Mythic Worlds and the One You Can Believe In

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The idols and false notions which are now in possession of the human understanding, and have taken deep root therein, not only so beset men's minds that truth can hardly find entrance, but even after entrance is obtained, they will again in the very instauration of the sciences meet and trouble us, unless men being forewarned of the danger fortify themselves as far as may be against their assaults. (Sir Francis Bacon, *The New Organon*, XXXVIII)

Unadulterated, unsweetened observations are what the real nature lover craves. No man can invent incidents and traits as interesting as the reality. . . . The truth–how we do crave the truth! We cannot feed our minds on simulacra any more than we can our bodies. . . . If you must counterfeit the truth, do it so deftly that we shall never detect you. But in natural history there is no need to counterfeit the truth; the reality always suffices.(John Burroughs, *John Burroughs' America*, 8-9)

I do not mean to suggest that the custom of lying has suffered any decay or interruption–no, for the Lie, as a Virtue, A Principle, is eternal; the Lie, as a recreation, a solace, a refuge in time of need, the fourth Grace, the tenth Muse, man's best and surest friend, is immortal, and cannot perish from the earth. . . . My complaint simply concerns the decay of the art of lying. No high-minded man, no man of right feeling, can contemplate the lumbering and slovenly lying of the present day without grieving to see a noble art so prostituted.(Mark Twain, "On the Decay of the Art of Lying")

The great enemy of the truth is very often not the lie -- deliberate, contrived and dishonest, but the myth, persistent, persuasive, and unrealistic. Belief in myths allows the comfort of opinion without the discomfort of thought. (John F. Kennedy)

PROLOGUE

People aren't as unique in fiddling with reality as they seemed before primate studies, but no creature else does innovation nearly as well, or wanders into error as often or as disastrously. Chimpanzees and monkeys can just barely scheme and deceive, and quadruped symbols of deception like the weasel and fox aren't in it. An adage for the public branch of concoctions came from Petronius in the first century, *mundus vult decipi, decipiature ergo*, "people want to be deceived, therefore deceive them." Long before then and ever since savvy ones in high places have found how well illusions serve their purposes in getting jobs done that take many hands. But presenting a public front isn't the half of it. We also endorse illusions personally and defend them with zeal. They range beyond politics in taking in the entire universe, but insofar as cults and other collectives gather in groups with influence they maintain a political side as well.

Our inventiveness includes innovation in weaponry, which makes armed illusions deadly. Where apes and monkeys managed no more than bites and scratches, the ingenious biped has come up with cudgels, slings, maces, bows and arrows, chariots, siege engines, and eventually canons, rifles, and atomic bombs, and for defense, shields, helmets, walled fortifications, and anti-missile missiles, none of them adequate. Much of the truth twisting has gone into gathering forces to use those devices. Preparation for doing so requires the invention of reasons. It is in the propaganda department that delusions come into play most aggressively, often among the ancients, and sometimes still, presuming no less than extraordinary high sanctions from the maker of the universe. That is where cults and nations often coincide. The biblical example joined Marduk, Mars, and others as a partisan war god that transmitted messages to the people through their patriarchy.

Such misconceptions made no demonstrable contact with the real universe, much of it brought within sight of the atmosphere-free Hubble telescope and of powerful electron microscopes capable of magnification up to about 10,000,000 times the size of the focal object. The compiling of data and tested theory has put notions that have lasted centuries in the history of ideas into a new light, especially those that concern nature, cosmology, and the place of mankind in the scheme of things. Reclassifying the illusions as *poesis* would mean fewer crusades on their behalf, fewer fourth level jihad movements (the war minded branch of Islam), and no rival sect

members and unbelievers tortured through all eternity. The problems of illusion-generated militancy would shrink appreciably if the basic dimensions and numbers of natural history were universally taught and what they say about untenable beliefs was brought into the debate. Science is often taught in specialty areas but seldom as an entire natural continuum.

That humankind is among the more self injuring species shows in accounts of lethal violence calculated in thousands of incidents, with cultural influence suggested by era differences, with higher rates between 700 to 1500 (120 per 1000) than currently (13 per 1000). Jose Maria Gomez in the Department of Ecology, University of Granada, extracts these and other figures from World Health Organization data and makes species comparisons decidedly not in the favor of mankind (Elaine Pagels, 2016). The toll from conflicts in the 20th century alone, put by some estimates at about 160 million, reiterates that appalling story. Many of the casualties we can attribute to errors in perception, to the propaganda that encouraged them, and to fervent beliefs contradicted by the natural continuum.

I won't be concerned with inbred brain modules or domains except to say that it seems doubtful that our vulnerability to delusions is due to any specific areas of brain architecture. What *is* unavoidable, however, is the conflict between ego or subjective point of view and objectivity. That is incurable for the obvious reason that any organism is first of all self oriented. We have to feed the singular mouth, see through personal eyes, and hear through personal ears. The brain is a very subjective instrument. At the same time any functioning organism has to live in a world not oriented around it. Getting these opposites in good balance is a lifelong task that requires constant adjustments as we learn more about what is out there. Casting ego and desire forth into what is truly there is a prime source of illusions. We humanize things easily, animating plants and animals, projecting human friendly creatures into sky and sea, some of them angelic and paying visits to our favorite cultural visionaries, some of them demonic. The most common corrective is familiarity with natural history. It sets the limits of what is real, and we needn't go far or look through magnifying devices to see enough of it to judge what is wildly improbable. Representative samples of natural history are all around us. What is far off and what is diminutive merely confirm its mixtures of order and disorder, beauty and irregularity, maternal kindness and predatory cruelty. The powers and dimensions are visible enough to teach us our proper place. Natural philosophy requires those who feel they have to animate a cosmic force behind all of that to make it accountable to natural history. When that is done the animation turns out to be indifferent to

justice, prone to bring wreckage and chaos about, and responsible for animal suffering extending hundreds of millions of years.

