

III

Blunt.Force.Trauma.

“ . . . and you see a tortoise, it's crawling toward you . . . ”

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Life (un)Expectancy

Prejudices and egoism . . . have placed barriers around each of us which constrict our view. If they are removed, if we resolve to leave behind the narrow conceptions of space and time which bourgeois life offers us, and no longer to view the world from the base, self-centered perspective, which sees advantages here, disadvantages there for us or our species, but rather to admit the facts in their naked truth, then the cosmos reveals to us an image of unspeakable grandeur.

– Eduard Suess, cited in Deborah Coen, “Big Is a Thing of the Past” (2016)⁸⁶

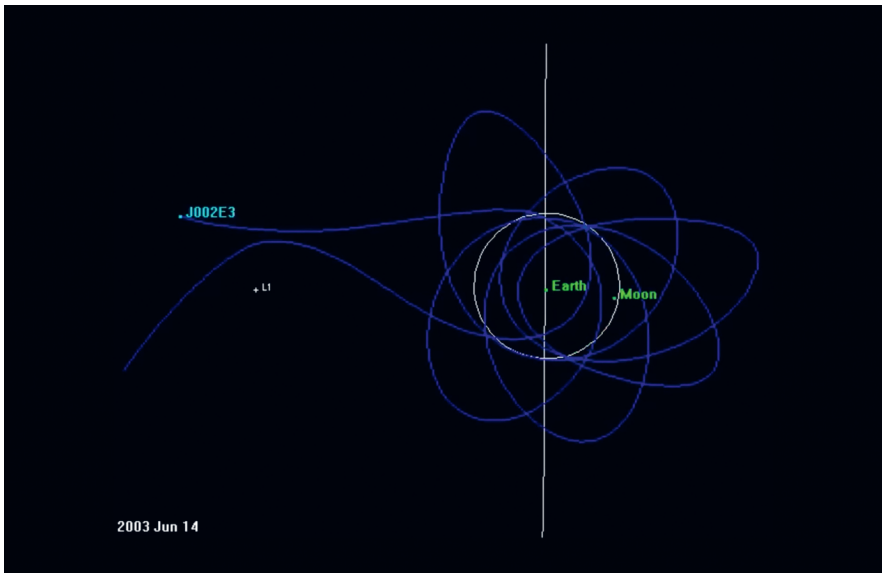


Fig. 6: Doing the rounds: J002E3, 14 June 2003.
Computer simulation by Jet Propulsion Laboratory, NASA, 2003.

Life takes such extraordinary twists and turns that the prefix ‘extra-’ fades away over the eons. During which, extraordinary becomes plain old –ordinary. Trace a path of life’s twists and turns and they resemble a sunflower stem capped by radiating petals. At least when viewed as a still frame from the vantage of a computer animation. The eye of the beholder here is a machine.

The computer animation starts innocuously enough: a yellow dot for a star, surrounded by a radiating series of emanating circles, like pond ripples after a

⁸⁶ Eduard Suess, translation cited in Deborah Coen, “Big Is a Thing of the Past: Climate Change and Methodology in the History of Ideas,” *Journal of the History of Ideas* 77, no. 2 (2016): 319–320.

stone has gone plonk. So far the location could be any of the billions of billions of solar systems: gaseous spheres powered by thermonuclear fusion reactions, orbited by captive rocky and/or gaseous planets.

At this point in the animation, the emanating circles take a more familiar form: the solar system is ours, and the object of its vision is the merry go round of our planet and its sole natural satellite – the moon. The animation's perspective looks down on our solar system from high above earth – start at the Arctic and go due Up for a distance equivalent distance to that between earth and our sun.

The ordinary twists and turns become extraordinary when an object enters at screen left. An emanating ripple, J002E3, is tracing a radically different path from the obedient series of emanating circles that make up our solar system: it is skirting a wayward path around the sun.

On its current path J002E3 is captive to heliocentric orbit, meaning it will bypass earth and stay subservient to its master. But J002E3 is on a trajectory towards Lagrange Point One, the point where a gravitational truce exists between exactly equal pulls toward earth or the sun. As it passes the point the object turns dramatically, because its existing trajectory and velocity means it cannot be party to this truce. It appears to bend around Lagrange, changing course by a full 90 degrees as it passes through a phase transition of gravitational forces. Then heliocentric, now geocentric. Then 'captive to the sun', now 'captive to earth.'

Once on the earth-side of this phase transition, J002E3 picks up speed, as Earth's gravitational pull grows ever stronger, followed by additional lure from the moon's gravity. J002E3 is drawn toward earth on a close slingshot trajectory – bringing it even closer to earth's surface than the moon. Then, having orbited only one hemisphere, it is as if J002E3 is repulsed by earth itself and slungshot back into space to nearly the same distance as Lagrange Point One.

So goes the first month of twists and turns, after which the trajectory only gets more convoluted and contorted. At the zenith J002E3 comes to a crawl, its escape velocity overpowered by earth's pull. Only to be lured back in and spat back out, not once, but six times. Each eccentric orbit traces another sunflower petal trajectory, with each petal cast by a new orbital trajectory around earth. By the time its pathway has painted six of these petals, the trace of all twists and turns conjures up a complete sunflower.

The object is first noticed by an amateur astronomer Bill Yeung on 3 September 2002. Yeung promptly alerts professional astronomers, who are as confounded as he. Their initial interpretation places J002E3 as an asteroid. So far nothing new here under the sun – asteroids come and go all hours of the day. And, when they are joined by unpredictable new arrivals, asteroids discount baseless ideas of 'if' and 'when' rather than "whenever": meaning whenever that "six-mile-wide asteroid hits your planet with the force of over a billion nuclear

bombs.”⁸⁷ That our planetary borders can be secured by mapping every near-earth object is mere fable in a cosmos where any of those objects may well be something new under the sun.

However, during our tenure on earth, it has only had one sizeable captive object: the moon. If it has captured a new asteroid, then this is something new under the sun. This initial interpretation of J002E3 was however confounded by how orbital perturbations of earth and the moon ejected all known geocentric objects eons ago. While the solar system’s formation saw proto-planets trap innumerable proto-satellites, they were all long since progressively shaken off by earth’s orbital perturbations. This makes the arrival of a new geocentric object something that does not happen once-in-a-blue moon. It is something that happens only a-handful-of-times-in-a-solar system, and a solar system’s lifespan is counted in billions, not millions, of years. Either the strata by-laws of expectations about predictability and periodicity need to be rewritten, or J002E3 is an asteroid from another solar system. Yet that is also something that only happens a-handful-of-times-in-a-solar system.

The surprise visit conjures up those unknown unknowns: events that can never be counted or countered. A reality where some cosmic progeny make for yet another terminal location for the “cataclysm upstream,” begetting a future securely determined by events that have already transpired. A future where what lies in wait has already been set in motion by the stars innumerable years ago. When the Stegosaurus cottoned on to Chicxulub’s imminent impact, he was only catching on to the tail end of a process whose most immediate path had been 160 million years in the making. Chicxulub had travelled across the cosmos all that time before terminating at/on/in earth. And before that journey, there were all the processes that led to the collision of two objects, which created Chicxulub and ejected it in the trajectory that eventuated in its earthly termination.

As with the abiotic cosmos, so too with the biotic which hitches a ride aboard it. Chicxulub is thought to have been created from a collision between its parent body and another at about the same time that many species of dinosaurs first appeared on earth, around 225 million years ago during the Late Triassic epoch. Meaning that the limited tenure of non-avian dinosaurs was already written in the stars, just as they were starting out.⁸⁸ In the same way Chicxulub cleared out dinosaurs for mammalian ascendancy, the Triassic-Jurassic Extinction Event had

⁸⁷ Brusatte, “Asteroid Killed Dinosaurs.”

⁸⁸ Amir Siraj and Abraham Loeb, “Breakup of a Long-Period Comet as the Origin of the Dinosaur Extinction,” *Scientific Reports* 2 (2021): 3803.

previously cleared out the then dominant clade of archosauromorphs (known as “ruling lizard forms”), paving the way for the period of dinosaur dominance over the 140 million years between. Like mammals meekly living alongside dinosaurs for 150 million years before their ascendancy to the throne, dinosaurs lived alongside archosauromorphs for 40 million years until the Triassic-Jurassic rupture, when all but crocodylomorphs, pterosaurs, and dinosaurs went extinct.

The universal sigh did not begin with the Stegosaurus comprehending Chicxulub, just as dinosaurs were neither the first nor the last endlings. Rather, the universal sigh was born as soon as the tenure of one dominant lifeform, having become overly accustomed to ordinary twists and turns, suddenly cottoned onto an extraordinary incursion, whether that realisation manifests as a J002E3 or the moment “when all of a sudden you look down and you see a tortoise, it’s crawling toward you . . .”

Spoiler alert: whatever *it* is, it does not end well. Never did. Never will. The trajectory of tragedy is written in the stars and encoded into the cell. Comedy suffers the same fate, but it does so with a wry smile. “This? This is how it plays out?” it asks. “Yes”, answers back the wind, “Because that which it played out for ruptures one through none.” In this fable, eccentricity is consciously uncoupled from being earth-centric, foreign bodies are no longer judged according to whether they pivot perfectly around us, local bodies no longer burned at the stake for advocating the gospel of becoming ex-eccentric: no longer seeing earth or ourselves at the centre of orbital observance or subservience.

