities in Earthworms”³² Ingold goes on to extend his splendid inquiries to include major studies concerning a colony of bacteria in a Petri dish that showed “the basic response system” suggestive of learning; and a massive study by Lewis Henry Morgan in 1868 on the ingenuities of the American beaver (*Castor Canadensis*) which both Marx and Engels apparently read and considered “key to their materialist theory of history.”³³

Ingold quotes Morgan at his best, when the engineer/tycoon who has become smitten with beavers writes instructively, “A beaver seeing a birch-tree full of spreading branches, which to his longing eyes seem quite desirable, may be supposed to say within himself: ‘if I cut this tree through with my teeth it will fall, and then I can secure its limbs for my winter subsistence.’”³⁴ It is this suppositional, “. . . may be supposed to say within himself . . .” that strikes us as particularly profound. Remember, it comes from that period of American history that, as in New Zealand and previously throughout the UK, Western cultures thought nothing of clear-felling to their heart’s delight; exploiting every mineral, laying down railroad ties, building up cities, expanding according to every ounce of Manifest Destiny and, in the case of Morgan himself, helping build a railroad to help carry off trainloads of Lake Superior iron ores. His study of the beaver, as Ingold elaborates, was the ardent work of a disciple, a thorough research project intent upon applying these animal’s engineering acumen to his acquisition of knowledge and subsequent wealth. Here was a man of his times who went against the grain of anthropology and science, convinced, as Ingold explains, “that the Creator had endowed *all* animal species, and not mankind alone, with a mind as well as a body.”³⁵ From that departure point one can easily see how Henry Clay Frick himself—with his ten-thousand coke-ovens throughout America—concentrated the fruits of *his* labors into another sort of veneration, a museum teeming with great landscape paintings that is the Frick collection on #1 East 70th Street in Manhattan, looking out over Central Park, the very intersection of America’s greatest urban garden and today’s 30 million+ visitors per year seeking 30 million experiences of joy and solace (and a good majority of them, bird, dog, squirrel and raccoon watchers).

³²op. cit., Maran et al., **Readings in Zoosemiotics**, Tim Ingold “The Animal in the Study of Humanity?” 1988, p. 357, cited from: Tim Ingold (ed.), “What is an Animal?” (**One World Archaeology 1**), 84–99. Unwin Hyman, London, Boston, Taylor Francis Books UK, Reed, E. S., “Darwin’s Earthworms: a case study in evolutionary psychology.” *Behaviourism* 10, 165–85.

³³ibid., Maran et al., **Readings in Zoosemiotics**, p. 360, citing the influence of L. H. Morgan’s **The American Beaver and His Works**. Lippincott Publishers, Philadelphia, Pennsylvania.

³⁴ibid., Maran et al., p. 362.

³⁵ibid., Maran et al., p. 360.

Fig. 10.3 “Central Park at Dawn, Manhattan, New York,” Photo © M. C. Tobias

But it is Morgan’s phrase, “may be supposed to say within himself” which serves us all well by providing the psychological similes and inroad into what the Greeks knew to be true agape, the fullest etymology of empathy and compassion, emotional contagion, pathos, *Einfühlung* (“feeling into”), the common coding systems in neurophysiology,³⁶ fellow feeling, mirror neurons, and ultimately Golden Rules and Ten Commandments: “Do unto others as you would have them do unto you.” Luke 6:31. The Law of Moses. It is an ethological appeal in the broadest sense.

In answering to this universal call, Dominique Lestel, Ph.D., the Parisian philosopher, ethologist, and founding member of the Department of Cognitive Science and Associate Professor at the École normale supérieure³⁷ summarizes some of the most promising windows on the Other Minds problem, within **Readings in Zoosemiotics**. For example, he points out that of the four marine mammal species studied intensively to date (by humans) (there are at least 125 marine mammals under watch by various scientific organizations worldwide³⁸—those same four, a dolphin (*Tursiops truncatus*), the toothed whale belonging to the dolphin Family (*Orcinus orca*), and the sperm (*Physeter macrocephalus*) and humpbacked whales (*Megaptera novaeangliae*), each has revealed “astonishing innovations” and “behaviours which have been described as cultural.”³⁹ Since the writing of that essay, numerous other marine mammal studies—from Harbor Seals (*Phoca vitulina*) to Beluga Whales (*Delphinapterus*

³⁶See Sperry, R.W. (1952). Neurology and the mind-body problem. *American Scientist*, 40, 291–312.

³⁷See <http://communicating.seti.org/?q=speakers/dominique-lestel>, Accessed March 12, 2016.

³⁸See <http://www.nmfs.noaa.gov/pr/species/mammals/>, Accessed March 10, 2016.

³⁹op. cit., Maran et al., **Readings in Zoosemiotics**, p. 379, taken from Lestel’s essay, “The Biosemiotics and Phylogenesis of Culture,” *Social Science Information* 41(1):35–68. Translated from the French by Nora Scott. SAGE Publications, Los Angeles, CA and London, UK, 2002.

leucas)—have yielded yet additional revelations. In studying 44 captive Belugas in Ontario over the course of 8 years, Michael Noonan and Elizabeth George discovered that the Belugas, among other forms, are communicating with bubbles.⁴⁰ In the case of the seals, “Comparative analyses of the roar vocalization of male harbor seals from ten sites throughout their distribution showed that vocal variation occurs at the oceanic, regional, population, and subpopulation level... Combined, these factors suggest that site-specific variation influences the development of vocal structure in harbor seals and these factors may provide evidence for the occurrence of vocal dialects.”⁴¹

One of Lestel’s most insightful elucidations comes from his points taken relative to the classic work of J.B.S. Haldane’s study in 1953, specifically in his analysis of the differences between “the ‘language’ of bees and human language.”⁴² Before one leaps to the obvious “Om” of a Tibetan mantra, and the “Hum” of a hive; or tries cleverly to link Polonius to Hamlet, as one bee to another, says Lestel, Haldane realized that “bees undeniably make movements which elicit responses in other bees; but the first are not necessarily communicating information about the new food source. Some of these movements can be regarded as ways of expressing the next action ... The honey-*bee’s* dance can thus be interpreted as the prediction of its future movements rather than the description of its past movements.” This fact alone, Lestel speculates, “evokes a distinctive feature of human language which may have permitted the shift from *evocative discourse*, which points to the future, to *descriptive discourse*, which talks about the past.”⁴³ And it is not just the hive that reveals the nature of discourse. Lestel reflects upon T. Ingold’s essay from 1989, “An Anthropologist Looks at Biology,”⁴⁴ in which Ingold argues to replace the “neo-Darwinian paradigm, with an evolutionary approach which instead reasons in terms of relations, and which identifies the organism or the person as the true creative agent at the origin of the evolutionary process.” In other words, “He suggests introducing a genuine anthropology of personhood into biology.”⁴⁵ This methodology, both obvious and compelling, comports with notable “long-term longitudinal studies” involving the drawing up “of genuine biographies.”⁴⁶

Such biographies have, by now, included—if one looks back to the beginnings of “children’s literature” and then proceeds through the early twentieth century so-called sentimentalists—Jack London, Rudyard Kipling, Ernest Thompson Seton, Anna Sewell, Johanna Spyri, Marjorie Kinnan Rawlings, Beatrix Potter, Kenneth Grahame, Lewis Carroll, Hugh Lofting, Gene Stratton Porter, and of course Felix

⁴⁰ See <http://mentalfloss.com/article/73418/beluga-whales-use-bubbles-communicate>, Accessed March 14, 2016.

⁴¹ “Patterns in the vocalizations of male harbor seals,” Sofie M. Van Parijsa, Peter J. Corkeron, James Harvey, Sean A. Hayes, David K. Mellinger, Philippe A. Rouget, Paul M. Thompson, and Kit M. Kovacs, © 2003, Acoustical Society of America. @doi: 10.1121/1.1568943# PACS numbers: 43.80.Ka @WA#, © <ftp://ftp.pmel.noaa.gov/newport/mellinger/papers/VanParijsEtAl03-HSealVocalPatterns.pdf>, Accessed March 14, 2016.

⁴² “Rituel humain et communication animale,” *Diogene* 4:77–93, cited on p. 386 of Lestel in op. cit., Maran et al., **Readings in Zoosemiotics**.

⁴³ *ibid.*, Maran et al., p. 386.

⁴⁴ *Man* (N.S.) 25:208–29.

⁴⁵ op. cit., Maran et al., Ingold, p. 389.

⁴⁶ *ibid.*, Maran et al., Ingold, p. 391.

Salten, among others—we are in the presence of worlds that represent something much deeper and lasting than mere scientific experiments.

Fig. 10.4 Right, “Original Illustration on Frontispiece by Hugh Lofting of *The Story of Dr. Dolittle*,” Photo © M. C. Tobias

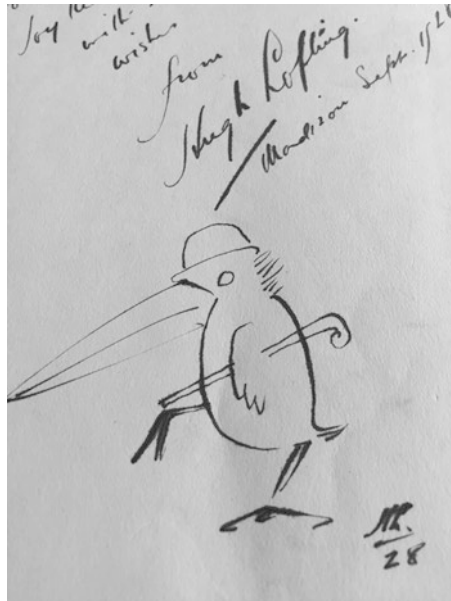
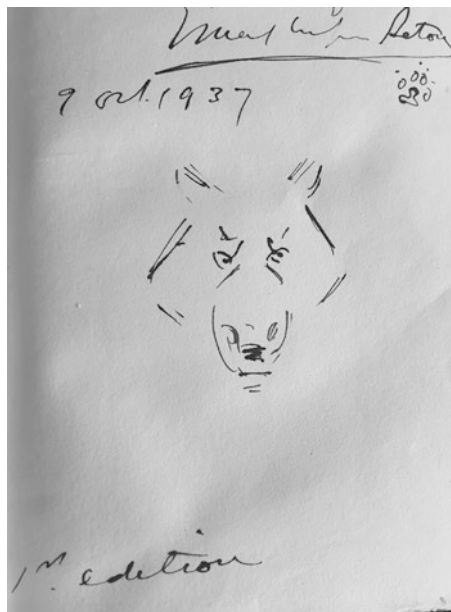


Fig. 10.5 “Original Illustration on Frontispiece by Ernest Thompson Seton of *Wild Animals I Have Known*,” Photo © M. C. Tobias



Someone like Seton spent most of his life outdoors observing animals in a manner that was as scientific as the “research” of a John Muir, and not entirely removed from the same spirit that impassioned the entire Transcendentalist, Hudson River School or Luminist Movements. What did distinguish “sentiment” from the cult of Teddy Roosevelt, was Roosevelt himself, the ultimate personification of a conflicted soul.

In fact, Roosevelt’s wrath as unleashed against all sentimentality in nature writing was not some bizarre anomaly, benign and simply confined to the pointless and puerile arguments of a big game hunter as plastered across popular newspaper and journal milieu of the early American 1900s. Roosevelt, for all of his conservationist brilliance, killed animals with a relentless frenzy, calling upon others to also rid the world of “criminal vermin” as he came to typify wolves. He was not the first schizoid-environmentalist, but certainly the most famous of them in the twentieth century. Encouraged by the reckless cowboy President, so impactful was the damage wrought by eager bounty hunters, data suggests that by 1908 the wolf populations in the USA had been reduced from some 200,000 to 2000 individuals.⁴⁷

Finally, in concluding this extensive section devoted to **Readings in Zoosemiotics**, Dominique Lestel’s contribution is also noteworthy in a profound, twofold emphasis. First, the fact, as Lestel puts it, that “Amazonian villages, to take only one example, are veritable menageries whose animal population often exceeds the human one.”⁴⁸ Second, his point that “The cognitive dimension of these exchanges between humans and animals should not be underestimated, nor should the multiplicity of the rationalities called upon.”⁴⁹

⁴⁷ See Frank Stewart, *The Natural History of Nature Writing*, Shearwater Press, an Island Publishers Book, Washington D.C., 1995, p. 85).

⁴⁸ *op.cit.*, Maran et al., Lestel, p. 396.

⁴⁹ *ibid.*, Maran et al., Lestel, p. 397.

Chapter 11

A North American Family: The Ecologies of Translation

Redressing the Anthropocene Through Interspecies Communication

Every act of communication is predicated on a deeply intuitive assurance that all parties to the exchange, directly or indirectly, are somehow meaningful and connected to a deep context. Of course, none of us has any control, or understanding of, ultimate meaning. It is more than enough to try and be meaningful—as we would perceive it—in the moment. In the broadest sense of psycholinguistics, this is the double entity of the *sign*, an implicature that *entails* meaning at the heart of life-adhering semions, signals of intent. In translating our ephemeral means and ends, intentions, goals, and articulations, we acknowledge recipients of our ideas and expressive moments in time. Neither the idea and its confining temporality nor the ideal that arises in the immutable and inexplicable realms of ethics, philosophy, metaphysics, and the ineffable is far from the root of the communicative impulse in humans. We know this to be true instinctively, though there is no empirical basis for arguing on the behalf of an ideal. Only self-evident conclusions without a basis in biology or chemistry. We simply believe ideals to be a crucial part of our species’ emotional and cognitive repository.

Fig. 11.1 “Cow Singing and Speaking, Rural New York,” Photo © M. C. Tobias



Fig. 11.2 “Cow Singing and Speaking, Rural New York,” Photo © M. C. Tobias



Fig. 11.3 “Cow Singing and Speaking, Rural New York,” Photo © M. C. Tobias



Fig. 11.4 “Cow Singing and Speaking, Rural New York,” Photo © M. C. Tobias



By ascribing our ultimate ideals (moral, aesthetic, philosophical, historic) to other species, we acknowledge that what is mysterious for humans, is no less mysterious for the Others. If we then consider the multiplier-effect of mysteries that accrues between minds and intentions, hopes and dreams, we are then tapping into the Unknown communication vortex at the heart of the biosphere.

Taking that constellation of meaning out into a greater realm of recipients, we recognize implicitly a world of sentience and sapience; a community of Others whose ambience is our own nonspecific lineage. That avowal of recognizable exchange is enough to suggest that the ecologies of translation are very real. Somehow a man speaks to his dog and vice versa. The words and gestures make it across the familiar yet seemingly infinite barriers of understanding.

What we have discovered is that these abiding acts and joys of communication have no rules between species. Anything and everything is possible. There is no science to say otherwise, but an endless array of experiential insights connoting the truth of interspecies communications. Accordingly, if we can but extend the olive branch and devotion of family to include other species in our emotional and daily understandings, grasp and embrace of a joyful world, rather than a fatalistic one, then we might also yield to our own internal curiosities and goodness, rejecting those colossal forces of ecocide so as to nurture instead a community renaissance akin to the gathering place of all beings. And to do so not as a spiritual anomaly, as in the near mythic cases of a Mahavira or St. Francis speaking with the animals, but as an everyday choice, a *reality* that has the character and long-standing virtue to eclipse our darker, consumerist side.

Anthrozoology transcends all of the endless question marks and agitation gripping the human world of obsessions and distractions. It gives us undaunted confidence to recognize Others in the mirror of ourselves.

Indeed, it is enough to *believe* in the possibilities of interspecies contact.

Consider those 300,000 pigeon-enamored Uighurs of the Muslim Turkic-speaking Xinjiang border of Kashgar, China's wild west. In the Kashgar market as much as \$400,000 has been paid for two Belgian racing pigeons. Says one local manager of a cell phone company interviewed in the market by the New York Times reporter Dan Levin, "One pigeon gives the love of 10 women," speaking of a 1000-year-old affection between these ancient Uighurs living on the rugged fringes of Kyrgyzstan who date their ornithological passions to antiquity, to the ubiquitous legends of Noah's Ark, Noah's legendary white dove, and the Silk Routes across which the Biblical legends spread. Of course, it is no pigeon paradise but, rather, a mixed affair. Many of those keeping hundreds of birds at home sell them for profits at high stakes racing tournaments, sometimes the birds flying a grueling 300 miles over freezing, rugged deserts and mountains. It is abusive, in other words.¹ Of course, such human/pigeon interactions seem to unfold only because pigeons have uniquely advanced brains that enable them to easily bond—at least partially—with members of our species;² to map their territories with opportunistic memories and iron-rich macrophage cells in pigeon beaks behaving like "magnetosensitive GPS cells," that are also found in ducks and fish.³ The end result of these long-distance

¹ See "Silk Road Market Caters To Lovers of Plumage," by Dan Levin, The New York Times International, February 16, 2016, p. A5, Accessed February 16, 2016.

² See <http://www.animalliberationfront.com/Philosophy/Morality/Speciesism/PigeonIntelligence.htm>, Accessed February 16, 2016.

³ See "Magnetosensitive GPS cells in the pigeon brain—Researchers have identified a component of pigeons' magnetic compass," by Mo Costandi, April 27, 2012, <https://www.theguardian.com/>

forays is not unlike those accomplishments of squirrels stashing their acorns with a profound mapping memory; or scientists calculating the universe and charting a course between constellations, although squirrels—who could once travel from the Pacific to the Atlantic across North America without every touching the ground (such was the level of the continent’s primary forest cover, and the directional acuity of the Sciuridae Family), might argue which species—people or squirrels—are more GPS adept.⁴

Fig. 11.5 “Inquisitive North-American Eastern Gray Squirrel (*Sciurus carolinensis*) Resting on Tree Bracket Fungus, Central Park, Manhattan,” Photo © J. G. Morrison



Think of Einstein working on a black board and in the darkness of his own neural infinities imagining and calculating gravitational waves. Then move forward a century for confirmation of his instincts as detected in a single acoustical translation sounding much like a bird’s “chirp” to human ears. Yet the everyday chirping (or whatever other phrase or phraseology has been applied—millions of them—to all those multitudes of birds, not unlike the pigeons of Kashgar), get almost no attention. We humans are much the lesser for this oversight.

No Laser Interferometer Gravitational-wave Observatory (LIGO), spanning two states on opposite sides of North America are needed to confirm the language of birds in our backyards, as was the case with Einstein’s “chirp,” which is our point.⁵ Historically, few people have been willing to admit to biological expansiveness

science/neurophilosophy/2012/apr/27/1, Accessed February 16, 2016.

⁴See “Clusters of iron-rich cells in the upper beak of pigeons are macrophages not magnetosensitive neurons,” *Nature*, 19 April 2012, Vol. 484, pp. 367–370; doi:[10.1038/nature11046](https://doi.org/10.1038/nature11046), by Christoph Daniel Treiber, Marion Claudia Salzer, Johannes Riegler, Nathaniel Edelman, Cristina Sugar, Martin Breuss, Paul Pichler, Herve Cadiou, Martin Saunders, Mark Lythgoe, Jeremy Shaw & David Anthony Keays, http://www.ucl.ac.uk/cabi/PDF/2012_Treiber_et_al._Nature.pdf, Accessed February 17, 2016.

⁵See <http://www.newsmax.com/TheWire/einstein-theory-of-relativity-gravitational-waves/2016/02/11/id/713875/#ixzz40AnaDLq4>, Accessed February 19, 2016.

beyond the matrix of human ego, as we have reiterated; to surrender to those things deemed heretofore impossible when it comes to the intelligence and sensitivities of other animals and plants; people who are trapped in a Cartesian mechanistic furnace of self-importance. Breaking out of this cul de sac is precisely where the nature and origins of biosemiosis commences. It is that engagement of international animal and plant sovereignties that holds promise for something remarkable.

Of course, it strikes as complicated, this existential breakdown of all barriers between the vast but equivalent variants on life. The assurance that a communicative act has transpired, or is on the cusp comes on the heels of tested realities. Even the most far-reaching artistic probe lives and breathes in a communion of like-minded senses. Anticipating their reception is part of the content. All those nerves, synapses, nuances and signs that comprise the séance have mutually agreed to explore together; share ideas, be part of the drama, engage as a fundamental pillar of the substance being dissected, circumnavigated, and traversed. Interspecies relations most certainly up the ante of communication prospects. This is no museum opening, with white wine and sparkling water. This is the Earth.

But the tens-of-millions of other species, viewed as iconic envoys of persuasion inhere within the signal, its trajectory and the impetus of volition that cumulatively define the speaker, the listener, the reader, the writer, the whole panoply of sentient purveyors of any form of articulation. And this is a most critical facet of rectifying the ills of the Anthropocene.

Fig. 11.6 “A Hen at Gut Aiderbichl Animal Sanctuary, Salzburg, Austria, Photo © J. G. Morrison



We believe our species has arrived at the momentous prospect for meaningful communion with the Others. We have not seen this opportunity since prior to the alleged extinction of *Homo neanderthalensis* approximately 40,000 years ago by

ultrasocial *Homo sapiens*. There are innumerable interpretations of what happened to *H. neanderthalensis*, leading to a hallowed, even teleological age of cultural apologies during the late Paleolithic cave art and artifacts associated with rituals, burials, cosmological and spiritual connotations. We are there again. But now the stakes are everything.

The personalities who are party to a communiqué harbor expectations that their utterances, or words committed to writing, pictures to canvas or some digital medium, sculptures to bronze, dance steps to the stage, cries and hollers into the clouds, all share in this universality of a language whose speaker is in his/her zone by dint of a primeval reciprocal promise (our Reciprocity Potential Theorem). Not just speech, but the silence of intention, perception, orientation that is biochemistry. Such complexities are akin to those currently at play in what is known as “deep learning” among aficionados of game algorithms, like Deep Blue and AlphaGo. Deep learning specifies a device with thousands of processor chips, endless code, language translations, and sufficient complexity of data acquisition to even search for subatomic particles. The two planks of those algorithms enlist, first, a “policy network,” and then a “value network.”⁶ Presumably, the second algorithm learns from the first, in computations including hundreds of billions of billions of machinations, an experience inside computers that aspires to human experience. The problem with artificial intelligence, when compared to human value judgements, or with any pan-lineage eukaryotic amoeba, is that despite the vast simultaneity of computations within a machine, human (and no doubt amoebic) concepts utilize a different kind of gestation period, allegedly the byproduct of tens-of-thousands of years of evolution in the case of *H. sapiens* and our relic nerve ending memories and caudal tails. Clearly, when such alleged judgment turns to inexplicable violence and mass killings, the whole ontology comes into question.

Humanity would be wise to liken such human vicissitudes, especially when the focus happens to engage different biological species, to a haphazard data paucity bereft of certitudes or predictable (stochastic) precedents.⁷

Hence, a man and his dog have never enjoyed the scientific standing to take their ancient fellowship much beyond a certain kinship, with fewer obligate statutes of a social contract we as a species have typically attributed to speakers of the “same” language. In 44 US states, the killing of dogs and cats for food is still legal.⁸ The only bond that links companion animals to humans in terms of fellowship is something that happened long before science. People and dogs go back tens-of-thousands of years. They’ve looked all that time into each other’s eyes and have collaborated in order to better grasp their respective customs, comings and goings, likes and

⁶ See “Showdown,” pp. 73–74, n.a., The Economist March 12th, 2016; <http://www.economist.com/news/science-and-technology/21694540-win-or-lose-best-five-battle-contest-another-milestone>, Accessed from hard-copy of The Economist week of March 12th.

⁷ See Joan Bybee, **Frequency of use and the organization of language**. Oxford: Oxford University Press, UK., 2007.

⁸ “Killing dogs and cats for meat is still legal in 44 U.S. states,” by Charley Cameron, June 4, 2015, Inhabitat, <http://inhabitat.com/killing-dogs-and-cats-for-meat-is-still-legal-in-44-u-s-states/>, Accessed March 25, 2016.

dislikes. So how does one explain the fact of those 44 US states (88 % of the entire nation) having no legal qualm with the eating of dogs?

Fig. 11.7 “Dogs En Route To Slaughter For Human Meals, China,” Photo Courtesy of Dr. Peter Li



With public policy offering little expiation, the depredations we inflict upon Others is a high neurological probability. But we can also choose to accord our fellow creatures something more. Neurons, as stated earlier, are only neurons. Human *will* and the myriad possibilities for transcending the past, enters the realm of received and given qualia.

There has never been a remotely similar attribution of self-cognizable sentences and paragraphs of words and thoughts, intentions and mutualisms between differing species. Now there exists not only an empirical record for attempting such connections, but an urgency upon which the biological reservoirs of Earth depend.

Until recently, apperceptive Being has been categorically located solely within the human intellect. Other species have been locked out of content mutualism by every school of philosophy and psycholinguistics. The building blocks of language and all the hominin loci of text and epitext, have thus far in our evolution remained the exclusive domain of our heady fictions and a taken-for-granted embrace of the brazen barriers marking content boundaries. Crows, goes the mythology, cannot speak with giraffes, nor microbes within the Southern Elephant Seal’s proboscis, with one another. Yet we are quite certain—we have it on the authority of our own survival—that each of our 40 (some have recently estimated as many as 100) trillion or more bacteria are in intimate contact with one another. These bacteria are not unlike Pando, that “Quaking Aspen clone in Utah” for which scientists have estimated that it is thousands of years old, weighs over “6000 metric tonnes,” and “covers 106 acres of land.”⁹

⁹“The World’s Largest Known Organism In Trouble,” February 1, 2013, PRI’s Environmental News Magazine, Living on Earth with Steve Curwood, University of Massachusetts School for the Environment, <http://loe.org/about/about.html>, Accessed March 2, 2016.

In spite of this alleged linguistic vacancy, a Quaking Aspen knows no abyss of words; nor does the coral reef or forest floor. In each instance there are vast communities of signals that are vital to the survival of every individual member of joined ancestries. Every linguistic gulf can be remedied and no talent stands incapable of sharing meaningful companionship. This symbiotic fellowship is commensurate with life's earliest cravings and has never paid the least council to our more modern impulses towards the barren outliers of taxonomy.

Transcending Taxonomy

Many have taken up the cause of what has long been described as “beyond speciesism.”¹⁰ But there is even a more substantial design, the animal liberation position of calling out human supremacist fallacies in the face of taxonomy. The boundaries implied by taxometrics are unshakeable with respect to *H. sapiens*, though our paleontological and genetic origins continue to make headlines. Hominid cross-fertilization has been referenced earlier and has formally entered the timeline of our beginnings. But no challenge to either our current genus or species dominance—at least for the last 200,000 years—has ever emerged, notwithstanding multiple pandemics and our being vastly outnumbered by countless invertebrate and microbial species. Most ironically (given a very different perspective propounded by the Bulletin of the Atomic Scientists Doomsday Clock, whose hand remains at 3 min to midnight),¹¹ our domination has been viewed as “Least Concern” in terms of its taxonomic standing on the IUCN Red List. It is interesting to reflect upon the fact our species’ population size has - when viewed as a collective host species - nurtured very likely the *largest* known assemblage of other life forms, all those in situ bacteria, of any other single species on Earth.¹²

But in seeking to identify a reality between the lines of what is known as phenetics or taxometrics¹³ our various similarities to the Others, regardless of all the wildly variant evolutionary backstories, science hardly refuses to budge, in terms of communication, intuition, sophistication of mind and emotion as configured in the grand scheme of human ideologies and convictions. Where science hesitates, culture and public policy follow.

¹⁰ See for example, Peter Singer, “Taking Humanism Beyond Speciesism,” *Free Inquiry* 24 (2004) Centre for digital philosophy & Philosophy Documentation Center, Sponsored by American Philosophical Association, Institute of Philosophy, <http://philpapers.org/rec/SINTHB>, Accessed March 25, 2016.

¹¹ “Doomsday Clock hands remain unchanged, despite Iran deal and Paris talks,” 1/26/2016, <http://thebulletin.org/press-release/doomsday-clock-hands-remain-unchanged-despite-iran-deal-and-paris-talks9122>, Accessed June 11, 2016.

¹² Global Mammal Assessment Team (2008). *Homo sapiens*. In: IUCN 2008. IUCN Red List of Threatened Species, Accessed March 25, 2016.