When ideas expressed in words became possible, probably some 50 to 40 millennia ago, *Homo sapiens* gained in capacity to disseminate ideas in detail. That is what enabled groupthink and allowed the invention of fables. Discourse became the great enabler. It was free eventually to conjure angels from the clouds and devils from underground caverns as well as demons in enemy camps. Because it is just as willing to serve imagination as logic, distinguishing facts from myths became one of the more arduous and frequent things the brain is assigned to do. We have sung anthems, chiseled idealized icons into marble and put them into celluloid strips to simulate motion, but nothing works quite like speech and writing for delivering emotion and conviction in response to real and simulated things. Confused classifications are the chief means of *substitution* or *displacement* rhetoric, and of *vaulting* rhetoric, as when Philip II of Macedon told his subjects he was a god and they were obliged to agree, vaulting because the title temporarily promoted him from mortal to immortal. Demigods have been frequent in the annals of dictatorship and their myths, and a little of that added prowess descends into cult rituals, sacraments, and those who administer them. Where token evidence is offered for the claims, add evidence selection as a branch of part-for-whole substitutions. One aspect of something is used to characterize the rest. In the typical it actually does. In evidence filtering on behalf of bias it doesn't.

Through its 13.8 billion years the universe has shown no inclination to be at like any of the myths of origin. The Hubble telescope's 20th anniversary image shows a mountain of dust and gas in the Carina Nebula that by itself makes any form of effective design hard to support. That's if jagged mountains and raging seas haven't already done so. The top of a three-light-year pillar of cool hydrogen is being worn away by the radiation of nearby stars, while stars within the pillar unleash jets of gas that stream from the peaks. The Eta Carinae Nebula, NGC 3372, is a gigantic miscellany of star clusters, dust, and gas trillions of miles in length. The shapes are only suggestive, the way a face appears in a rock formation or a cloud finger points across the sky. *Limbo* makes an apt spacetime metaphor for such a directionless, oddly shaped miscellany. All the galaxies put together appear to be a confusion, not a design, though galaxies do fall into clusters and superclusters. The human brain is itself something of a patchwork, albeit a marvelously functioning one at its best. The construction is like half planned architecture in which additions are tacked on as needed. Put nature's dimensions together by means of such a recording and categorizing instrument and again something like limbo fits

the results, nothing definitive in either the processing or its dissemination. Nature may have its infernos, purgatories, and paradises, but overall it doesn't show directional movement other than the eventual expenditure of star fuel and what physicists characterize as total entropy, lacking in any further transfers of mass and energy under the famous equation $E = mc^2$.

In using such words as *truth* and *reality*, I'm making an assumption about objectivity that in the context of postmodern skepticism toward discourse needs justifying. One popular movement of the last half of the 20th century, in intellectual circles at least, distrusted whatever claimed to be unvarnished truth, thinking more of discourse than clever demons or of atoms. The number of references to Thomas Kuhn's *The Structure of Scientific Revolutions* (1962) testifies to that. That followed a long tradition of skepticism that hit a high (or low) mark in Descartes. I enjoy playing the 'see who can doubt the most game' but find that once you start on it, it consumes too much time and space. We can never be absolutely certain that what we think is real wasn't the doing of an extremely tricky demon, but it seems a pointless game. I'll just assume that the desk at which I sit is real, not an illusion made up of atoms and molecules. If the tricky demon proposal turns out to be true and we've all been fooled, we would be none the better for guessing that ahead of time. The pros and cons have been examined many times, recently and expertly by Sean Carroll in *The Big Picture* (2016). I don't consider *objectivity* tarnished beyond use. Nor do books like Peter Godfrey-Smith's (2003) that detail how science and philosophy collaborate in defining what is real. We rely on marked lanes of traffic despite an occasional driver who crosses the yellow line.

Nor does objectivity finish its work with what can be measured and described with certainty. Intimations in gestures and facial expressions are subject to more than one interpretation, but one version is usually nearer the mark than others. The A students in class are right more often than those who tweet through the lectures. Accuracy depends on facts and thus on objectivity as free of missteps as we can manage. Among the reasonably well established theories are the ages, distances, speeds, and numbers of natural history. Even the magnificent wreckage and rebuilding process of the Carina Nebula is relatively contained by comparison to the whole of what is visible. In total the cosmos may be unshapely but in physics, chemistry, and in contained systems like the solar system it follows invariables such as the speed of light in a vacuum. Until it is broken apart, every atom obeys a strong force binding its neutrons and protons together. It is also true that despite the overall movement toward total entropy, any given area can increase in energy and organized structure through its

contacts with another areas.

In specialties remote from my literary background I rely on a good many scholars who have to be put together for a chronological picture of the natural continuum. These come to more sources than I like to inflict on readers, but both specialists and the rest of us have no choice but to consult studies remote from anything anyone can personally vouch for. For that matter, the universe itself has to be taken in samples that yield the invariables and constants. That is perfectly valid because what a handful of hydrogen atoms do in burning, splitting, and combining into helium has to be the same everywhere. With false starts and relapses, increasing the number of tested areas and combining them under comprehensive theories has been the general direction of intellectual history over the past several centuries, indeed from as early as ancient Egypt, Sumer, Babylon, and Greece. Natural philosophy depends not only on the sciences but on the humanities and arts. In that context *nature* includes information gathered from within the human sensory range as well as from methodical study. To adjust Einstein's saying: philosophy without science is lame, science without philosophy blind. (That's not quite what he said, but never mind.) Neither works as well without common experience as it does with it. The use of telescopes, spectroscopes, and microscopes depends on eyesight and its filtered passage into the brain's receptors. Everything is sized and its velocity gauged with reference to human proportions, never left completely behind even in numbers that reach into the dozens of zeroes.

