

Alain Badiou and the Ontology of the Chicxulub Impact Event

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Drawing on Alain Badiou's Being and Event, this article develops a philosophical analysis of the Chicxulub Impact Event and the subsequent Cretaceous-Paleogene (K-Pg) mass extinction. Traditional scientific interpretations of these events tend to focus on ideas of natural selection, arguing that the asteroid strike was merely an accelerant for the inevitable decline of the non-avian dinosaurs. More contemporary interpretations seek the deeper causes of the asteroid strike itself, tracing its cosmic origins to the Oort Cloud, the collection of planetesimals that resides at the periphery of the Solar System. This article argues that Badiou's philosophical representation of situations, multiples, and events elucidates the ontological implications of each of these interpretations. In particular, reading the traditional interpretation in relation to Being and Event highlights its anthropocentric implications, whereas a Badiouan reading of the more contemporary interpretation emphasizes not only humanity's but also the earth's nondescript status within the Solar System. In developing this analysis, the article reworks Badiou's assumption that events (as he understands them) do not occur in the natural world. I argue that, in actuality, the Chicxulub Impact Event captures, in retrospect, Badiou's understanding of an event as the sudden presentation of that which is unrepresented in a situation.

Keywords: Alain Badiou; Multiples; Situations; Events; Chicxulub Impact Event; Cretaceous-Paleogene (K-Pg) mass extinction; Cosmic history of the earth

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1. Introduction

This article enlists Alain Badiou's understanding of situations, multiples, and events in *Being and Event* to develop a philosophical reading of the Chicxulub Impact Event and the subsequent Cretaceous-Paleogene (K-Pg) mass extinction. The article has two main goals. The first is to explore the implications of deploying Badiou's philosophy as a lens to analyze events in the natural world. Badiou's theory of the natural multiple indicates that events (as he understands them) do not occur in nature, but I argue that the Chicxulub impact constituted an event insofar as it functioned as a catalyst for the sudden presentation of that which was unrepresented in the

Mesozoic Era.¹ The second goal of the article, which expands on this argument, is to examine how Badiou's philosophy of the event elucidates two contrary interpretations of the K-Pg extinction: a traditional interpretation that relies on ideas of natural selection to explain why the non-avian dinosaurs went extinct, and a more contemporary interpretation that investigates the cosmic origins of the asteroid.

A Badiouan analysis of the traditional interpretation focuses on the ecological history of the earth. In particular, this reading identifies natural selection as an all-important phenomenon that presented itself on a mass scale following the asteroid impact. This analysis ultimately emphasizes the anthropocentric dimensions of the traditional interpretation, particularly its tendency to construe humanity as the endpoint of natural selection. By contrast, a Badiouan analysis of the contemporary interpretation focuses on the Solar System at large, tracing points of connection between the asteroid impact and the cosmic history of the earth. The main basis of this connection is a shared history: the earth and the ancient asteroid are/were both descendants of an original protoplanetary disk that formed in the early stages of the Solar System. A key implication of this link is the basic notion that, for all of its rich and varied ecological history, the earth is actually just one more rock among the trillions that inhabit the Solar System. In Badiou's terms, the arrival of the asteroid functioned as an event because it violently presented the earth's wider cosmic status to the dinosaurs and the other lifeforms that flourished during the Mesozoic Era.

Introducing *Being and Event*

In *Being and Event*, Badiou declares that "mathematics is ontology" (2005: 4), a statement that critics generally regard as the most important and controversial claim in his work.² The claim is grounded on Badiou's thesis that being is fundamentally multiple (as opposed to a unified one). Ontology often attempts to define being as a single whole that encompasses everything in existence, but for Badiou, being is essentially an inconsistent multiple – that is, an immeasurable and chaotic assemblage. In Badiou's estimation, any presentation of a unified one is the result of an operation that imposes consistency and structure onto being. Such operations, which include anything from discursive practices to the institutional workings of nation-states to evolutionary cycles in nature, produce consistent multiples: aggregates made up of parts that fit together into a unity. Whenever being is organized into a consistent multiple, it occupies what Badiou calls a situation (Badiou, 2005: 24). As Ed Pluth writes, this theory suggests that "any presented order of things (multiples all) [is] derived from something else, from something prior to it: the chaos of the inconsistent multiple, which is what really is" (2010: 48). The challenge for ontology is that, in attempting to play the part of an operator that delineates an understanding of being, it runs the risk of "subordinating inconsistent multiplicity to the consistency of a single concept" (Brassier 2006: 62). In other words, rather than accessing what "really is" (the immeasurable excess of pure multiplicity), ontology simply creates another situation. The value of mathematics, for Badiou, is that it presents nothing *but* multiplicity.³

¹ As I examine below, for Badiou, the basic structure of an event involves the presentation of that which is unrepresented in a situation.