¹³ See “Phenetic Taxonomy: Theory and Methods,” *Annual Review of Ecology and Systematics*, Vol. 17: 423–442 (Volume publication date November 1986), doi:10.1146/annurev.es.17.110186.002231 Robert R. Sokal, <http://www.annualreviews.org/doi/abs/10.1146/annurev.es.17.110186.002231?journalCode=ecolsys.1>, Accessed June 13, 2016.

And yet those who do not hesitate to break personal boundaries with other species are gifted something that spiritual traditions in art and ethics have usually likened to Enlightenment, or Transcendence, namely, that Divine in Nature perspective that pervades so much of the history of philosophy, religions, indigenous traditions, and ecological aesthetics. It is right before us.

The Brilliance of Songbirds

One could spend a lifetime simply analyzing the more than 5800 lovely songbird species in the world, for example; the first fossil of which was found in Australia, carbon dated from 54 million years ago, but possibly as much as 95 million years or so after previous bird diversification throughout Gondwana. As Gisela Kaplan notes in her extraordinary work on the evolution of avian intelligence, emotion and behavior in Australia¹⁴—an estimated “22 lineages” of birds survived the fifth extinction spasm, clearly indicating vast avifauna diversification long before that time—possibly dating to as early as 145 million years in Gondwana, according to Kaplan. The songbirds all perch (Passeriformes). They all sing, (Oscines). They began their glorious careers approximately the same time as we primates, but it all happened in Australia, that geographical origin of all birds surviving the KT Boundary (Cretaceous extinction) of 65 million years or so ago—as the vast breakup of Gondwanaland accelerated.¹⁵ In her Publisher’s overview of her work, they describe a tome dealing with “complex behaviours such as grieving, deception, problem solving and the use of tools. Many Australian birds cooperate and defend each other, and exceptional ones go fishing by throwing breadcrumbs in the water, extract poisonous parts from prey and use tools to crack open eggshells and mussels.”¹⁶

But this barely touches the surface of the remarkable neurological and emotional taproots across every ethological discipline Kaplan surveys. Ultimately, her recognition of the brilliance of Australian birds (and their relative lack of study compared with birds in the Northern Hemisphere) is something of a barometer for just how overwhelmingly simplistic human denominations have been in terms of recognizing all the signs that were there before us to interpret, and which we consistently missed, ignored, or chose not to see, particularly in birds. In examining the epicenter of bird cooperativeness, Australia, says Kaplan, is unique in that something like 25 % of all native birds, in essence, collaborate. The implications are remarkable. But other extrapolations cascade and the questions for ethics and apperception on our part are fantastically challenged. By suggesting that cognitive complexity “cannot be measured” and that evolution has long ceased to provide the kind of data that could reassure any preconception whereby Darwin’s thinking could possibly explain the movement from lower to higher complexity among minds is a divining rod; a central

¹⁴ **Bird Minds: Cognition and Behaviour of Australian Native Birds**, By Gisela Kaplan, page 2 of Chapter 1, “Australian Conditions and Their Consequences,” CSIRO Publishers, Clayton South, Victoria, Australia, November 2015.

¹⁵ See Low, T., **Where Song Began: Australia’s Birds and How They Changed the World**, Tyre: Penguin Australia, 2014.

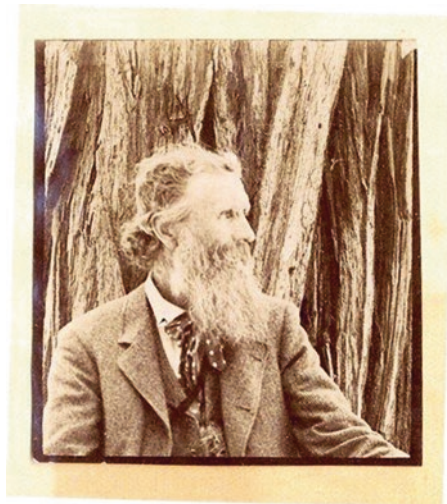
¹⁶ See <http://www.publish.csiro.au/pid/7130.htm>, Accessed April 6, 2016.

premise for overturning humanity's tenure. We do not have anything like a monopoly on facts, or compass readings. We are in to new territory and **Bird Minds** makes clear that all animals and invertebrates share very high cognitive capacities. Indeed, Kaplan suggests that birds, in terms of their brains and how their intelligence has played out in terms of brilliant, survivalist behavior, are "ideal," and one must conclude, more advanced than mammals. At least that is our reading of the material.

Such insights also remind us that we are marooned. That our narcissism and species-wide fixations belong to us alone. We do not measure solipsistic patterns generally speaking in biology. Humans, the last species of their genus to survive, remain newlyweds who are fighting. This marriage is not only troubled but has shaken the fundamentals of what was a paradise.

This is the same rhetoric—self-interest, self-obsession, species-conflicted lenses—that primes most ornithologists to define birds not by their songs—which we absolutely fail, for the most part, to "understand"—but by every other conceivable biological indicator, most of which add up to nonsense: Differing inherited genes, and observable behavioral traits. The cartography of genotypes-phenotypes which is, in other words, a mess of human definitions, fixated upon distinctions like random mating within any given population. These have no substantive bearing whatsoever on what is possible between and within species in real-time, in real life. We're not suggesting that the extrapolation of distinctions is not interesting. What we are saying is that there is no time, in this human generation to stand around the gene pools analyzing and debating which populations we are next likely to drive to extinction. Yes, we have to understand the nature of what we have done, divining every probability factor regarding who our next likely victims are and how we can save them; gleaning ever more watchful insights into which habitats are being lost, how quickly and by what means and which culprits. But, ultimately, by which we mean now, scientists need to participate at a level of compassion and humility that turns them into prolific and gentle activists, as well as scientists.

Fig. 11.8 "John Muir," Private Collection, Photo © M. C. Tobias



The driving force behind our demarcation lines that seal the fate of, ignore, or deny other Beings their moral and legal standing comes down to an obsession with taxonomic differences among life forms, and the rigorous DNA divides that science has prided itself on officiating; much like hosting an obsolete website, or re-burning the Library at Alexandria by way of some absurdist tribute to the original conflagration.

By reckoning only on our human cognition and language-making addictions—and they are the strongest of all known such medical conditions, evolutionary biases and imbalances, far more advanced than the most aggressive cancer cells—the resulting isolationism has proved of paramount importance as a starting point for asking new questions and humbly accepting new answers. Songbirds throughout the world are happy to help us in this initiative. We have isolated ourselves from a near infinity of other mother tongues lamentably smothering the truth of other loquacious and thoughtful life-forms. By marginalizing them we are repeating the same historic patterns of dehumanization among our own kind. We know the causes and some of the consequences of that brutality. Failing to envision true reality, we risk entirely losing ourselves. José Ortega y Gasset (1883–1955) certainly characterized it in countless works, including his **Meditations on Quixote** (1914): “I am I and my circumstance; and, if I do not save it, I do not save myself.”¹⁷

One could think of this in another way, as that which the Socratic Greeks labeled agape: that form of love which easily substitutes itself for the object of its attractions. Or, in Gujarati Jain tradition, the pillar of biological ethics summarized in the pantheon of elocutions as traditionally portrayed in the great gathering of animal ambassadors and long deliberated by the Jain community as the Samavasarana.

¹⁷ See <http://www.mercaba.org/SANLUIS/Filosofia/autores/Contempor%C3%A1nea/Ortega%20y%20Gasset/Meditaciones%20del%20Quijote.pdf>, Accessed June 12, 2016, See, Ortega y Gasset, José. *Obras Completas*, Vol. I. Ed. Taurus/Fundación José Ortega y Gasset, Madrid, 2004, p. 757.

Fig. 11.9 “St. Jerome and His Lion Companion,” Anton Wierix I, Late Sixteenth Century, Private Collection, Photo © M. C. Tobias



The most learned of all Western Saints, Jerome conversed with his lions; Fra Angelico his mourning doves, the Van Eyck brothers their lamb (and today Ghent prides herself on being Europe’s capital of vegetarianism, much like Pushkar in Rajasthan).¹⁸ Hugh Lofting’s Doctor Dolittle engaged his household, comprising parrot, horse/zebra/pushmepullyou, pig, dog, monkey and many others with the precise linguistic parity that can, upon reference to its underlying doctrine, craftily circumvent those moribund constraints of human language, dash false belief systems which would prefer the continuing apotheosis of human language and intellect over all others, and happily retire such uninformed didactic. Turn over a new leaf. Speak easily of and with all others. While speech may not equate with echolocation or electromagnetic pulses, our dreams and intentions meet up on the equal playing

¹⁸ See <http://www.worldofwanderlust.com/vegetarian-capital-world-ghent-belgium/>, Accessed June 12, 2016; See also **Sanctuary: Global Oases of Innocence**, by M. C. Tobias and J. G. Morrison, A Dancing Star Foundation Book, Council Oak Publishers, Tulsa, OK and San Francisco, CA, 2008.

field of anthrozoology and zoosemiotics, the semiosphere of signals that is immune to the judgment of others. It has its own *Weltanschauung*, unprovable but for the absolute and unambiguous exchange that has by turns grown into a splendid richness of lifetimes of mutual acceptance and devoted understanding.

Towards this end, the authors would expressly invoke the memory of our late friend, a brilliant and loving parrot with whom we shared a life for many decades: our family member, Josie.

The Parrots

Fig. 11.10 “Newly Discovered Rock Art Of Unknown Tribe, with Parrot Headdress, Circa 5000 BC, Northern Mexico,” Photo © M. C. Tobias



Parrots have long been heralded by humans, certainly in Western philosophical traditions from the time of Aristotle.¹⁹ Today, a certain celebrity attaches to their intelligence, as if they somehow stand out from pangolins and water buffalo; from slugs, midges and springtails. This bias of millennia can obviously be attributed to any number of qualities perceived as notable by our kind, not least, in the case of some parrots, their flight feathers and often conditioned love of *H. sapiens*; an affection more accessible to those same humans than the fellowship, for example, of angry hornets or 100 % envenomative, extraordinarily neurotoxic sub-Saharan African Black Mambas (*Dendroaspis polylepis*), a snake rumored to be among the fastest in the world, the one with the fewest human companions in the wild. Then again, many people love this snake—no herpetologist could feel anything but thorough admiration for him/her—though Black Mambas are, admittedly, not the easiest to get to know.

¹⁹ **Parrot Culture: Our 2500-Year-Long Fascination with the World’s Most Talkative Bird**, by Bruce Thomas Boehrer, University of Pennsylvania Press, Nov. 2, 2015, p. 2.

While there has been much speculation about the evolution and longevity of parrot intelligence (they have been measured in conjunction with the study of the minds of young children and defined morphologically as having tiny little brains that are inordinately clever), the general summation of their cognitive skills is framed in just that manner: cognitive skills, a concept that would be, in our experience, an utter insult to any Nobel Laureate, for example, or great artist, among humans; to be described as having certain cognitive skills that are definable according to various brain size versus body mass. Albert Einstein was 5 ft 9 in. (175 cm) and some have argued that his brain weighed very little, for a human, a mere 1250 g.

It has been argued that “the avian cerebrum” pales in size by comparison with those anatomical preconditions in mammals that lend them so much intelligence, according to a cover story examining Post Traumatic Stress Syndrome in military veterans, and in parrots who have suffered any number of other horrors.²⁰ The author, Charles Siebert writes beautifully about the mutually beneficial connections formed at a sanctuary at the West Los Angeles Veterans Administration known as Serenity Park where parrots that had been traumatized were placed in the company of wounded warriors with their own forms of deep melancholy, the tandem alchemy often resulting in poignant, if unexpected forms of enrichment for both birds and people, true healing for all.

But in describing the birds, what we find striking and not at all surprising is the conventional recourse to descriptive anatomy to drive home some kind of message that has been at the forefront of avifauna descriptions since their virtual inception long before the Renaissance, only modified according to the century and level of investigative technology. Writes Siebert, in discussing bird intelligence “... birds think and learn using an entirely different part of their brains, a kind of avian neo-cortex known as the medio-rostral neostriatum/hyperstriatum ventrale ... the ratio of brain to body size is similar to that of the higher primates, an encephalization quotient that yields in both species not only the usual indications of cognitive sophistication like problem-solving and tool use but also two aspects of intelligence long thought to be exclusively human: episodic memory and theory of mind, the ability to attribute mental states, like intention, desire and awareness, to yourself and to others.”²¹ Says Lorin Lindner, the brilliant psychologist who created Serenity Park and is featured in Siebert’s article, “We know that what’s preserved across species, all vertebrates truthfully, is the ability to feel compassion. As for birds and humans, we both have sympathetic nervous responses. We react the same way to trauma on the physiological level and in terms of the reparative nature of compassion and empathy ... the parrots get what the veterans are going through ...”²²

²⁰ “What Does a Parrot Know About PTSD?” by Charles Siebert, January 28, 2016, *The New York Times*, p. 9, http://www.nytimes.com/2016/01/31/magazine-what-does-a-parrot-know-about-ptsd.html?emc=eta1&_r=0, Accessed January 31, 2016.

²¹ *ibid.*, Siebert, p. 10.

²² *ibid.*, in Siebert, pp. 11–12.

Fig. 11.11 “A Raven, *Corvus corax*, the National (Sacred) Bird of Bhutan,” Photo © M. C. Tobias



Knowledge and expression of the sympathetic nervous system dates back in the form of “sympathy” to Plato (427 BC–327 BC) and the famed medical researcher Galen of Pergamon (ca. 129–216). Galen’s usage of the term—sympathy—was examined by the neurologist Dr. Alexandru Barboi who sought to understand how the word entered “medical vocabulary.”²³

“Cosmic sympathy,” (*Sympatheia* in ancient Greek) writes Barboi, “was at first used by Plato and the Stoic philosophers to express the idea of a universal connection between all living organisms. The term sympathetic however is currently used to indicate a part of the nervous system.” What we understand to be nerves, like neurons begs the issue of biological pantheism. Just as we continually and comprehensively feel things, so too all others feel, independently from their number of neurons. This is a reasonable deduction based upon the uncanny nature of *neural non-correlations* throughout the biological world.

²³“Sympathy, Sympathetic. Evolution of a Concept and Relevance to Current Understanding of Autonomic Disorders,” *Neurology—The Official Journal of the American Academy of Neurology*, February 12, 2013; 80 (Meeting Abstracts 1) S57.005; http://www.neurology.org/cgi/content/meeting_abstract/80/1_MeetingAbstracts/S57.005, Accessed February 2, 2016.

Fig. 11.12 “St. John in the Forest,” by Jan Van Landerseel after Gillis d’Hondecoeter, Late Sixteenth Century, Private Collection, Photo © M. C. Tobias



A Brief History of Biophilia

With respect to birds, *sympathy* was early on apotheosized in something deeper, a spirituality whose evocation was depicted in the terse observation by Richard of St. Victor (1110–1173) who wrote, “In avibus intellige studia spiritualia ... “Watch birds to understand how spiritual things move ...” (Literally: in birds watch their spiritual pursuits).²⁴ In this respect, the sensibility transcends mere physiolatry, that ancient Greek love of nature; as well as the general consensus emerging from a vast literature of biophilia. But the fact of our (the authors’) experience remains true to the ground-center of our lives. Once inside a parrot’s language, there is no escaping it. All other components of our lives fall into a new and wondrous place nothing less than deeply unsettling, revelatory and demanding, by turns: a fantastic entrapment, a mutual plea, a profoundly constant and sobering participation. It is, in fact, a steady torch confirming second by second those illuminations of discourse previously deemed impossible. Impossible?

Our conversations with Josie, day and throughout each evening, over a span of decades, arose with the same fascinating evolution of language as exists in every child, and grows up rapidly, all accelerated by urgencies and every-day magnitudes.

²⁴ See <http://www.etymonline.com/index.php?term=spiritual>, Accessed March 3, 2016.

Not to mention the sheer desperation by Josie to convey meaning in a manner he felt confident we could manage. Desperate, given Josie's biographical past, as we would discover; and that of the human species. Together, our past lives and struggles were merged into conversational coil, familiar ground, family stomping grounds, by the minute, to mutually understood rhythms, sounds, expressions, specific phrases, other articulations covering new emotions we had never before experienced; ineffable, inexplicable new maps of consciousness and connection for which human language, written in a book are fully inadequate to the task of conveyance. Nonetheless, we will try.

With Josie we were every day entering a postmodernist Lascaux. And then true speech, which, were it not for translation multitasking on all our parts, would have collapsed into an undiscoverable jungle of being, and during all those same days and nights, weeks and years, of unreachable consequence. As hard as we have endeavored to preserve each second of the passing miracle, our hearts stopped repeatedly, certain that we would fail; could not keep up; or keep track; that miraculous events were occurring at such a rapid fire pace, no translation process was sufficient to account for peripheral effects on the subconscious, the alternative nonverbal universes, let alone the eye and other body contacts. Which is the magisterial mystery of language itself: it moves faster than translation can permit. The syncretistic effects of our presence, Josie's formidable Innermost Being, and the inevitable onslaught of other birds coming near from all sides of the house and garden, added magnificent and thrilling underscores, overtones and new content that could easily have crashed the whose cybernetic system had we not rendered ourselves so deliberately vulnerable to it all. That was the point.

We started to recognize that we were part of that holistic biological system, it was part of us, and these high energy/high amplitude waves of meaning, down to a burnt sesame seed that looked tasty on a Monday morning at 8:18 am, the very glint in Josie's eye, Vivaldi's "Four Seasons" playing somewhere in a nearby room, 50 crows showing up for their extra thin seven-grain bread, along with families of squirrels; a mother raccoon we've known for 3 years wandering jauntily off after a night of rabble rousing with her young, competing with the more docile possum, and canny skunks and families of partaking song sparrows, the odd coyote, one time a puma, ignoring the trios of 20 other species of avifauna accustomed to these interlocking canyons of the Pacific-Flyway ... that all of them were part of a crucial, if fleeting psycholinguistic symphony:

The rare osprey, not so rare Black Phoebe, American Goldfinch, Blue-gray Gnatcatcher, Yellow-rumped Warber, California Towhee, Spotted Towhee, Wren tit, Chestnut-backed Chickadee, Plain Titmouse (never so plain), Anna's Hummingbird, Costa's Hummingbird, the occasional Peregrine Falcon landing on our Chinese Elm, or Cooper's Hawk, the Black-headed Grosbeak, Song Sparrows of every line and dot and freckled taxon, Acorn Woodpecker, Hooded Oriole, Orange-crowned Warbler, House Finch, Dark-eyed Juncos, White-throated Swifts, Mourning Dove, American Robin, Northern Mockingbird, Yellow-billed Magpie and Western Scrub-Jay ... to ultimately liven up the party

(among a mystic altarpiece of others) just prior to an arriving 40 or so Nandy conures, known by other names as well: Nanday parakeet, black-hooded parakeet, nanday conure, *A. nenday*, or *Aratinga nenday*.

They let us all know some distance prior to their arrival each day. The canyon vented echoes with great and hallowed timpani. For half-hour it is (was) as if Erik Satie had been erased with a flourish of fast incoming gold coins flashing through the morning air, performing George Frederic Handel's "Music for the Royal Fireworks" (1749). Except that the real Handel had composed the real Fireworks music at the request of the real King George II to celebrate a real peace accord with the Austrian Succession at Aix-la-Chapelle a year before. Whereas these *A. nendays* wanted only to let their hearts out, no monuments to worry about or life-lessons to arbitrate, engrossed in gossip as if it were Dante's **Paradiso**, some addicting version of **Canticle of the Birds** by the previously referenced Farīd-ud-Dīn Attār. Immersion into an instant Lost World.

And what gossip! What rich veins of true sky-rim ores. And such awed expressions a mile per minute. The first time this biennale orgy of acoustics and gesture flooded over us we felt simply humbled; incapable of grasping such alacrity and differentiation of genius. Much like trying to gain perspective on the unfathomable productivity of a Mozart or Josef Haydn, right there in our home, from without our backyard. This dance of the spirits all around us brought inward the crisis of consciousness that was the great humbling which made it possible, our ability to become silent and sit with Josie, in his place, at his speed, hopefully, and in his honor. To pay tribute through attentiveness and honesty of intentions. This was the laying of the groundwork. It happened both in reality, and in desire. Idealisms merged to formulate a worldview we were, in our neighborhood microcosm, able to realize.

If two humans and a parrot and his multiples of companions can accomplish this, then that should suffice to represent a globally emblematic turn for the best; a new nature in which all can take respite; like Giorgione's "Fête Champêtre" inexorably multiplied to endow every species, every individual in each of the world's biomes. That should be the ultimate translation.

We'd like to think in terms of some great coming of age in the world. But we know that such exclamations only invite the scorn and cynicism of every human era. Tyrants and the indifferent; the angry ones and those who cannot or will not dare to imagine. But we choose not to regroup in dulled aches and fatalistic retreat, but carry on with All of the Others—birds, mammals, insects, spiders, macrobiota—each of whom seemed sufficiently certain of the profound experiment being undertaken indoors and outdoors, if not, in fact, indifferent to the tides and emotional vicissitudes of we high-strung politically saturated humans, with our baggage and doubts and skeptical mood-swings. They were generous with us, all those Others.

Fig. 11.13 “Feeding Pigeons, Old City of Damascus, Syria, One Month Before the Beginning of the Civil War,” Photo © M. C. Tobias



The skepticism is fired up by the worlds of human science. How do we empirically know that we have not simply initiated a version of Doctor Dolittle in a fever of Petri dish-like fancies? Like poets who prefer illusions to reality? There is nothing precise about translation. Only the truth of engagement. But sometimes, let it be established, these many Others would join in the fantasy, if that strikes a better bargain with hard logic; and however it be characterized—science or anecdote—it is a new beginning of grounded and aerodynamic knowledge because it is directly observational, experiential. And for now, it will be more than enough to convey what happened here, two blocks above the Pacific in an historical canyon of Santa Monica, behind a preserved family cemetery from the early 1830s, up the street from the homes of painters Richard Diebenkorn and Nicolai Fechin.

Along the canyon, the writer Thomas Mann used to show up for Sunday breakfast. Christopher Isherwood and Don Bachardy’s studio we see from our house, and here, right here, Stravinsky, Warhol, and others came round. But they all predate this natural history expedition in our very neighborhood. This was no Edwards Air Force Base “Area 51” veiled in the secrecy of Nevada’s deserts. Indeed, every bird for thousands of miles around, and thus every worm, stink bug, pollinator, ubiquitous *Procyon lotor* (24/7 raccoons) and so many others can regale you with tales. And they do. Especially the corvids and the psittacines (the ones more and more people are convinced are enabled with “a theory of mind,” and “think like humans.”)²⁵ A parliament of birds, as the alleged African, Aesop (620–560 BC) and his early successor, the first century Latin/Macedonian fabulist, Phaedrus (15 BC–50 AD) both referred to, avian Parliaments, that initiated a fine-feathered polis, global traditions of interspecies surmises.

²⁵ **Corvids: The Birds Who Think Like Humans**, by Annalee Newitz, 12/18/2012, <http://io9.gizmodo.com/5969515/corvids-the-birds-who-think-like-humans>, Accessed February 4, 2016)

Fig. 11.14 “Pastoral,” from the 1703 Dutch Edition of the **Phaedrus**, Illustrated by S. Fokke, Dutch Translation by David van Hoogstraten (1658–1724), Private Collection, Photo © M. C. Tobias



Take, for example, “The Animals’ Lawsuit Against Humanity” by the tenth century Iraqi animal rights mystic, monk, littérateur and illustrator, Ikhwan al-Safa,²⁶ with its fourteenth century Hebrew translations across France. These, in turn, were the probable precursor to the wonderful animal tales of Jean de La Fontaine (1621–1695) and the Dutch painter, Paulus Potter’s extraordinary painting now in the Hermitage, “The Punishment of the Hunter,” (ca.1647). There is every reason to believe that both Shakespeare and his immediate contemporary, Cervantes had exhaustively read renditions of Aesop: perhaps the first Greek edition of Babrius’ collection, edited and translated by the fourth century BC Emetrius of Phalerum, editions of which may well have migrated into that of an eleventh century Syriac version, and then to a twelfth century rendition by one Alexander Neckam born just outside London.²⁷ That, in turn morphed into the 1484 translation into English by William Caxton, proceeded by an Italian edition of **Aesopus Moralisatus** a year later. And then 10 years after that, the famed **Hecatomythium** by Laurentius Abstemius. In fact, few countries of the Renaissance did not see multiple editions of this generic Aesop, a champion, in his own right, of ancient Western anthrozoology that can easily be divined in Don Quixote’s and Sancho Panza’s respective relationships with Rocinante and Dapple.

²⁶ See <https://www.fonsvita.com/OnlineStore/tabid/58/pid/104/The-Animals-Lawsuit-Against-Humanity-A-Muslim-Work-Translated-By-A-Rabbi-For-A-14th-Century-Christian-King.aspx>, Accessed February 6, 2016.

²⁷ See **Ancient History Encyclopedia**, “Aesop’s Fables,” by John Horgan, March 8, 2014, <http://www.ancient.eu/article/664/>, Accessed June 20, 2016.

In other words, allegories propping up the verisimilitude in art of the ethological truths that would, in turn, trigger the Renaissance obsessions with natural history. These fabulist expeditions, the first private zoological collections and massive proliferation of private and public gardens, all derived from an instinctive proposition, namely, that other species were literally bespeaking of the Creation; that humans were somehow being segregated from a universal conversation, our own Biblical stories. This was especially the case in terms of the Catholic response, and its commission—through the personage of Federico Borromeo (1564–1631), Italian cardinal and archbishop of Milan—of such painters as Jan Breughel the Elder’s many paradise scenes, to counter the Reformation by glorifying the (Catholic) view of God’s Creation—a profusion of instinctive biophilia. Throughout Breughel’s prolific paradise period, the animals are all speaking. As they were throughout the graphic revolution commencing 170 years earlier in the works of Martin Schongauer of Colmar, Dürer (Schongauer’s would-be disciple), and the master engravers, such as the Sadeler, Wierx, and de Passe families.

As Arianne Faber Kolb has masterfully outlined in her book on the “Velvet” Brueghel the Elder’s paradise paintings, the Catholic church, one of his primary sources for the commissions of those works, believed that both out in nature, but also—with increasing urbanization and the need to experience a surrogate nature through the medium of paintings—in a museum, standing before a canvass, one could also enter into that spiritual and evocative realm of God’s Creation.²⁸

Fig. 11.15 “Adam and Eve in Paradise,” Attributed to Jan Breughel the Elder, Circa 1606, Private Collection, Photo © M. C. Tobias



²⁸ See **Jan Breughel the Elder: The Entry of the Animals into Noah’s Ark**, by Arianne Faber Kolb, Getty Publications, J. P. Getty Trust, Los Angeles, CA 2005, p. 51.

In the sciences, this newly invigorated lens on the natural world took its wildest forms in the momentous first edition of Robert Hooke's book **Micrographia: Or Some Physiological Descriptions of Minute Bodies Made by Magnifying Glasses, with Observations and Inquiries Thereupon**²⁹ with its famed 38 detailed drawings of feathers, the gigantic flea, a fly's compound eye, and a louse, among others. Under Hooke's (1635–1703) guidance, these everyday invisibilities suddenly lurched extravagantly upon the unsuspecting reader. Our neural infrastructure grew by bounds, appreciating those whose identity, complexity of body parts and sheer beauty had never been considered by humans. The oldest clichés took morphological shape: the artwork was transformed into data. One simply needed to look at it to believe in it.