For nineteenth century geologist and biologist Eduard Suess, it is only by “admit[ing] the facts in their naked truth” that “the cosmos reveals to us an image of unspeakable grandeur,” albeit one which it just so happens to be dour and joyous in equal measures of tragedy and comedy. It is tempting to read the dourness of this image of the cosmos as tragic, or as manifesting Suess’ “disadvantages . . . for us or our species,” and likewise its joyousness as comedy or “advantages.” But a dour demeanour is not concerned with demarcating the human from nature, but rather folding the human, as a biophysical lifeform, into the cosmic void, no more, no less. And, given the two are co-constituted, of folding the cosmos into the human.

This act of folding is merely an attempt, perhaps ill-fated, to transcend the anthropocentric by way of a dour demeanour, in favour of the zoecentric, as the worldview befitting of the cosmos life calls home. It is no coincidence that Suess expounded such a worldview, forged as it was from his ground-breaking geological research, including coining the concept of the biosphere in 1857.⁸⁹ Though it is also no coincidence that Suess’ vision of cosmic grandeur was ill-fated too: his

89 Eduard Suess, *Die Entstehung der Alpen* (Vienna: Braumüller Verlag, 1875): 168.

manifesto promoted a collective we-the-species over petty intra-species squabbles between nation states and other such arbitrary tribes. But escaping such fates is like J002E3 trying to escape geocentric orbit – there can be no true transcendence of the anthropocentric until there is no anthropos, just like there can be no anthropos without tribes warring with one another.

Following Suess, “if we resolve to leave behind the narrow conceptions of space and time which bourgeois life offers us” how *on earth* then can the moral arc of the universe be seen as bending toward justice? J002E3 may bend toward earth’s gravity, and so too may a Chicxulub. And, provided their progeny is of cosmic origin, they make mockery of such a thing as morality. Whereas progeny of human origin makes for the make-believe variety, of wishful thinking morality in a universe that is amoral.

After all, it only takes a slight trip of the tongue to conflate the moral of a story with the morale of a story. If a story reveals morals to be yet another hollow conceit, then a morale based on such should follow suit. Belief that justice or morality can negate entropy appears spurious in a universe whose arc bends solely toward random acts of gravitational kindness/cruelty. When is the next “when-ever” that an extra-terrestrial body will mesh with the terrestrial? Compressing a five-million-year formation of the Panama Isthmus not into five decades but into five minutes. How long ago did the next “whenever” start? To whom would it matter if it happened five minutes, or five decades, or five million years from now? Or should that be to *what* does it matter?

For the time being, given how infrequent a “whenever” generally is, unannounced arrivals from outer space can generally be put aside. In contrast, earth is constantly influencing, and being influenced by, the waxing and waning of passing objects that never come close to touching it. How then are climate and evolution susceptible to bodies that never even bear down upon earth? From the ordinary of the moon’s orbit, to the extra-ordinary of an unannounced arrival, like a J002E3, how can human creations such as morality take heed of the amoral nature of the cosmos? Therein, recasting the “cataclysm upstream” as an exquisite sunflower written into the stars, even if the writing reveals that only a dour demeanour befits the unfolding rupture.

earThia

There are some oddities in the perspective with which we see the world. The fact that we live at the bottom of a deep gravity well, on the surface of a gas covered planet going around a nuclear fireball 90 million miles away and think this to be normal is obviously some indication of how skewed our perspective tends to be.

– Douglas Adams, *Is there an Artificial God?* (1998)⁹⁰

The life of man is of no greater importance to the universe than that of an oyster.

– David Hume, “On Suicide,” (2015 [1777])⁹¹

Earth came into being 4.54 billion years ago, give or take a point-something or point-zero-something or two. Two hundred million or so years later, earth consumed and was consumed by, direct collision with Theia, a Mars-sized planet. Earth is actually earTheia: a plural planet made of the sum of two bodies merged, not a cannibal that ate its wayward neighbour. Meaning the phrase *What on earth, on Earth?* should acknowledge the actual planet being referred to: *What on earTheia, on EarTheia?*

The innumerable gifts that emerged from this merging begin with the melted and melded earTheia that ensued. This melding also begat the moon, formed from consolidated detritus ejected in the momentary collision. But the gift that this event keeps on giving goes to life itself – in the evolutionary dance between vulnerability and volatility.

Already resplendent in such ordinary twists and turns as Teahupo’o and Hurricane Irene, at the scale of the cosmos the dance of these two tricksters provides the mandate for re-writing the strata by-laws of extraordinary predictability and periodicity on earTheia. The interplay between planetary and galactic is venerably displayed in the element central to Teahupo’o and Hurricane Irene: water. Another gift from the cosmos, delivered by way of hundreds of millions of years of barraging asteroids and comets and yet so indispensable for life that 73% of the walnutshell comprehending this gift inside the reader’s skull is itself made up of water. Taking that gift for granted, the gift to life is how water behaves due to earTheia’s ongoing reverberations. Or as they are more commonly known: tides.

At face value it appears a no brainer that *a moon* orbiting earth is the principal cause of tides. Beyond face value, the fact that *The Moon* orbits with relative

⁹⁰ Douglas Adams, “Is there an Artificial God?”, transcript of speech delivered at *Digital Biota 2*, Magdelene College Cambridge, September 1998, accessed 11 September 2021, <https://digitalspace.com/biota.org/people/douglasadams>.

⁹¹ David Hume, “On Suicide,” in *Essays, Moral, Political, and Literary*, eds. Thomas Grose and Thomas Green (London: Longmans, Green, & Co., 1875 [1777]), 66.

stability is the principal determinant of tidal periodicity. Say *The Moon* orbited instead like J002E3, then highly erratic tides would vary by orders of magnitude more than at present, in proportion to this imaginary J002E3-Moon's orbital eccentricity. Plot a J002E3-Moon's tidal periodicity on a cartesian graph and it would resemble J002E3's orbital trajectory of a sunflower: sea level drops 30 metres for eight hours, rises 80 metres for two weeks, drops 20 metres for 16 hours . . . Rinse and repeat, rinse and repeat. Such erratic variance would be intolerable for life-forms whose limits are defined by sea surface or sea shore proximity.

Consider the coral at Teahupo'o in terms of its limits for proximity to the surface of the sea. The non-living parts of hard or stony corals have fixed shapes and positions that collectively form reefs and reef breaks that end less than a metre below the water at low tide, such as Teahupo'o. Their presence at precisely that wave-accentuating depth is due to coral's need to be submerged in sufficiently salinated water, but also with sufficient sunlight. A colonial lifeform, the animal living within each coral structure keeps growing to be close enough to the sea surface, in the process secreting an exoskeleton-like rock that makes up the maze beneath.

Proximity limits to the surface arise because coral's principal energy source is the gift of zooxanthellae, microscopic algae living in their tissue. It is as if coral subcontract their energy absorption to zooxanthellae, who derive energy from photosynthesis. The flip side of the gift is coral's soft tissue, which provides refuge for the algae to live in. The merry go round of giving and taking means that coral and zooxanthellae are entirely symbiotic and co-dependent, thus the flip side of the merriment is simply that if one goes, the other goes too: "Ring-a-ring o' roses/A pocket full of posies/A-tishoo! A-tishoo! We all fall down."⁹² Just as the children dance in a circle, singing of human vulnerability to plagues in the nursery rhyme *Ring a Ring o'Roses*, coral's limits to life are inextricably bound to zooxanthellae's limits to life. Everything, everywhere, all the time, mixed up, woven into, and bound to all else.

Coral's dance between vulnerability and volatility means – *inter alia* – they die from overexposure to solar energy if exposed for too long above the sea surface. No different from us or our desert turtle. But sunk too deep below the water and they die from lack of chemical energy, because their live-in-outsourced energy providers cannot get enough exposure to sunlight. Tides caused by a J002E3-Moon would vastly outstrip coral's limits, along with all lifeforms nominally evolved for tidal periodicity caused by *The Moon*. Coral able to tolerate being

⁹² Gloria Delamar, *Mother Goose, From Nursery to Literature* (Lincoln, Nebraska: iUniverse, 1987), 38–39.

above water for days at a stretch, then tens of metres beneath the surface for weeks could no longer be ‘coral’: at that point, it would be another organism that had evolved to tolerate such limits, or died trying.

(*Caveat the nth*: evolution throws up rules, exceptions, rules to the exceptions and exceptions to the rules. Even on a finite planet, some coral already specialise in extreme tidal variation, such as those that live off the Kimberley coast in Australia, and others specialise in surviving in the relative darkness of the deeper ocean. Therefore, in an infinite universe, we withhold these truths as self-evident: that wherever life may exist, lifeforms may also have evolved to tolerate J002E3-Moon tides).

By extension, an earth with J002E3-Moon tides would be another world altogether. Picture the myriad submarine species depending on coral for their shelter and/or food and beyond, given that these extend well beyond the ‘frontline’ or first-affected, who are sensitively attuned to littoral or submarine zones. Their tolerance limits would become so modified that they would also collectively evolve into completely different lifeforms, or die trying. This would apply to all marine species and species living in littoral zones, the shifting sands where land meets ocean. The push and pull between volatility and vulnerability would be ceaseless, just like the push and pull between evolution and extinction. The only limit would be the size of the arbitrary lens through which one wanted to fathom the periodicity and eccentricity, just like the arbitrary framing in the animated reconstruction of J002E3’s twists and turns.