² See Brassier (2006: 59-60), Ling (2014: 48), Malicki (2015), Nirenberg and Nirenberg (2011), Norris (2020: 11), Vartabedian (2018: 6), and Watkin (2017: 8).

³ Badiou writes, "Strictly speaking, mathematics presents nothing, without constituting for all that an empty game, because not having anything to present, besides presentation itself – which is to say the Multiple – and thereby never adopting the form of the object, such is certainly a condition of all discourse on being qua being" (2005: 7).

Mathematics (and in particular set theory) is an ontological language because it deals with multiplicities on a purely formal level, offering an axiomatic framework for understanding the dynamics of situations in general.

Badiou's understanding of set theory animates the most crucial ideas in *Being and Event*, including his interpretation of the differences between presentation and representation in a situation. He argues that any given situation will contain elements that a) belong to it and b) are included in it. For Badiou, an element that belongs to a situation is said to be present in it. At its base level, a consistent multiple is simply a structure made up of everything that belongs to it. For example, a nation-state is a structure comprised of everything that belongs to the state, including its citizens, assets, military, and so on. The mere existence of the state presents a consistent multiple insofar as the state is defined by its capacity to create a unified one out of these many component parts. At the same time, Badiou maintains that, in addition to containing those elements that belong to it, a situation also contains elements that are included in it. An element that is included in a situation is said to be represented within it. For example, a nation-state actively represents its component parts in specific ways – the people who are present *in* the state may also be represented *by* the state as citizens. In this way, an operation counts the different elements that already belong to a situation, establishing a meta-structure atop the already-existing structure. The key point, though, is that the operation will not count everything that belongs to the situation. There will be leftover elements that belong to the structure but are not included within the meta-structure. For instance, a nation-state will typically contain people who belong to the state and yet are excluded from citizenship and/or denied equal rights. Such people are present but not represented in the situation. In this respect, a situation is a two-part structure. The situation itself is the structure that arises through the operation of counting a multiple as a unified one, but the *state* of the situation includes a meta-structure that re-presents, in a selective and exclusionary manner, what is to be counted as part of the one.

Just as a mathematical set contains subsets, a situation contains not just one consistent multiple, but many multiples that may obtain varying levels of presentation and representation. In Badiou's terminology, a multiple within a situation that is both present and represented is said to be normal. For example, a normal multiple in a nation-state consists of the citizenry that are afforded full rights and privileges. By contrast, a multiple that is present but not represented is said to be singular. In a nation-state, for instance, any one of a number of groups might be disenfranchised or denied citizenship, even though they belong to the state. Finally, a multiple that is represented but not present is said to be excrescent. As critics have acknowledged, it is difficult to identify a concrete example of the latter, but as far as the nation-state goes, potential options include spies who work abroad (they represent the state but are not present within it (Adkins, 2012: 511; Hallward, 2003: 99) or the state itself (inasmuch as the state is framed as pure representation (Pluth, 2010: 54-55)).⁴ Finally, a multiple that is neither present nor represented in a situation usually constitutes the void, which is the chaotic and immeasurable multiplicity of being itself (Badiou, 2005: 108). However, as I take up below, the latter can also include an abnormal multiple.

Badiou's mathematical theorization of situations provides a springboard to his understanding of events, which is the main axis of *Being and Event*. In layman's terms, an

⁴ Pluth writes, (1) [T]he state itself is said to be an excrescence because the state is a thing of pure representation with no real grounding in the multiples that are present in the situation (the state is itself an unfounded excess, as it were). (2) The nation-state, like the state of any situation, is actually a separate order, a separate count, not necessarily grounded on anything intrinsic to what is presented in the situation. Hence Badiou's use of a term like excrescence for it, which suggests something like an excessive outgrowth. (2010: 54-55).

