Does the Actuality of Life Favor Many Actual Histories?

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Abstract

This essay develops a simple conditional argument for many-history ontologies from the fact that life exists. The question is not why our exact evolutionary sequence occurred, but why reality contains the broad class of life-bearing histories at all. If such histories are sufficiently rare, then a single-history ontology makes the existence of life surprising, while an ontology containing many histories can make it unsurprising. In the limiting case, life may be vanishingly unlikely in any one history while almost certain to occur somewhere if many histories are actualized. Everettian quantum mechanics is a natural candidate for this kind of ontology because its multiplicity is not introduced for anthropic purposes, but arises from taking universal unitary quantum mechanics seriously. The Fermi paradox is discussed as pressure against the claim that life is common within a single history.

1 Introduction

Why does the actual world contain life? The question is not why human beings exist, or why this exact evolutionary sequence occurred, but why reality contains any life-bearing history at all: any physical history in which matter becomes organized into self-maintaining, reproducing, evolving systems.

One possible answer is that life is not surprising. Perhaps the fundamental laws of physics strongly favor stable matter, chemistry, planets, replication, and evolution. Perhaps, once a universe has the right physical structure, life-bearing histories are common. If that is true, then the existence of life gives us little reason to prefer an ontology with many actual histories over an ontology with only one.

But another possibility is that life-bearing histories are extremely rare. The rarity might enter at many levels. Maybe the fundamental laws and constants are only narrowly compatible with stable complexity. Maybe suitable planets are rare. Maybe abiogenesis is fantastically unlikely even on suitable planets. Maybe simple life is common but open-ended biological complexity is rare. The bottleneck could occur at the lower level of fundamental physics, or higher up in the contingent details of cosmology, chemistry, abiogenesis, and evolution.

The empirical status of these questions remains unsettled. We have only one known example of abiogenesis, observed from within a life-bearing history, so the rarity of life-bearing histories cannot be inferred directly from Earth's history. The early emergence of life on Earth may suggest that abiogenesis is not extremely difficult, but that inference is complicated by selection effects and prior assumptions (Spiegel and Turner, 2012; Kipping, 2020).

This essay develops a conditional argument: if life-bearing histories are extremely rare in a

single-history ontology, then the actuality of life supports an ontology in which many physical histories are actualized.

Everettian quantum mechanics, often called many-worlds, is a particularly interesting candidate for such an ontology. Its multiplicity is not introduced merely to solve an anthropic puzzle. It arises from taking the universal quantum state seriously and refusing to add a physical collapse: a special process by which one quantum outcome becomes actual while the others disappear (Everett, 1957).

On the Everettian view, the alternatives represented in the quantum state are not merely possible ways things might have gone. Under the right conditions, they correspond to physically real branches of the world (Wallace, 2013). This makes Everett relevant to the question of life because it changes what it means for a rare physical history to be actual. In a single-history ontology, if life-bearing histories are extremely rare, then our one actual history was very unlikely to be life-bearing. In an Everettian ontology, by contrast, a rare life-bearing history need not be the one selected history. It may be one among many physically real branches.[1]

The claim is conditional. If life-bearing histories are common, then no appeal to many actual histories is needed. But if life-bearing histories are rare, then the fact that reality contains one supports an ontology that actualizes many histories rather than only one.

The argument has four parts. First, I distinguish a single-history ontology from a many-history ontology. Second, I clarify the relevant datum: not this exact evolutionary history, but the actuality of a life-bearing history disclosed from within experience. Third, I consider where the rarity of life might enter: in the laws, in cosmological history, in abiogenesis, or in later biological complexity. Finally, I address the main objections: anthropic conditioning, Born measure, rival many-trial hypotheses, and the possibility that life is not rare after all.

The conclusion is deliberately modest. If life-bearing histories are rare under a single-history ontology, and if the actuality of a life-bearing evidential standpoint is legitimate evidence rather than something to be conditioned away, then many-history ontologies receive abductive support. Everett is the most interesting such ontology because its multiplicity is already suggested by quantum mechanics itself.

Before developing that argument, we need to clarify what "one actual history" and "many actual histories" mean.

2 One Actual History Versus Many Actual Histories

By a history, I mean a complete physical story of how the world unfolds: which stars form, which planets form, which chemical reactions occur, whether life begins, how evolution proceeds, and what macroscopic events actually happen. A history is not just a momentary state. It is an entire trajectory of events.

The argument depends on a contrast between two ways reality might be structured. On one view, reality contains only one actual history. Many things could have happened, but only one sequence of events really does happen. Other possibilities may be physically possible, mathematically represented, or assigned probabilities, but they are not actual. They are unrealized alternatives. On

[1] The argument is related to Wilson's treatment of multiverse hypotheses as undercutting defeaters for fine-tuning arguments (Wilson, 2020). Wilson's focus is on whether Everettian or other multiverse hypotheses undercut the inference from life-permitting constants to design. The present argument differs in emphasis: it is not primarily an argument about design or fine-tuning, but a positive abductive argument from the actuality of life-bearing histories to many-history ontology.

another view, reality contains many actual histories. Different possible sequences of events are not merely unrealized alternatives. They are physically real in some sense.