I'm not concerned with everything that runs counter to natural history, merely our vulnerability to misconceptions that propose quite different universes in the interests of self identified ethnic groups and nations. Modern weapons of mass destruction under the direction of blind faith aren't to be taken lightly, nor is science denial that blocks efforts to avoid environmental deterioration and what may become quite damaging levels of global warming. That overlaps to some extent Noam Chomsky's account of media propaganda in *Necessary Illusions: Thought Control in Democratic Societies* (1989), but his concern is mostly US propaganda in political and foreign policy contexts. I assume that what is true of Americans isn't unique and that the roots of credulous belief are ancient.

Ordinary run-of-the-mill fraudulence I set aside together with individual machinations. Someone seeking to make an impression rehearses a persona offstage before presenting it at a board meeting or joint session of Congress. We expect that, and Erving Goffman (1959) has done an admirable job on "the presentation of self in everyday life." Whether or not that is a core self or a ghost in the machine is another topic I avoid. I also eliminate fraud and error limited to given disciplines. Medicine, for

instance, has had its share of hoaxes and suppressed evidence. Quackery has gone public many times, as pseudo sciences such as alchemy and astrology once did and on a smaller scale still do. Going public in that sense doesn't raise armies, merely profits. Comprehensive accounts of the universe are what inspire collective beliefs and send armies forth. Because that level of illusion isn't based on reason and evidence, each variant tends to be hostile to the others.

That twisting the truth in modern scientific disciplines isn't more prominent is a tribute not only to those who go into them but also to systematic cross checking. Not much in the publishing arena is so thoroughly scrutinized as work submitted to professional journals and refereed books. In introducing *The Best American Science and Nature Writing* for 2006, Tim Folger remarks that proving a theory wrong is a favorite occupation in that shin-kicking industry. Despite that, histories of philosophy and science need chapters on errors, hoaxes, and partisan rejections of evidence. Theories eventually falsified have a purpose only if they elicit better support for better theories, as astrology and alchemy eventually did. "Something remarkable emerges from all the tumult," Folger concludes. "Even though the intellectual brawls never stop, charlatans are invariably exposed, and the ceaseless, collective, rigorous drive to find fault yields an understanding of reality impossible to achieve by any other means" (xii). *Invariably* is questionable, but the point is valid. We have good reason to trust methodical, peer reviewed findings more than we do most statements issued for public consumption.

Lest we condemn illusions and myths altogether we should remember that without them our distant ancestry might have remained too clan-oriented to build civilizations. Invention teamed with attention to detail has created everything that drives the streets and furnishes dwellings. It has manipulated the genes of domesticated creatures to bring them closer to what we want and of plants to increase yield. That is where Alfred Wallace, Charles Darwin and their forerunner the American William Wells in 1813 started, that is, with human rather than natural selection, the invention of dogs from wolves and of cows from wild aurochs.

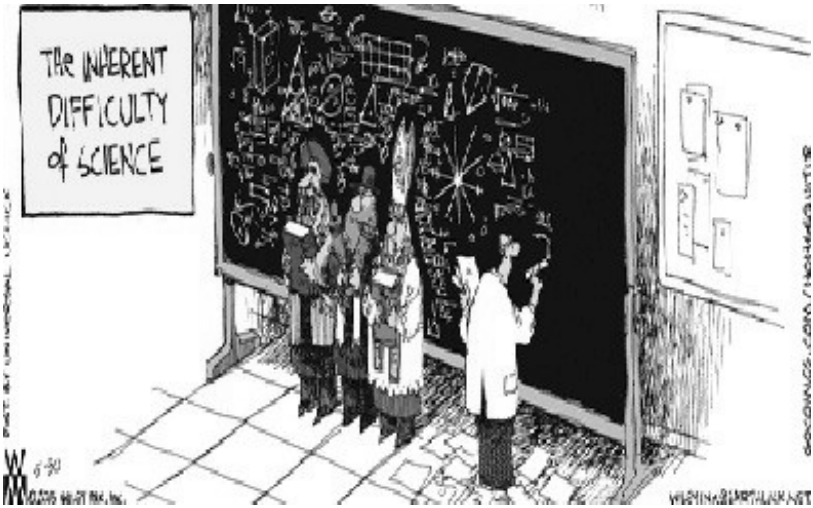
Even us/them hostility based on conflicting world views isn't an unmixed evil, merely predominantly so. Some historians argue for armed conflict as the means of putting scattered provinces and city states together peacefully. A recent president of the United States attributed all progress to war. The Roman Lucan in *The Civil War* voiced similar ideas. Alexis de Tocqueville (2003), an astute critic of American history, thought the American colonies and states potentially chaotic without a strong federal government, and that government came about from the Revolutionary

War and was maintained with civil war. Jefferson, Madison, and other founding fathers believed similarly. One military-minded student of civilizations, the Scotsman Adam Ferguson (1767, 1995), says with some credibility that the friendship, team cooperation, and courage of wars are ennobling. It is sometimes assumed that the best leadership arises in warfare. General Carl von Clausewitz as late as 1874 treated soldiers as pawns in the brilliant maneuvers of generals. That case for aggression as the drive train of progress is plausible only on the surface. The number of discoveries and inventions unrelated to conflict would fill a shelf of encyclopedias. Empires that fall within the range of archaeology and historiography–Sumerian, Anatolian, Hittite, Babylonian, Assyrian, Mittanian, Mycenaean, Chinese, Indian, Mongolian, Hebraic, Egyptian, Persian, Greek, Roman–were brought together and fell apart by convincing themselves of things that weren't true. They talked and wrote themselves into magnificence and talked and wrote themselves into committing atrocities. Wars played a mixed role, stimulating invention and bringing ruin.