event for Badiou represents a radical change that ruptures the prevailing order of a situation. At the same time, “Badiou’s event is a metaphysically liminal or amphibious creature” (Hunter, 2016: 132). Badiou emphasizes that, although an event is an irruption that alters a situation, it also emerges from *within* the situation through the sudden presentation of elements that are unrepresented. A potential site for an event (an “evental site”) coalesces through what Badiou calls an abnormal multiple. An abnormal multiple is the most minimal unit of structure in a situation – a multiple that exists as a unified one even though none of its members are present or represented in the situation.⁵ Such a multiple constitutes a “primal-one of the situation” because it stands “on the edge of the void” (Badiou, 2005: 175). As a minimal unit, the abnormal multiple wavers at the boundary between the basic operational structure of the situation and that which falls outside of any structure whatsoever, which is the void of pure inconsistent multiplicity. The abnormal multiple touches the void, as it were, but in doing so, it also cuts to the heart of the weakness that besets any situation. The abnormal multiple exposes the extent to which any situation is a precarious construct that attempts to conceal the inherent inconsistency and chaotic excess of multiplicity through an operation of re-presenting structural consistency. Thus, the abnormal multiple is an evental site because it opens the way to an event (such as a revolution) that reveals the volatility of unified oneness itself. This volatility develops through something that is present in (and centrally important to) a situation even though it is totally unrepresented within it.⁶

Badiou’s terminology as well as his examples create the impression that events only occur among human actors, but is it possible for events to happen in the natural world? Badiou seems to answer this question in the negative through his interpretation of the so-called natural multiple, which he describes as a “superior form of the internal cohesion of the multiple” (2005: 127). A natural multiple is superior to others because it is a model of consistency, stability, and equilibrium (2005: 128). As Badiou sees it, purely natural situations (which may include primordial ecosystems, the environment on a habitable exoplanet, the ocean depths, etc.) contain nothing but layers of normal multiples – that is, multiples comprised of elements that both belong to *and* are included within their situations. In these situations, the operator that “counts” the multiples and represents them is nature itself. An example helps clarify this idea. A particular multiple (a type of fish, for example) might exist within an ecosystem in which it faces threats from other multiples (sharks, predatory birds, etc.), but an attack from the latter would not qualify as an event within the situation. In Badiou’s terms, such an attack would come from a multiple that is both present and represented in the situation. For the fish, the predator is present because it belongs to the ecosystem just as much as the fish does, but it is also represented because the fish subsists within a natural equilibrium in which its behaviour

⁵ The example Badiou uses is of a family that is entirely clandestine within a state (i.e., not registered officially anywhere). The family might be present in a purely formal way since it fits within a state-sanctioned construction of basic social units (insofar as the nuclear family constitutes a fundamental unit in the sociopolitical order), but at the same time, *this* particular family would not truly exist in the situation since none of its members would be recognized as belonging to the state (2005: 175).

⁶ For Badiou, the aftermath of the event’s irruption involves a process of recognizing it and acting upon it. James Williams writes, “Badiou suggests that an event is a rare occurrence that cannot be recognised within a given state of affairs. It can, however, be named by subjects as that which cannot be recognised. Subsequently, a fidelity to the event can be constructed according to a well-ordered series of faithful acts implied by that first naming and driven by the hitherto unrecognised truth that it brings to light” (2009: 102-3). For further commentaries on how an event irrupts within a situation, see Bensaïd (2004), Bowden (2008: 32-34), Dewsbury (2007: 452-54), Hallward (2003: 107-15), Hunter (2016: 132-33), Riera (2005: 10-11), and Tweedie (2012: 105-6).

hinges on its instinctive need to recognize that predatory animals are necessarily included in its situation. In other words, it is not as though a predator that was already present in the situation would suddenly reveal its true identity when it attacks. Rather, the mere presence of the predator would represent it as a danger from the start. Speaking broadly, insofar as nature plays the role of an operator, it creates an array of normal multiples through vast evolutionary cycles in which all species exist in intricate symbiotic relationships. In a purely natural environment, something that is singular or excrescent to the situation could only be an unnatural element – that is, something that belongs to the ecosystem and yet is not included within its organic workings.⁷ In basic terms, this theory of the natural multiple implies that “[n]ature never internally contradicts itself. It is self-homogenous self-presentation” (2005: 128).