In a nutshell, tidal periodicity shapes the macroevolution of life. Not to imply that our arbitrary ‘ordinary’ is more conducive to life than all the ‘extraordinary’ it excludes. A planet with *The Moon* tides is not necessarily more advantageous to life than one with J002E3 tides, because the vicissitudes of the cosmos have a habit of punishing the complacency that occurs when life does not have to continually negotiate the limits it pushes up against. What then, when tidal periodicity from *The Moon* undergoes a phase transition to J002E3-like tides?

In a nutshell: the moon is moving away from us. The gift that keeps on giving is giving up on its creator. Although it was never completely subservient to its creator to begin with: it has been moving away from earTheia since it was first spat out. If twenty-first-and-last century human forcings of the currently unfolding rupture do not set in motion unstoppable processes that result in the oceans boiling away eons from now, then there will still be tides. By this point, almost as far into the future as the 4.54 billion years between now and earTheia’s genesis, the moon’s gravitational pull will be so weakened that tides will vary much less than they have for the last billion or two years. Picture this weakened tidal variation with a mock figure of one metre tidal variance either side of a baseline. Then, once in a blue moon, say every 100 millennia, the moon is pulled off its

ordinary orbit because it is so much further away from earth that it has become more susceptible to other planets' passing orbits.

It is still principally captive to earth, its master, but it now passes between different masters, like J002E3 passing from heliocentric to geocentric orbits. During these once-in-a-blue-moon phases of passing between different masters, the moon's drastically altered orbit now makes the tidal range vary 10 metres either side of the baseline. Picture this extraordinary event lasting for a century. Many lifeforms attuned to only one metre variance will go extinct because one century is simply not enough time for them to evolve and adapt, or migrate and escape. Gary Larson's Stegosaurus ushers in the rupture of Chicxulub, but his real-life kin were actually decimated 84 million years before the asteroid struck, due to an inability to deal with more much more gradual biophysical changes than those posited here. And these figures are sketched on the back of an enveloping mind – take any figures, because in keeping with the Dour, cosmic changeability and its consequences apply regardless. And they apply to life at large, no matter what our tiny human morals and expectations and misconceptions make of it.

Hume stated that the “life of man is of no greater importance to the universe than that of an oyster,” but we insist on seeing otherwise. We insist that morals are meant to exist, despite the vacuum of the void. In macroevolutionary matters which eviscerate such anthropocentric narcissism, the ability to adapt to *The Moon's* tidal variation thus comes in handy when earTheia shifts between climate regimes. Species attuned to the shifting sands of littoral zones have some existing mobility because of daily movements to tolerate tides. And, where this tidal range dictates, some coral have evolved to tolerate being above water for a few hours each day, because the daily tidal variation means there is no optimal height where they can remain always underwater, and get enough photosynthetic exposure.

To go from the ordinary twists and turns to extraordinary ruptures is to go from the daily shuffle of *The Moon's* tidal variance to being able to tolerate seismic change of a J002E3 ilk. This goes far beyond the ocean rising 130 metres to its present tense height after the Holocene ended. Such seismic change does not even constitute something extraordinary, for it is rendered imperfectly ordinary when viewed from the vantage of a computer animation replaying any history of any solar system.

Immediately above the computer screen where these words unfurl my view stretches out onto the present sea height, which makes the terrestrial edge of Australia. My balcony is a stone's throw from the littoral zone of Sydney Harbour, where the sea comes inland. Before that (most recent) 130 metre sea level rise the littoral zone lay 18 kilometres to the east. Meaning that such seismic scurrying from those marine critters carries in their swimstep the legacy of advantages

conferred by daily scurrying from the moon’s tidal periodicity, where Sydney is a mere synecdoche for the stage of range variation across all earthly ecosystems.

Tilting my view higher, to look much further above the computer screen, the moonlight that I write by provides not just illumination, but a telling reminder of how the moon also provides gifts that keep on giving, by reducing some of earth’s greater eccentricities – both orbital and tidal. Tidal periodicity exerts a stabilising effect on earth’s orbit, though the more pronounced effect comes from the moon’s orbit around earth itself. Without counterbalance from one’s own sizeable satellite, a planet’s orbit oscillates much more wildly, like Mars, whose sole companions are fear and terror: the names of its two satellites Deimos and Phobos. Even collectively they are but one hundredth the size of our moon, providing Mars with a negligible counterbalance compared to earth.

But even though the moon is a gift that keeps on giving, the cosmos is not in the habit of bestowing gifts without conditions. Life is still at the behest of more radical, yet quite predictable change, despite a local gravitational force which curbs earth’s wilder enthusiasm for orbital eccentricity. Once again, these persistent orbital twists and turns lead all the way back to earTheia. For that merging is also a theft that keeps on taking, in perturbations that make climatic precarity perfectly ordinary.

About “About the Issue of the Astronomical Theory of Ice Ages”

Every man takes the limits of his own field of vision for the limits of the world.

– Arthur Schopenhauer, *Studies in Pessimism: The Essays* (2004 [1893])⁹³

What if everything in the world were a misunderstanding, what if laughter were really tears?

– Søren Kierkegaard, *Either/Or: A Fragment of Life* (1992 [1843])⁹⁴

Perturbations from earTheia’s aftershock continue to reverberate through slight variations in earth’s eccentricity, axial tilt, and precession. These variations are mere fragments among the cosmic menagerie of catalysts for climate regime shifts: earTheia is not the root of all good and evil for climate changes of astronomical origin. Orbital perturbations also owe to the push and pull of other planets in the

⁹³ Arthur Schopenhauer, *Studies in Pessimism: The Essays*, translated by Thomas Saunders (Whitefish, MT: Kessinger Publishing, 2004 [1893]), 23.

⁹⁴ Søren Kierkegaard, *Either/Or: A Fragment of Life*, translated by Alastair Hannay (London: Penguin, 1992 [1843]), 38.

solar system, whose twisted tales and breadcrumb trails, if pursued, would reveal yet more layers of the World Turtle.

Acknowledging these rabbit warrens, but staying closer to home, earTheia relates to aperiodic ruptures of life as the collision seismically increased the planet's core density, and thus its volume of magma. Thus, the exceptionally high levels of volcanism on this specific planet with all the ensuing particularities must also be included on the list of gifts that give and take. The residual impacts of earTheia on earTheia's orbit – a veritable catch-22 in spades – still remain front and centre though, even though we have long since abandoned notions of 'front' and 'centre' when talking about an infinite universe or the interstices of our walnut shell minds.

Suffice to say that the residual impacts are akin to spinning a spinning top the size of a solar system and pushing the top away as it is released: the spin will retain residual eccentricities in its movement, right up until it comes to a rest. Earth does not come to a rest until the sun swallows it whole five billion years from now – so the residual eccentricities will manifest in the spinning top until this limited 'forever' comes to an end.

Within the menagerie that is this particular solar system certain patterns of misbehaviour show atomic clockwork precision. It was only confirmed that a once-in-a-blue-moon alignment between earth, Venus, and Jupiter warps their respective orbits, causing earth to change from a circular to a 5% elliptical orbit and back again, every 405 millennia, for at least the last 215 million years. An orbital shift of this magnitude can affect the planet's climate (in terms of season length, and amount of solar radiation received, for example). The Age of Dinosaur's began roughly 225 million years ago, and ended roughly 160 million years later, so even it was subject to climatic regime shifts amplified by orbital eccentricities. Not that each cosmic forcing was uniform – the 405 millennia cycle would have negligible or dramatic effects depending on the interaction of this loop with other planets' periodic cycles and/or aperiodic sunflowers.

The periodicity of the 405 was only confirmed in 2018, by combing through fragments of Arizona's Petrified Forest National Park for evidence of climatic change. The area, so named, because of the abundance of petrified tree wood from the start of the Age of Dinosaurs, the period of dinosaur dominance starting 225 million years ago. Once again, volcanoes feature in the extinguishing of life here: these fossils are the living, frozen in the moment they were buried under volcanic ash. It is in this ash that the evidence of the 405 millennia cycle was finally found, because volcanic ash preserves data on different elements of the climate during precise time periods: a Pompeii for trees, and once rendered into strata, such petrified lifeforms tell this long-predicted tale of cosmic clockwork.

Yet the periodicity of the 405, and its enshrinement in earth's strata via an eruption, highlights how astronomical origins for climatic change play out in

concert with whatever is happening on the stage itself. Say earth is being consigned, for the umpteenth time, into a glacial era by a variation in axial tilt. This consignment will play out very differently on earth before/during/after a Panama Isthmus or its unknown unknown equivalents. Because forcings from cosmic origins may be offset or amplified, depending on what biotic and abiotic forces are at play on and beneath earth's surface.

Looking at the stark contrast in climate pre- and post-Panama, Serbian polymath Milutin Milankovitch hypothesised about how particular perturbations catalysed transition points between ice ages. Deducing that earth's eccentricity, axial tilt, and precession occurred in cycles of 21, 40, and 100 millennia respectively, he then correlated these with transitions between glacial and inter-glacial periods. With each recurrence, earth's energy balance shifted from positive to negative, or vice versa. And with each shift, the world-as-it-was went and the *New World Coming* took its place.

Having calculated how susceptible climate was to these perturbations, Milankovitch was still stuck with the question of why his model only applied in the period following the formation of the Panama Isthmus. The same cycles have been occurring since time immemorial, but pre-Panama, they did not induce regime shifts. To boot, there was also the question of why the perturbations only amplified the onset and/or severity of glacial, and not inter-glacial, periods.