Believed myths include supportive or punishing gods and goddesses such as, anciently, Enlil, Shamash, Marduk, Re, Zeus, Jupiter, Yahweh, and currently a universal holy spirit. Stories of goblins, elves, fairies, nymphs, satyrs, the fates, gnomes, sprites, devils, angels, trolls, gremlins, vampires, and dragons are more obviously fabulous but less inclined to attract cults and lead to doctrinal conflict. In total numbers such projections of human psychology are nearly beyond cataloguing. Lists of ancient Mesopotamian figures alone if we include minor deities, spirits, and demigods numbered in three digits, some 16 of them major figures and about a hundred minor ones. Like ancient dynasties and like medieval and renaissance monarchies, both the Incas of South American and after them the Aztecs of Mesoamerica used such figures to rule. Law codes sponsored by divine counsels sometimes emphasized the protection of the weak and sometimes legitimized oppression. Among the Aztecs, myths conditioned people to believe that the functioning of the universe depended on tearing the hearts out of victims and holding them still beating up to the sun. The recipients of the sacrifices in Central America–Tezcatlipoca, Huehueteotl, and the bloodthirsty war god Huitzilopochtli–were intended to be intimidating, and so they were. Many beliefs and much doctrine seen in a social context are rhetorical enforcers. Their aim is to convince, not to explain how things work. That was clearly the case with the war god Yahweh and much of the time for Allah and God the Father adapted from him by Muslims and Christians.

The standard by which I gauge deflections from objectivity is equally

lofty in the sense that it looks to natural history as the most substantial and well verified context of everything in existence. Given its debris, extremes, and cruelty, as I suggested and will repeat at critical junctures, I subtract animations from it to avoid unnecessary monstrosities. In contrast, notions of the cosmos that until recently prevailed nearly everywhere and still do many places were as distant from the truth as Plutarch's version of earth in likening its governance to the sun moving in "a seasons in just proportions to the whole creation" (896). Much of what various populations believe is as far off the mark as that. The Jewish, Christian, and Muslim figures in the Non Sequitur cartoon are clutching thick tomes compiled before anyone knew the planet orbited the sun. They are dressed ornately and anciently. The equations on the board have to be worked around them lest they obliterate important portions of them.



We have come to understand the full scope of human and natural history only since radiometric rock dating, nuclear science in general, telescope- assisted astronomy, and advances in evolutionary biology. Astrophysics, geophysics, and chemistry underlie nearly everything including biology. As Hartmann and Miller point out in *The History of Earth* (1991), until the Dutch scientist Antonie van Leeuwenhock discovered single-cell life in 1677, lifeforms could not be studied "and classified according to their microscopic cellular structure" (101). Evolutionary biology awaited not only microscopes but the concept of natural selection's dependence on environment, which in turn derives

from physics and chemistry. Astrophysics now goes to the beginning those estimated 13.8 billion years ago. The story of life, earth branch, began over three billion years ago in single cell stromatolites and spent most of that span evolving into multicellular forms of life. What in the 17th century were separate studies of distant things seen in telescopes and minute things in microscopes are now connected in a single narrative. The discovery of subatomic particles, laws of thermodynamics, and mass/energy conversions was necessary to forge the links. What was once considered a great chain of being has become a chain of causes and effects. It can't be said too forcefully that this narrative replaces many another that prevailed almost uncontested until Darwin and what came together in the 1920s in the collaborations of geology, astronomy, evolutionary biology, and physics.

The most reliable data we take from three sources, sensory impressions, science, and chronicle history. *Poesis* adds a hypothetical or *what if* branch of learning based on simulation. I'll say more about that in the first chapter and at other points in defense of myths and fictions *recognized as such*. I've appreciated these enough to spend a career on them, including Milton's largely untenable version of the Jewish, Greek, and Christian version of world history. We find added reason to value fictions in Rousseau's hating them as much as he hated science–and Athens and Catullus, Hobbes and Spinoza and China. As Sir Philip Sidney (1992) remarks in *The Defence of Poesy*, historians courted the muses and "usurped of poetry their passionate describing of passions, the many particularities of battles, which no man could affirm; or, if that be denied me, long orations put in the mouths of great kings and captains, which it is certain they never pronounced." Indeed "neither philosopher nor historiographer could at first have entered into the gates of popular judgements, if they had not taken a great passport of poetry" (214). The history/myth hybrids of the ancients en route to science and philosophy support that notion.

The initial task is to sort areas of discourse into the right bins, one of the largest of which mingles fact and fiction, sometimes meaningfully, sometimes confusedly. Quite a few lively and impassioned differences would melt away if the distinction between objectively validated truth and illusions was better recognized. How large is this subject? Obviously outsized. "To sort out . . . [the] philosophical issues of anthropology and archaeology is not only difficult, it is also boring on a scale imaginable only by people who have read the complete works of Hegel," Robert J. Wenke warns in *Patterns in Prehistory* (1979). Adding natural history, beautiful lies, misconceptions, and myths of state would be like throwing in the

works of Gadamer. Hence I've settled for selected topics and historical samples that amount to reflections on myths and illusions. We can draw on methodical work without being methodical. Getting types of representation in mind with enough examples to indicate their uses advises taking core samples rather than attempting coverage. To test the climate of 100,000 years ago one need only sink a metal casing into ice and extract a sample, not excavate with bulldozers.

The goal we should work toward is the disassembling of harmful myths of the commonwealth and blind faith partisanship. What separates self identified groups and generates their mutual hostility is less important than the common human heritage. The myths block our vision of a reality that is far and away older, larger, and more formidable than any of the myths. That reality shrinks the human presence is to be expected. Reality checks often do. That is inherent in the maturation process from the infant's self-centered small world to ever expanding knowledge. That is perfectly acceptable. Ego should be dedicated to mind, not mind to ego. The universe is what it is. Having accepted it, we find it just as good to be a small part of so immense a reality as a larger part of a misconceptions. We haven't actually ruined much of anything yet except areas on the outer rim of the planet that a diminishing number of species and our own progeny will inherit.