The Being of the Chicxulub Impact Event

Nature might be free of internal self-contradictions, but if there is anything that could qualify as an event (as Badiou conceptualizes it) in the natural history of the earth, it would probably be the Chicxulub Impact Event. The following section builds on this premise to investigate how this ancient catastrophe can help rework Badiou’s understanding of the natural multiple. The section further explores how Badiou’s philosophy elucidates different historical interpretations of the impact and its aftermath. The first part of the section outlines scientific information about the impact, detailing its immediate and long-term effects on the ecosystems of the late Cretaceous period. The second part deploys Badiou’s conception of the event to analyze a traditional interpretation of the Cretaceous-Paleogene (K-Pg) extinction, which treats the asteroid impact as an accelerant for a teleological process of natural selection that consigned the non-avian dinosaurs to the abyss while simultaneously paving the way for the rise of mammals and, eventually, humanity. The third part enlists Badiou’s notion of the event to examine a more contemporary interpretation of the extinction, which focuses on the origins of the asteroid. This latter analysis opens up the full implications of reading the Chicxulub impact as a Badiouan event, revealing how the earth itself constituted an essential part of an evental site due to its cosmic connection to the destructive asteroid.

Sixty-six million years ago, in the month of June (Benton, 2020: 269), an asteroid measuring approximately 10 kilometers in length struck the surface of the earth at an oblique angle in what is now the Yucatán Peninsula (Morgan et al., 2022; Collins et al., 2020). The bolide, travelling at an estimated speed of 70,000 km/h, hit the ground with such force that it vaporized on impact, instantaneously creating “more than 12,000 cubic *miles* of pulverized, melted, distressed rock” while also ejecting hundreds of billions of tonnes of sulfur and carbon dioxide into the atmosphere (Black, 2022: 65). A shock wave that produced winds in excess of 1,000 km/h tore across coastal regions, shredding vegetation and animals in an estimated radius of 1,500 kilometres (Kring, 2007: 14). Ejecta from the blast, which included dust, rocks, pebbles, and glass melt beads, “peppered the [surrounding] landscape, and any dinosaurs in their path, with scattershot punches as if from a huge shotgun” (Benton, 2020: 256). Near the impact site, the ejecta rained back down, creating layers of debris that were hundreds of metres thick (Kring 2007: 14), but much of the ejecta was shot so rapidly into the air that it ended up in the atmosphere as a massive cloud of pulverized rock, dust, soot, and sulfate aerosols, which

⁷ Pluth writes, “This does not mean that nothing changes in nature, of course. The claim that there are no events in nature really just means that nothing happens to nature from outside of nature” (2010: 59). On these terms, an evental site in the natural world would probably only form through the intrusion of humanity into an ecosystem. Thus, any natural environment free from humanity (such as the entire Mesozoic Era) should be free, in theory, of evental sites.

circulated large sections of the earth in a matter of hours (Morgan et al., 2022). Moreover, because the asteroid struck in a coastal region, it vaporized “[u]ntold gallons of seawater,” creating a void in the ocean (Black, 2022: 62). Mega-tsunamis between 100 and 300 metres high rocketed away from the site, crashing into the continental landscape and travelling 300 kilometres inland before rebounding in a massive backwash, dragging mangled, crushed debris back toward the basin (Kring 2007: 13).

The asteroid strike wreaked havoc in a specific region, but it also became a global event due to its aftereffects. For one thing, an enormous amount of the ejecta that wound up in the atmosphere began to rain back down all across the earth in little pieces of incandescent rock and dust. Falling like a snowstorm of sparks, these fragments caused surface temperatures in various regions to soar while also igniting widespread forest fires within hours of the impact (Morgan et al., 2022; Black, 2022: 65-66; Vellekoop et al., 2014: 7537). Many dinosaurs, including the famous *Tyrannosaurus Rex* and *Triceratops*, probably died out in the space of a day due to the intense heat (Black, 2022: 74), and half of the earth’s total biomass may have been incinerated within a month (Randall, 2015: 208). Furthermore, the rest of the dust that remained in the air (along with soot from all of the fires) blanketed much of the earth, reducing the incoming solar radiation, triggering a subsequent period of global darkness and cooling that “perturbed a relatively stable, warm, latest Cretaceous climate” (Vellekoop et al., 2014: 7540). This impact winter happened so quickly (at least on a geologic scale) that it is difficult to ascertain its length and effects, but it likely eradicated numerous ecosystems, including those in the ocean, which would have lost base levels of their food chains due to the disruption of photosynthesis (Morgan et al., 2022; Vellekoop et al., 2014: 7537). All told, the consensus view among scientists is that the Chicxulub Impact Event was the trigger for the extinction of the non-avian dinosaurs and numerous other species, a mass dying that capped the end of the Mesozoic Era.⁸ The K-Pg mass extinction remains one of the most devastating events in the history of life on Earth, and it is the only major extinction that has been linked conclusively to an asteroid impact (Brugger et al., 2021: 1).