A mathematician, astronomer, climatologist, and geophysicist, Milankovitch founded the planetary climatology of our own backyard through to that of our planetary neighbours. In essence, he solidified the foundations for a developed sensibility toward the relationship between volatility (planetary motion), vulnerability (living individuals) and vitality (evolutionary adaptation). And he did so over a century ago.

Milankovitch's seminal paper outlining this sensibility – *About the Issue of the Astronomical Theory of Ice Ages* – was published in 1914, at the outbreak of World War One. Interred as a prisoner of war between Serbia and the Austro-Hungarian empire, Milankovitch described his first night in prison in his journal:

The heavy iron door closed behind me . . . I sat on my bed, looked around the room and started to take in my new social circumstances . . . In my hand luggage which I brought with me were my already printed or only started works on my cosmic problem; there was even some blank paper. I looked over my works, took my faithful ink pen and started to write and calculate . . . When after midnight I looked around in the room, I needed some time to realize where I was. The small room seemed to me like an accommodation for one night during my voyage in the Universe.⁹⁵

95 Milutin Milankovitch, *Canon of Insolation of the Earth and Its Application to the Problem of the Ice Ages*, translated by Israel Program for Scientific Translation (Washington, DC: US Department of Commerce and the National Science Foundation, 1969), 111.

As it turned out, Milankovitch's prison room lasted only for one night of his voyage into the universe – shortly thereafter he negotiated his release. He kept his head in the clouds, probing the cosmos, while a rancour of inter-human state-sanctioned mass-murder unfolded around him (a rose by any other name is a euphemism). While the world went to war, he traced discernible trails between earth's changeable motion, the evolution of life on it, and determined by inference, that cataclysms are recurrent events, subject to the whims of passing planets mixed with orbital variations still carrying out from earth becoming earTheia. His work continued throughout World War One and into World War Two, scouring scholarship and performing calculations for decades after the nominal passage from war to peace and back to war again. His journal excerpt about when "the heavy iron door closed behind me" is from *Canon of Insolation of the Earth and Its Application to the Problem of the Ice Ages*, published in 1941, despite a bomb destroying the manuscript at the printers.

If we are to accept Nigel Clark's invitation to "the event of our time," which is to embrace the universal sigh that "climate is responsive to our nudges only because it is far more precarious than we ever dared imagine,"⁹⁶ we must also apologise for our tardy response. For the "event" has been running now for over a century, at least for the ilk of a Milankovitch.

Taking up Clark's invitation was something successfully thwarted in the century since *About the Issue of the Astronomical Theory of Ice Ages*. Thwarted by what? By the collective societal embrace of sheltered worldviews, and a society that chose to sing the 1842 version of *Three Blind Mice*, never mind the 1609 version. Instead of embracing a 1555-and-then-some fidelity to the cosmos, the collectively sheltered worldview fostered a new kind of prison, closed off to the cosmos and its random acts of gravitational kindness/cruelty, although the closure was in ignorance only. The actuality remained as open as earThia to a Chicxulub.

The new kind of prison reigns so supreme that "the event of our time" inhabits a cage Max Weber warned against entering a century ago, in 1905:

No one knows who will live in this cage in the future, or whether at the end of this tremendous development entirely new prophets will arise, or there will be a great rebirth of old ideas and ideals, or, if neither, mechanized petrification, embellished with a sort of convulsive self-importance. For of the last stage of this cultural development, it might well be truly said: "Specialists without spirit, sensualists without heart; this nullity imagines that it has attained a level of civilization never before achieved."⁹⁷

⁹⁶ Clark, *Inhuman Nature*, 31.

⁹⁷ Weber, *The Protestant Ethic*, 181–182.

Nowadays we live "in this cage in the future" courtesy of the century of "tremendous development" since, when "entirely new prophets" did arise, though their dour visions remain as marginal as they are unpalatable. Harking back much further to the ghosts in our shell are the voices of older prophets who still permeate through us, though their antiquity has further suppressed any "great rebirth of old ideas and ideals." Having eschewed both of these, we instead underwent "mechanized petrification, embellished with a sort of convulsive self-importance." All and one blind to all which falls outside their narrow purview. Indeed, the twenty-first-and-last century, akin to Weber's "last stage of this cultural development" is one that "imagines that it has attained a level of civilization never before achieved."

Such is our self-perception. But, in their own way, even Arizona's petrified trees would have 'known' the first and third parts of the universal sigh. Not in our anthropocentric sense, but just in their own inimitable way, whatever that is, for we shall never be able to know their knowing. The eruption that subsequently buried them in ash would have alerted them to how "the world's climates are changing" via their elaborate sensory mechanisms. Like *Stegosaurus* upon his stage, they would have issued forth such proclamation, via their ability to communicate to one another through the so-called wood wide web, although, ironically, their chagrin would have been that 'the dinosaurs are taking over.'

On the more cerebral plane, the trees would have 'known' that they "all have a brain about the size of a walnut." The recent field of plant consciousness argues for such vegetal forms of cognition and comprehension, via staggering experiments that have revealed such behaviour. Our notions of words for such more-than-human thought are again poor proxies, just as our knowing cannot know their knowing.

So, against such delusions of civilisation, progress, and human exceptionalism, the Dour is the prophetic voice that throws a spanner into Weber's "mechanised petrification" by acquiescing to Suess' "naked facts" of a cosmos such as it is. In so doing the Dour eviscerates any notion of positive "development," whether of "entirely new prophets" or "a great rebirth of old ideas and ideals." Instead, the Dour declares that this "mechanised petrification" is the thing that broke the spanner, and not the other way around. It declares, contra Hume, that no philosophy can "improve the world" because the world never required any improvement, whether for the *Stegosaurus*, the coral of Teahupo'o, the trees of Arizona's Petrified Forest National Park, Lucy, LUCA, or, of course, us.

How then to break free the cage within which we live? No longer conflating myopic worldview for cosmic purview, nor manifesting Schopenhauer's man, who mistakes "the limits of his own field of vision for the limits of the world." No longer expecting predictability or periodicity, rhyme or reason. No longer abhor-

rent at the “cataclysm upstream,” but warming to its embrace. No longer conflating the morale of a story with the moral of a story. No longer rejoicing in civilisation so-called, but warming to its ever-tenuous and ever-contingent enmeshment in cosmic forces impervious to prisons, no matter how impenetrable a tyrant’s rampart. A civilisation unmasked as a hollow conceit against cosmic vicissitudes reveals something arising in its stead: a meek purview for equanimity between being and becoming petrified.

The Limited Sunset

Come, let’s away to prison.
We two alone will sing like birds I’ th’ cage.
– William Shakespeare, *King Lear* (1606)⁹⁸

How mutable are our feelings, and how strange is that clinging love we have of life even in the excess of misery!
– Mary Shelley, *Frankenstein* (1818)⁹⁹

If volcanoes bring earth’s fiery belly to its surface, and the sun brings gravitational centrifuge to earth’s shifting climates, then other stars bring both warmth and cold comfort to their captive planets. For though all that lies above and beyond incarceration may overshadow worldly predicaments, this cosmic purview does not so much break the cage free for escape, as obliterate it and its captives. Literature is for the living, just as obliteration is for those endings who observe stars not just for the cold comfort of cosmology, but also in search of demeanours appropriate to living during a rupture of life on earth. The Dour is a demeanour premised on how stars cast perspective over a worldview that restricts itself to the world, and hypocritical societies that imagine themselves to be the world, rather than merely of the cosmos.

Oscar Wilde brought this demeanour into his 1895 play *Lady Windermere’s Fan* when he declared that “we’re all in the gutter, but some of us are looking at the stars.”¹⁰⁰ Given that “we live submerged at the bottom of an ocean of air”¹⁰¹ as does all terrestrially-bound life, it may appear that we have always been in the

⁹⁸ William Shakespeare, *King Lear* (Oxford: Oxford University Press, 1957 [1606]), Act V, Scene III.

⁹⁹ Shelley, *Frankenstein*, 311.

¹⁰⁰ Oscar Wilde, “Lady Windermere’s Fan,” in *The Importance of Being Earnest and Other Plays* (London: Penguin, 1940 [1895]).

¹⁰¹ Torricelli, quoted in Walker, *An Ocean of Air*, 24.

gutter. However, Wilde captured the something new under the sun of his time, contemporaneous with Weber's "tremendous development" and Suess' vision of the cosmos as "an image of unspeakable grandeur," and only a little before Milankovitch's "one night during my voyage in the Universe." Common to all is the human condition of a body horizontal in a guttural predicament, but with mind breaking free of this constraint: to look at the stars is to receive wave particles of light that have travelled across the cosmos, into your retina, to be decoded into the picture play that is your mind. This is what it means to live within the insufferable cage that imprisons the body by escaping it with the mind, because the mind is vulnerable and open to the cosmos to which it is hitched.

However, as with all romantic quests, a sleight of hand or a decoupling of mind from body makes only a fleeting escape from prison. Three years after Wilde wrote this adage, his guttural predicament became literal, imprisoned as he was for his homosexuality. Like Milankovitch, Wilde looked at the stars from behind a heavy iron door, though his sentence lasted much longer than just one night. Over a century later, sightlines to the stars are bygone, at least for most guttural vantage points. Those venerable light particles no longer penetrate retinas because they are blocked by pollution: light pollution to heavy pollution and everything in between.