THE ACTUAL, THE HYPOTHETICAL, AND THE UTTERLY FALSE

CHAPTER ONE

QUARKS AND MADE UP THINGS

Naturalist Numbers Don't Come Naturally

That life is not only hard at times but precarious is the main reason for imagining it improved. The home cures aren't working. The crops are failing. Enemies are at the gate. Maybe Marduk has an answer if we can get his attention. An imperialistic campaign dangerous to those set to undertake it could use a favorable sign from one of the war gods. Drawing on a gift to foresee the future an oracle supplies it. Meanwhile in stars numbered very approximately in the septillions, electrons, protons, and neutrons keep their appointments in numbers we would call infinite if the literal meaning of the word didn't place it beyond the highest number. It isn't the practice most places any longer as Sean Carroll (2016) points out to call what the atoms and stars are doing 'causal', but the mechanics do operate by invariable laws. It always takes 4 hydrogen protons plus neutrons, and gamma rays to produce a helium atom, throwing off neutrinos and positrons in the process. We aren't far off in saying that the heat plus the nature of the neutrons, protons, electrons, and the rest 'cause' the helium to form so long as nothing remains of intent in the word. The entire natural continuum up to the point at which lifeforms start choosing within a narrow range of options is causal in that limited sense. So far as anyone knows nothing in the Periodic Table of Elements could have been any different than it is. Neither Marduk nor any of the other intangibles had anything to do with it, or with the tornado that touched down in Kansas today.

This first section consisting of three chapters applies the natural continuum as a litmus test to determine what is actual, what hypothetical, and what utterly false. The problem is always the same. We are capable of having quite firm convictions while mired in error and of feeling uncertain about what isn't all that doubtful. We can't change the brain's wiring, but we can improve the input and output. At its most comprehensive, the *actual* includes everything that exists of whatever size from quarks to quasars. About 16 constants are classified as universal plus half a dozen

more limited to the electromagnetic force. We've no reason to question these or equivalents in the theorems of math. The *hypothetical* straddles the difference between what is possible and what is well established, usually, if we're being methodical, in a suspended state pending further investigation. The number of galaxies, their clusters and superclusters is uncertain at present but is getting better calculated and will have an improved tool for seeing into deep space when NASA gets its next telescope aloft. Axioms and theories are relatively assured but normally provisional because exceptions might exist somewhere as yet undiscovered. Something stated hypothetically in a formal way is set it up for critical scrutiny. The *utterly false* needs no introduction, only an explanation as to why we so often consider something real when everything is stacked against it. That Superman flies through the air despite being quite heavy and having no visible means of support isn't intended to be believed and so isn't false, merely fictional. That is the case for novels, plays, and poems but not for sincere beliefs such as those of *The Divine Comedy* and *Paradise Lost.*

What difference does it make, one might ask. Take one of the more prominent issues of the day. A stat sheet on terrorism compiled by thinkingbynumbers.org calculates that we spend 50,000 times more per death on terrorism than on any other cause. Over 30 times the 3,000 victims of 9/11 perish annually in hospitals inadvertently, which isn't to say don't go there if you need to. You are safer in Manhattan's One World Trade Center than in the nearby hospitals. Several thousand times greater casualties came in the world wars and wars in Korea, Vietnam, Afghanistan, and Iraq than in the 9/11 attack. These in turn continue what has gone on for thousands of years in the only species that has wounded or killed its own in the hundreds of millions. Thinking accurately is thinking more by the numbers in many cases. That is dull and kills the evening news, but if the goal is to arrive at the unvarnished truth we sometimes have no alternative. Connotations cling more easily to words than they do to numbers, though statistics, too, can lie.

We have a valid and unavoidable subjective reaction to everything we encounter and an equally valid objective one if we stop to think. Reasons for variability in perception aren't difficult to see. What is new or startling is more memorable than what happens all the time. News media looking for something to fill the time find more promise in what makes noise than in a hospital infection or heart attacks that afflict non celebrities. Moreover, defense spending is profitable, and exaggerated dangers can be used to generate it. Politicians hire spin doctors for similar reasons and invent slogans to substitute for meaningful discourse. Corporations hired

researchers to show that DDT wasn't harmful. Fossil fuels have nothing to do with global warming their representatives in Congress maintain.

In daily life we sort things out on the run, usually making distinctions more or less reliably. No one could function very well without being right most of the time. As a discipline, naturalism teams up with philosophy to go a step further. Astrophysics starts at the beginning and proceeds with a mechanical sequence through to a projected total entropy in the range of a digit followed by over a hundred zeros in years. Where theories follow the Occam razor principle they eliminate anything unnecessarily elaborate. As Newton rephrased that principle, "We are to admit no more causes of natural things than such as are both true and sufficient to explain their appearances." That's not a particularly debatable point, but which of two explanations is preferable often is. Does nature happen to follow invariable laws and constants, or is it designed to do so? The repercussions of the latter alternative aren't to be taken lightly. Nothing that intentionally made a universe mostly inhospitable to life, has caused nearly all species to go extinct on the one known habitable planet, and inflicted pain on the survivors is to be entertained indifferently. If such a power, intervening at will from beyond nature, isn't necessary to explain what exists we've no commanding reason to add it. Natural philosophy can make room for it only provided that the characteristics presumed for it don't contradict what it has produced. Adding a host of demons to explain what went wrong loses credibility when we consider that none ever shows itself. The size and age of the visible universe argue against it, as do such facts and figures as these: if only one in every hundred billion stars has an orbiting satellite that sustains cellular life, there would roughly speaking be a hundred billion such in the universe. A couple of missions in search of them going from here to the ends of the visible universe in opposite directions would search only narrow bands 93 billion light years each 5.88 trillion miles.