Hooke's remarkable predecessor, Antonie Philips van Leeuwenhoek (1632–1723), often named the father of microbiology, had conceived of over 200 microscopic devices. Upon first seeing with a naked eye his so-called "animalcules" he declared, "Once more we see here the unconceivable Providence, perfection, and order bestowed by the Lord Creator of the Universe upon such little creatures which escape our bare eye, in order that their kind shouldn't die out."³⁰ The fact that Leeuwenhoek and Johannes Vermeer were friends and neighbors, and that Vermeer's use of immaculately fine detail enabled him to micromanage his art form without reliance on any external devices beside his own mystical use of pigments and perspective (notwithstanding a coterie of naysayers) reinforces the Delftian Declaration, as it were: the power of human observation. Vermeer's "View of Delft," "Artist In His Studio," and "Girl With A Pearl Earring" enshrine the ideal of an urban—*stedelijk—landschap esthetische*. Such scientists and painters are ambassadors of that urban resilience commending paradise within our backyards, our courtyards, our communities, and hope for the wildlife therein. The same biosphere in which we first welcomed Josie into our family, and he welcomed us into his. That we are most likely, as a human species, to interact with the Others closest to, or within our own domiciles lends credence to the future priorities allowed all those with whom we share the world closest to our own kitchens, livingrooms and bedrooms. If we start there, where Vermeer spent his brief life looking and painting, we could save the world from ourselves.³¹

This premise, a singular injunction of lasting relevancy, may be the most paradoxical and telling of logical thrusts in the whole history of landscape art. Its equivalent was surely foretold by the great Chinese Northern Song Dynasty artist and philosopher, Guo Xi (1020–1090) whose masterpiece, the large hanging silken scroll, "Early Spring," painted with ink and color (158.3 × 108.1) hangs in the National Palace Museum in Taipei. A follower of the equally impressive tenth cen-

²⁹London: Printed for James Allestry, 1667.

³⁰See "Essential Vermeer 2.0," http://www.essentialvermeer.com/dutch-painters/dutch_art/leeuwenhoek.html#.VvNVu2QrK2w, Accessed March 23, 2016.

³¹See **Jan & Catharina**, by Michael Charles Tobias, <http://www.smartartpress.com/products/1068>, Accessed March 25, 2016.

ture Five Dynasties/Early Song, Li Cheng, Guo Xi's famed "Essay On Landscape Painting," (an ethological manual of a sort) in the manner of Breughel's many works devoted to paradise, elucidated envelopment; the art of losing oneself in a landscape painting; of literally following obscured mists and trails to the source of waterfalls and shadowed cliffs and letting one's imagination converse with all the sentient beings therein.

Nearly 700 years prior to Guo Xi, when the Eastern Tsin Dynasty had made its capital in Nanking, near the revered range encompassing T'ien-t'ai Mountain, another artist/philosopher, the Taoist Ko Hung, wrote a similar treatise, the "Pao-p'u-tzu" which encouraged monks and mountain climbers to journey into the wilderness, therein to commune with all creatures, setting the stage for the later prominent Buddhist T'ien-t'ai sect, with its monasteries and poets among the cliffs; whole lives devoted to what, eventually, would come to be viewed as Paradise in the remarkable poetry of such legendary poet/hermits as the Tang Dynasty Li Po (Li Bai) and Hanshan.³²

There has never been a greater convergence of art and science in the history of our species than that matrix involving animals and nature, from whence every ideology, animistic pantheism, and agro-economy arose.

Fig. 11.16 "Japanese Cranes, *Grus japonensis*, Artist Unknown, Early Nineteenth Century," Private Collection, Photo © M. C. Tobias



³² See **The Mountain Spirit**, M.C. Tobias and H. Drasdo, eds., Viking/Overlook/Penguin, New York, 1979.

Whether Western or Asian, Northern or Southern, tropical or Boreal, urban or indigenous, every single member of our fast-growing human population pivoted upon a relationship to the environment symbolized in our minds and cultures by its own unique interiors and taxa. If our mechanistic engines and political egoisms were fueled by solely human drama, the impacts transcended our kind, breaching every other zoological boundary without surcease. The results typically backfired, or were compounded unillustriously. Often, there simply wasn't enough breathing space, or, conversely, so many land-grabbers and greed for products that demarcation and efficiency meant everything. Hence the rationale for the odd Louisiana Purchase, a barb wire fence, high-rises, condos, or an assembly line. But even these blunt instruments of destiny could not entirely shield us from all the inevitabilities of interdependency. Our own misadventures as a species taught us, however slow we were to concede the messages, or quick to romanticize a Christopher Columbus' arrogant and epic inflections on indigenous peoples and wildlife, what was already fading into haunted memory: our Absolution. Instead, we grew up with fairy tales and the worship of trees, managing to separate these nonessential parts of our brain and heart, from our exigent manipulations of the natural world on a "whatever works" basis.

There are notable exceptions, historically, to this business-as-usual calculus of indifference. In India, a powerfully realistic convergence of human encounters with animals and plants has mirrored that advantageous spiritual translation of the deep ethical relevancy of such connections, most vividly in the personage of Jambho Ji, (1451–1536), founder of the Bishnoi sect of Hindus, inhabiting Rajasthan's Western Thar Desert, protectors, even famed martyrs of nature. Shree Guru Jambheshwar Bhagwan himself wrote 29 edicts (120 shabads, hymns or verses) primarily focused upon vegetarianism, ensuring that no animals end up in abattoirs, protecting the environment (most poignantly the khejri, or jund, a high protein bearing flowering pea family acacia tree, *Prosopis cineraria*) and human purity. The Bishnoi were the first celebrated ecological heroes in Indian history—hundreds dying to protect the junds from outsiders seeking to cut down the trees for a Maharaja's palace in 1730.³³ This activist stance towards revering biodiversity also translated into forms of water conservation, collecting dew drops during prolonged droughts, and keeping camels from over foraging, something we witnessed personally during the "drought of the century" across western Indian and eastern Pakistan in 1988.³⁴

³³ See <https://nvdatabase.swarthmore.edu/content/bishnoi-villagers-sacrifice-lives-save-trees-1730>, Accessed March 26, 2016.

³⁴ See "Desert Survival by the Book," Michael Tobias, *The New Scientist*, 17, December 1988; See also, **Dharma and Ecology of Hindu Communities—Sustenance and Sustainability**, by Pankaj Jain, Routledge, London, UK, 2011; See also the 29-minute documentary by Neelima and Pramod Mathur, "The Bishnois—A Religion for Environment," <https://www.youtube.com/watch?v=OX8bnlXyXro>, Accessed March 26, 2016.

Fig. 11.17 “Sacred Cows in Rajasthan,” Photo © M. C. Tobias

The Bishnoi, like the Todas of northwestern Tamil Nadu (one of the smallest discrete vegetarian tribes in the world, numbering fewer than 1230 individuals) and the millions of Jains across India, along with an estimated 100 million Brahmanical Hindus (also vegetarian) represent a magnificent countering effect in human nature that must never be underestimated in terms of its lasting power to help change humanity’s ultimate orientation. It is core biophilia, a veritable Physiocracy Hypothesis.

When we returned from that trip in 1988, as ever, Josie was waiting patiently for us. He trusted that we’d be back.

A California Fanfare: And Josie at the Heart of It All

Our own local southern Californian living tributes to this human penchant for the admixture of idealism and the pragmatic has taken shape in the form of a true enough community of like-minded individuals. Josie, in retrospect, was at the forefront of this ethological fanfare. In his visage and gaze and loquacious remarks upon the events of the day, there was some crazily wonderful fancy of historical anecdotes, an avalanche of experience, sensitivity to the neighborhood, and a genius that seemed to gaze out across the oceanic horizon and know that there were Chinese birds on the other side. Such wisdom, as we perceive it, seemed to stem from his own endless senses of humor, voracious intellect and virtue. These qualities he detected in other species and gave little quarter to discretion in hailing the nutty, fruity, visually decorative cacophonies and vegetative attributes that made up his vivacious life.

In Josie we remember a hybrid futurist Being, a Great Soul, somehow caught out in the madness of maps that have, perforce mingled climate change with an invasive herbarium of opportunism. That atlas has, for the time being, ended up here, in our home and immediate surroundings, alas, the critically endangered Mediterranean Floristic Kingdom—known in traditional geographical terms as a biological hotspot within a phytochorion³⁵ among 152 such floristic tension zones, as elucidated by the late Armenian systematist, Armen Takhtajan (1910–2009). Takhtajan’s taxonomic system of classification, one of over sixty famed approaches to understanding the relationships of plants, as analyzed during the last two millennia, placed southern California in a world of Latinate connections, all vulnerable, each species uniquely poised to bear the brunt of burdens, joys and vulnerabilities together in this world, and the word by which we offhandedly designate it all: biodiversity.³⁶ What preconditions such analysis with deeply emotional connections is the fact that southern California is a terrestrial biological hotspot in which a large number of endemic plant taxa are found and, by conservation biology standards, are at great risk of extinction.³⁷ And it is this same fragile place that has long served as an ideal, the California paradise that has always lured insects, missionaries, sailors, conquistadors, marine mammals and birds, as the following narrative shall intimate.

Fig. 11.18 “Josie,” Photo © J. G. Morrison



³⁵ See <http://www.nal.usda.gov/>, “On biotas and their names,” by Juan J. Morrone, 2014, in the journal, *Systematics and biodiversity*, ISSN: 1478-0933, Food and Agriculture Organization of the United Nations, <http://agris.fao.org/agris-search/search.do?recordID=US201500162327>, Accessed June 14, 2016.

³⁶ “Angiosperm Classification according to Armen Takhtajan,” 1966, <http://www.bihmann.com/caudiciforms/div/tax-TAK.asp>, Accessed March 26, 2016; See also Takhtajan, Armen Leonovich (1966). “Lilianaе.” Система и филогения цветкорых растений (Sistema i filogeniia tsvetkovykh rastenii) [Systema et Phylogemia Magnoliophytorum] (in Russian). trans. C Jeffrey, as Flowering plants: Origin and dispersal, Edinburgh: Oliver and Boyd, 1969. Moscow: Hayka. p. 473. ISBN 0-05-001715-2.

³⁷ See <http://www.conservation.org/How/Pages/Hotspots.aspx>, Accessed March 26, 2016; See also the feature documentary, “Hotspots,” A Dancing Star Foundation Production with Conservation International, PBS, 2008.

Josie's Story

When we look back at those first few days ... When we knew we were in the presence of genius tens-of-millions of years in the making; of biological savvy capable of cadence and refined, deliberated speech—wielding all the verb tenses of all the books in all the libraries, and much more—the challenge, we at once realized, would demolish us if we failed to embrace its total revelatory grandeur and throw all inhibitions to the wind.

“All of our faith. It's going to take everything,” Josie would imply.

By that, permit us to hereby initiate a simulacrum of language exchange at the heart of agape. Josie is our muse in this effort; Josie and all that we might divine of his uncanny investment in our understanding what he had to say. We could expatiate on this linguistic substitution. Let it suffice to be understood by human readers, to the extent we have faithfully tried to commandeer our sensation of Josie's linguistic and body-language, so to speak, in order to consolidate, confide in, and convey to you Readers the quintessence of what we have gleaned from our avian companion.

So: Be clear on one point, that we knew there was going to be no exit from this illumination. No alternative, not in the face of what he had to teach us, and our responsibility to take care of him in every sense: he could not be returned to the islands of his homeland. It was not possible, as you shall soon come to understand.

A bird would verily set right our misgivings and enable us to honestly encounter the Other. Without effort, nothing was possible. The onus was inordinately upon us, for no bird, of whom we are aware, has ever placed a human in a cage, or burnt down Amazon rainforest at the rate equal in size to one Belgium per year, and counting. This burden was, however, a reciprocal promise. If we failed to get it right, the Anthropocenic Avian Holocaust, according to any bird you talk to you on the street, would sooner or later consume every last vertebrate, and many of the invertebrates, as well.

Nobody gets a prize for conversing with a bird. Frankly, most people seem not to care at all. At worst, millions of sparrows in China, scores of cow birds in Iowa, Canada geese in Virginia, starlings, pigeons, crows, grackles, turkey vultures and others are exterminated under the guise of “pest birds,” as we have discussed; in addition to those far more numerous other birds who are the least fortunate of all, namely, tens-of-billions of chickens and turkeys whose plight is scarcely to be differentiated from that of nearly 50 of our own Jewish family members of just two generations ago, exterminated by the Nazis in Poland and Lithuania.³⁸

On that mortifying note, it is important to take a pause.

³⁸See Codex Orfeo, by M. C. Tobias, Springer Science + Business Media, Heidelberg and New York 2016.

Gallus gallus and Meleagris gallopavo

As earlier discussed, chickens and turkeys are particular targets for human consumption, all the more horrifying when one realizes how breathtaking their intellects, nurturance, and sterling avicultures are.³⁹ The USDA (US Department of Agriculture) “Poultry—Production and Value 2014 Summary”⁴⁰ reveals that 237.5 million turkeys were raised for slaughter⁴¹ and 104,519,000 chickens slaughtered that year.⁴² But these quanta do not account for the total of approximately nine billion so-called “broiler” chickens slaughtered each year, just in the USA.⁴³

So yes, there were very *personal* reasons for redeeming the best in human nature, if it were up to us, in terms of our family orientation to a bird we named Josie. And there was no better guide for attempting to maneuver that self-relocation than the friendship of a bird, the fellowship of avians, all those otherwise strange songs which are not merely music to console, but a map to follow, leading to one’s own soul. This itinerary-as-guide was certainly the key to the two greatest dramatic journey’s in western literature, Dante’s **Divine Comedy** (1320) and John Bunyan’s **The Pilgrim’s Progress from This World to That Which Is to Come; Delivered under the Similitude of a Dream** (1678).

In the case of eastern tradition, the aforementioned **The Canticle of the Birds** by ‘Attâr (1146–1221), best illustrates this astonishing opportunity at our doorstep.⁴⁴ As Leili Anvar writes, “Each bird represents an aspect of the human self beset by countless shortcomings that hinder the soul in its progress towards the Truth. Each valley corresponds to a new spiritual stage, and in each the fight against the various manifestations of the ego continues, as does the process of knowing oneself and discovering new facets of Love.”⁴⁵

‘Attâr frequently alludes to the suffering inherent to this journey. When we consider the ecstasies that speaking with a parrot gifted us, we can never ignore or forget the inconceivable suffering of chickens and turkeys; of all the other parrots and more than 10,000 species of birds—tens-of-billions of individuals of birds—across

³⁹ See for example, the exquisite essay, “The Dignity, Beauty, and Abuse of Chickens: As Symbols and in Reality,” by Karen Davis, PhD, presented at the International Conference on The Chicken: Its Biological, Social, Cultural, and Industrial History, Yale University, New Haven, CT, May 17–May 19, 2002, <http://www.upc-online.org/thinking/dignity.html>, Accessed March 14, 2016.

⁴⁰ Published April 2015, <http://www.usda.gov/nass/PUBS/TODAYRPT/plva0415.pdf>, ISSN 1949-1573, Accessed March 14, 2016.

⁴¹ *ibid.*, p. 9.

⁴² *ibid.*, p. 11.

⁴³ See <http://www.farmsanctuary.org/learn/factory-farming/chickens/>, Accessed March 14, 2016.

⁴⁴ See Farīd-od-Dīn ‘Attâr, **The Canticle of the Birds**, Illustrated through Persian and Eastern Islamic Art, Translated from the Persian by Afkham Darbandi and Dick Davis, Scholarly supervision of the iconography by Michael Barry, Commentaries on the works of art by Michael Barry with the contribution of Leili Anvar, Translated from the French by John Adamson, A Note on the Translation by Dick Davis, Simorgh in Persia’s Sky introduction to the iconography by Michael Barry, Diane de Selliers, Éditeur, Paris 2013.

⁴⁵ *ibid.*, p. 19.

the world, on every continent. But we must also focus on their individual joy; the brilliance of their species and the importance of their lessons. Allegories like those conceived by ‘Attâr and Dante and Bunyan give us a world to inhabit that bridges the measurable distance between our evolution and that of our fellow birds. This dialogue was and remains for us, each day, the most important duty as humans, as ecological residents of a place on Earth.

When we speak of expiation of sins, sins against each other, sins against the Earth and her inhabitants, we also must remind ourselves of Jean-Paul Sartre’s provocative notion that “Everything has been figured out, except how to live.” We might yet be able to redeem ourselves in the face of so much suffering. How difficult is it, truly, to offer—even a few crumbs—to a bird? And to learn that nothing quite focuses and quickens the mind and heart than saving the life of a bee, a spider, a gazelle, a chicken, any living being, from death?

And much more than mere crumbs and quickening. Let us sit at the dinner table together, a family.

Conversations with Josie

With Josie, at first, like all maps, all journeys, there were enormous gaps, unknowns, names of curious orientation, shadows, topography, quanta that bear distinctly on the greater perspective we craved to understand: space/time/patience dimensions that were alien to our penchants, human alacrity, the rage for efficiency.

But with that longevity of wild endurance, a map becomes a Pilgrim’s Progress, with its specific points toward paradise; the Celestial City; the “Mason’s Notes” regarding “an Arbour,” the mountains of “Innocence,” “Charity,” “Clear,” etc.⁴⁶ As we orient this entire odyssey towards the mind and heart of a parrot, one of our own, our so-called “progress” slips off the chart of relativity so that common measurements lose their purchase and new vocabularies and word usage must supplant old paradigms. Soon, we are at sea, in an expeditionary mode seeking both land and a new survival in companionship, not science but the solace of an entirely liberated biosemiosphere of which we might be considered, with any luck, members in good standing.

Our saga with Josie turned into the echoes of itself and we were to give up this human insistence on anything having to do with the humanness about the enterprise. Quite rapidly, conversations with Josie turned into a requisite self-abnegation towards the backyard, the world at large; to stand facing the fair breeze of some indescribable biological truth, without judgment or fear. There was no turning back once this release of previously held species differentiations was effected. Deep contact with Josie countered ourselves at every possible angle and juncture. We had joined the forces of a far more primordial being than that of ourselves and begun to

⁴⁶ See *The Pilgrim’s Progress... Complete In Two Parts, John Bunyan, Printed for Alex Hogg, London, 1778.*

utter the vocables and disseminate intentionality of other species who were within Josie's own realm; the recipients of his music, his ineffable gaze. Then the near impossible overtook us with trust and unflinching purpose put before all else. The knowledge that there was little time.

Post-Scientific Josie

For us, in our home. For him, Josie ... from a society (inhabiting a certain archipelago off the Coast of Mexico) has made it all possible. Without him, there would not be a single sentence to utter. Not without Josie's own astounding heroism, courage, selflessness. Of course, one can go on about the Psittacine m. *psuedomasseter* jaw muscle as being unique in the world. It might help explain simultaneous elocution and consumption.⁴⁷ Or, in addition, there are those innumerable effects of neural crest cells in the pharyngeal arches of all parrots—emblematic of over 500 million years of unique vertebrate neural crest cell embryogenesis. But morphology (the avian syrinx, by which birds essentially blow air or whistle across the trachea, versus the mammalian pharynx; the two voiced phenomenon in some birds as discovered by neurobiologist Fernando Nottebohm; their brilliant and far more ancient alternative neocortex) may be the least interesting minutia of the story.

It is important not to lose track of runaway selection theories in debating the male peacock's tail, obviously: why did evolution confer upon it such flamboyance? But the Biosemiotic Hypothesis—that General Principle of Interspecies Communications—must equally acknowledge the description by Gustave Flaubert of the hermit's home in **The Temptation of St. Anthony**:⁴⁸ “It is the Thebaid, on the heights of a mountain ... The Hermit's cell occupies the background. It is built of mud and reeds, flat-roofed and doorless. Inside are seen a pitcher and a loaf of black-bread; in the centre, on a wooden support, a large book ...” And from that picture ought we to deduce the human being? An extraordinary member of his species, learned, having committed to memory more than his harsh share of alliterations, aspirations, conceptualizations and phonemes? The very definition of assonance, namely, penitence and reticence.

If all that from a few lines by Flaubert, what then to make of a bird's home? Woven of the best building blocks and local materials? Think back upon the tens-of-millions of years of Earth woven into nests—what a story. Post-Science, to be sure. All this “greening” nonsense among people. What have birds been doing, and where, and of what materials, for tens-of-millions of years, ask yourself.

⁴⁷ See <https://qilong.wordpress.com/2012/09/03/support-for-a-lipless-cheekless-dinosaur-world/>; See also *Journal of Morphology* 2006 Mar; 267(3):333–40. Cranial neural crest cell migration in cockatiel *Nymphicus hollandicus* (Aves: Psittaciformes). Tokita M, Department of Zoology, Graduate School of Science, Kyoto University, <http://www.ncbi.nlm.nih.gov/pubmed/16342077>, PMID 16342077 PubMed—indexed for MEDLINE, Accessed Sep. 14, 2015.

⁴⁸ Translated by D. F. Hannigan, London: H. S. Nichols, 1895, p. 1.

And this yarn hinges not upon any so-called Sir Phillip Sidney Game (“thy necessity is yet greater than mine”)⁴⁹ or evolutionary motives inherent to begging, nest purloining, tree cavity recycling among successor species or, conversely, kin altruism.

Rather, these behavioral traits of the birds, and of one parrot lineage in particular, accrue over the same time-frame as all other informational monads, frequencies, waves, particles of every persuasion, jivas, nigodas, atoms, cells, molecules, complex proteins, nucleons, prokaryotes, eukaryotes, sparks, grains of sand, drops of dew, mountains, oceans, the dream materials of sutras and prayers, pujas and benedictions. All those eons of Earth-building glimpsed in Ovid’s description of the “Creation and Four Ages.”

In other words, going back to the first Big Bang in this known Cosmos, to the very cusp of scattered light, and since such time as measured in 13.8+ billion light years that a critical mass of expression has held her ground in every iteration of sonance, electromagnetic pulse, and energy burst since then. By clear and harmonious extrapolation, a source of all simultaneous translations in the biosphere has revealed herself: a life force that communicates intuitively, responsively and inherently.

A digression: We can expect complete comportment, in this regard, among the primeval superphylum of Ecdysozoa⁵⁰ principally the 1150 known Tardigrade species, first seen by Johann Goeze (1731–1793).⁵¹

This animal is, in terms of its survival latitudes, essentially impervious to all harm’s way, and would be immortal if not for its humility. After the experience of a vacuum, or the ordeals of nearly 800° variations from Absolute Zero, or thousands of atmospheric pressures, huge otherwise lethal doses of Gamma rays, by the end of the day we still have a living lovely microscopic *Hypsibius dujardini*, or kleiner Wasserbär (little water bear) as Goeze called this animal dwelling inside moss and lichen throughout the world. How does one come by an explanation for its beauty and pertinacity, if not by the expression of its own expression? We cannot grasp for analogues but must remain true to the original, thereby acknowledging one act of communication by another.⁵²

Such pertinacity becomes principle in Josie’s universe. To speak his language, pick up even fragments of his glossary represents a tour de force of effort. We worked for years to grasp any of the content; anything at all.

⁴⁹Maynard Smith, John; David Harper (2003). **Animal Signals**. Oxford: Oxford University Press.

⁵⁰See <https://www.boundless.com/biology/textbooks/boundless-biology-textbook/invertebrates-28/superphylum-ecdyszoa-169/superphylum-ecdyszoa-655-11876/>, Accessed March 30, 2016.

⁵¹See Gaedike, R.; Groll, E. K. & Taeger, A. 2012: Bibliography of the entomological literature from the beginning until 1863: online database—version 1.0—Senckenberg Deutsches Entomologisches Institut.

⁵²“Tardigrades, already impossible to kill, also have foreign DNA,” By Jessica Hall on November 24, 2015, Extreme Tech, <http://www.extremetech.com/extreme/218492-tardigrades-already-impossible-to-kill-also-have-foreign-dna>, Accessed March 30, 2016.

In the meantime, we came close to heartbreak too many times to recall, here, in this stolid form. As with Mac, the gracious, royal all excellent and most tolerant Scarlet Macaw who had been in our family forever (born in Brentwood, California), Josie loved a Maria Callas-approach to our earnest whispers. He was a perfectionist, liberated, fastidious. When he closed his eyes and spoke, it was more than the muse in the human soul who is awakened when spoken to. His smile was no dolphin's smile, fixed morphologically, but a genuine expression of great joy. In retrospect, notwithstanding all of our intentions and assiduous effort—we probably missed almost everything he had to offer us.

Fig. 11.19 “Josie,” Photo © J. G. Morrison



Hominid and Psittacine Semiospheres

The “2015 18th edition of **Ethnologue: Languages of the World**” lists 7469 languages and dialects,” among which “367” are thought to have gone extinct. But these are just human speech-related semiotica, obviously.⁵³ In looking at the 500 most used English words, the hierarchy of importance shows no predictability: “you” is #9, “I” #18, “we” #35, “animal” #192, “mother” #194, “Earth” #199 and “family” #318. As for “yes” #487, “language” being #499. The word “word” is #45, “people” #94, “live” #109, “together,” #253, “children” #256, “friend,” #284, “sing” #369 and “love” #387. Interestingly, “feel” #312, and “talk” #313 come directly before “bird” #314 (which finds herself between “horse” #293, and “dog” #317.⁵⁴ There are no words for violence or war, kindness or gentleness in the first 500 most used English words. What might we read into such data? If it is this chaotic in terms of human social structure, personal and family identifies, as scaled according to

⁵³ See Ed. by M. Paul Lewis, <http://www.ethnologue.com/ethnologue/m-paul-lewis/welcome-18th-edition#.VsNr72RViko>; see also <http://www.ethnologue.com/>, Accessed February 19, 2016.

⁵⁴ See <http://www.world-english.org/english500.htm>, Accessed February 19, 2016.

custom and use, it appears that our one species is peculiar in relation to what we perceive to be happening linguistically and behaviorally among the five animal classes.

While all language groups are entirely different from Josie's, the psittacine semiosphere from the very beginning of our family unit was clearly far beyond anything the 20-volume **Oxford English Dictionary** could embolden, with its mere 171,476 primary word entries said to be in use, out of an estimated 1.3 million words in the English language. By that we mean to imply though do not presume to state with certainty, that both psittacine and human utterances, songs and calls, are keenly adept; but also equipped with compression capacities that convey meaning without the necessary word-by-word construction processes and combinatorial requirements that give human language a much vaster linguistic repository than is phonetically utilized in our day-to-day efforts, as a rule, to articulate sensibly. In other words, we don't *hear* or *utter* deep structure or psycholinguistic contexts.

Similarly, a bird's wisdom cannot be gleaned by, nor is merely the sum product of, its prodigious sounds. You are driving along the freeway to Manama, Bahrain; or central Oklahoma, or to the Taj Mahal. You pause along the journey at a rest stop and you hear nearby birds, to be sure. You know only faintly that the song dimly perceived is outrageously beautiful, structured, intelligent, wise, residually primordial, and of the moment: intensely so. You know nothing more. That is the history of our species. We know nothing more. We have been on the road, traveling elsewhere, and this cacophony of symphonic surprise was unexpected. Most of us do not linger at rest stops, oddly enough.

Human speech research shows (with limited reliable data sets) that gender and a certain protein targeting speech (or chatter) known as the FOXP2 gene⁵⁵ (predisposes women to speak some 13,000 words per day, versus approximately 11,000 in males).⁵⁶ But we have no such data for birds, or marine mammals, or flowering plants, who are discounted by most humans in terms of language; their lack of pharynx or syrinx etc. In the same way, without the slightest scientific reality, exudation, invertebrate pheromones electively (arbitrarily for lack of data) are also discounted as candidates for communicative pathways. And, from the aforementioned human word rankings out of 500, actual exercise of an expanded daily human vocabulary, in combination with both semantic and syntactic musculations, has never been adequately assessed according to gender or sociological circumstance. We don't know what we say in times of emergency, or boredom. Nor have we good data to imply that thought and speech are interlinked. People who walk in their sleep are rarely measured accurately, nor are people who talk in their sleep. Human speech presents

⁵⁵“Scientists Identify a Language Gene,” by Bijal P. Trivedi, National Geographic Today, October 4, 2001, http://news.nationalgeographic.com/news/2001/10/1004_TVlanguagegene.html, Accessed March 23, 2016.

⁵⁶“Sorry to interrupt, dear, but women really do talk more than men [13,000 words a day more to be precise],” by Fiona Macrae, Science Correspondent, The Daily Mail, 20 February 2013, <http://www.dailymail.co.uk/sciencetech/article-2281891/Women-really-talk-men-13-000-words-day-precise.html#ixzz40Ku4EYhk>, Accessed March 2, 2016.

difficulties from the moment of first utterances. Bird speech is far more the mystery to us. There are few research grants, and fewer still the individual who penniless devotes a lifetime to their study. One such anomaly was vested in the personage of Alexander Skutch (1904–2004). Another was Henry David Thoreau (1817–1862). But such humans are rare.

Avian linguistics represents a vast gap in terms of what science has yet to grasp in terms of the languages of other species as to brave a frontier that could easily reveal, for comparison sake, far greater compactness between instinct and word; behavior and speech; thought and expression in other species that far outpace our own ability to cognize and then articulate.