Adapting a flexible approach to Badiou’s construction of the event affords diverse perspectives on the relationship between his ontology and the Chicxulub Impact Event. These perspectives can be filtered through both traditional and contemporary interpretations of the K-Pg mass extinction. Interestingly, the main traditional interpretation works against Badiou’s understanding of the natural multiple. This interpretation, which retains some currency in mainstream accounts, proposes that the dinosaurs went extinct because they were ill-suited for life in the first place. This line of reasoning traces its roots to the initial discovery of dinosaur fossils in the early nineteenth century, predating theories of the Chicxulub Impact Event (Powell, 1998: 159). In this framework, the dinosaurs are seen to be “mindless automata that barged around knocking over Jurassic trees, and surviving only because all the other dinosaurs were equally stupid” (Benton, 2020: 128). As Riley Black points out, these one-dimensional images of the dinosaurs eliminate the need to even probe why they went extinct: “How could shambling, malformed monsters that looked like a herpetologist’s nightmare ever be the pinnacle of life’s story?” (2022: 6-7). Underlying such questions is the assumption that the asteroid impact was a necessary event that paved the way for a higher form of life, namely mammals and (eventually) humans. James Lawrence Powell summarizes this perspective: “The great, lumbering, pea-brained beasts (...) simply lost the survival race to the more nimble and intelligent mammals – our ancestors” (1998: 159).

⁸ However, some dissenting views have argued that other developments, such as volcanic activity, played a major role in the K-Pg extinction. See for instance Keller et al. (2004).

The traditional interpretation of the K-Pg extinction reworks Badiou's explication of the natural multiple on two interlocking levels. On the first level, this interpretation portrays nature as an operator that determines which species are represented in the overarching situation of ecological history.⁹ In this context, commentaries on the dinosaurs' deficiencies frame them as a self-contradiction in the natural world – a vast multiple that belonged to the evolutionary life cycle of the earth without actually being included in it. Put glibly, this perspective views the dinosaurs as something akin to an evolutionary mistake. In Badiou's language, due to their lack of intelligence and reptilian behaviour, the dinosaurs never rose past the point of being singular multiples within the situation of ecological history. They were present in this situation merely because they did, after all, form countless genera and classes that qualified as unified ones, but these ones formed amid a largely purposeless expansion of organic multiplicity. The underlying implication of this assumption is the idea that, insofar as nature functions as an operator that creates ones out of the chaotic void, it possesses a meta-structure (based on natural selection) that determines which species are supposed to "count" in the long-run history of life on Earth.

This superficial account imagines that nature is analogous to a nation-state that contains species that qualify as citizens of the earth, and others that are more like transients. For my purposes, the second level of intersection between the traditional interpretation of the K-Pg extinction and *Being and Event* unpacks the anthropocentric implications of this account. On this level, the real operator is not nature itself, but a retroactive version of nature that *humanity* has built around its own conception of natural selection. This is to say that identifying natural selection as the key component of nature's meta-structure is a distinctly human operation. Framed from this perspective, the traditional interpretation of the extinction actually inserts humanity (or at least the potential rise of humanity) into the Mesozoic Era. Mammals existed alongside dinosaurs all across the Mesozoic, but they were just small, nocturnal creatures until the K-Pg extinction, after which they came into their own, expanding into their modern forms over the course of the subsequent 10 million years (Benton, 2020: 284). The traditional interpretation suggests that the dinosaurs were slated for destruction because the "clearly superior mammals were waiting in the wings to take charge" (Black, 2022: 7). More specifically, they were waiting for the opportunity to produce a branch that would, in time, give birth to ultra-intelligent creatures capable of dominating the planet.