Animations do have a place. We get slightly more familiar with the fourth planet from the sun (Mars) and even the far distant Pluto because of the Roman war god and the god of the underworld. The personifications don't share characteristics with the objects, but the names are easy to remember. Field, alpine, rosy, and wooly pussytoes–to go from the immense to the trivial–project kittens into plants that have almost nothing feline about them. Other kinds of feet were on the minds of those who named the partridgefoot and the coltsfoot. Animating things in that manner to make them more personable and memorable is subjectivity teaming up with science. Names like *beggarticks* and *sneezeweed* are catchier than *Bidens cernua* and *Helenium autumnale*. The lousewort has carried a tarnished reputation for centuries despite having never deposited a louse

on anyone. That insertion of something familiar is useful and harmless and falls under convenience rather than falsehood. At least the lousewort does actually exist. *Ceres* never did. Groupthink being regional, we have less difficulty in seeing that seriously intended animations of other places are myths than we do with those in our immediate vicinity.

Nomenclature in General

Quite apart from mistaking parts for wholes and believing what isn't likely be true, any attempt to sort out degrees of probability runs into an unavoidable mismatch between words and things, as pronounced at times as the one between geometry ('land measurement') and topography. Names are deceptive in the sense that they make categories seem as real as particulars. Not until we get from abstractions down to instances do names designate actual things. In saying *that white rose* we put the object in a botanical category, with *white* distinguish it from the kind's other colors, and with *that* designating something existing at the moment. The real thing. The generic category is in the hands of botanists and gardeners. Nature itself doesn't so much as add one thing to another to get two. It merely follows regular reproductive steps to produce more of the same, the seeds of things in Ovid's panoramic creation in *The Metaphorphoses*. When we say the *actual* it is *that* white rose we mean, not whiteness categorically or the *rose* as a kind. The universe is made up of constantly changing particulars. The mechanical procedures are the invariables and constants by which they come about. We can if we wish assign repeatable patterns a secondary existence but they aren't actualized until they appear in singular instances. That objects come in repeated patterns refers us to atomic, molecular, and genetic near replication not, as in Platonism, to pre-existing idealized forms cited by category titles. In a more obviously contrived manipulation, lions are one thing under naturalism and another in monarchical symbolism. In that kind of substitution of name for thing we have no trouble distinguishing between the symbol and the object, though some of the animal's strength and ferocity may carry over to a monarch in public perception. Only the man actually exists. The office he holds is a convention, an agreed upon artifice. Insofar as it alters his own brain work and puts a crown on his head it takes particularized existence and moves from an idealization to ontology. So do the works he accomplishes one by one, these too having to be particularized in instants to move from plan to reality.

Numbering is as conventional as the awarding of names. Calculations can map the patterns and chart the regularities, and to that extent we can

endorse a mild anthropic principle and say that math too corresponds to constants like the speed of light, ever the same in a vacuum. It can specify the angle of a plane's departure from an assigned longitude and latitude at zero elevation. In fact math may be the only way to specify such things exactly. Newton's theory that gravity weakens by the square of the distance separating attracting masses is a confirmed calculation even though no one knows for sure yet just how gravity works, and as Ian Stewart (2016) points out, applying gravity to predict future motion quickly runs into figures that would disable a supercomputer (48-49), billions of trillions and trillions of billions. *Velocity* per se has no existence, nor does vector, angle, and length in the geometry branch of math. Only something moving at a speed from a starting point at an angle from another line has reality. Speed and vector and the position at a given instant are calculations of *it*, the objective thing. Thus a plane moves with respect to earth's surface along a line of flight calculated in terms of speed, longitude, latitude, and elevation.

As Scott Atran points out in *Cognitive Foundations of Natural History* (2004) and together with Douglas Medin in *Native Mind and the Cultural Construction of Nature* (2008), whereas the everyday names of folk usage work by readily visible likenesses and differences, what scientific taxa take into account often go unnoticed. Though quite different means of categorizing, these tend to be mutually supportive: "Folk biological groupings have always provided an intuitive underpinning and empirical approximation for the scientific species" (149). Noteworthy taxonomists such as Aristotle, Theophrastus, Dioscorides, Cesalpino, Linnaeus, and Darwin, have sometimes had to rearrange the categories of their predecessors to line up ancestry with offspring. Since Darwin and Wallace, the genetic heritage hasn't always been self evident. Although anyone can see that a dog has a different ancestry than a cat, not many would automatically link a Chihuahua to a gray wolf or a chickadee to a dinosaur. The history of a given Chihuahua has followed a DNA trail the individual instances of which were DNA carriers. The recurrence of the DNA combinations with slight variations, parting gradually from a line of wolves, can be said to have a formal or secondary existence, but again these too need individual instances to be actualized. Evidence for lines of descent is layered in strata and has to be sorted. Linking a sloth to ancient grazers of sea grass and seaweed is a relatively recent practice. That would have no bearing on the survival of legacy beliefs except for the illusion universal up to about Darwin that whatever has a name has existed since the hour of its making.

Common sense, science, and *poesis* have their own ways of handling

resemblance and attaching connotations to semantics. Unlike science, which calibrates differences carefully, when poems put two things together one of them is normally more familiar than the other, and both express feelings that may be more important than the semantic citation. What counts isn't so much how well we know one or the other term but how far apart they are and what emotion flashes across: "My love is like a red, red rose" locates the less tangible love at a measured distance from the familiar red rose. We know the lady herself isn't literally in the rose family or symbolically thorny, that only the beauty of a very red rose transfers. As in gapping a spark plug, poets generally want just the distance that will make mental and emotional sparks fly but not so great as to seem absurd. My love is like a green, green onion would raise a chuckle rather than devotion to beauty. Of course anyone who actually said my love is like a red, red rose outside of a poem would already be suspect. Speaking in poetry is as unnatural as speaking in legalese or with the staged majesty of a leonine king.