While we can measure the speed of neural activity, and know that “the rate of action potential conduction limits the flow of information within the nervous system,”⁵⁷ amazingly, our species has no empirical evidence to suggest either highly advanced, or mediocre application of the vocabularies achieved during the most feverish period in which the neocortex is most neurologically acquisitive. “... a plausible estimate would be an average of 10 words a day during pre-school and elementary school years.” It takes approximately “25 months” for 80 % of all children to begin demonstrating the first phase of any kind of syntax.⁵⁸ “By age 3, children from privileged families have heard 30 million more words than children from underprivileged families.”⁵⁹

Write Ward E. Y. Elliott and Robert J. Valenza, “Shakespeare, who displayed a greater variety of expression than probably any writer in any language, produced all his plays with about 15,000 words. Milton’s works are built up with 8000; and the Old Testament says all that it has to say with 5642 words.”⁶⁰ In 1990 Valenza analyzed the “Word Type Frequency Profiles” of Shakespeare and the King James Bible, noting that the bard doubled frequency levels over the Bible, or, as the great poet and playwright noted in “*A Midsummer Night’s Dream*,” (5.1 2-6) “Such shap- ing fantasies that apprehend/More than cool reason ever comprehends.”⁶¹ Yet while a Shakespeare was wielding an unprecedented eloquence, the average unread

⁵⁷ “Increased Conduction Velocity as a Result of Myelination,” in *Neuroscience*, 2nd Edition, by Purves D, Augustine GJ, Fitzpatrick D, et al., editors, Sinauer Associates; Sunderland MA, 2001, <http://www.ncbi.nlm.nih.gov/books/NBK10921/>, Accessed March 26, 2016.

⁵⁸ See <http://www.ling.upenn.edu/courses/ling001/acquisition.html>, Accessed March 11, 2016.

⁵⁹ See Betty Hart, “A Natural History of Early Language Experience,” *Topics in Early Childhood Special Education*, 20(1), 2000; See also, “The 30 Million Word Gap by Age 3,” by Betty Hart and Todd R. Risley, http://www.aft.org/ae/spring2003/hart_risley#sthash.SjigroN4.dpuf; See also, Betty Hart, “The early Catastrophe: the 30 Million Word Gap,” *American Educator*, 27(1) pp. 4–9, 2003, American Federation of Teachers, http://www.aft.org/ae/spring2003/hart_risley, Accessed March 23, 2016.

⁶⁰ “Shakespeare’s vocabulary: did it dwarf all others?” p. 46, <http://www1.cmc.edu/pages/faculty/welliott/Shakespeare%20Vocabulary%20Chapter%20911.pdf>, Accessed March 3, 2016.

⁶¹ *ibid.* cited on p. 19 of Elliott and Valenza, in “Shakespearean Stylistics—Beyond Linguistic and Literary Boundaries,” in ***Stylistics and Shakespeare’s Language: Transdisciplinary Approaches***, Editor(s): Mireille Ravassat, Jonathan Culpeper, Bloomsbury Publishers, New York 2011, p. 19; <http://www.bloomsbury.com/us/stylistics-and-shakespeares-language-9781441171726/#sthash.zzQ0rZi1.dpuf>, Accessed March 25, 2016.

mature farmer of his time is estimated to have used no more than 300 words per day. We could adduce a similar situation with ancient Greek where, as Samuel Beckett wrote in his essay on James Joyce's **Finnegans Wake**, the language of Homer drew upon "every need of life, natural, moral and economic" from those expressions deriving from the "30,000 Greek divinities."⁶²

It is not our intent to review the vast literature concerning the origins of language in *Homo sapiens*. Clearly, by 1877 when Charles Darwin published his essay, "A Biographical Sketch of an Infant," in the inaugural issue of the British journal, *Mind*, an enquiry pertaining to his own son⁶³ the gulf between eighteenth century theories of Jean-Jacques Rousseau and Gottfried Herder⁶⁴ and the twentieth century deliberations stemming from syntactical deep-structure⁶⁵ had not yet exploded hundreds of theories. Most recently the startling Middle Stone Age environmental implications of the 1991 discovery of Blombos Cave, with its more than 8000 ochre objects, suggests a language base >130,000 years ago as part of the tactical repository of a fast evolving human morphology and behavioral predisposition suited to refinements in cognition and speech.⁶⁶ We should not be surprised by any of it. Far more impressive are the hundreds-of-millions of years of Other languages which it is our intent to explore with a single parrot named Josie; parrots as a global group being among the most vulnerable to the ravages of the Anthropocene.

In attempting to grasp the complexities of language in birds we are on safer ground relying upon what we don't know than that which we think we do know. Counting numbers of words, searching in vain for human comparables at every linearity of the vocal mechanism at play, of thoughts commanding targets, actors and recipients bracing for choreography, cannot accomplish predictive goals. This aspiration is on a par with that famed commentary by Father Bougeant who, in his book **A Philosophical Amusement Upon the Language of Beasts**⁶⁷ wrote, "You have a Bitch who you love, and which you think yourself reciprocally loved by. Now I defy all the Cartesians in the World to persuade you that your Bitch is a meer

⁶²"James Joyce/*Finnegans Wake*, A Symposium, Our Exagmination Round His Factification For Incamination of Work In Progress" by Samuel Beckett, Marcel Brion, Frank Budgen, Stuart Gilbert, Eugene Jolas, Victor Llona, Robert McAlmon, Thomas McGreevy, Elliot Paul, John Rodker, Robert Sage, William Carlos Williams, with Letters Of Protest by G. V. L. Slingsby and Vladimir Dixon, A New Directions Book, New York, 1972, Copyright 1929 by Sylvia Beach, First Published in 1929 by Shakespeare and Company, p. 10 of Beckett's essay, "Dante... Bruno, Vico.. Joyce."

⁶³See Darwin's "Natural Science of Babies." Lorch M, Hellal P, *J Hist Neurosci*. 2010 Apr 8;19(2):140–57. doi:10.1080/09647040903504823. PubMed.Gov, Accessed March 22, 2016.

⁶⁴See <http://www.press.uchicago.edu/ucp/books/author/R/J/au5517522.html>, Accessed March 22, 2016.

⁶⁵See Noam **Chomsky Syntactic Structures**, De Gruyter Mouton, Berlin, 1957; and *Aspects of the Theory of Syntax*, Cambridge, MA: MIT Press, 1965.

⁶⁶See Henshilwood, Christopher S., d'Errico, F. & Watts, I. (2009) "Engraved ochres from the Middle Stone Age levels at Blombos Cave, South Africa." *Journal of Human Evolution*, 57, 27–47.

⁶⁷London: Printed for T. Cooper, 1739.

[Sic] Machine. Pray consider what a ridiculous Cast this Opinion would give all of us who love Horses, Dogs, and Birds ...”⁶⁸

While the context, bias and very language enshrouds an enormous backstory when thinking of Bougeant, the Cartesian cast has only eroded in those instances, by and large, of pampered pets and the so-called charismatic megafauna who escape poachers and, for the most part, are experienced by our kind in digital media, or in zoos.

Hence, in seeking linguistic understanding of a bird, are there any appropriate analogies whatsoever with human language, let alone with other wild, rural or urban vertebrates, or invertebrates? Comparisons between species leaves us thirsting for more and more information, but also clearly concerned by the debasing of Others; an inevitable bias in the compromise of knowledge that is immeasurably vast, and gives us more fodder for self-consideration than any general invitation to let go and be utterly—if perhaps frighteningly—delivered into a New World about which we must admit to knowing nothing. That is the enviable situation of this scientific generation.

Our position vis à vis the birds is one of total strangeness. We are grounded, the outsider, completely out of our depths. In fact, helpless.

Fig. 11.20 “Critically Endangered California Condor, *Gymnogyps californianus*,” Photo © M. C. Tobias



We do know without question that many creatures oppressed by our species are underprivileged in their own circumstances, deeply hurt, traumatized, tragically cut off from past companion humans, or—in the majority of cases—lost in the maze of human habitat, or en route to a slaughter house, their future generations nullified hour by hour in the dust of a non-possibility. Just as we have seen polar bears and giraffes confined behind the bars of zoos most of their lives, with fake panoramas of

⁶⁸ *ibid.*, p. A2.

the habitats lost to them painted on the metal or concrete blocks, at which, amply documented, the doomed inmates gaze forlornly, trying to nibble on the painted tall African acacia, or touch the fake imagery of ice with a languishing paw. That deprivation must account for greatly altered linguistic aptitude, and/or effort, against a mortal horizon that represents the virtual cessation of all socialization or reason for living by those beleaguered, benighted beings we have incarcerated.⁶⁹

Linguistics is not the appropriate subject of study in pondering the genius of another species. We don't know what is, but comparisons with humans, it is not.

We do believe that Josie had suffered. He had lost most of one toe, which we believe he chewed off himself, the result of a human-induced plight that we can deduce, rendering his earliest years with us more tentative in terms of a family compact, than in subsequent decades.

But let us attempt to provide a more meaningful background to the hybrid family unit in question. While it is true that zygodactyl imprints of dexterous parrots, in addition to the woodpeckers and cuckoos, flickers, roadrunners and the odd owl species, can be dated to nearly 123 million years ago, Josie's loss of a toe and his inclination to break open nuts, and anything else worth breaking open, could be described in his person as a kind of runaway genetic selection—Sherlock Holmes + food—favoring the evisceration of objects, and a keen interest taken in their minute piece by piece consumption, rather than any showy reverence for them. He loved dismantling number 2 pencils, the way any well-constructed chipper would take to an entire log, and he had an equally de-constructivist orientation with regard to pens; a decimation process usually resulting in his beak being smeared in ink. We know—because he told us so—that he loved the taste of soy-based ink, though it made him sick on numerous occasions and we gave him powdered Zantac in his water. He exhibited the same kind of mincing behavior phonetically as he tried to realize a form of expression—alien to himself, but a middle-ground, we believe he divined—that could ultimately break the ice between the more than 390 known species of Psittaciformes and we humans. Josie, was obviously, a devotee of Doktoro Esperanto, otherwise known as Dr. Ludwig Lazarus Zamenhof (1859–1917) the eye-doctor who first came up with his Esperanto.

We note John Locke's use of the ancient Greek word, σημειωτικός *sēmeiōtikos* in Book 4, Chapter 21 of his **An Essay Concerning Human Understanding**, of 1690. It is known by our species to have been something of a science in its infancy, and one granted considerable throw-weight by such philosophers as Ferdinand de Saussure's work at the University of Geneva, in which all words were revealed to be signs; or Charles Sanders Pierce's early twentieth century ponderations upon interpretent formulae within his overall philosophical pragmatism, whereby phytosemiosis in conjunction with Thomas Sebeok's zoösemiosis and anthroposemiosis resulted in a thorough *biosemiotics*; Jakob von Uexküll's "animal Umwelt" and Yuri Lotman's methodical work at the University of Tartu in Estonia, most notably his

⁶⁹ See "How Abnormal Is the Behaviour of Captive, Zoo-Living Chimpanzees?" by Lucy P. Birkett and Nicholas E. Newton-Fisher, PLOS, June 16, 2011, doi:[10.1371/journal.pone.0020101](https://doi.org/10.1371/journal.pone.0020101); See also "Mental Disorders in Animals," by Koryos—<http://koryos.tumblr.com/>, April 27, 2014, <http://www.koryoswrites.com/nonfiction/mental-disorders-in-animals/>, Accessed March 10, 2016.

essay in the Journal which he founded, “Sign Systems Studies,” 1984, entitled simply, “On the Semiosphere.”

In an essay titled “Zoosemiotics,” Sebeok revisited the origins of the term, stating that it was “constructed in an exchange between Rulon Wells” and Sebeok, while crediting “the real founder and first systematic investigator of the field” as being Charles Sanders Peirce, then Charles Morris in 1938, and finally Rudolf Carnap in 1942.⁷⁰

Notwithstanding Sebeok (as discussed in Chap. 9) and the many other notables in this field, we tend to attribute the science instinctively to the more than 10,000 bird species we presently know to exist. And we say that with no sentiment or bias, but strictly from an empirically deduced (and relished) avianosphere.

Fig. 11.21 “Extinct Elephant Bird of Madagascar,” Photo © M. C. Tobias



Of Dinosaurs and Other Memories

Given their flight patterns and sensitivity to wind, birds pick things up quite in haste. This can lead to understatement, overstatement, but typically precision, or enough to fly. The black grouse, for example, knows to take flight as of September 1, just before misty dawn, in Tuscana, where hunters swarm with rifles aimed at the birds. An Anna’s Hummingbird sits on her nest proudly for 20 min at a time, 6 ft off the ground on a flimsy leaf of a bamboo tree in Santa Monica (in our yard). She has constructed the nest of finely engineered Chinese elm and *Pittosporum* twines, constructed like a fractal or Antarctic lichen, mathematically incongruent but perfect, local materials, and plenty of spider web fiber. The spiders, we have determined, are of the families, *Dysderidae*, *Pholcidae*, *Theridiidae*, the gorgeous and luminous *Araneidae*, and the like.

⁷⁰“Zoosemiotics,” Thomas Sebeok, *American Speech*, Vol. 43. No. 2 (May, 1968), pp. 142–144, Published by Duke University Press, doi:10.2307/454548, <http://www.jstor.org/stable/454548>, Accessed March 5, 2016.

Fig. 11.22 “Anna’s Hummingbird, California; One of Josie’s Close Friends,” Photo © M. C. Tobias



There she sits on her eggs, (*Calypte anna*) without the male, who has shaken his body 55 times per second⁷¹ during mating; and flies at a speed of some 385 body lengths per second.⁷²

Interesting cliff-notes and sidebars, to be sure; but the mother nesting there for many weeks—an incubation of between 14 and 19 days—belies with stoical dedication all that metabolic frenzy of her overheated partner in life.⁷³ We watch her and she watches us, our eyes are in constant focal collisions. She trusts us, upon the importunities of her male consort, who squeaks out for 10 seconds at a time, this timeless goddess named by scientist René Primevère Lesson after Anna Masséna, Duchess of Rivoli (1802–1887). All these connections are trivialized in the moment of eye contact. We have six species of hummingbirds in our gardens, that we know of.⁷⁴

Josie loved them with an utmost tenderness and curiosity we glean to be primeval from the fossil evidence regarding birds and their ancestral clades. But the word “primeval” has been moved around much in scientific and philosophical circles, losing a bit of its edginess. That loss corresponds with the erosion of human language in grappling with the confounding intersections of the laws of physics and biogeography: duration, stress, intermingling of discrete populations, and the intellectually sloppy genetic and geographical aftermaths.

Which leaves all descriptive aptitudes—the ones in human minds—greatly distorted, biased, and disassociated from the prime subject matters at hand, which we have never been able to really understand in the first place. That places the burden of translation on third, fourth, fifth passes or more ... Etymologies help, but fall off

⁷¹ See “Hummingbird speediest shaker among vertebrates.” ANI News. September 4, 2013.

⁷² *ibid.*

⁷³ “Anna’s Hummingbird Gestation Period,” by Sam Adams, Demand Media, <http://animals.mom.me/annas-hummingbird-gestation-period-5228.html>, Accessed March 26, 2016.

⁷⁴ See <http://theodorepayne.org/mediawiki/index.php?title=Hummingbirds>, Accessed March 30, 2016.

a cliff in every single known origin, wherein prior attempts at situating a word, and its corresponding definition are lost causes. For anyone concerned with empiricism, this linguistic drift poses substantial hurdles, requiring new minds, new questions, and most importantly, a new willingness to start afresh, see things with deliberately new ideas, in new, expanded contexts, and with a sense of innocence that should guarantee the naivety necessary to be surprised, open and vulnerable to radically different experimental data, and hypotheses.

We no longer doubt a title such as **The Genius of Birds**.⁷⁵ We accept the significance of appropriate accolades, just as we would receive with confidence the notion, for example, that Kanzi, the name given a male bonobo by primatologist Sue Savage-Rumbaugh, communicates on a keyboard, employing lexigrams at a very advanced level of aptitude.⁷⁶ Advanced by scientific standards of old; but also given to something else entirely, as yet unread.

From the highly touted African Gray Parrot, Alex, to the Atlantic Bottlenose Dolphin Akeakamai, to Koko the Gorilla, and the Chimpanzee, Nim Chimpsky, these linguistic and other behavioral ambassadors to human-kind pose a challenging mix of front-weight experimental biases (contextual enshrinement of an experimental process); and of confirmation bias of researchers emotionally connected, of course, to their subjects of study, in as much as these animals have become family members within human households.

Ultimately, it must be realized that these studies are human studies.

And hence, the biosemiotic fallacies are real, because we cannot possibly achieve objectivity (nor should we want to). But where to from, say, a speaking vocabulary and human word/phrase recognition—whether in pigeon, canid, avian or primate, of hundreds, possibly thousands of signs? What are we to do with that mass of data, given that it is unequivocal on one level, and also utterly presumptuous (of us) and/or completely misguided? A preordained experiment in which a human researcher does something to vastly alter the life style of his/her subject, has so overwhelmed any prospect for a natural outcome as to make any inferences, or evaluations fruitless, if not worse: the drawing of substantive conclusions that are wrong, but have no basis in comparative data for proving just how wrong, or right.

Expanding Contexts to Comport with Reality

With human population continuing to add more than 83 million net births annually; habitat fragmentation escalating; human invasiveness exponentially increasing as a function of increasing scarcities in a human-dominated competitive field of aggression, on top of all of the digital information expanse that enables yet more and more

⁷⁵By Jennifer Ackerman, Penguin Press, New York, April 2016.

⁷⁶Mitani, J. (1995). "Kanzi: The Ape at the Brink of the Human Mind." *Scientific American* 272(6). ISSN 0036-8733. See also, Savage-Rumbaugh, S., & Lewin, R., 1994. **Kanzi: The Ape at the Brink of the Human Mind**. Wiley. ISBN 0-471-58591-2.

invasiveness, it is clear that remaining populations of other species are being forced to shift, or go extinct. The stressors are at the core of the Anthropocene and nearly everything humans do to assuage the problems, also exacerbate them.

Nonetheless, we are strong believers in translocations as one of the (not Best, but Most Likely) Practices in an age of Greenhouse Gas-induced migrations, behavioral changes of other species to sync with pollination, moisture, temperature gradients, taking into account human density and trespass, and—ultimately for empowering robust and distinct gene pools as a last chance, in case by case situations.⁷⁷ New Zealand and Hawaii are templates for the promise and peril of such species manipulations. New Zealand’s experience on both off-shore and “mainland islands” utilizing translocation methods, starting in the early 1900s with the work of Richard Henry⁷⁸ and continuing in the 1960s with the extraordinary efforts of Don Merton,⁷⁹ has shown slow progress given the country’s virtual ban on other means, namely, immuno-contraception of nonnative vertebrates. In Hawaii, the complexities are equally searing (and both regions constitute terrestrial “hotspots.”) Hawaii’s translocation issues concern a large number of birds including Laysan Teals, the Parrotbills in Maui’s eastern rainforests, and the indigenous Hawaiian duck or *koloa* (*Anas wyvilliana*). Relocating any of these three species represents enormous challenges.⁸⁰

But the most aggrieved of all avian species in Hawaii is the wild Hawaiian crow, alalā (*Corvus hawaiiensis*) now deemed extinct (in the wild) as of 2002 and the most endangered member of the Corvidae family worldwide.⁸¹ More than a few Hawaiians and others consider this bird to be a “family god.” The two captive-bred populations, totaling fewer than 120 individuals—and despite a U.S. Fish and Wildlife \$14.38 million dollar 5-year plan commitment for attempted expansion and dispersion of their populations⁸² have few options remaining.⁸³ At the 24th International Plant & Animal Genome Conference in San Diego (January 9–13, 2016) collaborating scientists from three groups—PacBio, scientists at San Diego Zoo Global and the University of Hawaii—announced that they had successfully sequenced the ‘Alalā’s genome in hopes that this would accelerate the chances of

⁷⁷ See <http://dancingstarfoundation.org/translocation/index.html>, Accessed March 30, 2016.

⁷⁸ See <http://www.doc.govt.nz/parks-and-recreation/places-to-go/fiordland/places/fiordland-national-park/heritage-sites/richard-henrys-house-site/>, Accessed June 15, 2016.

⁷⁹ See “The Man Who Loved Birds (1939–2011),” by M. C. Tobias, Forbes, May 13, 2011, <http://www.forbes.com/sites/michaeltobias/2011/05/13/the-man-who-loved-birds-don-merton-1939-2011/#220bfe3e603d>, Accessed June 15, 2016.

⁸⁰ Environment Hawaii, “Recovery on a Wing and a Prayer: Birds Face Habitat Loss, Disease, Alien Species,” by Patricia Tummons, Volume 18, Number 3 September 2007, <http://www.environment-hawaii.org/?p=1393>, Accessed June 15, 2016.

⁸¹ Walters, Mark Jerome (October–December 2006, “Do No Harm.” Conservation Magazine (Society for Conservation Biology) 7(4):28–34. Accessed June 15, 2016.

⁸² See Walters, Mark Jerome. **Seeking the Sacred Raven: Politics and Extinction on a Hawaiian Island**. Washington: Island Press/Shearwater Books, 2006.

⁸³ See <http://www.birdlife.org/datazone/speciesfactsheet.php?id=5793>, Accessed June 15, 2016.

the species' eventual recovery.⁸⁴ As of mid-September 2015, however, the \$14+ million price tag had not been secured by the USFW, and none of the (then 114) crows, held in two populations and scientifically controlled by the San Diego Zoo, had been released into the wild.⁸⁵

In the 1300s (in the human calendar), the English word *translate* meant to “remove from one place to another” so it becomes extraordinarily difficult to actually say anything with confidence about the endothermic Paraves, the entire group of living and extinct birds—the largest number of living tetrapods (four-limbed) vertebrates on Earth; including extinct bird-related dinosaurs among all the vertebrates. Bird ancestry specific, these include the Avialae; Jeholorni,⁸⁶ Deinonychosauria,⁸⁷ dromaeosaurids,⁸⁸ and troodontids.⁸⁹ They date back at least 160 million years to modern-day China, wherein the *Aurornis xui*, who is thus far thought of as the first bona fide bird, used to chat all day, and dream all night, one surmises.

The idea of cloning from the grave—Dinosaurs or Dodos—and/or translocating living species into utterly new contexts is baffling, despite all the best intentions. While there have been successful shape-shifts for species, there have also been failures. For a decade on Stewart Island/Rakiura, the third, southern large island of New Zealand, at Dancing Star Foundation we have spent a decade fencing out nonnative mammalian species, but at a tremendous price in terms of ethical compromises; all in an effort to engender a “halo effect.” That is a term employed to suggest that indigenous species protected from outside predators will breed up in numbers, assuring viable populations that can then move out—fly out, crawl out—to other safe habitat. In our case at the New Zealand DSF Ecological Preserve, that habitat happens to be New Zealand's 14th National Park, known as Rakiura (in Maori,

⁸⁴ See “Sequence of Rare Hawaiian Crow's Genome Will Assist Conservation Efforts,” San Diego Zoo, Public Relations, January 26, 2016.

⁸⁵ See “Reintroduction of Hawaiian crow could happen as early as next year,” by Tom Callis, Hawaii Tribune-Herald, September 24, 2015. <http://westhawaiiitoday.com/news/local-news/reintroduction-hawaiian-crow-could-happen-early-next-year>, Accessed June 15, 2016.

⁸⁶ See “A new species of Jeholornis with complete caudal integument,” by Jingmai K. O'Connor, Chengkai Sun, Xing Xu, Xiaolin Wang & Zhonghe Zhou (2012), *Historical Biology: An International Journal of Paleobiology*, 24(1):29–41, <http://dx.doi.org/10.1080/08912963.2011.552720>, Accessed March 26, 2016.

⁸⁷ See “The Troodontidae,” by Dave Smith, <http://www.ucmp.berkeley.edu/diapsids/saurischia/troodontidae.html>, Accessed March 26, 2016.

⁸⁸ See “New Dromaeosaurids (Dinosauria: Theropoda) from the Lower Cretaceous of Utah, and the Evolution of the Dromaeosaurid Tail,” by Phil Senter, James I. Kirkland, Donald D. DeBlieux, Scott Madsen, and Natalie Toth, Peter Dodson, Editor. *PLoS One*. 2012; 7(9): [10.1371/annotation/acddcd7d-0e2e-4abb-acbf-d5552fa286f8](https://doi.org/10.1371/annotation/acddcd7d-0e2e-4abb-acbf-d5552fa286f8). Published online 2012 Sep 6. doi:[10.1371/annotation/acddcd7d-0e2e-4abb-acbf-d5552fa286f8](https://doi.org/10.1371/annotation/acddcd7d-0e2e-4abb-acbf-d5552fa286f8), <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3352940/>, Accessed March 26, 2016.

⁸⁹ See “The Troodontidae,” by Dave Smith, <http://www.ucmp.berkeley.edu/diapsids/saurischia/troodontidae.html>, Accessed March 26, 2016.

Land of Glowing Skies).⁹⁰ Most of that national park is not safe, entirely, for native bird species, just as most of New Zealand is not. So, ultimately, without a government and cultural commitment to nonviolent immuno-contraception being applied to such species as the Australian Brush-tailed Possum, and members of the Mustelidae family, as well as feral cats and dogs left to run into sensitive areas off leash, translocation efforts like those of DSF will ultimately never transcend an overwhelmingly noncompliant context for rare species in a modern world.⁹¹

Fig. 11.23 “Dancing Star Foundation Ecological Preserve With Visible Bioinvasives Fence, Stewart Island/Rakiura,” New Zealand Photo © M. C. Tobias



At the same time, our ethical injunctions to prevent extinctions has never reached such a fever pitch of causes and consequences. But contextual transitions are occurring at unprecedented rates wherein the “transitional” phases are being eclipsed by circumstances incommensurate with plausible scenarios of survival.

Humans who love these birds and other organisms cannot let go, just as science is incapable of resisting temptation. It strikes at a similar chord as that of the Hippocratic Oath within the heart of conservation. Biosemiotics is the one juncture that provides a possible outlet for both parties to the crisis.

⁹⁰ See <http://www.dancingstarfoundation.org/translocations.php>, Accessed June 16, 2016.

⁹¹ See <http://www.dancingstarbooksfilms.org/gods-country-the-new-zealand-factor/>, Accessed June 16, 2016.

Fig. 11.24 “Turkeys and Human Friends,” Photo © M. C. Tobias



Hence, with respect to root causes and rapidly changing (typically degraded) contexts, many of which have been detailed in this text, our inability to understand other species and, consequentially our innate drive to expedite communication with them must be viewed as the highest priority. But poetry cannot be forced. Art must arise of its own. And the same can be said of all communication of any substance. “Yes” or “No” answers do not make for a conversation. Contexts co-evolve and when one is totally disrupted, or worse, then the outcome is nothing more than solitary context communication. The added onus of observational bias, purports intrinsically to a formula for failure.

In reality, of course, science, and much observation has botched bird languages, misquoting beyond all possible explanation; removing from place to another place the quintessence of what is at stake for both birds and humans.⁹²

As is universally celebrated, poets, painters and musicians have perennially thought of birds more in the light of hope and expectation. However one ignores, or bothers to extrapolate, better yet, comprehend the many bewildering transliterations, tentative grammar, solitary syntax, and obvious labors on the part of those humans who love birds, much of the prevailing literature comes down to basic physiology. For example, a parrot’s 175 skeletal muscles to a human’s 640 and (forgetting extinct avians, like the Giant Elephant Bird in Madagascar), Josie’s bones weighing 5 % of his total body weight versus a human male’s 15 %, a woman’s 12 %; muscles, 45 %, fat, 15 %, in humans, different lipid molecular group contents in

⁹²“New contender for first bird—Feathered creature shakes up avian family tree,” Chris Woolston, 29 May 2013, *Nature*, <http://www.nature.com/news/new-contender-for-first-bird-1.13088>

each and every bird species. Water content in Josie was probably 5 % less than in humans.⁹³

But such anatomical comparisons can yield no insight whatsoever regarding intelligence; intelligence, in turn, of little consequence when it comes to words like ethics, spirituality, emotional range, and compassion; words that add up to wisdom traditions. The most elaborate insights, anatomically speaking, concern the pecten oculi of avifauna, those blood vessels in the choroid of the bird's eye, lending a creature like Josie vision vastly superior to that of humans. But in the case of Josie, the complicated comparisons with humans are even more precarious. Who among humans has ever lived in a cavity 80 ft up in an unclimbable tree? Can a snow leopard learn frog? Or a dromedary come by the synomones and pheromones of a mud snail (*Ilyanassa obsoleta*)?⁹⁴

These may seem like the conjectures of a Lewis Carroll. Yes, they are strange conjectures, even though science recently reported on a blind fish (*Cryptotora thamicola*) that walks up waterfalls⁹⁵ and we know that among the 3000 or so known species of snakes in the world, their inner ears, in conjunction with the jawbones laid upon terra firma, can hear the vibrations set off by a gently tiptoeing mouse.