In the context of *Being and Event*, any assumption that events in the Mesozoic Era anticipated the rise of humanity gestures towards a link between the latter and the concept of the abnormal multiple. From this perspective, the potential superiority of the mammals, and the attendant possibility that a species like humanity could develop, formed the eventual site of the Mesozoic. Because this potential was merely latent until the asteroid strike, it was neither present nor represented in the situation of the Mesozoic. What would have been present, however, was a meta-structural operation that "counts" species based on their place within a hierarchy of natural selection. According to this scenario, the abnormal multiple would have consisted of the primal unit of a superior species. On the one hand, this unit had no physical presence since it was, after all, located in the future, but on the other hand, it would have been implicitly present in *all* of the ones since, according to this version of nature's meta-structural logic, every species subsists within the hierarchy. Therefore, the Chicxulub Impact Event brought about the violent presentation of that which was unrepresented in the Mesozoic, which was the inevitability of a dominant species' emergence. Put another way, because the impact supposedly revealed the

⁹ Here, the situation constitutes the entirety of life on earth, with all of the plant and animal species that have ever existed forming the multiples that make up the ecological history of the planet. Most of the following argument focuses on the situation of ecological history writ large, though I also discuss specific situations within this larger one (such as the Mesozoic Era).

meta-structure of nature on a macrocosmic scale, it exposed inequalities among the various multiples. The upshot is that the dinosaurs were revealed to be, not normal multiples, but singular multiples: beings that were present but not represented in ecological history.

On the surface, this reading posits humanity as both a product and a proponent of an ecological operation founded on natural selection. Here, humans represent the goal of natural selection, but only because they frame it according to their own assumptions. Situated in the context of *Being and Event*, humanity's self-reflexive role as an operator offers a particular vision of ecological history built around our own chauvinism. The irony is that this is a vision of nature that is ultimately split into a dichotomy, which consists of an excrescent multiple and the void. In this dichotomy, humanity qualifies as an excrescent multiple because it is fully represented in ecological history without being present in nature. Dominant, destructive, and oddly external to the natural world, humans are never quite present in any given ecosystem. Instead, they represent, on their own terms, the meta-structural logic of the situation, framing nature as a progressive movement that has led inevitably to their own supremacy. The dour consequence of this reading is the implication that the dinosaurs and *every other* species in the history of the earth inhabit the level of a singular multiple since none of them are afforded full representation in ecological history. Yet if this is the case, then these species should all be destined for extinction since they are, by definition, evolutionary self-contradictions. They actually sink to the level of inconsistent multiplicity: in every case, their long-term fate *must* involve the loss of their status as unified ones and their corresponding consignment to the chaotic formlessness of the void.¹⁰ As such, inconsistent multiplicity lurks at the heart of an anthropocentric conceptualization of nature since, by its reasoning, humans are the only species that truly count in the situation. In Badiou's words, if ecological history is seen to be teleological, then it must be stocked with countless multiples (i.e., species) that are destined to collapse into inconsistent multiplicity under the meta-structural counting of a natural world that favours humanity above all else.

Contemporary scientific re-evaluations have debunked conceptions of the K-Pg extinction that work from self-serving premises of teleological natural selection. For one thing, it is evident that the dinosaurs were, in fact, "among the most successful creatures ever to live," with a reign that stretched across 160 million years (Powell, 1998: ix). For another thing, the factors that led to their extinction and the survival of (some) mammals did not centre on the innate superiority of the latter. Instead, a range of differences in behaviour that had little to do with cognitive ability played defining roles in the survival rates of both terrestrial and marine animals (for example, creatures that fed on detritus and that could shelter underground had greater chances of survival (Morgan et al., 2022). Finally, and most importantly, "animals do not have internal timers that regulate when a species are 'born' or 'die' according to some cosmic clock" (Black, 2022: 8). This is to say that no species constitutes a self-contradiction in the natural world. They are all equally part of ecological history. In the framework of *Being and Event*, the refutation of

¹⁰ A self-serving anthropocentric construction of natural selection works from the basis that humanity should somehow be exempt from extinction in the future, either due to our ability to manufacture technology that would permit long-range interstellar migrations (a far-fetched scenario) or for some mystical reason that involves our exceptional status on Earth, if not the cosmos in general. The counterpoint to such assumptions is the observation that *every* species on Earth, including humanity, is destined for extinction. For one thing, in the long-term, the earth will always be subject to major disasters, including perhaps asteroid strikes that might be even more catastrophic than the Chicxulub Impact. For another thing, the earth will not remain habitable forever. In this respect, humanity's status as a species that occupies a single planet all but ensures that we will one day be extinct, an idea I revisit below.

the natural-selection thesis seems to redeem the concept of the natural multiple since it suggests that every species is always present and represented in ecological history. On these terms, the Chicxulub Impact Event has the quality of an unnatural occurrence, with the asteroid playing the part of an interloper to the situation of the Mesozoic. From this perspective, the impact may fail to qualify as an event in Badiou's sense of the term.