When poetry revives worn-out metaphors, it does so by reestablishing a distance that has collapsed from overuse. The gap between the maker's hand and a tiger is the question of Blake's "The Tiger." What possible being could have made such a thing? The naturalist's answer is that the environment shapes every part of that and other predators, the claws, teeth, burning eye. The prey and the forest were already there, and over time the bright eye, fangs, and claws grew to take advantage of them, no shaping hand or eye involved. The connotations that come with the question drop the reader into depths of mystery based on the history of personifications. Blake's questions put these to a severe test. "Did he who made the lamb make thee?" is the key to that, implying that if you use the word *God* in the context of a tiger you've attributed to the maker something wild and cruel. A common theological answer would be *yes*, the divine maker made the lamb on which the tiger can feed if it chooses, and that makes the symmetry indeed fearful. "Did he smile his work to see?" The naturalist escapes the malice in that by assuming that the tiger just happened. Environment and biology did it, tough luck for the lamb, but that's the way natural heterogeneity works. Some things in an ecological combination collaborate, some devour, some get devoured. Ovid keeps enough ill tempered deities on hand to account for nearly anything including that ferocity, one advantage of a polytheistic set, though still not plausible for the billions of trillions scattered through spacetime.

In initiating a search for common ancestry and the rules of biological replication-divergence, resemblance follows another principle in naturalism free of intent. Nature never means to go from point A to point

B. *How* it does so is the question, not *why*, although a naturalist might take up the latter question in order to dispose of it. At the level at which categories link instances, likeness and generalities belong more to taxonomy than to natural history, but the goal of science and philosophy alike is to get from instances to axioms or in this case laws of succession. These produce the likenesses and the category nomenclature, a filing and communication convenience. Making the connections is the joint business of observation and axiomatic philosophy. How stars burn and create elements couldn't be discovered without knowledge of subatomic particles. Poets, philosophers, scientists, and theologians alike were left without a blueprint until neurons, protons, and electrons were added to the record of names and concepts, the names being more or less arbitrary but having Latin and Greek roots.

Shortly after the major parts of atoms were discovered galaxies were identified and found to be moving away as if pushed from a condensed center. The master natural history narrative that took shape in outline in a few decades from the beginning to the middle of the 20th century, featuring first Ernst Rutherford's work with electrons and then astronomy and particle physics, dispelled a good many illusions that had fired the imaginations of differently oriented populations. The nuclear furnace we call the sun became something else entirely. Ancient civilizations might have fought over territory and other matters anyway, but adding illusions increased the intensity of their differences. None of this is to say that language, math, and reality don't come together nicely at times. Among fabricated buildup/breakdown/buildup objects, the Subject-Verb-Object sentence is among those capable of standing in for natural history's sequences. I'll reserve for later continental philosophy's and postmodernism's objections to discourse that simple and positive. The key to the sentence and strings of them built into paragraphs, monographs, and narrative structure is the active conjunction, the link between subject and object. Conjunctions work because both things and ideas have connections. Comment on that, too, I'll reserve for later, when the development of language can be considered as a landmark in the prehistory of *Homo sapiens*, indeed at about the demarcation line often set between *HS* and *HSS* some 50,000 years ago.

Disjunctions among things bring chaos and among ideas nonsense. Humans are unconnected to trees and rocks with respect to feelings but can be joined with them in touch or even something as ephemeral as light reflected from either and reaching the other. We have connections of all kinds with real objects that remain or keep moving when we are absent. I know the clock on the wall has continued to be there, because while I was

gone it ticked off the same span as the wristwatch I compare with it. Someone might have tampered with it, true, but I was within sight of the only entry to the room and didn't see or hear anyone. I judge the odds against any outside interference to be negligible. The clock is real and my conjunction with it is easily renewed. S-V-O in the making: "I see the clock." No tricky demon allowed.

The Shape of Things

Another indication that something presumed to be historical has been doctored is strictly formal. *If a story has an announced beginning* ('I sing of arms and the man'), *a progressive logic, covers an extended span, and ends decisively, it is fictional.* The happy endings of novels, plays, and movies aren't the problem, but the fictions of traditional cosmology can be. If they displace a great deal of natural history they become supreme fictions. Neither natural nor human history unfolds in a decisive way over long spans. It is from the present that the past is reconstructed and a conclusive future is projected. The present can in fact indicate what the past had to have been to bring it about, and the future can be predicted, but enhanced history and anything comprehensive about the future are a different matter. It is present misogyny that created Eve and Pandora and present misery that creates a future without misery.

On the extended time scale of evolution the impulse to move everything including species toward betterment did what it could with the mechanics in the later 19th century, when evolution was sometimes made out to be teleological. Had it not extracted humans from high primates? That was crucial to the effort to salvage providence and intelligent design when survival of the fittest argued otherwise. Ruskin was among the first to head in that direction. Without going to his extreme, Stuart Kauffman (1995) proposes an overall evolutionary advance from bacteria to humans that makes the latter at home in a universe graced "with a bounty of order." Meanwhile we spin "around an average star at the edge of a humdrum galaxy" (Kauffman, 71). Biological organisms can't be projected into the macrocosm with anything resembling comfort. Cellular life doesn't venture abroad physically without a closed environment equipped with oxygen, water, and provisions, and venturing abroad mentally likewise runs into the discomfort of extreme temperatures and distances outside everyone's comfort zone. However adventurous and ingenious future inventors get, humans are never going to colonize the universe.

The realistic guidelines for detecting stories that work under different

laws than the known ones are set for us by natural history. That a long range narrative ending decisively is fictional, however, doesn't hold for segments singled out and assigned boundaries for story telling purposes, as a biography can use birth and death for natural boundaries. The Olympics have opening and closing ceremonies. Terms of office are set to the hour. Someone could make up a plausible life story of a molecule, as Gamow's Mr. Tompkins imagines the life of electrons. Entire civilizations begin and end, though in that case with vital components before and after that lead another life. Some natural beginnings and ends fall within our sensory range, but enlarging the framework weakens the relation of parts. Anything inclusive is also inconclusive. The miscellany factor and the huge numbers in the microcosm and macrocosm are disorderly in total if not in all local areas. If the big bang gives way to a big crunch, making cosmic expansion and contraction into a pulsating cycle will produce an endless story. That cosmologies and world histories before the 20th century were fundamentally flawed is revealed as much by their decisive beginnings and endings as by their miracles. One day the creation got underway with a command, and another day as yet unspecified it will come to an end by the same means.