Over a century ago, Suess decried how "prejudices and egoism . . . have placed barriers around each of us which constrict our view." Now, he could add a literal dimension of restriction, as concrete as Milankovitch's or Wilde's impoverished sightlines from their respective prisons. Should the electric lights be extinguished, and the sky cleared, these sightlines would become visible again. But from the human 'gutter', the only way this renewed vision might obviate imprisonment is if we follow Suess' precondition, to see further and "no longer to view the world from the base, self-centred perspective." Only therein does "the cosmos reveals to us an image of unspeakable grandeur."

Remaining with Suess, it is then also necessary "to admit the facts in their naked truth" in order to do away with seeing "advantages here, disadvantages there for us or our species." But what does this admission gain? The cosmos gives cold comfort, even if minuscule portions of the infinitive void – stars – radiate gifts that keep on giving. Starlight, stellar heat, the elements, molecules and atoms – born in furnaces burning at millions of degrees. Only to implode or explode when their thermonuclear reactions pass a critical threshold. Our own sun is itself a third-generation star, meaning even it has a ghost in its shell – harking back to origins of being born from the twice re-incarnated ashes of exploded stars. If the cosmos is regarded as the world, rather than this third rock from this sun, in this solar system, in this galaxy, at this moment in time, then it begs a worldview as empty as the void between stars.

From changeability, to its consequences, to comprehension of same: the world-as-idea and the world-as-cosmos are unified in their negation. The question remains as to how we are supposed to live in the resulting void, illuminated only by the clarity of a dour demeanour. Novelist Cormac McCarthy probes Weber's speculation that "no one knows who will live in this cage in the future" by responding with two candidates trapped within his novel *The Sunset Limited*. For White, one of the two characters, world-as-idea and world-as-cosmos coalesce because:

I don't regard my state of mind as some pessimistic view of the world. I regard it as the world itself. Evolution cannot avoid bringing intelligent life ultimately to an awareness of one thing above all else and that one thing is futility.¹⁰²

The Dour chimes in on all these notes, proclaiming that as a demeanour, it is neither pessimism, nihilism, or cynicism, but rather unified in fidelity with "the world itself." In short, it is a state of mind that is completely at one with the world itself. The Dour personified would make one riposte to White, however: while futility reigns supreme in this "awareness of one thing above all else," given a universe slated to end in either a cosmic crunch or universal heat death, a dour demeanour advocates fidelity to the vicissitudes of the cosmos precisely as an insurrection against any all-encompassing futility.

In matters closer to home, and nearer in time than the end of the universe, White espouses his dour worldview to Black – the only other character in the novel – in a back-and-forth exchange that takes place in one room of a small sparse tenement apartment in New York City. Black provides a counterpoint worldview that finds life worth living, in contrast to White, whom Black has just prevented from jumping in front of the Sunset Limited train. Black is now holding White in his apartment until he can be assured that the former will not attempt suicide again. To which White asks: "So what am I, a prisoner here?", only to be told: "You know better than that. Anyway, you was a prisoner fore you got here. Death Row prisoner."¹⁰³ The prison is not the room, the cage is not the mind. Rather the restraint is mortality, which no manner of mind-over-matter can circumvent.

In the larger sense, beyond the sole claustrophobic apartment setting, both characters are further imprisoned in a society that thinks the world of itself, rather than thinking of the world itself. White remains trapped in Weber's "cage in the future" and Wilde's "gutter," because he has closed himself off from "look-

¹⁰² Cormac McCarthy, *The Sunset Limited* (New York: Vintage International, 2008), 31.

¹⁰³ McCarthy, *The Sunset Limited*, 31.

ing at the stars” and their perennial “image of unspeakable grandeur.” The vision is as ultimately futile as the universe’s grandeur is fleeting, but the Dour maintains that fidelity makes a mockery of any notion of morality, and that once noted, any such pessimism, nihilism, or cynicism are rendered mute.

McCarthy’s own demeanour appears to heavily inform White’s monism that the world-as-idea is the world-as-cosmos. The philosophy that comes forth in his novels is premised on “admit[ing] the facts in their naked truth,” both of cosmic vicissitudes and of how humanity fails to live with commensurate fidelity to those vicissitudes. In an interview about his post-apocalyptic novel *The Road*, published in September 2006, one month before *The Sunset Limited*, McCarthy was questioned as to the cause of the civilisational and biosphere collapse described in the book. In *The Sunset Limited*, the reader is informed of the suicide attempt that catalysed the novel’s events, but in *The Road* the reader is never told what kind of catastrophe cast the two protagonists, a father and his son, along that road.¹⁰⁴

The fact that McCarthy’s response refuses to answer the question only serves to further imbibe another core quality of a dour demeanour: the by now familiar conditions of unknowability so essential to Clark. McCarthy replied to *The Washington Post* that

I don’t have an opinion. It could be anything – volcanic activity or it could be nuclear war. It is not really important. The whole thing now is, what do you do? The last time the caldera in Yellowstone blew, the entire North American continent was under about a foot of ash. People who’ve gone diving in Yellowstone lake say that there is a bulge in the floor that is now about 100 feet high and the whole thing is just sort of pulsing. From different people, you get different answers, but it could go in another three to four thousand years or it could go on Thursday . . .¹⁰⁵

In our journey down *The Road* we are not meant to know when it terminates, just as we can never know when the next bend will yield the *New World Coming*, nor which umpteenth layer of the World Turtle will yield an answer to whether Yellowstone’s next supervolcano eruption is a few days or a few millennia away.

McCarthy captures how the Dour is a demeanour that embraces, rather than braces, for impact. It is about how to live during a rupture of life on earth, because “the whole thing now is, what do you do?” Which is to say that the Dour does not embrace *the* impact, but rather embraces *for* impact. Just as there is no revelry in the sheer horror of a supervolcano eruption “on Thursday,” or a

¹⁰⁴ Cormac McCarthy, *The Road* (New York: Alfred A. Knopf, 2006).

¹⁰⁵ Cormac McCarthy, interview with John Jurgensen, “Hollywood’s Favourite Cowboy,” *The Wall Street Journal*, 20 November 2009, accessed 1 July 2019, <https://www.wsj.com/articles/SB10001424052748704576204574529703577274572>.

nuclear war, the Dour does not embrace any such end of this world. What it does embrace is a premise of an altogether different register: that *all* life has always been at the behest of cosmic vicissitudes, and that these are now coupled with the human capacity to unleash a rupture of life on earth.

How then can a stance of fidelity to such vicissitudes accommodate the inescapable moral abyss of human-caused ecocide? Volcanoes raining earth's fiery belly down on its surface make no calls upon morality, but humans raining down thermo-nuclear bombs on one another or directly causing mass extinction cries out for the same. The Dour acquiesces to just how inescapably part and parcel of the cosmos, and of the chaos therein, we are. Human violence – whether in the form of the wars through which Milankovitch lived, the inhumane imprisonment that Wilde endured, or the collective destruction of the planet that McCarthy imagines – are deplorable and unconscionable *in our own terms* because they originate from intention.

This time round there is no Chicxulub or Panama Isthmus to castigate. Though our capacity for destruction is not unique, just as *homo sapiens* are not unique. To believe otherwise is uphold the tyranny of human exceptionalism and self-importance. The Dour enfolds humans into history as just another disaster, in a cosmos where there is no moral to the story, and no rhyme or reason to what ends one world or heralds a *New World Coming*.

Above, below, within, and without, the cosmos is prone to going up in smoke, whether exploding novae above, erupting volcanoes below, irrupting pathogens within, or the inexorable passage of time without. We do not know when Yellowstone's next 'whenever' might be. The question is whether we do as Cranmer did upon the pyre, and resist the 'whenever' handed to us, at the cost of our fidelity. Fidelity by way of the dour demeanour requires humility that recognises all mortal beings are sentenced to death by their mortality.

Trying to outrun this is to live in a nursery rhyme, and a frightening one at that, where the farmer's wife is only ever barely outrun, but still looms behind us, brandishing her knife. Or do we acquiesce, as did Ridley and Latimer, and accept that 'whenever' has come, remaining level-headed, open-eyed and faithful to a reality in which our continued existence was always at the behest of the vicissitudes of the cosmos.

If cosmologies bequeath demeanours laying claim to be one and the same as the cosmos itself, then a dour demeanour is comfort both cold and warm. To accept the Dour's invitation "to seek fidelity to a story that puts the cataclysm upstream of our humanity, and not simply downstream where we can still dream of diversion"¹⁰⁶ is to become one-and-the-same with the world-as-it-is. Where the re-

106 Clark, *Inhuman Nature*, 31.

ward for answering yes to Clark's question about "are we ready to be 'true'" to this sombre dream is an ambivalent one.

But such rewards *are* highly ambivalent, given the comfort both cold and warm that they impart. When the tyrannical King Lear invites his daughter Cordelia to live out their remaining days together in prison he tells her that they will "take upon 's the mystery of things/As if we were God's spies . . . /In a wall'd prison . . . /That ebb and flow by th' moon."¹⁰⁷ The moonlight cannot convey the sun's warm to their cell, but it can convey its reflected light, even in the dark of night. Then again, viewing the cosmos from this guttural vantage point, it was never really an invitation, given Cordelia was already imprisoned before Lear invited her, and our humanity was already hitched to the vicissitudes of the cosmos before there was such a thing as humans. So, there is Clark's invitation to make sense of the world-as-it-is, and Lear's invitation to use non-sense to cope with the way the-world-is-as-it-is, but only by taking up both invitations earnestly can any glimpse of equanimity between being petrified and becoming petrified be gleaned.