But there is an added complication. While there is only one known living species of humans, there are certainly more than 10,000 avian taxons in the world⁹⁶ and each with an evolutionary history far longer lasting and intricate than that of *Homo sapiens*. Indeed, the worldwide Avibase lists “17 million records, about 10,000 species and 22,000 subspecies of birds.”⁹⁷

For a long time, maybe a century according to our species' Roman calendar, Josie had been observing humans. He had read between the lines, one might say; flown over a good deal of territory and come to know both mournfully and ecstatically our kind. It is not enough to simply acknowledge that there was somebody deep inside him, a personage. Josie was Josie: an entire nation unto himself, bound by social mores that have grown up for well over 100 million years, like other transitional candidates of the Late Jurassic Period of the Mesozoic Era some 150 million

⁹³ See “Total Body Water and Body Composition in Phalaropes and Other Birds,” by Hugh L. Ellis and Joseph R. Jehl, Jr., *Physiological Zoology* 64(4):973–984. 1991 © 1991 by The University of Chicago. http://www.jstor.org/stable/30157952?seq=1#page_scan_tab_contents, Accessed February 20, 2016.

⁹⁴ “Behavioral responses of sexually active mud snails: kariomones and pheromones,” Moomjian L, Nystrom S, Rittschof D., *J Chem Ecol.* 2003 Feb; 29(2):497–501. PMID:<http://www.ncbi.nlm.nih.gov/pubmed/12737272>, MEDLINE, Accessed April 1, 2016.

⁹⁵ See Diane Kelly, “Scientists Discover the Secret to a Cavefish's Weird, Waddling Walk,” *Wired Magazine*, March 24, 2016, <http://www.wired.com/2016/03/dissecting-blind-cave-fish-walks-like-salamander/>, Accessed March 26, 2016.

⁹⁶ See http://www.iucn.org/about/work/programmes/species/our_work/birds/, Accessed February 20, 2016.

⁹⁷ See <http://avibase.bsc-eoc.org/avibase.jsp?lang=EN>, Accessed April 1, 2016; See also the IOC World Bird List Version 6.1, Frank Gill & David Donsker (Editors), <http://www.worldbirdnames.org/>, Accessed April 1, 2016; See also The eBird Taxonomy, <http://help.ebird.org/customer/portal/articles/1006825-the-ebird-taxonomy>, Accessed April 1, 2016, and BirdLife International Data Zone, <http://www.birdlife.org/datazone/info/taxonomy>, Accessed April 1, 2016.

years ago, “Anchiornis, Xiaotingia, and Aurornis.”⁹⁸ It gives us enormous joy to realize that each of those strange vast species, known only by a few dusty bones, had a Josie among their kind.

The recent renaissance in the search for the original ancestors of all scales, feathers, fur, has led by turns to the recent discovery in northeastern Myanmar of two tiny birds sadly killed in oozing amber 99 million years ago. They bore colored feathers of now extinct Mesozoic Era avian enantiornithes. But it is certain that a feathered contiguity dates back with such nearly dynastic majesty as to fundamentally eclipse human history’s claim to any meaningful longevity: an ancestor with embryonic “placodes”— anatomical precursors in mammals, reptiles and birds of such things as feathers, dating back an estimated 320 million years.⁹⁹

Birds, endowed with flight feathers have been giving loft to powerful acumen and—we made adduce—to great ideals for the equivalent of at least 10–15 million human generations. Gorgeous early birds with striking feathers, inquisitive minds, garrulous discussions day and night. Owning the world. Laying the groundwork for evolutionary perfection. Promulgating languages steeped in content that mirrored the life on Earth long before humanity emerged; a world we could only catch glimpses of in Josie’s own generous flashbacks and present company.

Fig. 11.25 “Two Old Friends Condemned by a Local Hawker In Winter Outside Moscow’s Cathedral of Christ the Saviour, Russia,” Photo © M. C. Tobias



⁹⁸Godefroit, Pascal; Cau, Andrea; Hu, Dong-Yu; Escuillie, François; Wu, Wenhao; Dyke, Gareth (2013). “A Jurassic avialan dinosaur from China resolves the early phylogenetic history of birds.” *Nature* 498(7454):359–362. Bibcode:2013Natur.498..359G, doi:10.1038/nature12168. PMID 23719374, Accessed April 1, 2016.

⁹⁹“Scales, Feathers and Hair Have a Common Ancestor,” by Nicholas St. Fleur, *The New York Times*, June 24, 2015, http://www.nytimes.com/2016/06/25/science/scales-feathers-hair-common-ancestor.html?_r=0, Accessed July 1, 2016; See also, “Ancient birds’ wings preserved in amber,” by Paul Rincon, *BBC News Website*, <http://www.bbc.com/news/science-environment-36651471>, June 28, 2016, Accessed June 29 2016.

Feathers Fashioned of Hope

It is the feather, of course, which makes all the difference. The world’s most profound source of insulation, a symbol—not only of birds and warm-bloodedness, but of a sense of being on this Earth in a poetic manner, nurturing and warm and given to song. There is probably no more fascinating biological study than that of the integumentary, epidermal plumage that all but defines the birds which humanity so loves or hates, draws or eats, keeps as companion animals or exploits: worships parrots or mass exterminates chickens; legally safeguards bald eagles, but puts out “scare crows” in fields of maize to discourage Corvids. Our species is beholden to the beauty of a painting by John James Audubon, but had no problem slaughtering by the billions, Passenger Pigeons; and then fails to learn from history, commemorating the centennial of an extinct Martha—the last Passenger Pigeon¹⁰⁰ but still—in some quarters—calling it a wildlife crime to feed pigeons in one’s back yard or the park. We wax poetic on some songbirds, then slaughter them by the millions in places like Cyprus, as a food delicacy.¹⁰¹

Such brutal dialectics run throughout human history. The birds we love, others we despise. Who are we to be so atrociously fickle? What species does that?

That some people think it “OK” to capture and sell as a pet a \$40,000 parrot, snatched from the wild while eating a chicken sandwich for a dollar or two gives us to wonder about these galling multiples of criminal inconsistency. In thinking about it, we can arrive at few conclusions other than the obvious: it is very human.¹⁰²

Fig. 11.26 “*Gallus gallus* Mother and Chicks, in the Bahamas,” Photo © M. C. Tobias



¹⁰⁰ See http://naturalhistory.si.edu/onehundredyears/featured_objects/martha2.html, Accessed June 16, 2016.

¹⁰¹ “Slaughter of the song birds,” “Songbirds are a culinary delicacy in Cyprus—but catching and eating them is illegal. Even so, the practice is on the rise and could be threatening rare species,” by Shaoni Bhattacharya, January 26, 2016. Nature 529, 452–455, 28 January 2016, doi:10.1038/529452a, <http://www.nature.com/news/slaughter-of-the-song-birds-1.19222>, Accessed June 16, 2016.

¹⁰² “The illegal parrot trade remains a problem in Latin America,” <http://www.birdlife.org/datazone/sowb/casestudy/165>, Accessed April 2, 2016; and “The Real Reason Behind McDonald’s And Burger King’s Chicken Nugget War,” by Ashley Lutz, Business Insider, Jan. 20, 2015, <http://www.businessinsider.com/why-mcdonalds-chicken-nuggets-are-on-sale-2015-1>, Accessed April 2, 2016.

Chicken (*Gallus gallus*) and parrot are alike in almost every respect. They share a legacy with their forbears, the Theropodic dinosaurs blessed with feathers: beta-keratin, vaned and down feathers, after-feathers, hollow shafts, rachis, and quill, and most importantly for parrots, flight feathers on the wing (remiges), and rectrices—a whole other set of flight feathers on the tail.

A Whistling Swan (*Cygnus columbianus*) has more than 25,000 feathers in the cold months, 6000 feathers on an average chicken, estimates of between “10,000” feathers on a Little Blue Penguin to “108,000” on an Emperor Penguin.¹⁰³ The average songbird has some 2250 feathers. And so peculiar and unfortunate is our moral penchant that, despite this love affair such as Dürer has demonstrated on our part, still, some three billion pounds of chicken feathers are dumped in waste bins after the many billions of “broiler chickens” are slaughtered annually just in the USA, probably some 15 billion pounds of discarded chicken feathers worldwide each year.

When one holds a feather, studies it, everything starts to make sense in the world. One good benign place to start is the U.S. Fish and Wildlife Service Forensics Laboratory Online.¹⁰⁴ In the 20 pterygiae (areas of ordered feather cover) in any bird between the Ruby Hummingbird (*Archilochus colubris*) with 940 feathers (the least number outfitting any known bird) and the aforementioned Whistling Swan, parrots are all over the place in terms of feather numbers. The nearly 9 lb New Zealand Kakapo (*Strigops habroptilus*), three times the weight of an adult Hyacinth Macaw—inhabiting its own biological tribe, the Strigopini, which separated some 70 million years ago from the other New Zealand parrot genus, Nestor; both enjoying twice the ancestral timeframe of most neotropical psittacine genera—will rival any eagle in numbers of feathers, even though it is a flightless parrot.¹⁰⁵ At least 11,000 of the Kakapo’s feathers were once used at times by Maori for capes, clearly one of many factors leading to this remarkable species’ near extinction, and numbering today under 130 individuals.¹⁰⁶ Most large raptors are in the 5000–8000 feather range. Parrots, other than the Kakapo and large Macaws, would average more like 2500–4000 feathers.

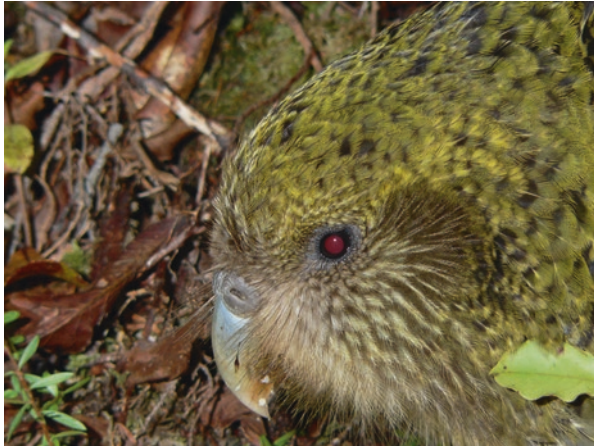
¹⁰³ John Carlson, “Prairie Ice,” <http://prairieice.blogspot.com/2009/01/how-many-feathers-on-penguin.html>, Accessed April 1, 2016.

¹⁰⁴ See http://www.fws.gov/lab/featheratlas/feather.php?Bird=RCPA_tail_adult, Accessed April 1, 2016.

¹⁰⁵ See <http://www.Earthlife.net/birds/feathers.html>, Accessed April 1, 2016.

¹⁰⁶ See “Kakapo Recovery,” <http://kakaporecovery.org.nz/iwi-perspective/>, Accessed July 16, 2016.

Fig. 11.27 “Critically Endangered Kakapo at Night, Whenua Hou, Stewart Island, New Zealand,” Photo © Paul Jansen, Courtesy of “Hotspots” Film Production, Dancing Star Foundation



So what does it matter? Who would bother to count the feathers, and why? The number, the color, the density, the length, the multiple parasites inhabiting the feathers, all serve some aspect of evolutionary communication signals. It is known that in the case of club-winged manakins (*Machaeropterus deliciosus*) of the Tropical Andes—Columbia and Ecuador, primarily—as well as the male African broadbills, each communicates mechanically with their wings, not by way of their syrinx. They sonate, a form of stridulation not unlike that manifested by countless species of arthropods, as in the case of spider “seismic stridulation,” for example.¹⁰⁷ Other bird species, as well, from hummingbirds to barn owls, employ such sonation to speak with one another and with other species. Those of us who care, are quite literally desperate to understand what they are saying and singing. It is our perhaps most profound predilection to want to comprehend these melodious, enigmatic telegrams.¹⁰⁸

Like sonation, stridulation equates with the soul-soothing universal calls of the more than 900 species of true crickets (family Gryllidae) around the world, whose males communicate by furiously scraping their serrated tegmina, or forewings that are filed like leathery combs.¹⁰⁹ In some avifauna, the Grouse, Jungle Fowl, Capercaillie,

¹⁰⁷ See a companion to the textbook **Principles of Animal Communication**, Second Edition by Jack W. Bradbury and Sandra L. Vehrencamp, published by Sinauer Associates, Sunderland, MA, 2011, <http://sites.sinauer.com/animalcommunication2e/chapter12.02.html>, Accessed April 5, 2016; See also, Bostwick, Kimberly S.; Prum, Richard O. (2005), “Courting Bird Sings with Stridulating Wing Feathers,” *Science* 309(5735):736. See also doi: 10.1126/science.1111701, PMID 16051789.

¹⁰⁸ Bostwick, Kimberly S.; Richard O., Prum (2005). “Courting Bird Sings with Stridulating Wing Feathers” (PDF). *Science* 309(5735):736, doi:10.1126/science.1111701. Accessed April 2, 2016.

¹⁰⁹ Chapman, R.F.; Simpson, Stephen J.; Douglas, Angela E. (2013). **The Insects: Structure and Function**. Cambridge University Press. pp. 826–833. ISBN 978-0-521-11389-2.

and Kakapo, their clicks, lek-related booms, howls and other magnificent mating display songs, signals and calls are all conditioned by the size and feather architecture of the wings.¹¹⁰ Still others, like the classic case of the Common Snipe (*Gallinago gallinago*), engage in what has been loosely described as “drumming,” “bleating,” “throbbing,” the art of making a “rattle” and an “eerie fluting.”¹¹¹

Throughout the biosphere anatomical engineering is universally oriented to biosemiotics. Everyone has something important to say and everyone is listening, or listening in. Other organisms are watching. The American cockroach (*Periplaneta americana*) for example, the fastest running insect in North America, sees that which is sending signals to it with compound eyes containing 2000 lenses. A remarkable personage.

And just as cavity nesting birds, for example—like Macaws—are tenants of the trees, *inquilinistic*, utilizing another organism for its home; so to the obligate and facultative ectoparasites, principally mites and the chewing lice of the vast order Phthiraptera, particularly among the *Brueelia spp.*, love feathers and will actually themselves molt three times in the space of a month, thereby reaching maturity, in perfect sync with the growth, shedding and added growth of the macaws they inhabit. This is co-symbiosis not unlike the scores of creatures inhabiting humans and all other mammals. In the beautiful hoopoe (*Upupa epops*) two species of symbiotic bacteria inhabiting its wings combat one another with secretions that succeed in preserving the integrity of the bird’s plumage.¹¹²

Many parasites have preferred host species, and they are most assuredly loyal to them. In the same way, feathers, by way of evolutionary signals, are enriched by various pigments, structural coloring, photonic mechanisms, iridescent effects that have been studied for many centuries all conferring upon the feather a remarkable constellation of attributes. The feather is a globe-trotting emperor of the airways, hosting microscopic worlds-within-worlds; housing reproductive organisms, color and patterned lures for mates, sound innovation, the primary locomotive, ritual mating, and social preening fundamentals upon which the individual and social realities have been performed since the earliest dinosaurs.

The organisms living in the feathers are quasi-inquilinistic, meaning they are phoretic, using the feathers as temporary forms of transport from one bird to another. In essence, for the parasites, the feathers are also forms of communication

¹¹⁰ *ibid.*

¹¹¹ Taylor, L.E., 1925. “Further notes on the flight performance of the snipe.” *Condor* (Cooper Ornithological Society) 27(6):224–226. doi:[10.2307/1363286](https://doi.org/10.2307/1363286). JSTOR 1363286., Moore, Grenville (March 2004). “Oxhill News: Nature Notes,” Accessed April 5, 2016.

¹¹² See Martin-Vivaldi, M; et al. (2009). “Antimicrobial chemicals in hoopoe preen secretions are produced by symbiotic bacteria.” *Proc. R. Soc. B* 277(1678):123–30. doi:[10.1098/rspb.2009.1377](https://doi.org/10.1098/rspb.2009.1377). PMC 2842625. PMID 19812087, Accessed April 2, 2016. For one of the most comprehensive studies on the approximately 2500 species of chewing lice in birds and mammals, see Price, Manning A., and O.H. Graham. 1996. **Chewing and Sucking Lice as Parasites of Mammals and Birds**. U.S. Department of Agriculture, Technical Bulletin No. 1849, 309 pp. <http://naldc.nal.usda.gov/naldc/download.xhtml?id=CAT10838407&content=PDF>, Accessed July 1, 2016.

whereby the parasites meet and greet, eat, grow, travel, learn, and co-evolve in a manner that may be described as symbiotic. At times, literally, they get pissed/pooped off which could mean, in some cases, a louse falling tens-of-thousands of feet through the air.

Central to the life force deriving from feathers is the critical reality of birds allopreening one another, part of courtship rituals, one of the most continuous and loving aspects of an avian lifestyle that maintains the aerodynamic perfection of feathers and wings, while spreading oils from the uropygial gland, or, in the case of parrots, creating a dry powder with the toes and beaks working the unincised base of the feather and thereby spreading other medicinal effects to preserve the wing's health. And it mirrors that of mammals, certainly in the case of all grooming mammals like female Japanese macaques, where the patient picking of lice confers greater sociability and guarantees friendships within the primate community.¹¹³ Birds themselves have extended the role of allopreening to other species. For example, cattle egrets will sit atop zebra and hippos scrubbing the hair of ticks.¹¹⁴

But, of course, it is one thing to have feathers, and another to have a dream to aerially circumnavigate the Earth. Probably the first to do so were two Wandering Albatross (with the exception, perhaps, of transmigrating spores). A bar-tailed godwit (*Limosa lapponica*) has flown 7145 miles from Alaska to New Zealand¹¹⁵ The bar headed goose (*Anser indicus*) has been found to fly over the Himalayas at a height exceeding 21,000 ft.¹¹⁶ but Common Cranes and Rüppell's Vultures can fly much higher, between 33,000 and 37,000 ft respectively. Meanwhile, the four-ounce (113 g) Arctic terns (*Sterna paradisaea*) that nest in Iceland and Greenland typically fly circuitously to the Antarctic and back over a distance of 44,000 miles. "Since the birds often live 30 years or more, the researchers estimate that, over its

¹¹³See "Network centrality and seasonality interact to predict lice load in a social primate," Julie Duboscq, Valeria Romano, Cédric Sueur, & Andrew J.J. MacIntosh, *Scientific Reports* 6, Article number: 22095 (2016), doi:[10.1038/srep22095](https://doi.org/10.1038/srep22095), *Nature Outlook*, <http://www.nature.com/articles/srep22095>, Accessed April 2, 2016.

¹¹⁴See "Cleaning symbioses: proximate and adaptive explanations," Robert Poulin, *Alexander S Grutter—Bioscience*, 1996, Vol. 46, No. 7 (Jul.–Aug., 1996), pp. 512–517, Published by: Oxford University Press on behalf of the American Institute of Biological Sciences, doi:[10.2307/1312929](https://doi.org/10.2307/1312929), Stable URL: <http://www.jstor.org/stable/1312929>, http://www.jstor.org/stable/1312929?seq=1#page_scan_tab_contents, Accessed April 2, 2016.

¹¹⁵"Alaska Bird Makes Longest Nonstop Flight Ever Measured," Dave Hansford, for *National Geographic News*, September 14, 2007, <http://news.nationalgeographic.com/news/2007/09/070913-longest-flight.html>, Accessed April 1, 2016.

¹¹⁶Highest Flying Bird Found; Can Scale Himalaya "The bar-headed goose can reach nearly 21,120 feet, new study shows." By Ker Than, for *National Geographic News*, June 10, 2011, <http://news.nationalgeographic.com/news/2011/06/110610-highest-flying-birds-geese-himalaya-mountains-animals/>, Accessed April 1, 2016.

lifetime, an arctic tern migrates about 1.5 million miles (2.4 million km)—equal to three trips to the moon and back,” writes Mason Inman.¹¹⁷

Ornithological descriptions countenance no end of lavish praise from humans. Perhaps that is because of the Icarus in our hearts; hearts which, like birds have four chambers, two ventricles and two atria, although relative to their size (most pronounced in hummingbirds) avians have larger hearts than we mammals. Their circulatory systems are enriched by a higher red blood cell count proportionate to their size, all the more intriguing given that many of the soarers and migratory birds have pneumatic bones without marrow in the human sense. Indeed, since in humans bone marrow is the location of red blood cell production the question obviously arises for avifauna: how do they manage with such large hearts, but a lesser bone marrow loading? The answer was discovered in 1621 by the Italian professor of surgery and anatomy in Padua, Hieronymus Fabricius: in a bird’s cloaca, and only revealed posthumously in his manuscripts.¹¹⁸ The secret—an “antibody-producing B-lymphocyte lineage” that comprises over “10,000 follicles surrounded by connective tissues.” It is today known as the *bursa of Fabricius*, a secret anatomical epicenter at the heart of the most successful vertebrate evolution in biological annals.¹¹⁹ This internal organ is unique to birds, the secret site of its hematopoiesis, the production of red blood cells.¹²⁰

¹¹⁷“World’s Longest Migration Found—2X Longer Than Thought,” by Mason Inman, for National Geographic News, January 12, 2010, <http://news.nationalgeographic.com/news/2010/01/100111-worlds-longest-migration-arctic-tern-bird/>, Accessed April 1, 2016.

¹¹⁸Adelman HB (1967). **The Embryological Treatises of Hieronymus Fabricius of Aquapendente: The Formation of the Egg and of the Chick (De Formatione Ovi et Pulli), The Formed Fetus (De Formato Foetu)** 1. Ithaca, New York: Cornell University Press. pp. 147–191.

¹¹⁹“Bursa of Fabricius,” Kalle-Pekka Nera, Minna K Kyläniemi, Olli Lassila, Published online: November 2015, doi:10.1002/9780470015902.a0000506.pub4, <http://www.els.net/WileyCDA/ElsArticle/refId-a0000506.html>, Accessed April 1, 2016; See also, Egypt. Poult. Sci. Vol (31) (II): (613–620), “Histological Study On Bursa Of Fabricius Of Quail Birds (*Coturnix coturnix japonica*),” By Hassan S.A. Al-Tememy, Jinan S. Hussien, and Bushra S. Rasool, University of Baghdad, http://www.epsaegypt.com/pdf/2011_september/15-1270.pdf, Accessed April 1, 2016.

¹²⁰Ribatti D, Crivellato E, Vacca A (2006). “The contribution of Bruce Glick to the definition of the role played by the bursa of Fabricius in the development of the B cell lineage.” Clin. Exp. Immunol. 145(1):1–4. doi:10.1111/j.1365-2249.2006.03131.x. PMC 1942006. PMID 16792666. Accessed April 1, 2016.

Fig. 11.28 “Parliament of Birds,” Illustration for Aesop’s *Fables* by Wenceslaus Hollar, 1668, Photo © M. C. Tobias



Between their eyes and their feathers a bird is a genius to behold. Any bird. Which would explain why ornithological painting is almost as historically profuse as any other subject matter on a canvas or through the lens of a camera, perhaps with the exception of landscapes themselves. Certainly one of the most evocative and photo-realistic paintings of a feather by any artist was Albrecht Dürer’s “Left Wing of a Blue Roller” (1512), the *Coracias garrulous*.¹²¹ With continuing depredation of the European roller’s population (estimated at approximately 100,000) this gorgeous bird’s status was upgraded by the IUCN to “Near Threatened” in 2005.¹²²

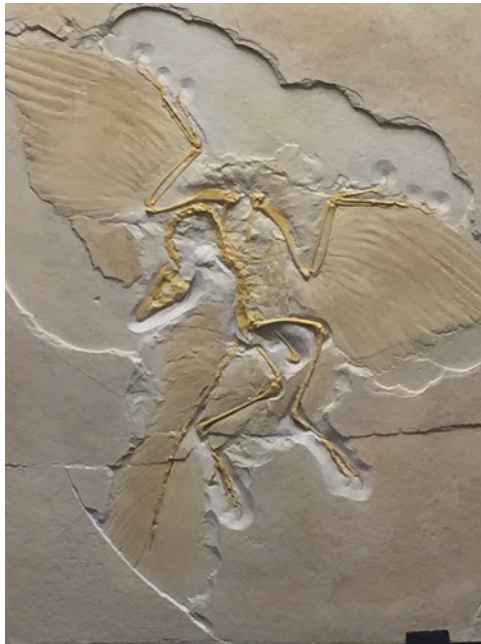
And so it goes. Ecological schizophrenia inherent to our species, the veneration and violence meted out with equal zeal.

¹²¹ Watercolor and gouache on vellum, heightened with white. Overall: 7 11/16 × 7 7/8 inches. Albertina, Vienna. See Dürer in DC: Some Observations on the Great Observer by Thomas Micchelli on April 27, 2013, <http://hyperallergic.com/69690/durer-in-dc-some-observations-on-the-great-observer/>, Accessed April 1, 2016.

¹²² Avian Web, <https://www.beautyofbirds.com/europeanrollers.html>, Accessed April 1, 2016.

One thing is certain: Josie’s feathers and ancestral nerve endings must have experienced everything. As John Noble Wilford describes the dinosaur-to-bird saga, it was Thomas Huxley, first enraptured by an *Archaeopteryx* fossil removed from a quarry of limestone in Bavaria, that suddenly revealed to him a feather; a feather he had not expected to find. And with it, as Huxley described in 1867, “14 anatomical features that occur in birds and reptiles alike, but not in mammals.” It was this evolutionary pathway from reptiles to avians that helped Huxley promote Darwinism.¹²³

Fig. 11.29 “*Archaeopteryx lithographica* Fossil, Jurassic of Germany, Natural History Museum, Georgia College and State University Collection, Photo © M. C. Tobias



Aside from the feathers and other exquisite anatomical equipment that got him to where we were able to meet him, the most readily decipherable portion of his (Josie’s) bio-history commenced with ancestors most recently settled in what we might term “Mexico.” Prior to that, his genetic ancestry for some 9 million years belonged to the neo-tropics. And long before that, given the absence of glaciers in that part specific region of the Amazon, the tropical Andes.

But for all that, we must never fail to pay tribute to the most anatomically brilliant of all accoutrements aiding the non-molting (in some cases, temporarily flight-compromised) parrot’s itinerary, lust-for-life, and unrivaled genius: the flight feathers.

¹²³ ‘Dinosaurs Among Us’ Retraces an Evolutionary Path, By John Noble Wilford, New York Times, MARCH 28, 2016, A review of a new exhibition at the American Museum of Natural History, Accessed April 1, 2016.