Before the radiometric dating of rock, spectrometers, and powerful microscopes and telescopes, both cosmology and earth history were based on limited observation. Not until Alexander von Humboldt's *Kosmos* (1845, 1858) was an extended and at times well theorized earth history put together. Up to that point it generally fell about four billion years short of the mark and cosmic history over three times that. Impressions strictly from within the sensory range can be misleading. A star close to earth looks larger and brighter than an equivalent farther off and neither it nor the rest orbits the planet as it appears. Even before the mind starts its processing of sensations the senses have already been at work on them. The brain filters what has made it through, sorting, putting similar things together, and composing schemes to account for them. Telescopes and microscopes, too, were used at first to emphasize wonders rather than the fuller story they would eventually help piece together.

The fleas and flies that Royal Society members Henry Power (1623-1668) and Robert Hooke (1635-1702) watched under magnification impressed them with the symmetry and beauty of the eyes and the agility and strength of the bodies. Isolated from other facts, that was surprising. Awareness of marvels caused the brilliant Hooke, master of half a dozen disciplines or what later became disciplines to conclude that "we shall in all things find that Nature does not only work Mechanically but by such excellent and most compendious, as well as stupendious contrivances, that

it were impossible for all the reason in the world to find out any contrivance to do the same thing that should have more convenient properties. And can any be so sottish as to think all those things the productions of chance? Certainly, either their Ratiocination must be extremely depraved or they did never attentively consider and contemplate the Works of the Al-mighty" (Vickers, ed., 1987, 128). Thus the quandary of Blake's 'what if', which Hooke like nearly everyone of his times failed to think through. He needed only to imagine the tiger, lamb, and smile together to see the problem, or if that didn't work, include an earthquake, a drought, or a plague. Lacking a concept of millions of years of nature-modified lifeforms, most of them failing at some point, Hooke's conclusion seemed logical within the constrictions of the prevailing world history. Even using common observation, however, he was ignoring the fragility of the insects and their mortality. It wasn't unknown that they came forth, grew, died, and disintegrated.

The information that instruments added wasn't really needed to show other irregularities in flora, fauna, and geography. If geometry sets a standard for symmetry, much of nature is irregular. It has few if any parabolas let alone anything as nifty as a hyperbola. The planet's tectonic plates move unevenly, sticking and then lurching, leaving cracks and raising mountains–earth's broken crust stood on end. Both the irregularity and the catastrophes were as evident in the 17th century as in any other time. Shorelines are rough hewn. Peaks, valleys, canyons, swamps, and forests are unshapely and home to ecological mixes whose components both collaborate and fight for space. Sir James Jeans (1932) is understating the case in saying that the universe "appears to be actively hostile to life like our own" (4). The habitable margin is extremely narrow: "At a rough computation, these zones within which life is possible, all added together constitute less than a thousand million millionth part of the whole of space" (6), an estimate on the generous side since the visible universe continues to deepen and what is visible is only a small part of the whole. He wasn't of course allowing for the possibility of billions of other habitable places.

Unlike science and natural philosophy in accounting for nature's mix of order and confusion, works of art subordinate details to a design, and it is just such crafted artifacts that set a model for lofty concepts of the universe. They are part of our projecting into something else what is a human construction. Coherence through and through is a sure sign of intelligent engineering. Art can be complex but isn't allowed to be random. Henry James in "The Art of Fiction" (2004) finds it "a kind of huge spider-web of the finest silken threads suspended in the chamber of

consciousness, and catching every air-born particle in its tissue" (434). That stresses sensitivity and perception more than order, but it also underscores design. It is the structure of the web that holds it in place and makes it receptive to whatever floats or flies near. In brief a poet reconciles things that in the real world are at odds. W. H. Auden (1962) calls an accomplished verbal artwork a community of such reconciled feelings and substances, but a verbal one only and warns against thinking that because "all is well in the work of art, all is [also] well in history. . . . all is not well there" (71). Actually all isn't well in art either except in the sense that it is coherent. Thatched huts in the forest have witches living in them who bake and eat little children.

Consciousness we hold responsible not only for imaginative invention but for value systems. The latter make use of nature but stand apart from it as framed art does. Codes of conduct may take natural history under consideration, but they are set by common agreement and framed in prescriptive language. Making a human cease to be is normally condemned except when nations call for doing it on a large scale. (The 'thou shalt not kill' tenet of the decalogue is violated wholesale at the command of the figure who presumably issued it.) Justice, compassion, temperance, beauty, courage, glory, generosity, foolishness, and sadism are sufficiently removed from anything material to justify Thomas Huxley's separation (in *Science and Morals)* of mental things from external things. Comparatives such as *more glorious*, *wiser*, *kinder*, and *crueler* are judgmental. They assume an average compiled from numerous instances that in most cases haven't been methodically tabulated. They are constituted both *within* and *against* nature.

Bacon's distinction between history and *poesis* offers an explanation not for value systems per se but for hypothetical and imaginative projections of value. Made in the divine image in his view, the soul has a higher sense of perfection than anything it finds in nature. Though that doesn't account for monstrosity myths, guileful figures like Isis, or treacherous ones like Marduk and Orestes, it does suggest why images of perfection are appealing and why we like to think them real: "The use of this Feigned History hath been to give some shadow of satisfaction to the mind of man . . . wherein the nature of things doeth deny it" (186), hence golden age myths. Ending a fable with poetic justice remedies a glaring defect in history and is one of the appeals of fiction. The reason for heroic modes is that people seek more ample greatness and more exact goodness than history normally illustrates. They desire magnitude, and so "poesy feigneth acts and events greater and more heroical." History, Bacon adds in *The Advancement of Learning*, lacks what we crave. The episodes of