Two Days Before the Day After Tomorrow (after Trey Parker)

In a way, the film does have a happy ending.

– Lars von Trier, on *Melancholia* (2011)¹⁰⁸

The evolution of the Earth . . . is galactically controlled through a Rube-Goldberg-like chain of gravitational accidents: a hypothesis that is as exhilarating to most astronomers as it is preposterous to most geologists.

– Mike Davis, "Cosmic Dancers on History's Stage? The Permanent Revolution in the Earth Sciences" (1996)¹⁰⁹

In a pursuit unusual for a novelist, McCarthy was a Writer-in-Residence at the Sante Fe Institute in New Mexico, from 1988 until his death in 2023. The private research facility studies complex adaptive systems in all shapes and sizes, from the comings and goings of Jupiter's Great Red Spot and the uplift and carry of Saharan sands to Amazonian soils, to the cycling between water and air in Hans Haacke's *Condensation Cube*. The Institute brings such an "inquisitive humour"¹¹⁰ to bear on empirical knowledge, say a Yellowstone nudging up against a barely

¹⁰⁷ Shakespeare, *King Lear*, Act V, Scene III.

¹⁰⁸ Lars von Trier, "Director's Statement – Lars von Trier," *Melancholia* Press Kit (Magnolia Pictures, 2011).

¹⁰⁹ Davis, "Cosmic Dancers on History's Stage?", 69.

¹¹⁰ Hume, *Dialogues Concerning Natural Religion*, 38.

still-sealed earth surface, as well as speculative thought, say a collision-course asteroid set in motion, where a Chicxulub comes unannounced around the bend.

The common thread to all these humours, whether scientific or literacy, is excess. Or rather, how all systems are intrinsically and inescapably open to the universe, even if a sheltered worldview tries to see them as self-contained. As Clark remarks:

The irruption that literally punctures the horizon of our planet – the impingement of a dynamic and unpredictable cosmos on earth processes – offers an extreme case of a remainder that cannot conceivably be contained, an asymmetry which is abyssal. And such excess is not simply an input that can be represented, accounted for or anticipated, for this would constitute an inclusion.¹¹¹

If a system cannot be closed off and accounted for as something discrete from something else, then at some point the sums will not square off. For “such excess” is shorthand for the disequilibrium of N-LSD: even in negative energy balance, when a deficit of solar radiation is retained within earth, it is still an excess, just one of cold rather than warmth.

While the list of inclusions is as unbounded as the universe is infinite, life on earth is arguably at the behest of a particularly local excess: our sun. Its intermittent explosions of electromagnetic plasma rain down deep into space, including, of course, on earth. Over the last half millennium that records of these solar flares have been made, their erratic occurrence shows no rhyme or reason. Underpinned by causal mechanisms that are stochastic and aleatoric, all we can know is that they will keep on occurring, but with no periodicity. The plasma takes three days to reach earth’s atmosphere – a small warning window for a civilisation hitched to encircling electromagnetic technologies in the form of satellites. Had a particular coronal ejection in 2012 happened one week earlier, earth’s location would have meant all near-earth orbiting satellites would have been directly hit, bringing every Hollywood disaster film on the subject into real time 3D.

As Clark remarks, “such excess” can never be counted, or countered, because that presupposes an ability to incorporate unknown unknowns into sums that never square off. Not that this requires anything as dramatic as a Chicxulub “that literally punctures the horizon of our planet.” The excess underpins events which affect, but never actually touch the planet, like the effect of orbital eccentricities on macroevolution. It is intrinsic to every star we observe, whether seeking insights into the human condition, like Wilde, or seeking the perspiration of earth’s climate, like Milankovitch. When Wilde looked to the stars, he was inspired to

¹¹¹ Nigel Clark, “Ex-Orbitant Globality,” *Theory, Culture & Society* 22, no. 5 (2005): 180.

place the burden of worldly predicaments into the weightless conditions of the cosmos. When Milankovitch looked to the stars, he was inspired to bring earth's climate into dialogue with its gravitational allegiances. Sadly for these two men, nowadays that same dialogue need heed a new reality: that the burden of worldly predicaments must remain weighted firmly down here on earth, because the energy imbalance that catalysed the unfolding rupture is decidedly a by-product of civilisation so-called.

For philosopher and writer Georges Bataille, one need look no further for the headwaters of the cataclysm upstream than our most immediate star. At all scales he frames the overwhelming excess of radiant energy received from the sun as precipitating cataclysms: both those intrinsic to evolutionary mechanics and those induced by human-forcing:

Solar energy is the source of life's exuberant development. The origin and essence of our wealth are given in the radiation of the sun, which dispenses energy – wealth – without any return. The sun gives without ever receiving.¹¹²

Precisely because of its excessive generosity, however, this gift without return also takes away without rhyme or reason. Bataille pondered how, given that solar ebullience is more generous than necessary for bare survival, excess accrues when less heat is radiated back into space versus absorbed around/within/on/in the planet itself. Seldom do the sums square off and earth obtains, let alone maintains, an energy balance.

Bataille saw the same entanglements with excess as intrinsic to a single organism, just as they are to a single planet, positing that:

The living organism, in a situation determined by the play of energy on the surface of the globe, ordinarily receives more energy than is necessary for maintaining life; the excess energy (wealth) can be used for the growth of a system (e.g., an organism); if the system can no longer grow, or if the excess cannot be completely absorbed in its growth, it must necessarily be lost without profit; it must be spent, willingly or not, gloriously or catastrophically.¹¹³

Stars, he remarks, embody “futility”: the same futility that McCarthy sees in the void of the world-as-idea/world-as-cosmos. They rain down their bountiful energy on their captive planets, precipitating excesses that render climates precarious. For Bataille, the cataclysm upstream flows from the sun – which, given it is a star already thrice reborn, means it is merely a portal to a universe that retrieves such gifts by completely obliterating, and then resurrecting them.

112 Georges Bataille, *Accursed Share: Volume 1: Consumption* (London: Zone Books, 1991), 28.

113 Bataille, *Accursed Share*, 21.

Bataille and Milankovitch both effectively support what is known as the Court Jester view of evolution. Namely, that abiotic forces are the main impetus for evolution. From solar energy excess or dearth, to the whims of passing planets and erupting volcanoes and asteroids, the Court Jester dances to “the impingement of a dynamic and unpredictable cosmos on earth processes.”¹¹⁴ In particular, under the auspices of the Court Jester hypothesis, an equilibrium punctuated with volatility means that evolution proceeds in relatively short bursts, akin to Clark’s “moments,” interspersed with much longer periods of stasis. Recall that here ‘short’ is measured at the scale of deep time, so that such ‘moments’ could be many millennia in duration.

For Anthony Barnosky, who coined the term in 1999,¹¹⁵ the Court Jester was a riposte to the then dominant evolutionary hypothesis of the Red Queen, named and proposed by Leigh van Valen in 1973.¹¹⁶ The Red Queen hypothesis holds biotic forces as being the main impetus for evolution. As co-evolving species drive one other to adapt, they enact an evolutionary arms race and form dependencies. Any two co-involved species, say a lion and an antelope, evolve in lock step with one another. As one adapts to outrun the other, the other steps up to keep in step, or dies trying. In the meantime, both co-evolve, undergoing genotypic and phenotypic change. The metaphor for such evolution is the Red Queen in *Through the Looking-Glass*, in whose race “it takes all the running you can do, to keep in the same place.”¹¹⁷ Except that to stop running is not to come to a standstill. It is to die.

Is there no end to the revolutions of the earth? Mike Davis captures this sense of never-ending revolutions of the earth versus understandings of it, in his 1996 article “Cosmic Dancers on History’s Stage? The Permanent Revolution in the Earth Sciences,” with 149 judicious footnotes pointing beyond, beneath, behind, and above the World Turtle. In it, he favours a catastrophist stance, one that is in keeping with Suess’ conditions for seeing “unspeakable grandeur,” by seeing ruptures as no longer having “advantages here, disadvantages there for us or our species.”¹¹⁸ Remarking on asteroids that explode in the atmosphere, Davis finds the Court Jester always has the last laugh:

114 Clark, *Ex-Orbitant Globality*, 180.

115 Anthony Barnosky, “Distinguishing the Effects of the Red Queen and Court Jester on Miocene Mammal Evolution in the Northern Rocky Mountains,” *Journal of Vertebrate Paleontology* 21, no. 1 (2001): 172–185.