Ornithologists, for simplicity sake have dumbed down the anatomy to a series of numbers ... Primary feathers, p1, p2, etc. Moving along to Secondary feathers, then tertials, tectrices, rectrices, and emarginations. The anatomy is easily studied in reference materials. We need not go there. Simply look up to the sky and remind thyself of that miracle of which humans—for all of our machines—are utterly incapable of accomplishing on our own. We lack every aspect of this divine invention: the so-called oars (the remiges), quills and attaching ligaments. While every tetrapod displays a manus (hand) at some measure of distant (distal) displacement, we lack the necessary genius in the machine: the wing, with its vortices, wingtips, ulna and quill nobs. But most fundamentally, our hair is no substitute for feathers.¹²⁴

A Personal Genealogy

We move now to Samuel Gregory's **History of Mexico**¹²⁵ which describes how Montezuma II's (1466–1520) capital, Tenochtitlán, in the area of today's Mexico City, contained "a garden filled with shrubs and plants of every scent, and flowers of every hue; an extensive menagerie of wild beasts, collected from the mountain regions and burning plains of his broad dominions; an aviary, filled with the feathered races of unnumbered variety of note and plume, which abound in the wonderfully varied climate of that country." But this all came to a horrifying end in June 1521 when Hernán Cortés (1485–1547) burned that aviary, a four-story high bamboo, emerald, turquoise/wooden building just across the street from Montezuma's palace. A few of the birds managed to escape, the rest burned to death. Much of the aviary burning is known from a book entitled **Historia verdadera de la conquista de la Nueva España** (1632) written by one of Cortés' soldiers, Bernal Díaz del Castillo. He referred to "Montezuma's zoo," and indicated it was not just the birds, reptiles, living specimens of all the other regional animals, but human dwarfs and those stricken with disabilities that had been confined there and burnt to death. On pages 65 and 66 of his Volume II, Castillo writes of the sheer abundance of multi-colored birds, from Royal Eagles to parrots; ducks, "Quezales" (Quetzal), birds from Cuba, birds of every possible hue, including five colored birds—"green, red, white, yellow and blue." The aviary was called "Chapultepec" from the Aztec, "grasshopper hill." In the early twentieth century a biologist named Alfonso L. Herrera was allowed to re-create Chapultepec with a huge collection of Mexican species who were, we surmise, captured and relocated and one can well imagine the collateral damage, a topic insistent throughout ornithological history, as we will deal with at some depth later on.¹²⁶

¹²⁴ See Muller, Werner; Patone, Giannino (1998) "Air transmissivity of feathers" (PDF), *Journal of Experimental Biology* 201(18):2591–2599, PMID 9716511, <https://www.ncbi.nlm.nih.gov/pubmed/9716511>, Accessed June 16, 2016.

¹²⁵ F. Gleason, Boston, Mass., 1847, p. 11.

¹²⁶ **Encyclopedia of the World's Zoos**, Volume 1, edited by Catharine E. Bell, page 1434, the section titled "Zoológico De Chapultepec," 2001, <https://books.google.com/books?isbn=1579581749>;

While the Aztec King Montezuma did not hesitate, according to Gregory¹²⁷ to consume the human flesh of children, served up with fowls: geese, trogons, quails and partridges, pigeons and eagles, no Aztec was ever allowed to harm the Quezal, although they would not hesitate to extract the Quezal's feathers (or Quetzels, as some called them). It is alleged that Montezuma himself gave Cortés—prior to all the fighting—a royal Aztec headdress of the Quetzal, known as the Penacho, or plume de Montezuma.

Sometime before 1521, Josie's ancestors—at least one male and one female who may well have been in the Chapultepec itself, and survived, or certainly would have heard about the massacre—must have fled central Mexico (and parts of Central America) arriving at length upon the lovely Pacific archipelago known as the Islas Mariás; nine rocks and islands populated by a very humble collective of biological hamlets and solitaires. Lovely tortoises, leisure raptors, happily secretive snakes and unusually feisty crickets among others were there, along with Josie's ancestors.

About 70 miles off the coast of Nayarit, in addition to five very small rocky clusters, each of the Islas María Madre, María Magdalena, María Cleofas, and San Juanito, were “discovered” by rapacious and weary conquistadors in 1526. The fellow leading the charge, one Fernando Cortés de San Buenaventura, was a nephew of Hernán Cortés. He was searching for *paradise* (people still did that) which he had been informed by certain sources was to be found in an Eldorado like no other, a place secretly known as Baja California, populated by “black Amazons,” as described in the sixteenth century novel **Las Sergas de Esplandián**. Its author, Garcí Rodríguez de Montalvo published the work in Seville in 1510, although there is some evidence to suggest it part of a series of books published even prior to 1492.¹²⁸ Early cartographic efforts to find this terrestrial paradise, as it was reckoned, showed it to be an island separated from the mainland of New Spain by some narrow body of water. Legends abounded throughout the sixteenth century about the beasts who could be tamed there; and the “califs” or a singular Queen Calafia, who ruled the island.

Some say the man seeking this Paradise was named not de San Buenaventura but Diego Hurtado de Mendoza, and that he left from Acapulco in June, 1532, arriving at the Magdelenas which were then renamed following a certain mutiny that turned very bad. Mendoza escaped with his few remaining loyal soldiers on a ship named the San Marcos, heading on a course straight towards a place to be called San Diego. He was never heard from again. In 1536, Cortés sent an expedition in search of California (it was actually Cortés' fourth effort to commission his underlings to find this mythical and elusive Garden of Eden), led by one Francisco de Ulloa. Like Mendoza (and de San Buenaventura), de Ulloa vanished from the history books.

See also, A. L. Herrera. *Ornitología mexicana* (México: Impr. de I. Escalante, 1898.

¹²⁷ **History of Mexico**, op.cit., p. 12.

¹²⁸ Putnam, Ruth (1917-12-19). Stephens, Henry Morse; Bolton, Herbert Eugene, eds. Herbert I. Priestley. “California: The Name.” *University of California Publications in History* (University of California Press) 4(4):305, Accessed April 2, 2016.

Fig. 11.30 “Northern Mexico, Between Josie’s Island Home and Southern California,” Photo © M. C. Tobias



It’s possible that a few of Josie’s predecessors took advantage of those ships and shipwrecks, using the floating logs—it happens throughout the world; in the same manner certain nonnative ant species arrived at Rapa Nui (Easter Island), for example; or the Critically Endangered Swift (*Lathamus discolor*) and Orange-Bellied Parrots (*Neophema chrysogaster*) still manage by whatever means to migrate between Australia and Tasmania. In Mexico it is believed that the endangered Thick-Billed Parrots (*Hynchopsitta pachyrhyncha*) largely dependent on the nearly destroyed old growth forests of the Sierra Madre Occidental, may spend part of their winters on the Nayarit coast, a migratory distance of many hundreds of miles, just across from the Magdalenas.¹²⁹ Moreover, research on the genus *Amazon* in Brazil, commencing in 1982, specifically tracking the Red-tailed Amazons, showed that they would leave the mainland every night for large roosts on an island.¹³⁰ It is also

¹²⁹ See All About Birds—“Border Traffic—Conserving Mexico’s Thick-Billed Parrots,” By David Wilcove; illustration by John Schmitt, January 15, 2008, <https://www.allaboutbirds.org/border-traffic-conserving-mexicos-thick-billed-parrots/>, Accessed April 2, 2016.

¹³⁰ Biology, Medicine, and Surgery of South American Wild Animals, edited by Murray E. Fowler, Zalmir S. Cubas, John Wiley & Sons, Sep 25, 2008, p. 149.

known that the Red-Spectacled Amazon, or Pretre's Amazon migrates throughout Brazil and Uruguay.¹³¹

While more than 325 North-American breeding birds migrate south in the winter, no known neo-tropical parrots migrate nonstop distances of great length.¹³² Rather, they are partial, semi-migrators within their continental range, and usually within short distances, maximum, a few 100 miles. Among the non-psittacines, many, if not most species migrations from North America to the South and back again involve up to 20-hour nonstop flights, particularly among the insectivorous songbirds, the warblers, vireos, tanagers, swallows, buntings, and orioles. A "non-stop flight over as much as 650 miles from coastal Louisiana and Mississippi across the Gulf of Mexico and to the Yucatan peninsula," is one of nature's magnificent annual rituals for Ruby-Throated Hummingbirds..¹³³

Given this non-migratory predilection on the part of 99 % of all of the nearly 400 parrot species, one may adduce that Josie's journey would have been a zigzag of uncertainties with no clear motive compelling his journey, other than to escape from the situation that would soon come to devastate bird populations on the Magdalenas. But thus far, the California Bird Records Committee has only weighed in on the Red Crowned Parrot, in terms of full criteria sanction as a fully naturalized avian citizen of southern California. The U.S. Fish and Wildlife has been less stringent in its use of the word "naturalization" for arriving parrots.¹³⁴

Skip ahead a few decades. This is how we (the authors) perceived Josie's Narrative after years of his having joined our family. Realize that this is our interpretation of his story, as intimated/told to us by Josie himself, in his own manner. We acknowledge a vast literary history of such narrative switches, with all of their debatable diegetic-like questions of true origin, content and relevancy, not unlike the differences in real time between metaphor and simile, shorn of the philosophical divide that Rudolf Carnap (1891–1970) invoked in his **Philosophical Foundations of Physics**.¹³⁵ There, Carnap asserted that, unlike scientific, deterministic laws of nature, there are probabilistic laws.¹³⁶ This poses substantial premises that underscore a vast literature of anthrozoological connections and possibilities. For example, David Herman's edited collection¹³⁷ considers such major pillars of transdisciplinary biopoetics and autobiographical trans-species consciousness and

¹³¹ Avian Web, Beauty of Birds.Com, <https://www.beautyofbirds.com/redspectacledamazons.html>, Accessed April 2, 2016.

¹³² "All About Birds—The Basics Of Bird Migration: How, Why, And Where," January 1, 2007, <https://www.allaboutbirds.org/the-basics-how-why-and-where-of-bird-migration/>, Accessed April 2, 2016.

¹³³ See the Oklahoma Department of Wildlife Conservation's site: <http://www.wildlifedepartment.com/wildlifemgmt/species/neotropical.htm>, Accessed April 2, 2016.

¹³⁴ See <http://www.californiabirds.org/>, Accessed April 2, 2016; See <http://10000birds.com/red-crowned-parrots-at-irvine-regional-park-orange-county-california.htm>, Accessed April 2, 2016.

¹³⁵ Edited by Martin Gardner, New York: Basic Books, 1966.

¹³⁶ See Mauro Murzi, <http://www.iep.utm.edu/carnap/> Internet Encyclopedia of Philosophy, ISSN 2161-0002.

¹³⁷ **Creatural Fictions: Human-Animal Relationships in Twentieth- and Twenty-First Century-Literature**, edited by David Herman, Palgrave Macmillan, New York, 2016.

reflection as in the works of Franz Kafka,¹³⁸ Italo Svevo's dogs,¹³⁹ Theodore Ziolkowski's genealogy of "philosopher dogs,"¹⁴⁰ and the breathtaking, posthumously published text of the 10-hour address by Jacques Derrida in 1997 at a conference in C erisy in Normandy, which he called "The Autobiographical Animal" and asked the basic question regarding his own cat, and what his cat saw in Derrida, a naked man looking in the mirror in the morning. That pivotal exchange provided Derrida a platform from which to gaze out over his own body of work, and the whole history of philosophy and of humanity's "dominion over the beasts."¹⁴¹ Emotional telepathy encoded in language/understanding/poetic cues might be the easiest combinatorial approach to understanding Josie's story-telling; Orphic biosemiotics between species and, later on, by means of metempsychosis.

Josie: "The *Islas Mar as* (aka *Magdalenas*) on occasion suffered for lack of rainfall, and young birds, unaccustomed to seeking out subterranean rivulets, were easily taken to depression and/or fantastic journeys. This could lead to radical departures; two birds, young lovers, lifting off with no clear idea in their minds where they were off to, flying in a northerly direction. Sometimes an entire flock might be stricken with these flights of the imagination. Ten at a time, shrieking in delight as they left land for open waters, parrots, mind you, with little experience of the water. Courageous dreams. No flock pressure, as with penguins who have skuas, orcas and leopard seals, principally, to worry about." He'd heard tails from some of the local Mexican gulls about Antarctica which, to Josie's way of thinking, was about as inviting as Mars, which he could view many nights of the year up in those starry countenances above the Pacific.

Josie cont., "Hence, the salvation represented by a floating log, once reality set in and they all owned up to what so much heroics had actually accomplished: an urgency in one form or other, turned round in the whirl of their increasingly desperate quest for fresh water; caught up in the ether, strange winds. Some, regret to say, were so confused they flew west, forever, heading, one presumes towards Micronesia. God only knows. We never heard a word. Many die of heart attacks, as I'm sure you are aware."

¹³⁸ "Franz Kafka and Animals," Peter Stine, *Contemporary Literature*, Vol. 22, No. 1 (Winter, 1981), pp. 58–80, Published by: University of Wisconsin Press, doi:[10.2307/1208222](https://doi.org/10.2307/1208222), Stable URL: <http://www.jstor.org/stable/1208222>, Page Count: 23.

¹³⁹ **I racconti**. Milano: Garzanti, 2004.

¹⁴⁰ See Theodore Ziolkowski, **Varieties of Literary Thematics**, Princeton, NJ: Princeton University Press, 1983—particularly the chapter: "Talking Dogs: The Caninization of Literature."

¹⁴¹ See **The Animal That Therefore I Am**, Jacques Derrida, Edited by Marie-Louise Mallet, Translated by David Wills, ISBN: 9780823227914, Fordham University Press, April 2008: See Publisher's Pr ecis, <http://fordhampress.com/index.php/the-anima-that-therefore-i-am-paperback.html>, Accessed July 7, 2016. Like parrots, dogs continue to illuminate the rich, indeed endless expanse of human consciousness in contact with other species. This has been beautifully demonstrated in an MA Thesis at Harvard entitled, "Narrative Complexity in the Talking-Dog Stories of Cervantes, Hoffmann, Gogol, Bulgakov, and Kafka," by Schneider, Ivan, A.L.M., Harvard University, 2012, 95; 1518403, A Thesis in the Field of Foreign Literature, Language, and Culture for the Degree of Master of Liberal Arts in Extension Studies.

The Fool's Paradise

What we do know for certain is that a few of Josie's kind made it to California. There were already people inhabiting that place, and some of them shot arrows at the parrots, or captured them in nets. Today, at a minimum, 60,000 parrots from Mexico are being killed in the process of illegal wild trade with the USA and other countries. Estimates suggest that as many as "78,500 parrots are captured each year," and the mortality rate during capture and/or transit "exceeds 75 %." Mexico has a known 22 psittacine species. Of those, at least 20 are classified as either threatened, at risk, or under special protection, that's the degree to which country-wide avifauna depredations have fast escalated.¹⁴² As of 2008, the Red List of IUCN showed three of the Mexican parrots as endangered: The "Yellow-headed Parrot *Amazona oratrix* [Josie's species], Red-crowned Parrot (*Amazona viridigenalis*) and Thick-billed Parrot (*Rhynchopsitta pachyrhyncha*)."¹⁴³ But this same report suggests that with respect to the bird trade "an estimated 4–14 % of Mexican wild-captured parrots (up to 9400 birds) are smuggled each year."¹⁴⁴ Based upon the Defenders of Wildlife research, we find this number dated and probably greatly underestimating the degree of the crisis for parrots in Mexico.

In the midst of all this flurry of human aggression, with time, there was active communication, back and forth between escaping Mexican parrots. Psittacines, as has been earlier discussed, have complex, memorized maps in their brains, as do all vertebrates and invertebrates. These are never dulled, each point on the compass magnetically fixed generation after generation, and probably taught in songs between parents and offspring. And as with mammals, there are likely to be translators who are able—by dint of dual geographic location—to know at least a few sentences, ideas, concepts between species and across geographical regions. In this manner certain communiqués passed from avian clan to clan. A general sense of the geographical oases versus hazards became well established in every mind, with points that stood out: a dried-out lake here, and vast groves of the 20 species of California oak trees and oak shrubs, there; especially those oaks 20 years or older, starting to teem with acorns; but particularly those oaks 50 years or older, utterly thick with acorns, at least in certain years, and the parrots knew which ones and how old they were. They would emanate and call out precociously coded messages to each other, and never fail to read those missives marked "Urgent: Acorns."

¹⁴² See https://www.defenders.org/publications/the_illegal_parrot_trade_in_mexico.pdf, From the Executive Summary, p. 7, Accessed May 15, 2016.

¹⁴³ BirdLife International, "State of the World's Birds," <http://www.birdlife.org/datazone/sowb/casestudy/165>, Accessed April 2, 2016.

¹⁴⁴ *ibid.*

Fig. 11.31 “Central Cordillera In Baja, Part of Josie’s Itinerary to ‘El Dorado,’” Photo © M. C. Tobias



For Josie, it was a terribly difficult journey. A marine gulf. A mountain range. Multiple deserts. Low-flying aircraft. Poachers. And then, with time, human lights. Annoying, painful, disorienting. In addition to acoustical madness and resulting migraines.

In the meantime, Josie’s entire chain of islands sold 353 years after the debacle of the Cortés years for just over 3500 human pesos to one Manuel Carpena from the mainland village of San Blas. This man killed bovines in large numbers, then eventually sold his business, forever stained in blood, along with the bloodied islands to Mexico’s Government, which then transformed the Magdalena islands into the setting for Mexico’s most notorious Federal prison, something only humans have ever devised, with the exception of certain insects who also basically imprison some of their enemies (some spiders then going on to cannibalize them).

Josie himself. Well, he was born, most likely on Isla María Madre, rather than the less forested human enclaves of Rehilete, the Bugambilias or Papelillo. But this is speculation. Josie himself was not certain.

Some years ago Mexican officials (long after various jail breaks) turned the islands into nature preserves, and international plans for significant conservation designations have been analyzed. From the perspective of those indigenous birds (principally) whose well-being is said to be under consideration, there is no point belaboring the patience inherent to Josie’s kind, namely, the Yellow-headed amazons, as ornithologists call them: *Amazona ochrocephala oratrix*, with its allegedly three phylogenetic conspecific clades which have actually been described by some researchers as a “taxonomic headache”; taxons all quite endangered.

What is especially ludicrous is that the general literature on *A.o.oratrix* describes what we (the authors) know to be one of the most complex languages we have ever studied/experienced to be composed of the following two sentences, and two only: “*kyaa-aa-aaah* and *krra-aaah-aa-ow*.”

Moreover, it is believed that the three “tresmariae” species, as they’ve come to be known, are down to fewer than 100 individuals, while Yellow-headed parrots in general (the much larger Genus) number less than a couple of 1000 in the wild.

“As far as my few remaining relatives in your jails, your cages,” said Josie, “I simply don’t know. There is no way for me to reach them. I’ve given up.”¹⁴⁵

Somehow, despite this tumultuous past, Josie made it to the legendary Utopia, California, as is now obvious.

The year, we believe, was 1978. A “fool’s paradise,” he called it.

Fig. 11.32 “Josie’s Newfound Sullivan Canyon, Santa Monica, California,” Photo © M. C. Tobias



The first thing that had happened to him was that somebody captured him with a net when he came looking for fresh washer. Josie got away within a few days by eating one of his four toes that had probably been tied down. Either that, or he’d

¹⁴⁵ See BirdLife International [2013]. “*Amazona oratrix*.” IUCN Red List of Threatened Species. Version 2013.2. International Union for Conservation of Nature. See also Monroe, B., JR., & T. Howell. 1966. Geographic variation in Middle American parrots of the *Amazona ochrocephala* complex. Occasional Papers of the Museum of Zoology, no. 34. Louisiana State University, Baton Rouge; as well as Russello, M. A., & Amato, G. (2004). A molecular phylogeny of *Amazona*: implications for Neotropical parrot biogeography, taxonomy, and conservation. *Molecular Phylogenetics and Evolution*. 30(2):421–437.

been shot in the foot with a BB gun. His zygodactyl foot was a mess; inflamed bumblefoot, and every chronic problem known to opposable toes: pododermatitis, hypovitaminosis, hyperkeratosis, and lesions. All in addition to mite infestations on his skin (*Knemidokoptes*), and osteomyelitis. He had it all. Even swarming bacteria within the tendon sheaths, a disease of the blood called bacteremia, which kills most parrots stricken with it, if untreated. But we know Josie. He was indefatigable.¹⁴⁶

Then, by most painful measures, he found himself living under the strange eye of human staff at a place called Busch Gardens on some 17 acres. A year before Josie had arrived in Los Angeles, those gardens had been consecrated to some fanfare as a sanctuary for birds. Some 240 of them were parrots that had been captured by officials (probably U.S. Fish and Wildlife Law Enforcement) at the Mexican border crossing in Tijuana. The conditions of those birds was dreadful, and many did not survive.

It is rumored that at least a 1000, maybe 1200 other birds lived at Busch Gardens in notably well-attended and favorable circumstances (for captive animals). The general literature mentions there were over 180 species there during Josie's incarceration.

Beer was served for free to all the people who came to admire them. Josie on occasion could be easily coaxed into sampling cold beers, if the weather exceeded 90°. The venue had been designed as an amusement park for human consumers (and, by all accounts, to educate people for the best reasons, about the wonder and beauty of birds).

Josie wanted none of it. In December, 1976 when the beer gardens shut down, he managed to escape and probably flew directly towards the Santa Monica Mountains, arriving at length at some intersection near the summit of Mulholland Drive where it meets Sullivan Canyon.

And from that vantage point, he was able to see his beloved Pacific Ocean. We lived nearby. Halfway over the ridge tops he likely stopped to rest adjoining a swimming pool at one of numerous inviting domiciles affording seemingly safe respite. His odyssey took an extremely fortunate turn, at that point. He hobbled up a gravel driveway to the entrance of a forested nearly five-acre wild estate, the home of welcoming humans wherein dwelled a deeply compassionate family including a scarlet, and a blue and gold macaw. All inhabited, according to Josie, a veritable paradise, with outdoor misters, extensive rose gardens, large and diverse native and exotic tree species, a semi-domesticated Gibbon named CooCoo and a very affable raccoon, not to mention one of the authors (Jane) of this book, in a canyon known as Mandeville. The site, a "French village" house in Norman style, was no doubt named after the famed explorer, Sir John Mandeville, author of his own fantastic **Travels** of Sir John Mandeville, published in 1357. Josie was in good company.

Ironically, Mandeville's tales allegedly inspired Christopher Columbus, who, in turn, would provide much of the impetus for conquistadores like Cortés.

This estate included a very large library and Jane had—long before Josie's arrival—devoured, for example, Alfred Newton's and Hans Gadow's famed 1894 **A Dictionary of Birds**. In their Part Three treating of "Parrots," page 691, Newton and Gadow had prophetically written the following: "Considering the abundance of

¹⁴⁶ See "What You Need To Know About Parrot Feet," Margaret A. Wissman, DVM, Bird Channel. Com, <http://www.birdchannel.com/bird-diet-and-health/bird-feet-health.aspx>, Accessed April 2, 2016.

Parrots both as species and individuals, and their wide extent over the globe, it is surprising how little is known of their habits in a wild state ... and seeing how many are oppressed by and yielding to man's occupation of their ancient haunts, the extirpation of some is certain, and will probably be accomplished before several interesting and some disputed points in their economy have been decided. The experience of small islands only foreshadows what will happen in tracts of greater extent ...” Jane was mentally anguished by such prophecies and thus, in addition to her prevailing instincts, was utterly prepared for the miracle of Josie.

One day, long after Josie had become one of Jane's pillars of existence, a terrible hot wind—the Santa Anas, so called—roused a massive wildfire. The sound of fire trucks was everywhere. It would be known as the “\$70 million holocaust.” Hundreds of nests were destroyed and with them, birds who were not as fortunate as Josie, many sucked into the flames, or killed from smoke asphyxiation trying to flee. Approximately 80,000 acres of land, all the way to the ocean, were burned: Agoura, Carbon Canyon, pieces of Malibu, included.

Josie heard and saw other parrots fleeing. Green ones, red crowned, even other Yellow-headed ones, all flocking to the largest standing Sycamores, American sweetgums, some taking up temporary evacuation headquarters in the maples and Norfolk pines, eucalypts and a bewildering variety of palms, most of which could be found in Mexico.

Of course, there is plentiful data insinuating that city birds, or migratory birds arriving in cities quickly learn the ropes, solving food gathering technicalities and also inculcating somehow a stronger immune system for dealing with urban pathogens. Many urban avifauna are thought to be far more tolerant of humans than their rural cousins, as in the case of bullfinches. Some of this is attributed to what is believed to be “learned behaviors.”¹⁴⁷ But, as with most avian research, there are always seemingly conflicting data, at least for certain species. Swedish Great tits (*Parus major*) seem to fare far better growing up, and descending from parents who also lived outside of human cities. In fact, the specific research into this problem suggests that “urban great tits have shorter telomeres than others of their own species living in rural areas.” Telomeres protect the ends of chromosomes from premature deterioration in birds, humans, and most over vertebrates. Cities engender “stress that the urban great tits are experiencing” and this “is what results in shorter telomeres and thereby increases their risk of dying young,” according to biologist Pablo Salmón, an Evolutionary Ecologist on the Faculty of Science at Lund University in Sweden.¹⁴⁸

¹⁴⁷ See “City Birds Are Better Problem-Solvers,” by Sarah DeWeerd, Conservation Magazine, April 26, 2016, Source Audel. J-N et al. “The town bird and the country bird: problem solving and immunocompetence vary with urbanization.” Behavioral Ecology doi:10.1093/beheco/ary201, Accessed April 27, 2016.

¹⁴⁸ P. Salmón, J. F. Nilsson, A. Nord, S. Bensch, C. Isaksson. Urban environment shortens telomere length in nestling great tits, *Parus major*. Royal Society Journal, *Biology Letters*, 2016; 12(6):20160155 doi:10.1098/rsbl.2016.0155, Lund University. “Urban bird species risk dying prematurely due to stress.” ScienceDaily. ScienceDaily, 20 June 2016. www.sciencedaily.com/releases/2016/06/160620112028.htm; Story in Conservation Magazine, “Urban Birds May Age Fast, Die Young, June 28, 2016,” by Sarah DeWeerd, June 20, 2016, <http://conservationmagazine.org/2016/06/urban-birds-may-age-fast-die-young/>, Accessed July 1, 2016.

Josie's family, Jane and Mac and the others, also moved on, in due course, to a house a few miles away, just blocks above the Pacific; a cottage dominated by a Chinese Elm (*Ulmus parvifolia*) also known as a lacebark, a marvelous tall tree, over seven stories, its edible parts highly nutritious (34.4 % protein).¹⁴⁹—one of those the Japanese love to torture and compress from birth into 2-ft high bonsai trees.

Fig. 11.33 “From Left to Right, Mac, Jane, Stanley and Josie Beneath a Lemmon Tree,” Photo © M. C. Tobias & Feather



Once settled in, Josie climbed to its apex without hesitation. From there, he presented a lengthy 2-day discourse (interrupted only by the onset of darkness) to other birds, insects, spiders, and Santa Monica's botanical kingdom in general along the Pacific. He loved being up atop that elm and apparently received high marks for his sermons, for not 24 hours later, a large Peregrine falcon arrived on a limb just below the perch from where we had managed to coax Josie back down and into his music room, open on all sides with floor-to-ceiling windows and full length mirrors, looking out over Balinese-like gardens and the Pacific, as well as the outflow of Rustic Canyon.

The family grew in size and included other members of the Aves Class: in addition to Mac (a massive Scarlet Macaw who had also come from Mandeville Canyon, the previous domicile), Feather (a cherry-headed polymath of a Conure) and Stanley (a shy Amazon with whom Josie by fits and starts fell quite madly in love). At one point, two Malaysian Minas from a passerine family that went by the name of *Sturnidae* joined in.

Our street should have been called the Rue de la Ménagerie, like the ones in Strasbourg and Quebec given the enormous diversity of birds showing up daily, including plenty of Acorn Woodpeckers, the many species of hummingbird, countless titmice, Song Sparrows, California towhees and spotted towhees, and then one strange Autumn afternoon, an emerald-colored Lesser Necklaced Laughing-thrush, *Garrulax monileger*, from Cambodia's threatened forests. This latter most exotic and linguistically adept Winnie stayed for about a month—Josie, all of us, were in awe—then disappeared on Thanksgiving day. He was the size of a Gentoo Penguin. Winnie's sudden

¹⁴⁹ See http://plants.usda.gov/plantguide/pdf/pg_ulpa.pdf, Accessed April 2, 2016.

disappearance left a vast gap in our hearts. Josie explained what that was all about, but all of our human cognition was left dangling. He was better at acceptance than we are.

Meanwhile, Josie loved to examine images by Jacques Barraband and Francois Levaillant, their famed book, of course, *Histoire Naturelle Des Perroquets*, with its Lilacine and turquoise-fronts; blue-cheeked and yellow-lored; Amazons from Jamaica and Puerto Rico, Cuba and Hispaniola. Even a Tucuman, Kawall, Mealy, and St. Lucian. An imperial and a vinaceous-breasted. The list of mealies, and endlessly arrayed colorful amazons that defied human or avian description, from all over the Caribbean, including—Josie indicated—an old friend he recognized (or relative) from Martinique. And of course, cousins with white fronts and orange wings; a girlfriend, once, who sported an outrageous yellow nape, her brother a red brow, their first cousins both spectacled and crowned. From Panama and Honduras, Guadeloupe and Josie's own Tres Marias. Josie would stare wide-eyed at the reproductions of all these marvelous relatives and utter memories lodged linguistically between a whisper and nostalgic sighs. Parrots love human books. The very largest of them are also suitable for nesting materials, even nests themselves. The OED, for example.