Nonetheless, an analysis of the impact that focuses on the origins of the asteroid affords a more expansive perspective, which, in addition to taking into account the Mesozoic Era and ecological history, also explores the situation of the Solar System. This perspective offers a way to view the Chicxulub impact as an event. The scientific basis of this reading centres on contemporary interpretations of the K-Pg extinction that are more invested in discovering the origins of the asteroid than in parsing the reasons the dinosaurs went extinct. Most of these interpretations work from the basis that the extinction was, in many respects, a contingent event – a disaster that simply *happened* due to a sequence of occurrences that easily could have been different. For example, if the asteroid had landed in the middle of an ocean, it may have been more of a local catastrophe that ravaged specific coastal regions, as opposed to a global one that wiped out 75% of the species on the planet (Black, 2022: 59-60). At the same time, though, acknowledging the contingency of the event has, in some ways, also intensified the search to trace the origins of the asteroid in order to understand why exactly it struck the earth when it did.

The precise history of the asteroid remains obscure, but it seems likely that it originated in the Oort Cloud, the vast collection of icy planetesimals that resides at the periphery of the Solar System. Located a phenomenal distance from the sun, the Oort Cloud is thought to contain trillions of rocks suspended between the sun's gravitational pull and the "outward tug from the rest of the Galaxy" (Tasker, 2017: 71). The total mass of the Oort Cloud might be only five times that of Earth's mass, but this cloud nonetheless likely contains billions of objects that measure over 200 kilometres across in size, plus many others that are smaller (Randall, 2015: 115). These objects are the remnants of the Solar System's protoplanetary disk, a "rotating gas and dust factory" that coalesced around the sun billions of years ago, contributing gradually to the formation of the planets, including Earth (Tasker, 2017: 31). The formation of the planets happened via collisions and mergers among rocks in the protoplanetary disk (Tasker, 2017: 47-51), but many of these rocks were "never aggregated into a planetary home," ending up instead in the "scrapyard" of the Oort Cloud (Black, 2022: 44). In all probability, the Chicxulub impactor started out as a planetesimal in the Oort Cloud. At some point, collisions with other rocks would have disrupted its orbit, sending it plunging into the Solar System, where it eventually broke apart under the gravitational pull of the asteroid-eating gas giant of Jupiter. Most of the pieces would have fallen into Jupiter, but a lone piece evidently was knocked free and sent onto a collision course with Earth (Black, 2022: 44-46).

In Badiou's language, the asteroid was neither present nor represented in the situation of the Mesozoic until it landed in the centre of it, so it could conceivably be categorized as an element from the void. On a symbolic level, the Oort Cloud does have associations with the void since it is symptomatic of the vast reaches of outer space that stand at the edge of the Solar System. An image of trillions of planetesimals occupying the most distant borders of our star system captures a vision of chaotic multiplicity – a kind of excess that fails to fit into any discernible situation on Earth. One could therefore say that the Chicxulub Impact Event signified the invasion of the void into the unified oneness of ecological history at large. In this reading, the asteroid impact did *not* present the meta-structure of nature and the corresponding inevitability of humanity's rise. Rather, it was an intrusion from the void that exposed the way

that nature as a *whole* is always on the verge of collapsing into chaotic formlessness. To put it in concrete terms, the asteroid could easily have annihilated all life on Earth, fracturing the basic unified oneness of ecological history altogether.

Treating the asteroid as a pure interloper, this reading appears to adhere to Badiou's idea that events never take place in nature. Then again, the possibility that the earth itself was a component part of the evental site reorients the analysis, suggesting that the impact was, in fact, an event in Badiou's sense of the term. The depiction of the earth as an evental site hinges on a primordial cosmic link between our planet and the asteroid. Both the Oort Cloud and the earth are descendants of the original protoplanetary disk that formed in the early stages of the Solar System. Taking this link into consideration, the asteroid was more than just an element from the void. It was also a member of a *consistent* multiple made up of all of the bodies that developed from the protoplanetary disk, including the earth itself. In retrospect, the asteroid and the earth had a shared history because they were both "rocks" that belonged to and were included within the situation of the Solar System's life cycle. In this analysis, the operator is the sun itself, which serves to bind together the multiplicity of planetary bodies into the unified one of a star system.