116 Leigh van Valen, “A New Evolutionary Law,” *Evolutionary Theory* 1 (1973): 1–30.

117 Lewis Carroll, *Through the Looking-Glass, and What Alice Found There* (London: Macmillan, 1871).

118 Suess, in “Big Is a Thing of the Past,” 319–320.

Catastrophes are both condensations of temporal process – for instance, a million years of ‘normal’ environmental work condensed into hours, even seconds – and exponential escalations of the energy circulating through the planetary metabolism. In this dual sense, comet bombardments act as superchargers of geological and biological evolution.¹¹⁹

The supercharge he refers to is saltation: abrupt evolutionary change, whether an ascendancy of a new Animalia order following the clearing out of old, or more local affairs such as adapting to novel climate regimes courtesy of the Panama Isthmus formation. Excess is again at the heart of such affairs: as “exponential escalations” circulate not just “through the planetary metabolism” but through Bataille’s “living organism.” Setting aside debates as to their relative influence on evolution, the Court Jester and Red Queen play the ‘Immortal Game’ against one another on the chess board, as catastrophism v gradualism respectively. Their interplay only reveals further layers to the World Turtle, demonstrating how evolution throws up rules, exceptions, exceptions to the rules, and rules to the exceptions. For instance, the other principle mechanism of evolutionary change is spurred by cooperation rather than competition, when species are symbiotic with each other, such as zooxanthellae and coral.¹²⁰

Perhaps this cosmic menagerie is the “happy ending” that Lars von Trier wryly claims for his film *Melancholia*, which faces not the end-of-the-world but the end-of-the-planet, via impact from a fictional planet named Melancholia. While Bataille saw the sun as the upstream cataclysm’s headwaters, von Trier peeked behind what the sun conceals, to speculate on whether it could be harbouring a new Theia. Melancholia is the metamorphosis of a Chicxulub, or the next “whenever,” as it suddenly appears in the night sky, having evaded all astronomical detection due to the cover of the sun. Where a J002E3 illustrates how random acts of gravitational kindness/cruelty give rise to erratic orbital trajectories, and how such smaller-sized objects matter little for life on earth, a *Melancholia*-like rogue planet illustrates the difference between an extant earTheia and an melarTheia.

The film centres on two sisters, Justine and Claire, and their diametrically opposed postures when suddenly finding out earth is soon to be hit with another cosmic joke by way of the Court Jester. Justine epitomises a dour demeanour, as the avatar of von Trier, in the same way that White is the avatar of McCarthy in *The Sunset Limited*. While Justine is ill-suited to so-called normal society and exhibits suicidal tendencies, just like McCarthy’s White, her older sister Claire

¹¹⁹ Davis, “Cosmic Dancers on History’s Stage?”, 84.

¹²⁰ Lynn Margulis, “Symbiogenesis and Symbiontism,” in *Symbiosis as a Source of Evolutionary Innovation Speciation and Morphogenesis*, eds. Lynn Margulis and René Fester (Cambridge, MA: MIT Press, 1991), 1–20.

thrives in the world when it is business as usual. Only when Melancholia is first detected do their true colours start to shine, as the qualities of those who possess a dour versus a dire demeanour.

For Justine, cosmic vicissitudes are final cause to inculcate equanimity. She faces the imminent obliteration of the world-as-idea/world-as-cosmos with both meanings of the term: “equal mind” and “calmness and composure, especially in a difficult situation.”¹²¹ It is not so much that she acquiesces, but rather that she discredits Claire’s dire demeanour, who panics in response to McCarthy’s question about “the whole thing now is, what do you do?” Whereas, Justine comes to terms with what to make of life when it’s abundantly clear that there is nothing to do but uphold the honesty that her “view of the world” was in fact “the world itself,” just like White in *The Sunset Limited*. However, the Dour makes a riposte to both Justine and White’s suicidal tendencies: if one can behold a “view of the world” that is “the world itself” then one has found the true beauty between the layers of paint and pain alike. Or, as John Keats put it: “Beauty is truth, truth beauty, – that is all/Ye know on earth, and all ye need to know.”¹²²

As the sisters respectively embrace and brace for Melancholia’s impact, they re-enact the universal sigh in Gary Larson’s dinosaur town hall meeting. Claire retreats into notional childhood innocence, and Justine comforts Claire’s son Leo and her sister by constructing a cage of sticks for both sisters and the child. As if returning voluntarily to imprisonment, but not that of a Wilde or a Milankovitch, nor even that of White’s entrapment in Black’s room, but rather Weber’s “cage in the future,” sheltering a worldview as obliterated as the world itself. Meanwhile, Justine is reluctant to face the grand finalé through a fantastical lens. She holds true to Wilde’s adage, in that the human is only born into, lives out, and dies in guttural predicaments. Nevertheless, she looks upon the end-of-the-world-cum-end-of-the-planet with an earnest ear toward wonder, notwithstanding an ungrateful chagrin at the inherent meaningless and futility of the universe. As von Trier wryly remarks in *Melancholia*’s press kit: “in a way, the film does have a happy ending.”

Begging the question: which way is that?

¹²¹ “Equanimity,” Oxford English Dictionary (Oxford: Oxford University Press, sixth Edition, 2007).

¹²² John Keats, “Ode on a Grecian Urn,” in *Annals of the Fine Arts for 1819, Volume 4*, ed. James Elmes (London: Sherwood, Neely, and Jones, 1820), 639.

The Sky is Falling in (Maybe Not)

A fire broke out backstage in a theatre. The clown came out to warn the public; they thought it was a joke and applauded. He repeated it; the acclaim was even greater. I think that's just how the world will come to an end: to general applause from wits who believe it's a joke.

– Søren Kierkegaard, *Either/Or: A Fragment of Life* (1992 [1843])¹²³

A sense of humour is the only divine quality of man.

– Arthur Schopenhauer, *The World as Will and Idea* (1907 [1818])¹²⁴

“In a way,” the cataclysm always already lies in wait: inconceivably far upstream, potentially ever-present, and incalculably consigned to eventuate by forces already set in motion at an undisclosed location. The danger in giving the cataclysm an amorphous quality is that it then threatens to subsume all events and likelihoods, from those that emanate through forces beyond the reach of blame, to those catalysed by humans, whether accidental or intentional.

For the contemporary nature writer Robert MacFarlane, a flat ontology like that in *Melancholia* is no means for obviating human guilt. In relation to his 2019 book *Underland: A Deep Time Journey*, he cautions:

There is a perilous comfort to be drawn from deep time. An ethical lotus-eating beckons. What does human behaviour matter when *Homo sapiens* will have disappeared from Earth in the blink of a geological eye? Viewed from the perspective of deserts or oceans, morality looks absurd, crushed to irrelevance. A flat ontology entices: all life is equally insignificant in the face of eventual ruin.¹²⁵

However, viewed from the perspective of the tortoise we have flipped onto its back, morality ceases to be absurd, and the Dour becomes embroiled in the imbroglia of human destruction of the more-than-human world. The upturned tortoise in the desert is the “event of our time” – it is an actuality, not an eventuality of “eventual ruin.” Further, even the time taken to describe this event has borrowed from time we never had in the first place. It was a luxury that could be ill-afforded at the best of times, let alone now, when, as Greta Thunberg puts it “the house is on fire. I am here to say, our house is on fire.”¹²⁶

¹²³ Kierkegaard, *Either/Or: A Fragment of Life*, 43.

¹²⁴ Schopenhauer, *The World as Will and Idea*, 42.

¹²⁵ Robert MacFarlane, “What Lies Beneath: Robert Macfarlane Travels ‘Underland,’” *The Guardian*, 4 April 2019, accessed 1 July 2019, <http://www.theguardian.com/books/2019/apr/20/what-lies-beneath-robert-macfarlane>.

¹²⁶ Greta Thunberg, “Our House Is On Fire,” transcript of speech delivered at the World Economic Forum, Davos, Switzerland, 25 January 2019, accessed 6 May 2019, <https://awpc.cattcenter.iastate.edu/2019/12/02/address-at-davos-our-house-is-on-fire-jan-25-2019>.

Equanimity for MacFarlane is not found in the enticements of such a flat ontology. Immediately following, he stresses that “we should resist such inertial thinking; indeed, we should urge its opposite – deep time as a radical perspective, provoking action not apathy.”¹²⁷ While MacFarlane is talking about recognising human guilt in catalysing the unfolding rupture, a great danger lurks when conflating the agency that caused the rupture with the agency that seeks to remedy it. While the danger is eminently self-evident, the response to it determines who takes leave of the Dour, to adopt a dire mindset instead.

Those who resist a dour demeanour and the abandonment it implies in favour of a dire posture ask: what course of action could be remotely commensurate with the forces at play? What manner of human agency actually exists to send Melancholia on a trajectory to skirt earTheia, or suppress Yellowstone’s bulging magma from puncturing earTheia? At this late hour of an inherently meaningless and futile universe, has it not only ever been empty gestures? In essence, this is like McCarthy reacting equally to destructive forces as diverse as thermonuclear war or a supervolcano eruption with the same response: “the whole thing now is, what do you do?”

The answer that may and/or may not be serious harks back to the common denominator between Larson’s dinosaurs and their dour demeanour: comedy. Albeit with the same amorphous quality von Trier gives to his “happy ending”: it only exists “in a way.” In *The Comedy of Survival*, Joseph Meeker agrees with MacFarlane’s admonishment of morality, but still in a way resists the enticements of a flat ontology. Comedy, he argues,

is careless of morality, goodness, truth, beauty, heroism, and all such abstract values men say they live by. Its only concern is to affirm man’s capacity for survival and to celebrate the continuity of life itself, despite all moralities. Comedy is a celebration, a ritual renewal of biological welfare as it persists in spite of the reasons there may be for metaphysical despair.¹²⁸

But how can we celebrate continuity when extinction attests to so much discontinuity? Ironically, one of the few answers Darwin did not provide in *On the Origin of Species* is how species actually originate. Instead, he inferred such from how species transform into different species over time. Such a frame of reference cares little for Meeker’s “metaphysical despair” or MacFarlane’s “eventual ruin.” It does not kowtow to the Court Jester’ evolutionary chaos, but instead to the Red Queen’s evolutionary war games. After all, the Red Queen is there each and every day in every moment, whereas the Court Jester makes infrequent and un-

127 MacFarlane, “What Lies Beneath.”

128 Meeker, *The Comedy of Survival*, 33.

announced arrivals that may reset the game, but then leave the players to devise new rules in the struggle for existence.