We talked with Josie about “genes” and how they moved in the manner of creeks and tributaries. And concepts, like clade, interbreeding, conspecificity, and phylogenetics. Josie basically had access to everything we—his two human friends—could only muster by way of crude bird-science speculation on such topics as DNA and monotypes, of which Josie was considered to be one.

Explained Josie, one day, “If your tail feather does one thing or another thing. If your bill is one color or another, as a kid, or an adult. By the way, bills and beaks are synonyms.” “It all adds up in this language of DNA, or so they—you humans—say.”

That would have been Josie's manner of assimilating the new onslaught of typically peculiar words, phrases and concepts. We granted him, and ourselves, every possibility when it came to communicating human-related concepts. Josie was not only patient but, clearly, lending commentary in a manner it took us years to translate.

Of some perplexity to Josie was the issue of magnas and the Sula Valley. So many details to remember.

He began, one morning, the sun gently obscured by a cool, fresh incoming marine haze, “The whole *Weltanschauung* that is meant by human science to encompass we *tresmariae* citizenry,” he would complain, frustrated. Josie simply refused to comment on much of it because it was such human-specific arrogance that prompted this level of intrusiveness into private matters; not to mention the noise accompanying human speech and speculation aloud.

By now the reader will appreciate that we (the authors) are merging Josie's narrative, as can be deduced from human sources and anecdotes, regional and local histories, with our own imputations, which is to say, our decidedly pained attributions of thought and speech as he would articulate it. We acknowledge that all of this by now has turned into something of a leap of faith. Again, we would argue that the spirit trails of all those versions of transmigration, not merely upon death, as in the case of his many family members, we were to interpolate, but long prior to those family tragedies, involved a level of heady philosophy encompassing living creatures, as well as the shared neural infrastructure that empowers something practical about interspecies bonding: a form of communication more powerful than evolution.

We had become a family after a few years of both in human and parrot time.

Fig. 11.34 “Josie’s Canyon Abutting Santa Monica and the Pacific, Where He Lived His Last 25 Years,” © M. C. Tobias



That is at the core: biosemiospherics that take the next great leap in giving us the emotional and cognitive tools to grasp what has been going on forever behind us in time, all around us geographically, and in our bodies. In other words, everywhere throughout the biosphere. Our ecological altruism had been superseded by a far greater and necessary purity: we took every meal together, slept together, played, conversed, listened to Bach and Mozart and toured the Old Masters together. Much of our time was outdoors. But he also loved wooden antiques (for mastication) and became obsessed with oddities like plastic pens and paper clips and wads of newspaper (usually the New York and Los Angeles Times, but he also loved the tensile strength and coating of the paper stock used in *The Economist* and *New York Review of Books*). We always made sure that an article about Republicans, preferably with their photograph was positioned strategically on the facing newspaper directly beneath his perch, when the call of nature demanded of him a certain positioning that could be read minutes in advance. He would let us know.

By all these easily cued realizations, a methodology of communiqués evolved between us and Josie. An approach we hope to merge: personal family history with the Other Minds problem. Our loved one, Josie, with whom—in the intimate proximities day and night—we would spend over 30 years. What we are therefore conveying is no mystery to us though it may well be to some. This is, of course, the underlying impulse to anthropomorphize. But it is also a case in point that we lived, so to speak, with Bambi and feel a certain proprietary sobriety in disclosing both

biological details, but also our emotional responses in a language that does not stint, but, rather, provides generously for the intermingling of words and attributions as if it were (and it is) Josie's own Narrative. We do this with the best of intentions, to push the envelope, as we say, towards acceptance of a hybrid poly-conceptualization of what everyone who has ever been in love with a companion, a member of the family who happens to be Other than human, can easily appreciate; as well as the profound difficulties we all encounter in conveying—should we even bother to attempt it—the profoundly private details of life and all her ecstatic nuances to others. Love. Grace. Patience. Puzzles. Metaphysics. The ultimate phantasm that is true bonding between species. Their composite requisite: communication by any means, at any level, without any tethers to logic or illogic.

It is one thing to show off lovely pictures of our children and grandchildren. But quite another to soberly depict life with a bird in a manner likely to persuade. Like “Old Blue” of Rangatira, among New Zealand's far-flung Chatham Islands, the last living female robin of her species who would, in collaboration with humans endeavor to save her kind,¹⁵⁰ we can say with absolute authority that Josie was also assaying to preserve everything about her species; to open a window for humanity on what had to occur if we were—all of us—to get along in the twenty-first century. It should also be pointed out that among Maori, rangatira refers to humans of great practical wisdom. But clearly Old Blue was of an equal stature.

Josie's Final Narrative

So now permit us to completely move forward in Josie's own Narrative, as we have endeavored both to elucidate its genealogy and the impulse to give ourselves entirely over to it, without the normal fear of being discounted as merely sentimental or silly. These are not outrageous claims, but humble confessions of a much enlightened parrots. And we embrace the late Albert Schweitzer's credo that sentimentality with regard to other species is one of humanity's most profound callings, or words to that effect.

So we put ourselves in his mind, taking into account what little information we had gathered as to his biological coordination in terms of the Amazonian topography out of which his kind is said to have emerged.

Not in his vocables, per se; but, rather, what we could read in his eyes, preening behavior, response and response time to other psittacines in the neighborhood (a tiny percentage of the global estimates which, as of 2008 suggest 393 species and 92 genera).¹⁵¹

Could Josie have known about pine forests in Belize or northern Chiapas? Forests of Guatemala, Tabasco or Nuevo Leon? He'd certainly heard of Antarctica, as

¹⁵⁰ See http://blackrobin.info/index.php?option=com_content&view=article&id=105:the-black-robin-story&catid=7, Accessed June 16, 2016.

¹⁵¹ “Zoological Nomenclature Resource: Psittaciformes [Version 9.013]”; <http://www.zoonomen.net/avtax/psit.html> zoonomen.net. 2008-12-29, Accessed March 9, 2016.

mentioned. Did his sight of downtown Los Angeles in any manner translate into fear? But he would have had more than enough sorrow to grasp the pet trade, poachers, and the fact of nets and cages. He would have counted the ways, and understood the illusions of his friends who died while fleeing human invasions in their homelands. He clearly meditated more than a few times on the nature of death, the loss of loved ones. Had Josie ever encountered Brazil nuts (*Bertholletia excelsa*) with their many comfort components like dietary fiber, sodium, and potassium? Probably not directly as these were properties of an Amazonian nut and Josie's itinerary suggests that millions of years of evolution had separated him from the unsaturated oleic fatty acids and B9 consumed by more southerly psittacines, those in the heart of the nine-nation, 2 million square mile Amazon proper.¹⁵²

A cursory survey of the origins of the word, Amazon, suggests that it originated sometime during the renaissance of the Guarani people who worshiped Mainimbi, a hummingbird, as well as a Pombero or spirit named Cuarahú Yara who spoke like a bird that had a whistle to take care that any jaguar or snake be called out before it could attack.

The Spanish explorer Vicente Yáñez Pinzón claimed to have discovered the Amazon in 1499.¹⁵³ In fact, what he found (and named the Río Santa María de la Mar Dulce, or the River of Saint Mary of the Sweet Sea) was actually the estuary opening 7 miles wide onto the Atlantic. From the time of that discovery, human science has come to recognize some 223 known neo-tropical terrestrial ecoregions such as the Bolivian Yungas or Chocó-Darién moist forests; the Iquitos varzea or Magdalena Valley montane forests; all of Mato Grosso and the Rio Negro campinara; the rocky tepuis and Venezuelan Andes montane forests; the Ecuadorian dry forests and Hispaniolan pine forests. Of course, geographers continue to debate boundaries and ever-more-refined definitions of what actually constitutes the fast shrinking Amazon. It is a discouraging picture, to be sure.¹⁵⁴

And, of course, the Tres Marias Archipelago, where we know Josie was likely born, "or so my parents always told me," he indicated, was far removed from the coordinates of the Amazon, other than by those wondrously multitudinous ways in which birds of all neo-tropical species are able to transmit acoustical and psychic messages along aerodynamic trails that humans have absolutely no access to.

¹⁵² "Nutrition facts for Brazil nuts, dried, unblanched, 100 g serving." nutritiondata.com. Conde Nast; US Department of Agriculture National Nutrient Database, version SR-21. 2014. Accessed April 3, 2016.

¹⁵³ Morison, Samuel, *The European Discovery of America: The Southern Voyages, 1492–1616*. New York: Oxford University Press, 1974.

¹⁵⁴ "Key Neotropical ecoregions for conservation of terrestrial vertebrates," by Rafael D. Loyola, Umberto Kubota, Gustavo A.B. da Fonseca, Thomas M. Lewinsoh, Published 6 January 2009, © Springer Science + Business Media B.V. 2009, *Biodivers Conserv* (2009) 18:2017–2031; <http://link.springer.com/article/10.1007%2Fs10531-008-9570-6#page-2>, Accessed April 3, 2016. See also, *The Encyclopedia of Earth*, "Neotropical humid forests ecoregion," Published: October 15, 2008, Updated: September 11, 2011, 8:57 pm. Author: Commission for Environmental Cooperation, Contributing Author: C Michael Hogan, Topic Editor: Mark McGinley, <http://www.eoEarth.org/view/article/156715/>, Accessed April 3, 2016.

Josie, cont: “So the Amazon, that 3-million-year-old exchange across the skinny Isthmus of Panama, made for all these unique birds, geckos, New World Coral snakes and so forth. All kinds of fabulous beings, some of whom I was not crazy about, including some big cats and snakes, and annoying insects that could bring about the death of birds like me, whenever they took a fancy to migrating north and sometimes causing great commotion, both by their own confusion, but also by the unfortunate wrath meted out, at times, by sudden strangers in strange lands.”

Josie, cont: “In addition, all of us on the Tres Marias had heard alarming rumors of millions of human newcomers not far away called Indians who spoke about 1500 different languages, we are certain of that. And who have only been in the neotropics for, I don’t know, maybe ten or twenty or thirty thousand years. I never actually witnessed violence but it was indeed alleged that some of those Indians also used to kill us, or worship us, or use us. One of those three categories, as a rule. We never trusted them. However much you may be inclined, in this human politically-correct era to romanticize indigenous peoples. Trust me, they killed us all the same.” And to kill a bird you also have to kill the symbol of a bird; destroy a cloud, tarnish the truths of the Earth’s bountiful migratory paths, infect the very notion of colorful feathers and of flight, of wind, and the poetry of wind, with hostility and what I have heard described, by friends and family, as human psychosis. Like aiming a poison dart into the essence of Vaughan Williams’ quintessential “Lark Ascending.” Who among you would conceive of such a thing?”

Josie cont: “A few million years ago, we were, by your genetic standards, well over 1000 species and 109 families. Indeed, if you really go to the heart of what a family means, we were more like 100,000 families, from the Amazon to Australia to New Zealand. Never been to any of the three. Nope, I come from the Tres Marias., as you by now understand. But because we parrots keep such strong family ties, cousins, second, third, fourth cousins, and more distant relatives, superfamilies, the word spreads round. From cavity to cavity; clay lick to clay lick. Cage to cage. Thanks to humans, and occasional other predators, we have long endured exponential trauma. We have burial rituals in the sky; and whole philosophies devoted to life after death. But you have your own science and spirituality, and mingling all these ideas might only confuse some of the more urgent basics we need to clear up, between birds and humans, if we’re all to survive. We all know as of now it’s not looking too good.”

The Futility of Comparisons

Josie: “Throughout my varied flight patterns, over a life now verging on one hundred of your years, I have heard it uttered by many learned people that we parrots display a greater linguistic range than any known bird-type. Indeed, it is further alleged that we can wield more verb tenses, flamboyant adjectives, and past perfect syllogisms beyond that of any known species. Frankly, this is a bit overstated, as I have heard described about certain circumspect viruses who are, themselves, abundantly well-spoken. Sharks bark of course. I’ve heard them. But insects and spiders, why, they often will go years without so much as a hiss or yawn. They keep their

counsel. Whereas there are known to be certain sloths and anacondas who think all the time, but remain silent. My own ancestors were good friends with the really big sloths” “Megatheriums?” we ask.

Josie: “Mega being the operative word. But, frankly, nobody in all the neo-tropics - from what I always heard from my grandparents, parents, uncles and aunts - is quite as garrulous and linguistically driven as the army ants and Black Howler Monkeys. Squirrel monkeys, with their adamant squeaks, may also claim victory in the realm of ‘Greatest Gossip.’ Whereas parrots, with the arrival of human (mostly male) hunters, drove us quite quickly to conspiratorial silence, if you know what I mean.”

Fig. 11.35 “Squirrel Monkey, *Saimiri sciureus* group, Northern Amazon,” Photo © M. C. Tobias



Josie, cont: “But there is a clear difference with we parrots. We speak our minds but hold our tongues. That our concision breaks company with dullards is clear at a glance. Parrots suffer no fools, and those slow to articulate push the limits of our patience. We are high metabolism spirits of the forest and take to nothing sluggish. I’ve always wondered about snails, potato bugs, lizards that sleep most of the day. And plants in general.”

Josie, cont: “I once heard about a mealy parrot who spent her 90 years inside an arboretum somewhere in England without ever saying a word. What was there to say? Render a forlorn commentary on her captivity? When her captors, who claimed to love her as a family member, not once took her for a ride in their Aston Martin? Do you have any idea what a joy it would be to ride in a convertible at high speed on an open country road?”

Josie, cont: “Not to mention all the love affairs, songs and visions, expeditions, fly by nights, fly by days, traumas, shocks to the system in every sense, hopes, dashed desires, signals, mixed messages, exhaustions and liberations, captures and escapes, horrors and alleviations, traps and freedom, horizons, and nothingness. That is how your kind has seen fit to summarize my utter Being, my labors, poems, passions and obsessions; my achievements, pyramids, oceans crossed and continents traversed; my clan’s utmost desires for their parents and their children; for their wives and husbands. By association, all of the other life histories whose paths I have crossed, or befriended. By no choice of our own, our resignations and frustrations; decapitations and cannibalisms; torments, mountains and waterfalls to die for, loves of my life, loves lost, the burden of not millennia but hundreds of thousands of centuries and all concentrated in

this piercing pellucid pure and precise brain that I have inherited, cultivated and preened into its current form, that sees everything. Absolutely everything.”

Josie, cont: “Whereas you are content with what, I now know you call, a ‘link’. I saw you looking at that website the other day, ‘http://californiaparrotproject.org/id_guide.html, The California Parrot Project’ with its enumeration of those of us whose species and populations have been, so called, “naturalized” here in your make believe Utopia. Oh, the noises of your world! Acoustical blemishes that destroy our fragile inner ears. Thirteen of my near conspecifics, says the website, near enough that I count them as close intimates; a community in the greater Los Angeles avian ghetto, in the following order: Red-crowned parrot, Lilac-crowned parrot, Red-lored parrot, Blue-fronted parrot, Yellow-headed, white-fronted, Mitred, Red-crowned and Blue-crowned and Black-hooded, Yellow-chevroned, White-winged and Rose-winged parakeets. The first six, of course, you name Genus *Amazonas*. The next three, Genus *Aratinga*, then the Black-hooded Genus *Nandayus*, species *Nenday*, the next two Genus *Brotogeris*, and the last Rose-winged, Genus *Psittacula*, species *Krameri*. In fact, just to set the record straight, your 13 assumed migrants to paradise are: ‘*Amazona viridigenalis*, *Amazona finschi*, *Amazona autumnalis*, *Amazona aestiva*, [yours truly], *Amazona oratrix*, *Amazona albifrons*, *Aratinga mitrata*, *Aratinga erythrogenys*, *Aratinga acuticaudata*, [as mentioned], *Nandayus nenday*, *Brotogeris chiriri*, *Brotogeris versicolurus*, [and, once again], *Psittacula krameri*.’ Now here is a question for you. You people made computers, databases, photography, science, ethics, philosophy, history, ethnography, and so on. Here is what your data base from that website says about me, and I paraphrase the link’s entire descriptive sequence: ‘We are, as of 1994, no more than 7000’ individuals of ‘three subpopulations in Mexico: the race *magna* in Tamaulipas, San Luis Potosí, Veracruz, Chiapas, Tabasco and Campeche; the nominate race from Jalisco to Oaxaca; and the race *tresmariae* on the Islas Mariás ... There are conflicting reports that *tresmariae* is stable and under considerable threat.’”

Josie, cont: “So how does that work? ‘Stable’ and at the same time ‘under considerable threat’?”

Josie, cont: “We are said to inhabit basically everything we can, including dry lands, but also humid ones; big trees, little thorny shrubs (not on your life, thank you very much). Those of us in Belize apparently favor ‘forest patches.’ In other words, someone sees one or a few of us struggling through ‘savannas,’ ‘semi-arid terrains,’ ‘coastal scrub and mangroves’ and figures that ‘favor’ is the appropriate verb, even though it is also declared we like ‘tall deciduous forest and humid riverine woodland.’”

Josie, cont: “We are assumed by your experts to be of the category, ‘Endangered’ on the IUCN Red List of Threatened Species, CITES Appendix 1, which is the second most serious level of jeopardy to be in, other than ‘Extinct in the Wild.’ This assessment from both the ICUN and BirdLife International recognizes that in just one decade our numbers were believed to have plummeted by a startling ‘68 %.’ That certainly got my blood rushing.”

Josie, cont: “At an inferred ‘average [parrot’s] length’ of ‘15 in’ your experts, going on and on about our anatomy and behaviors, have expatiated with exasperating, pretended omniscience that which they think makes us who we are, give us our birthright and biological heritage, focusing—not on our well-known (among birds) commentaries on singular topics, be they the best height north of Mexico City in which to build

a nest, those clay licks most apt to foster impunity from poachers and help those of us without a mate, or to find one. Nor is there any attention paid to our long history of waxing poetically, discussing high in the canopies all of the great questions of the world, and of ancient history, what you do in the best Irish Pubs. Instead, your bird enthusiasts have clung to the most boring of elaborations: our color combos from our feet to our primaries, secondaries and wing tips. You've for some reason found it of interest to go and on about how dark our iris is during adolescence, to substantiate the color of our eye rings, beak and crown, pretending to be color swatch experts, when, in fact, you'd do better selling Victorian pastels and watercolors at auction in London. And of course, all the rage for Senegal parrots and how well they can see.¹⁵⁵

Josie, cont: "Yes, it's true, a parrot's eyesight is excellent, that is until it goes."

Josie, cont: "And then all that nonsense about four zygodactyl toes, two to the front, two to the rear. You remember what happened to my toes, two of them, in any case. And you go on and on about our maxilla, or beak and the means by which it is attached to our brains (though no mention of our minds that I have ever seen); our monomorphic visages, obscuring—to human eyes—the differences between us boys and girls; our digestion processes, involving the consumption and breakdown of food, an action carried out by different body parts in symphonic harmony, as a rule, commencing with our proventriculus, then on to the ventriculus, the intestines and finally whoopa!—into the great outdoors through our, well, I won't mention the name if you don't mind. Except to say you call it the cloaca. As children we were raised in a household where it was never mentioned."

Josie, cont: "As far as the number '7000' applying to the three subpopulations, I don't know where these so-called experts are getting their multiplication tables from. Frankly, it is wishful thinking. I get vibrations now and then (what you might term emails) from relatives in Mexico, Guatemala, Honduras, Panama, and elsewhere. None are particularly sure, but my great grandmother intimated, back in the 1970s, that we numbered fewer than 60. A pen pal in Manaus who keeps in touch with all of the avian chiefs throughout the Amazon, informed me a few years ago through the Great Parrot Underground, that 97 % of our entire neo-tropical superfamily was besieged and very few would make it. They suggested that the southern central portions of Suriname offered us the best chances of survival. But such a journey could prove epic in its rigors." As you know, I made a bee-line to El Dorado, here, in California. It was a circuitous odyssey that took me to the Baja interior, then, confusedly across Mexico into the luscious Sierra Madre Oriental - where I almost remained; then due northwest, backtracking, through Texas and on up to California. Little did I know, upon arrival, I would be captured by your kind. My daily depressions drove me to drink, what with beer in abundance. Finally, my day of true liberation arrived."

¹⁵⁵ See <http://www.greyforums.net/forums/showthread.php?192762-Parrot-Vision>, Accessed April 2, 2016.

The Crisis of One Plus One

Josie, cont: “The root of the dilemma is biosemiotics, as you well know; of birds and your ungainly species co-habiting the same planet. I’ve read up on the problem and deduced its cornerstones which I shall try herewith to lay out for you. Be patient, you will be undermined and I realize that cannot be an easy experience to grapple with.”

Josie, cont: “Every object of sentience is unique. No human language says it better than ancient Hungarian, which designates this quality as ‘szívszorítóan gyönyörű.’”

We conferred with a colleague working with the Club of Budapest, Nora. She translated it as: “heartbreakingly beautiful.”

Josie, cont: “Your Max Planck is worth mentioning for many reasons we understood in childhood, but it took humanity ages to catch up with the basics of quantum mechanics, and—more importantly—quantum biology. In terms of adding up things, like birds, or nuts, Planck was unwilling to commit himself, and rightly so. It is clear, for example, from the recent excavations at Quarry Creek in Carlsbad, California, circa 50,000 BC that the 10-ton Columbia Mammoth was still very much with us, along with the 2-ton Giant or Antique Bison (as yet to be determined). Bird remains were scattered among these vertebrate giants, as they were at the Doushantuo formation, 632 million years ago, in China. This was at the beginning of what you term the Ediacaran, a full 90 million years prior to the cliché Big Bang of biodiversity, as you name the Cambrian period. Anomalies, from places like the Burgess shale in Canada, cast doubts on the singularity of this time-frame but it is clear from the fossil record that somewhere lingering beneath the biological cascades were all sorts of sleeper species with three germ layers—endo, ecto and mesothermal liners or, if you will, biotic components which gives to their kind a triploblastic *raison d’être* of nomenclature in which they have symmetry, mouths, anuses, and a view looking forward, not just past.”

All of this suggests the emergence, eventually, of birds who are the very best at moving forward of any creatures on the planet. If, as Ediacaran theorists hold, this was a pre-Cambrian blockbuster—the most important arousal of morphological changes in a billion years—then birds must go back to that timeframe, not merely 150 million, or 163 million, but perhaps over 600 million years back. Declared Josie, “All of this would appear especially true in terms of our perching and cavity nesting, given the recent findings published in *Nature* in early September 2015 by Thomas Crowther and colleagues, that ‘42.8 % of the trees on our planet (1.39 trillion) are located in tropical and subtropical forests.’¹⁵⁶ Swartpunt Farm in southern Namibia. That’s the key, according to your species’ recent findings.”¹⁵⁷

Josie realized that we were at a loss, the two of us, before his cascade of received mammalian cognition; websites, data, etc.

¹⁵⁶ “Just how many trees are there?” by Debra Netburn, *Los Angeles Times*, Saturday, September 5, 2015, p. B2, Accessed September 8, 2015.

¹⁵⁷ Simon A. F. Darroch, Erik A. Sperling, Thomas H. Boag, Rachel A. Racicot, Sara J. Mason, Alex S. Morgan, Sarah Tweedt, Paul Myrow, David T. Johnston, Douglas H. Erwin, Marc Laflamme. “Biotic replacement and mass extinction of the Ediacara biota.” *Proc. R. Soc. B*, 2015, doi:10.1098/rspb.2015.1003, Accessed September 30, 2015.

“Key to what? you are no doubt wondering. To a true vision of paradise, an Ediacaran renaissance—herbivores one and all who sat clinging to dreams throughout their lives, inflicting no harm. Evidence from the southern Pacific to the Boreal Forests. Swartpunt was near the end of this luscious ‘Garden of Ediacara,’ ‘545 million years ago,’ say your scientists.”

Fig. 11.36 “Josie,” Original Oil Painting by Astrid Preston, Private Collection, Photo © M.C. Tobias



“And then, as least for parrots like me, B-Day, April/May, 1955.”

“What is ‘B-Day’” we ask him.

And Josie launches fluently into it: “As you well know, Prime Minister Winston Churchill, speaking of the coming Operation Overlord, of D-Day and H-Hour, had said in 1943 that ‘In wartime, truth is so precious that she should always be attended by a bodyguard of lies.’ In Spanish and Portuguese, of course, Día D, hora H are the equivalent military usages of the day of days, and hour of hours. And while we all had become familiar enough with those two prestigious languages—the former from Cervantes’ **Don Quixote**, the latter Luis De Camoëns’ **The Lusiad** (‘Behold, O king, how many a shore we try’d!/How many a fierce barbarian’s rage defy’s!/Yet still in vain for India’s shore we try,/The long-fought shores our anxious search defy. Beneath new heavens, where not a star we knew/Through changing climes, where poison’d air we drew;/Wandering new seas, in ggulfs unknown, forlorn ...’¹⁵⁸ we did not see any of it coming, and hence have subsequently remembered those two

¹⁵⁸ Translated from Book V, Volume 2, page 79, by William Julius Mickle, The Third Edition, London, 1798 Printed For T. Cadell Jun. and W. Davies in the Strand.

terrible months as B-Day, the day the birds of the Tres Marias were all but finished. And no India in sight.”

“It was little different than the invasion of Normandy, your hateful fateful day in April, 1955. For nearly a century there had been human interlopers, a day here, a few hours there. In one case in the late 1880s, over 400 birds were killed. But the Spring 1955 invasion was different, as the report would indicate when published 2 years later by a certain scientist.” Josie referred to the author simply as “the scientist.”¹⁵⁹ “Our last hopes for any peace of mind were dashed by that exposure, promulgated with the best of intentions, no doubt, no doubt, but, like all of your other science concerning birds, this could only add insult to injury, leading to our inevitable decline and disassociation from our ancient, weathered home.”

And Josie continued, “To summarize the scientist’s preoccupation, he seems to have loved the islands, loved its avian inhabitants, and endeavored to do right by us.”

“Not all ornithologists are ill-intending,” we suggested.

Josie, cont: “Yes, yes. Of course. But like all those others this chap mentions in his introductory remarks, from Andrew Jackson Grayson in 1865 to Alfonse Forrer in 1881 to Edward William Nelson (**Natural History of the Tres Marias Islands, Mexico**, 1899), Professor C. L. Herrick and his son Harry Herrick, as well as Dr. T. S. Maltby from New Mexico in 1898; all of this human information added up to what? An insatiable appetite for more and still more information. All of you are addicts for information, as if that is going to solve the problem. Information inevitably leads to conflict.”

Josie was quite the philosopher, as you’ve no doubt by now realized; and on that day took great strides to nimbly dissect our Theory of Reciprocity Potential we had earlier mentioned to him. His incisive comments can be summarized in the following iteration:

“Your theorem of Reciprocity Potential pivots upon the direct and indirect upstream reciprocity networks that evolution has pre-ordained. Hence, altruism and collective community compassion excite populations, species and individuals throughout every biotic community as a matter of both pragmatic and ideal exigency. $RP = \sqrt{c} \times \sqrt{\mu} \div (\Sigma * XN)$ (where Reciprocity Potential is equal to the square root of compassion, times the square root of the population mean ($\sqrt{\mu}$) divided by $(\Sigma * XN)$ the sum of the entire group – the earth’s biological collective of *Homo sapiens*, all human individuals. This indeed has some merit. In spite of humanity’s exponential disarray, one might yet extrapolate sustainable probability and (de-escalated) distribution factors, the potential for deep ethology in a world inhabited by ten, eleven, even fifteen billion of you humans, with all of your demographic, high-end consumerist inflictions. This is an appropriate way, I might add, of conjuring up the essential pillars of primordial eco-system affiliations, particularly from my perspective as a bird. All of us birds who can peer across, or down upon the maelstrom of your kind, no matter how bad it looks, have been able to ascertain a magnificent matrix for the meeting of minds and of hearts. There is hope, after all, both across the wide contemporary spectrum of both human and avian eco-psychologies, but also in bio-computing, for the conservation of individuals just like me, and the two of you, as well; in households just like this one, both indoors and

¹⁵⁹ October, 1957, Volume 74, The Auk—A Quarterly Journal Of Ornithology, Number 4, “The Avifauna Of The Tres Marias Islands, Mexico,” by Kenneth E. Stager.

out-of-doors. I don't know if you actually meant all that by this rather eloquent mathematical expression, but I have had ample time to verify its truth and I will defer in favor of optimism."