The underlying significance of this connection emerges through the thesis that the earth was part of the abnormal multiple that constituted the evental site of the K-Pg extinction. Again, for Badiou, an abnormal multiple is the most basic primal unit in any situation – a multiple that wavers at the edge of the void because none of its elements are present or represented in the situation. The earth may well be just another rock among the planetary bodies that inhabit the Solar System, but this particular cosmic multiple was never present or represented in the situation of the Mesozoic. Indeed, Badiou's understanding of the natural multiple appears to exclude the cosmic realm from any situation on Earth. The concept of the natural multiple suggests that, in any given organic environment, cosmic elements either do not exist at all, or are folded into the situation. In a marine ecosystem, for example, the sunlight is just another element within the local situation, occupying the same ontological level as the plankton, fish, predatory birds, and so on. For the beings in the ecosystem, that the sunlight exists because the earth is a planet orbiting a star is not only irrelevant, but unrecognizable.

The irony is that the entire situation of the Mesozoic (or, for that matter, ecological history) depended on the earth's status as a rock that happens to be orbiting the sun at a specific distance. It is the earth's place within the multiple of planetary bodies in the Solar System that makes it habitable in the first place. The Chicxulub impactor also had a place within this multiple since it too was a rock that happened to be orbiting the sun until it was pulled into the Solar System. In this way, the asteroid strike brought about the violent presentation of that which was unrepresented in the situation, that is, the earth's place within a multiple comprised of numerous planetary bodies. In retrospect, this latter multiple functioned as an abnormal multiple not only because it was neither present nor represented in the Mesozoic, but also because it stood at the edges of the void. In other words, the Oort Cloud itself was not the void. Rather, the planetary bodies as a whole comprised (and still comprise) the most minimal unified one that exists vis-à-vis earthly life. This is the multiple that the operator (the sun) first created, generating the structure of the Solar System, without which the planet itself would not exist. Beyond this particular situation stands the true void, the absence of any star system at all. Ultimately, then, the asteroid strike was like a meeting between two members of the abnormal multiple – in figurative terms, a reminder that the earth is just a piece of rock in space. The eruption of the evental site fractured the ostensibly natural multiple of the Mesozoic by revealing that the entire unified oneness of ecological history is a precarious structure that depends on the place the earth occupies in a planetary multiple within the Solar System.

Conclusion

Tracing intersections between *Being and Event* and the Chicxulub Impact Event casts light on a historical transition in interpretations of the K-Pg extinction. The traditional interpretation utilizes a reductive understanding of natural selection to suggest that the asteroid strike simply accelerated the inevitable decline of the dinosaurs and the rise of the mammals. A Badiouan reading of this interpretation emphasizes the degree to which it retroactively inserts humanity into the Mesozoic Era. Humans were neither present nor represented in any form during this era, but Badiou's conception of the abnormal multiple as an evental site elucidates how teleological theories of the K-Pg extinction treat the latent potential for humanity as a crucial element in the Mesozoic. In the context of *Being and Event*, this interpretation ultimately downgrades all other species to the level of singular multiples that were/are destined to collapse into the void of inconsistent multiplicity.

By contrast, contemporary interpretations of the extinction that focus on the origins of the asteroid tend to group humans together with all other species. These interpretations acknowledge that the earth's wider status as a planetary body within the Solar System remains opaque to the beings that inhabit any given ecosystem. The ecosystem may depend entirely *on* this status, but this dependency is not germane to lifeforms caught up in symbiotic relationships and evolutionary cycles. Consequently, that the earth is one among trillions of rocks that descended from a protoplanetary disk is neither present nor represented in nature. Yet this reality *can* crash into the natural world, as happened during the Chicxulub Impact Event. Human discourse and behaviour represent this possibility in variegated ways (whether through Hollywood films about impacts, the Sentry monitoring system, etc.), but they typically do so in a manner that attempts to frame the situation of the Solar System as a normal multiple that subsists within the (falsely) larger situation of human civilization. As a result, they often assume that human technology should be able to regulate and manage the Solar System. In doing so, they obfuscate the main implication of casting the earth as an evental site, which is that humanity is destined for extinction precisely *because* our planet is just another rock in the Solar System.

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