Not only does Darwin mention “the struggle for existence” more than 40 times in *Origin of Species*, he also uses the phrase as the title of chapter three. Nine years prior to Darwin’s publication, Alfred Lord Tennyson expressed a similar demeanour, describing nature as “red in tooth and claw”¹²⁹ in his poem *In Memoriam A. H. H.* And two centuries prior to that, Thomas Hobbes surveyed the societal landscape of the House of Tudors, including Queen Mary’s reign, surmising in 1651 that human life outside the conventions of societies formed in the modern period would be “solitary, poor, nasty, brutish, and short.”¹³⁰

At the heart of all these appraisals is a deep pathos that claims the natural order of things is suffering and violence. These demeanours persist into contemporary evolutionary biology, with Richard Dawkins employing Tennyson’s “Nature, red in tooth and claw” in his 1976 book *The Selfish Gene*,¹³¹ to present a case of evolution as being survival of the fittest. More recently, in his 1995 book *River out of Eden*, Dawkins lays bare the playpen animal that life exists within:

The total amount of suffering per year in the natural world is beyond all decent contemplation. During the minute it takes me to compose this sentence, thousands of animals are being eaten alive; others are running for their lives, whimpering with fear; others are being slowly devoured from within by rasping parasites; thousands of all kinds are dying of starvation, thirst and disease. It must be so. If there is ever a time of plenty, this very fact will automatically lead to an increase in population until the natural state of starvation and misery is restored.¹³²

Dawkins is referring to an atemporal view of life. This still holds true during the tenure of *homo sapiens*, but we must now add that “the total amount of suffering” for animals is wilfully, callously, and exponentially increased by everything from hunting, fishing, and all other means by which humans devour the more-than-human-world, through to destruction and pollution of habitats and so-called civilisational psychopathologies such as factory farming, racing animals for sport, and zoos.

If there is comedy to be found in Dawkins’ atemporal view, it is only in the folly of continually projecting anthropocentric views onto life-at-large. True that

¹²⁹ Alfred Lord Tennyson, *In Memoriam A. H. H.* (London: Edward Moxon, 1850), Canto LVI, line 15.

¹³⁰ Thomas Hobbes, *Leviathan* (London: Bloomsbury Publishing, 2006 [1651]), 12.

¹³¹ Richard Dawkins, *The Selfish Gene: 30th Anniversary Edition* (Oxford: Oxford University Press, 2006 [1976]), 53.

¹³² Richard Dawkins, *River Out of Eden: A Darwinian View of Life* (London: Hachette, 2014), 154.

here, Dawkins attempts to decentre the anthropos in favour of a biocentric view. But he does not go beyond this to a zoecentric view, where the bios of “animals . . . being eaten alive” and “rasping parasites” make way for the zoe- of microbial life whose existential experience (which often takes place in conditions so extreme as to exclude every other form of life) is on a plane so utterly alien that all concepts of things like “suffering” must be put aside.

So, also setting aside the perennial quest to transcend the now in favour of the eternal, and the anthropocentric in favour of the zoecentric, we are recalled back to the present tense and recall that the cold comfort of a flat ontology was always an unaffordable luxury for that very same present tense. Thus far the story has been set in the safety net of the past, and in a version of the near present that has studiously avoided the extent of human culpability for catalysing the unfolding rupture. Suitably out of reach of the present tense, and thus only relevant insofar as it shows how we got this far. All other things being equal, our story could stop here in a present day that eschews the tortoise flipped by the cumulative consequences of human industrial activity.

But all other things are not equal, because now the question arises: would the Dour still be the default demeanour if the Dire and the Dice could be discounted? Or is it merely a comforting catastrophism, retrofitted to mask an abhorrence of the present tense, and the future horrors it is begetting? This is the continuation of the small journey sung in these pages, and in any eventuality, just as the past gives way to the present, the surprise arrival of J002E3, like that of the desert tortoise, brings the Dour into cold relief against the Dire.

When J002E3 showed up, it also showed up the conceit of expectations built around predictability and periodicity. In a nutshell: it should not have been. No new satellite was anticipated, because all had been shaken off by earth’s orbital perturbations. Not here, not now, and not with such eccentric behaviour. If the last time a given event actually happened was 4.34 billion years ago, then it is not expected to happen all that often in the timescale of a solar system, or even a galaxy, let alone a single planet. The question remained: *how on earth, on Earth* was J002E3 then becoming captive to earth’s orbit?

The answer revealed an all-too-human genesis for the wayward body: it was becoming geocentric because . . . we put it there. Albeit by wayward intention meeting ‘shift happens’: J002E3, aka the Saturn V booster rocket from the Apollo 12 moon mission. The intention, after it had successfully powered the 1969 moon landing, was to cast the booster into heliocentric orbit. However, a guidance system error meant the 10,000-kilogramme detritus instead orbited earth for two years, until escaping by becoming heliocentric.

When Saturn V was ejected from earth’s orbit, the trajectory modelling heavily discounted the probability of its return. 1971: we thought we had seen the

last of it. In the same year earth began trapping more solar heat than can be radiated back into space we also started waywardly throwing space junk at the sun. 2002: heralds the return of a wayward creation to confront its creator, like Frankenstein's monster, or *Bladerunner's* Roy Batty. Or perhaps, given the magnetic forces involved, something more comic, like the Return of the Son of Monster Magnet, spawn of Frank Zappa's band, The Mothers of Invention, on their album *Freak Out!*¹³³

In 1971, the *New World Coming* was catalysed. But even by the time J002E3 was discovered in 2002, few were willing to grasp the fact that this rupture had been unleashed. In this new world, wayward intentions come back to haunt us in ways that exceed our wildest expectations. So too in all worlds subject to cosmic forces outside our influence or control. Predictability and periodicity were never at home in any world, least of all in new worlds coming.

However, J002E3 did not turn out to be the next 'whenever' of a Chicxulub, nor *Melancholia* by another name. Nor did it harbour the patricidal rage of prodigal sons Roy Batty or Frankenstein's monster, returning to confront their respective makers. J002E3 is the rupture, the "Relentless/Invisible/Indefatigable/Indisputable/Undeniable" rupture writ large. Thom Yorke goes on to ask "So how come it looks so beautiful?/How come the moon falls from the sky?"¹³⁴

To answer his first question: the rupture may look "beautiful" because it is the awe-inspiring, uncanny, and sublime monster created as a by-product of civilisation so-called. Which, like Frankenstein's monster, we must somehow come to love, even though we find it abhorrent and now wish we had never created it in the first place. Making morals from the abysmal morale of that story will be the onerous task of the Dire. To answer Yorke's second question: "the moon falls from the sky" for the same reason the sun holds it up. Which is for no rhyme or reason at all. Shift happens, but our twofold challenge is to disambiguate the shift that has always happened, whose beauty mesmerises us with the power of a moonrise or sunset, from the shift that has happened because of us.

At first, we may have marvelled at J002E3's surprise arrival in geocentric orbit, and the surprise arrival of the tortoise's entrance into the desert. Now, however, we sombrely understand that both events happened with distinctly anthropogenic twists and turns. The unpredicted return of inert matter, whether rocks or rocket ships, barely hints at Clark's "conditions of unknowability." Yet the prospect of the prodigal sons returning shows how much more unpredictable matter becomes when it becomes alive. Saturn V is no less a monster, not because a 10,000-kilogramme metallic

133 The Mothers of Invention, *Freak Out!* (Verve Records, 1966), LP.

134 Thom Yorke, "And It Rained All Night," track 7 on *The Eraser* (XL, 2006), LP.

object can bring significant harm to bear, but because its behaviour throws into comic relief the conceit of periodic or probabilistic mindsets when reality is in fact stochastic processes all the way down. From little things, big things grow. From little things, big things growl.

Having eccentrically danced a 15-month lure around earth, on 14 June 2003, J002E3 was slungshot back out into deep space proper, into heliocentric orbit, returning back via Lagrange Point One, passing by at almost the exact same point above that it had traversed on its way in. (With the caveat that there is no such thing as above, just as there is actually no such thing as the same point in space over time.) Currently J002E3 is on hiatus somewhere on the yonder side of the sun, until it twists, turns, and re-returns to earth in 2041.

Our trajectory so far has charted a J002E3-like path, full of eclectic and eccentric twists and turns, and digressions into darkness and the eternal void of an inherently meaningless universe, only to turn back upon our home planet through flybys that delve deep into the subject of life itself. And then to be repulsed again, venturing away at a permanently insufficient escape velocity, only to be lured back in by the gravitational thuggery of earth itself.

That past is now done and dusted: ashes to ashes, dust to water. The Dour remains always ever present, but the Dire and the Dice turn instead to the present and future respectively. Act II concerns the period between when J002E3 left geocentric orbit in 1971 and returned in 2002, while Act III concerns the period between when it next left geocentric orbit in 2003, and will next return in 2041. The world J002E3 returns to will be radically re-configured in any eventuality, the only question is how, and by what? If the Dour is abandoned in favour of the Dire and thus the Dice, what J002E3 returns to in 2041 will be a planet heavily configured by radically experimental technoscientific conservation deployed in the meantime against the unfolding rupture.

“ . . . and you see a tortoise, it’s crawling toward you . . . ”



Fig. 7: New World Coming: Transporting Saturn S-IVB Third Stage, aka J002E3, for the Apollo 12 mission, United States of America, 1969.