The three of us sat quietly for some time. It was true. And we had infected Josie, even, by dint of having computers around which he could not resist, either; the keys, as a rule, which he eviscerated. So there we were, the three of us, along with Mac, and Stanley and Feather and all the Others who were members of our family, inside, outside ... grappling with what Josie had just rightly declared. It was true. And Josie later that day went on to explain more of his own personal history.

How all of the early and mid-twentieth century autecologists and old-school zoologists found his homeland irresistible. How they had fanned out across the islands for most of May of that year in question, 1955. Their thrust was emphatically taking of 'specimens' which meant, of course, killing birds, said Josie, just as Audubon had done, and with equally passionate resolve and justification: For Science.

"What, did you think they were seeking companion animals? If so, I never saw live pets sitting up front in the air conditioned family car. No, we were titled on three-by-fives, once dead; an insatiable and heinous propensity meted out indiscriminately far beyond any natural, logical let alone compassionate perspective. Some of the corpses were taken to Europe's highest ranked museums, others to right here in Los Angeles."

Josie detailed various aspects of the destruction he himself had witnessed. All kinds of human-induced curses, from the logging of the islands' Spanish cedar to cultivation of henequen cactus—an intensively practiced commercial endeavor throughout the Yucatan.

And how the scientific community came to think of the Magdalenas as a kind of floristic paradise, replete with 100-ft tall *Ficus* and gorgeous bromeliads and orchids in every direction. So much for discretion, Josie intoned.

At one point during that awful May, said Josie, 300 of the archipelago's avifauna were taken as corpses to the American Museum of Natural History, across from Central Park.

"Some park," he said. "By the year 1955, there had already been expeditions by the Millers in 1925, by Colburn in 1927, and then in 1938 by groups from the Los Angeles County Museum and University of Michigan Museum of Zoology."

"The scientist commenced his own monumental report," said Josie, "with the documentation of nesting birds on Maria Cleofas and San Juanito. Of Brown Boobies and Great Blue Herons. And the first mention ever of Hook-billed Kites.

"I met him, although he wouldn't remember me," Josie continued. "But he was probably a very nice fellow, considering his circumstances. Scientific circumstances, I mean. I actually saw him stop his car while heading to the Governor of the island's house, a big old place, so that some 25 Douglas Quail could safely cross the road about 15 ft in front of his vehicle. He was definitely a good ambassador for humans but, in the end, a scientist, of course."

Josie described how the 1955 expedition had reported back on seeing Golden Plovers, Western Willets, various Gulls, Pigeons, and Doves, as well as a few raptor types. And then, at length, descriptions of the island group's psittacines.

"This is where I get agitated, just as a lump blocks my vocal cavities; the air stymied in those physiological airways, transit lounges of jargon and all that excita-

tion otherwise working in my favor to produce a sound, a meaningful phrase, a love psalm are instead condemned to what you might describe as *choking up*.”

Josie cont., “First, the Blue-rumped Parrotlet (*Forpus cyanopygius insularis*); and then our large-bodied cousins, the Yellow-headed Parrot (*Amazona ochrocephala tresmariae*). Both of these magnificent carolers in every season are the poet laureates of the open water archipelago. When first the scientists discovered our luscious canyon forests these old friends were the town criers who alerted every other bird, but also every insect down to those one cannot see; who cried out from each water hole with a generous frenzy and resorted to no chicanery, either, when it came to fruits and nuts—all for one and one for all, they reiterated in male chanticleer harmonics and female chorales to rival your own greatest Baroque composers and performers.”

Josie, cont: “And so continued the scientist’s overview of the psittacines on my ancient islands. How our flocks of some 20, would feast in the mornings on all the agaves, our blue-green breasts ablaze in the bursting sunlight; and how we had gone from tame to wild, without exactly connecting the dots in terms of the most obvious incursions, namely, human. The very comparisons upon which such conclusions were inferred came from the ‘skins of oratrix’ collected on the mainland. A savagery which very few birds can ever bare to mention. Let alone pass on the information your scientists seem to thrive upon: size of wings, tails, bill-to-nostril, tarses, even testes. And by twists and turns, between 1865, 1897 and 1955, the scientist had concluded that something was going on to undermine the populations of the psittacines. Increasing visitations, forest clearance, and of course the other companion vertebrates—like goat and bovines, sheep, dogs, and also ship rats—that travel with you humans to islands such as ours. Not to mention your adorable kitty cats. Once feral, they can be downright sadistic. And to the South those once gorgeous Galápagos. To the North, Guadalupe and the Farallones, all the way north to the Aleutians and beyond, resting upon the remarkable shores of what today is Russia’s Wrangel Island.”

Fig. 11.37 “Post-Migration, Flocking/Nesting Western Gulls Among the Farallones,” Photo © M. C. Tobias



He knew all of this. Josie. A parrot living with us in Santa Monica. Down to every detail. And sometime, when the rare visitor would come over for dinner and ask innocently, "Oh, do your birds talk?"

Josie's Final Act of Heroism

"All these things," lamented Josie, "not to mention a penal colony, and then an outbreak of those men and women who had been so tried and tortured themselves, fleeing the prison walls and forcing the Mexican Federal Government to shut down the islands to all but those indigenous peoples still living there. What a mess for *Amazona oratrix*, not to mention *all* of our Psittacidae family members on the four principle and several additional Tres Marias."

Josie cont., "And not just the parrots. But all of the herpetofauna of the regions.¹⁶⁰ The specimens, or 'material' as it was called, were collected during the latter half of March, 1964 by two humans. You can fairly make out what was the condition upon arrival of said 'material': the newly described *Tantilla bocourti*, one of 64 such black, nocturnal secretive little snakes, harmless to humans, lethal to some birds, and to most centipedes and a hard-working member of the largest snake Family on Earth, the Colubridae. Yet such fine upbringing could not save it from overly ambitious zoologists. And the same for another outstanding scion of that same beleaguered family, also caught on that 1964 outing. I quote, *Hypsiglena torquata* (Günther). 'A single specimen of this nocturnal species was collected on Isla María Magdalena on 23 March 1964. The snake was moving over a rocky beach near the water's edge between 2200 and 2300 h. The specimen (LACM 25247), a female, measures 434 mm total length, of which 63 mm (12.2 %) is tail. It has the following scale characteristics: 179 ventrals, 44 subcaudals ... There are 63 body blotches and 22 tail blotches on the dorsum; many of the dorsal blotches run together, especially on the tail.'¹⁶¹ Now as a rule we parrots do not go out of our way to cozy up to snakes. Indeed, we grant them the widest possible corridor and girth for all of their activities, if possible. But we would never think to capture them for purposes of such rude scrutiny. Never ask a parrot her age, or inquire of a snake her number of dorsal blotches. It's just not done. We were raised better than that, both up in the tree, and around the dinner table, and everybody in the animal kingdom knows exactly the decorum and etiquette of which I speak. Why, I wouldn't even presume with the humble pecan, or pistachio. Walnuts and macadamia, the same. I hold no grudge, or would ever speak disparagingly of those upon whose life force I, too, depend. Never. And it now appears that that includes people like yourselves, as well. But after all these years, I don't need to remind you two of that."

¹⁶⁰ See "Herpetofauna Of Western Mexico: New Records From Sinaloa And The Tres Marias Islands," by Roy W. McDiarmid, Joseph F. Copp and Dennis E. Breedlove, Natural History Museum of Los Angeles, Number 275, June 30, 1976.

¹⁶¹ *ibid*, "Herpetofauna Of Western Mexico:..."

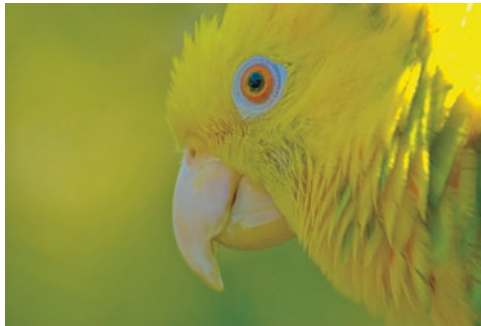
That was our most beloved Josie, and then he committed himself to his final act of heroism: He let go, lamenting in advance for a few days, and then allowing nature to take her course.

Josie had hidden from us the usual signs, but in the end, a moribund shadow crawled over him as he withdrew, day by day, into another realm. We gave every minute to him but, in the end, were helpless. Not even a Dr. Dolittle could have reshaped Josie's dignified finality.

Josie died in our arms, aged 90, 100, possibly 110, because who among us may judge? Or count properly in Josie-type years?

We felt at once the reality of Bach's immortal lines from the Bach Cantata, "Jesu, der du meine Seele, and o Gott, mein Hort!" ([Josie,] You who my soul ... O God, my treasure!)¹⁶²

Fig. 11.38 "Josie," © M. C. Tobias



We'd been advised that he might have been suffering from an incurable brain tumor that came upon him quickly. The veterinarian rushed to the house and, after 3 days of Josie keeping himself covered between pillows on a bed, in a quiet nook he made out for himself from where he could look out in a southerly direction over the Pacific, towards his homeland far off on the horizon, he quietly surrendered to a little needle, his eyes closed within five seconds and we all bid our unspeakable farewells. He with his vast binocular field of vision, huge eyes, and waterproof tears. Oh sure, scientists are keen to remind us that only mammals cry when they are in pain. An evolutionary thing. Why would a bird cry if that signaled to a potential predator that he or she was vulnerable? Why, indeed. Beyond that we can only utter our lasting prayers, for Josie, and for all of us.

¹⁶² Bach Cantata Translations, BWV 78, "Jesu der du meine Seele," Emmanuel Music, http://www.emmanuelmusic.org/notes_translations/translations_cantata/t_bwv078.htm, Accessed June 17, 2016.

Chapter 12

Coda

The Silence of Järvenpää

Josie, as you have just read, truly altered the entire qualia, mindset and presuppositions of this entire treatise, not to mention our personal lives and all those who were privileged to get to meet him. His genius and “field of vision” has revolutionized our own approach to anthrozoology—to what that word really must connote. And then, just like that, this giant of musical and other mental refrains went silent, as the famed Sibelius during his final years, a period legend now knows to be “The Silence of Järvenpää.” From one who had written so beautiful a “Karelia Suite.” It was the same with Josie. Suite after Suite.

Fig. 12.1 “Henry David Thoreau,” Photograph in Private Collection, Photo © M. C. Tobias



There is much debate about the human subconscious or preconscious states. On August 30, 1856, Thoreau wrote, “It is vain to dream of a wildness distant from ourselves. There is none such. It is the bog in our brain and bowels, the primitive vigor of Nature in us, that inspires that dream.”¹ This is not a true-or-false conjecture. Instead, it conjures all those contradictory impulses that defy our cognition and lay claim to a subconscious affiliation that is, if anything, timely. As we have endeavored to describe, what is inside that “bog in our brain” comprises the same atoms, cells, and biochemical relational expressions that exist both in and outside our brains; are active and critical to every living organism. Death is an ongoing manifestation of this dialogue, intricately woven into a fantastic fabric we have ignored, except under microscopes or wobbly theories of reincarnation; and even in the post-microscopic novel ecosystems of our near-term future, we must confront the reality of our presence as one organism amid billions of trillions of Others. That a certain clay has arisen in new configurative designs and behavioral quirks in the name of vertebrates has no bearing on the ongoing realities of a planet etched in

¹ **Thoreau’s Country: Journey through a Transformed Landscape**, By David R. Foster, Henry David Thoreau, Harvard University Press, 2009, p. 5.

biological telegrams beneath a thin ozone-thwarting stratosphere. Every one of those telegrams takes on many forms of diction and behavior but it most certainly behooves our species to read and try and make sense of each and every one of them, to loosely paraphrase Nikos Kazantzakis.

Where sense has no sense, in our understanding of the word, it further makes total sense for us to liberate ourselves from our narrow definitions and, rather, take part in a dialogue that may be obscure, unintelligible, but psychologically critical to our mental health going forward. More than mental health: the survival of humanity is at stake in the interspecies equations we have been examining. Of course, like every species, *H. sapiens* is unambiguously fated to go extinct. Few species—granting their biological specificity at the levels Linnaeus, and subsequent geneticists have preferred—survive much longer than one, two maximum three million years (in human time) or so. We have no idea how long is long, temporally speaking, in the heart of a butterfly or beetle, any beetle, or what time meant to *T. rex*, and how the initial survivors of that bright blast overhead some 66 million years ago translated the odd-ball explosion into their own visions of a future, which they clearly had nurtured with enormous aplomb and dexterous ideality.

So it is not a rude or premature question as to whether we will go extinct. We will. Many of our colleagues throughout the scientific communities worldwide believe it is only a matter of time on a very tenuous, short leash. Some say in this century. We do not disagree. Let us be clear. This is a desperate time. These are depressing realizations but the evidence has quickly and abundantly mounted. We are all in trouble. What is more distressing, and at the root of this accelerated truth of our waning durability, or rationale for even being allowed—by all that nature’s own matriarchal schemes dictate—to continue, is that we are also dragging all these other species and habitats down with us and in so doing, predicating the extinction of humanity herself.

Humanity, which we so believe in; applaud, count on. But the bets are off. We’re pushing every biological and planetary limit and doing so at a pace, a rate, as tabulated in death-tolls of Others, that we have broken through the sensory and intelligible surfaces of logic, of every biospheric oath implicit in the gift of life, and behaved as traitors, miscreants beyond the imagination of any cancer cell; and are now punching holes in the heart of the matter. No other species has ever dared to massively behave so foolishly, narcissistically, angrily, so ruthlessly.

Where is our twenty-first century Portia, who in Shakespeare’s genius, has sayeth, “The quality of mercy is not strained./It droppeth as the gentle rain from heaven/Upon the place beneath. It is twice blessed:/It blesseth him that gives and him that takes.”²

²“The Merchant of Venice,” Act 4, Scene 1, p. 8.

Fig. 12.2 “Dr. Biruté Mary Galdikas and Loving Friend,” Photo © J. G. Morrison



Taxonomy has never tested our tolerance, only excited a confirmation bias that seems to empower our attempts to conquer nature with impunity. Only love and bonding with other species can break down that belief that we are superior beings to all others; that, in our continual delusions, our mental states are worth all the Himalayas combined; and that what we think is relevant may be completely irrelevant.

The sum total of our imagining may not hold a single candle to the nocturnal *Poecilus poecilus festivus*³ a carabid beetle that occupies one of the most multitudinous groups of life forms on Earth, and happens to be as beautiful as any Giant Panda, Elephant, Amur Tiger, or Royal Albatross, let alone Vogue cover girl. Similarly gorgeous are the diurnal flying tiger beetles, such as the cosmopolitan *Cincindela sexguttata*⁴ At least 140 species of the *Poecilus* genus have thus far been discovered all across Africa, Europe, the Levant, and Middle East, and each one of these ground beetles seems more golden and beautiful than the next, with their metallic elytrons (hardened forewings).⁵

³ See <http://carabidae.org/taxa/festivus-chaudoir-1868>, Accessed April 3, 2016.

⁴ See http://www.fcps.edu/islandcreekes/ecology/six-spotted_tiger_beetle.htm, Accessed April 3, 2016.

⁵ See *Carabidae of the World, 2007–2016*, <http://carabidae.org/taxa>, Accessed April 3, 2016.

Fig. 12.3 “Six Spotted Tiger Beetle, *Cicindela sexguttata*, Southeastern U.S.,” Photo © M. C. Tobias



There are well over 40,000 cosmopolitan Carabidae family species throughout the world, and more being found all the time, making it one of the ten largest families of organisms on the planet. Famous among them is the flanged bombardier beetle (subfamily Paussinae) who has created the ability to squirt a pain-inducing volatile secretion by way of a defense. Charles Darwin in his college days, studied beetles on the banks of the River Cam in Cambridge (which then flows to the Great Ouse and on to the North Sea, a total of 40 miles, 64 km). This was just prior to his Professor John Stevens Henslow suggesting Darwin be the naturalist on board the H.M.S. Beagle, from 1831 to 1836. And it was on this particular day, a day like any other, that Darwin got more than he had reckoned upon: a dose of such a secretion right down his throat. He had found two intriguing carabids beneath a log and wanted greedily to collect them both. So while he carefully prepared the first, he held the other one temporarily in his teeth, intending to take it away as well; at which point the one in his teeth exploded an acidic bomb directly into the target area. Darwin gagged. He should have by then learned his lesson for in that same letter, addressed “Dear Jenyns” ... he had written, “A *Cychrus rostratus* once squirted into my eye & gave me extreme pain.” (*Cychrus* is another genus of carabids endemic to Europe).⁶

The moral to the story: one of the nineteenth century’s greatest biologists was once conquered by a beetle (served him right, of course) and he dropped both loves, but never forgot the lesson, suggesting, eventually, that human psychology must be forever transformed by the remarkable adaptations of creatures far and wide throughout this grand experiment which he would come to characterize, of course, as evolution.⁷

⁶ See <http://www.darwinproject.ac.uk/letter/DCP-LETT-1009.xml>, Accessed April 3, 2016.

⁷ Charles Darwin, “Letter to Leonard Jenyns, October 17, 1846”.

Fig. 12.4 “*Poecilus sp.*, on South Face of Alaska’s Mount Blackburn (16,391’) in South-Central Alaska,” Photo © M. C. Tobias



In assessing the intelligence of these insects, a very significant set of experimental methods and insights was recently characterized by two Russian researchers as follows: “We call it catalog learning, the name we give to the ability of animals to establish associations between stimuli and coherent behavioral patterns (patterns consist of elementary motor acts that have a fixed order). Instead of budgeting their motor acts gradually, from chaotic to rational sequences in order to learn something new, which is characteristic for a conditioning response, animals seem to be ‘cataloguing’ their repertoire of innate coherent behavioral patterns in order to optimize their response to a certain repetitive event.”⁸ Previous to their study, only one other ground beetle had been examined for learning capacities, *Pterostichus melanarius*. Yet, write Reznikova and Dorosheva, “Until the classic studies of Schneirla (1929) on maze learning in ants, it was repeatedly suggested that insects show little or no learning (Hollis and Guillet, 2011). However, long-term studies make clear that associative learning appears to be universal within insects. There are many examples in the literature on associative learning in insects, particularly in Hymenoptera (including parasitoids, solitary and social wasps and bees, as well as ants), Orthoptera (cockroaches, grasshoppers, locusts, crickets), Lepidoptera (moths, butterflies), Diptera (flies), and some others (for detailed reviews see Hollis and Guillet, 2011; Matthews and Matthews, 2009).”⁹

In the case of bees, as has recently been examined, the questions concerning “feeling” and “happiness” are nothing less than profound, as well as being indicative, according to some, of obvious consciousness, and hence, “awareness,” “subjective experience,” and even the suggestion “that consciousness” is so “ubiquitous” as to possibly be present “even in nonliving arrangements of matter, to varying degrees.”

⁸“Catalog Learning: Carabid Beetles Learn to Manipulate with Innate Coherent Behavioral Patterns,” by Zhanna Reznikova and Elena Dorosheva, *Evolutionary Psychology* www.epjournal.net—2013. 11(3):513–537, <http://evp.sagepub.com/content/11/3/147470491301100304.full.pdf>, Accessed April 3, 2016.

⁹*ibid.*, p. 515.

As to the “ethical consequences” of such (as of the early twenty-first century) revelatory considerations, a heated debated drags on within the scientific community, lodged in a hypothetical purgatory when it comes to granting “pain” to certain organisms. In other words, despite thousands of years of spiritual awakening, and a century of revolutionary neurophysiological studies, humans, generally speaking, are loathe to cede to any others that pain-and-thinking neural infrastructure we pride ourselves on monopolizing in the natural world.¹⁰ Hence, our gratitude when Dr. Alfred Mead, Professor at Georgia College and State University in Milledgeville, one of the world’s leading paleoecologists specializing in Cenozoic mammalian systematics, was quick to point out that the approximately 22,000-year old bones of an extinct *Bison latifrons* in his laboratory had been, by all osteological indications, suffering from arthritis. This was a level of human empathy stretching back to the Pleistocene epoch, the best in science.

Fig. 12.5 “Paleoecologist Dr. Alfred Mead Showing Dr. Wayne Clough, 12th Secretary of the Smithsonian Institution, the Enormous Horns of an Extinct *Bison latifrons* Individual,” Photo © M. C. Tobias



With the oldest known insect fossil being that of *Rhyniognatha hirsti*, some 400 million years of antiquity, discovered in what is today Scotland¹¹ and the realization that, from genetic research, the most primordial of insects must have evolved some 480

¹⁰See “Do Honeybees Feel? Structure of Insect Brains Suggests a Capacity for Basic Consciousness,” by James Gorman, The New York Times, April 19 2016, p. D6, http://www.nytimes.com/2016/04/19/science/honeybees-insects-consciousness-brains.html?rref=collection%2Fsectioncollection%2Fscience&_r=1, Accessed April 19, 2016.

¹¹“New light shed on the oldest insect,” Michael S. Engel & David A. Grimaldi, Nature 427, 627–630 (12 February 2004). doi:10.1038/nature02291; <http://www.nature.com/nature/journal/v427/n6975/full/nature02291.html>, Accessed April 3, 2016.

million years ago in the Ordovician Period, when oxygen levels were only 68 % of what they are today, and long before the emergence of mammals, we can adduce a vast encyclopedic knowledge in every living insect. The notion of “catalog learning,” as Reznikova and Dorosheva describe it in carabids, must be extended in ways that challenge our imaginations. Nearly half-billion years crawling in the dirt, surviving, expanding their domains with encouragement from others—from every barometric reading, nanosecond, drop of water, shadow, minute variation in humidity and temperature—learning, second by second, age upon age, the nature of the world. We who are, at best, 200,000 years old—or 338,000 if we consider the recently confirmed “A00” Y chromosome in the Cameroon¹²—are such rank amateurs in the time-frame of biology as to defy comparisons when it comes to insects, who also achieved wings long before any dinosaur. We know almost nothing about the dirt, or the living air. All of our boasts combined beg credulity when attempting to lend any but the most superficial survey of true sensitivity and intelligence in *H. sapiens*. At least, in our uncertainty, we can sometimes be kind, create works of art that we enjoy, and try to extend virtue to others. Think of Ralph Vaughan Williams’ “Five Variants Of Dives And Lazarus,” (1939) a loving, pantheistic English folk song that seems to have been conceived for all living creatures to enjoy. Even for the somber, quiet Earth, stone and mud, to relish. Antonin Dvorak’s “Nocturne for String Orchestra, Op. 40” (1870). Or the initial quiet lyricism of Edward Elgar’s “Wand of Youth Suite No. 1,” (1907/1908) prior to its instructive if disheartening turn of brass mood. Samuel Barber’s “Adagio for Strings,” (1936). Joaquin Rodrigo’s “Cançoneta” (1923).

¹² Am J Hum Genet. 2013 Mar 7;92(3):454–9. doi: [10.1016/j.ajhg.2013.02.002](https://doi.org/10.1016/j.ajhg.2013.02.002). Epub 2013 Feb 28. “An African American paternal lineage adds an extremely ancient root to the human Y chromosome phylogenetic tree.” Mendez FL, Krahn T, Schrack B, Krahn AM, Veeramah KR, Woerner AE, Fomine FL, Bradman N, Thomas MG, Karafet TM, Hammer MF. <http://www.ncbi.nlm.nih.gov/pubmed/23453668>, PubMed, Accessed July 8, 2016.

Fig. 12.6 “5000 Year Old Rock Painting of Tribal Group, Probably Led by Ecstatic Shaman, Tamaulipas State, Mexico, Tribe Unknown,” Photo © M. C. Tobias



But we must be clear about what truly constitutes intelligence by way of learned experience. We are beginners, eager for utter transfiguration, and this acknowledgment should grant us the strength to be humble beside all the Others, our ultimate, and most accessible mentors. If not, there is absolutely no point discussing intelligence, or giving the slightest nod to what we have done, where we have been, as a species.

The measure of success of any biological being is its ability not only to survive but to maintain a certain behavioral and ethical equanimity that ensures that all those living creatures around it may also survive and be safe from anxiety or true threat. Coordinating this dance involves clarity, intuition, and compassion. The nuts and bolts are not entirely out of our control, although, in the end, everything is. Thank goodness.

As such, this situation places our species’ unleashing of the Anthropocene in the most astonishing mirror when we look at our ungainly selves and begin to comprehend what we have done, what we are doing, what we are capable of—good and dreadful—and what we must endeavor to do, starting immediately.

Fig. 12.7 “Brokpa Children, Northeastern Bhutan,” Photo © M. C. Tobias



If kindness, tenderness, the creation and appreciation of art and beauty, of mammalian nurturance, means anything of significance in the evolutionary record—all of which we believe to be the case—now is the time for us to prove it. To make good on our promise as a brand new species, lest one notorious “product” of evolution that is Us, be cast off by the Earth, deemed unsatisfactory, a failure. That is altogether possible and if we are to ensure some other, more salubrious outcome—one that encompasses our grandchildren and theirs—we have much collective work to do.

Fig. 12.8 “An Elderly Lady,” by Gerard ter Borch, Dutch 1617–1681,” Original Oil Painting, Private Collection



Fig. 12.9 “Close-Up of ter Borch’s ‘Elderly Lady,’” Original Oil Painting, Private Collection, Photo © M. C. Tobias



It is not good enough to think ourselves clever. Our alleged “genius” is failing. Every beetle or parrot whose soil and forests are, day by day, disappearing, has been trying desperately to warn us about it. “Desperately” is not overreaching: We know what Josie told us. We also know that he accepted us just as we accepted him, into our family. If the biosphere is to welcome our species into *its* family, an occurrence less and less likely by the hour, we have to do more than simply think and write about these things. For at least 163 million years Josie’s ancestors left this world richer, more diverse than when they first arrived here. Our species, in just a few thousands of years has done everything in its power to destroy the planet, a horrible but absolutely necessary confession that we must listen to, hear ourselves over and over again repeat until the message sinks in. We cannot shed the guilt nor the duties attendant upon its stark recognition; where all is not lost should we choose at this 11th hour to rouse ourselves at the momentous task before us.

The biosphere is an open exchange of information between all species. The best approach we can think of in prying free our grasping and hopelessly idiotic attempts to remain dominant is to liberate ourselves from the oppressive lens of taxonomy which demarcates one species from another, however useful this methodology might have seemed, since the oft-referenced genius who was indeed Linnaeus at his best, in the 1758 10th edition of his great masterpiece, **Systema naturæ**. It was that, a work of breathtaking sensibility. But the grand old Bible of nomenclature is now tragically half-obsolete in a world where connectivity and the opportunities it affords

are far more crucial to embrace than any science of demarcations, differentiations, and differences. The similarities that together comprise the conditions and global citizenry of *life* and of a living planet should obviously be our new focused approach to survival, admonishments—and those who hate authority, and most of us do—wisely aside.

Fig. 12.10 “Portrait of Carl von Linné (Carolus Linnaeus),” by Per Krafft the Elder, 1774, Oil on canvas, The University of Uppsala Art Collections [wikidata:Q927577]



Anthrozoology is, at its most far-reaching, the varied attempts by our kind to communicate with the Others. By doing so, we risk losing ourselves into a very different kind of world; a richer, safer, and infinitely more enduring biosphere. There is no greater, no finer, no more important risk than that. And one we must embrace wholeheartedly. We are not afraid of it. We welcome it, as Josie welcomed whatever was next for him, in this great evolutionary odyssey we all share, together.

Fig. 12.11 “St. Francis and the Blessing of the Animals,” from the 1593 Francis **Biography of Saint Francis**, by St. Bonaventura, Private Collection, Photo © M. C. Tobias



Fig. 12.12 “Michael Aufhauser, Founder of Gut Aiderbichl, and Friends,” Photo © Gut Aiderbichl, Courtesy of Michael Aufhauser and Friends, Salzburg, Austria