This contrast becomes especially important in quantum mechanics. Quantum mechanics characteristically represents a system as involving several possible outcomes at once. For example, a radioactive atom may be described as having one component in which it decays and another component in which it does not decay. When that atom interacts with a measuring device, the measuring device may become correlated with these alternatives: one component of the total state records decay, while another records no decay.

The question is: what does that quantum description mean physically?

A single-history view says that, when quantum theory presents several possible outcomes, only one of them becomes part of actual reality. The other outcomes may appear in the mathematics. They may help determine probabilities. They may describe things that could have happened. But they do not actually occur. So, if a radioactive atom either decays or does not decay, a single-history view says that one of those things really happens and the other does not. If the decay later affects a mutation, an organism, or an evolutionary path, then only one resulting biological history is actual. Reality follows one path through the space of physical possibilities.

Examples of single-history approaches include textbook collapse or Copenhagen-style formulations, objective-collapse theories such as GRW (Ghirardi et al., 1986), hidden-variable theories such as de Broglie–Bohm pilot-wave theory (Bohm, 1952a,b), and more recent stochastic approaches such as Barandes's indivisible-stochastic formulation (Barandes, 2025). These views differ sharply in ontology and dynamics: GRW modifies quantum dynamics with spontaneous collapses, Bohmian mechanics adds definite particle configurations guided by the wavefunction, and Barandes recasts quantum systems as indivisible stochastic processes in configuration space. For present purposes, however, they share the relevant feature: a single actual history is selected or realized, rather than all the alternatives represented in the quantum state being equally actual.

A many-history view says something different. It says that the different outcomes represented in the quantum state are not merely possible outcomes, one of which is selected. Rather, when the alternatives become separated into effectively non-interacting branches, more than one outcome is physically real. In one branch, the atom decays. In another branch, it does not. If those alternatives later lead to different macroscopic events, then reality contains multiple macroscopic histories.

The best-known many-history view is Everettian quantum mechanics. On this view, the universal quantum state never collapses down to a single outcome. It evolves according to the unitary dynamics of quantum mechanics. What we call a measurement is not a special physical process that selects one outcome and deletes the others. It is a process by which different outcomes become correlated with different branches of the world (Everett, 1957; Wallace, 2013).

This does not mean that anything imaginable happens. The branches are not arbitrary fantasies. They are constrained by the actual quantum state, the actual laws of physics, and the dynamics of quantum evolution. Nor does the ordinary Everettian picture require that different branches have different fundamental laws or constants. At the level of familiar quantum measurements and decohering macroscopic events, the branches are different histories unfolding under the same underlying physical laws.

In short:

Single-history ontology: many possible histories, but only one actual history.

Many-history ontology: many possible histories, and many actual histories.

This distinction matters for the argument from life. If life-bearing histories are common, then one actual history may be enough. A single-history universe would not need extraordinary luck to contain life. But if life-bearing histories are extremely rare, then the difference between one actual history and many actual histories becomes important. A single-history ontology actualizes only one path through physical possibility. If almost all such paths are lifeless, then it is surprising that this one actual path contains life. A many-history ontology changes the comparison. It does not need the life-bearing history to be the one selected path. It needs only for life-bearing histories to occur somewhere among the many actualized histories.

The argument is therefore not that our exact world is surprising. Every exact world-history would be highly specific. The relevant question is whether the whole class of life-bearing histories is rare. If it is, then a theory that actualizes many histories may have an explanatory advantage over a theory that actualizes only one. In rough terms, a single-history ontology faces the question, "Why did the one actual history land in the rare life-bearing class?" A many-history ontology can answer, "It did not have to be the one selected history; life-bearing histories are actual because many histories are actual." The rest of the essay develops that thought more carefully, including the qualifications about measure, anthropic conditioning, and the empirical rarity of life.

2.1 A Caveat About Branching

The phrase "many histories" should not be used too casually. In Everettian quantum mechanics, there is a technical question about what exactly counts as a branch.

A quantum state can be mathematically decomposed in many different ways. So if one says that all branches are real, one must ask: branches in which decomposition? Why treat the quasi-classical branches, the ones containing stars, planets, organisms, records, measurements, and ordinary macroscopic events, as the physically relevant histories, rather than some mathematically different decomposition of the same quantum state?

This is often called the preferred-basis problem. It is a real issue for Everett. The usual Everettian answer appeals to decoherence. Physical systems constantly interact with their environments. Those interactions suppress interference between certain components of the quantum state. The components that remain dynamically stable are the ones that look approximately classical: localized objects, stable records, definite-looking outcomes, and macroscopic histories (Zurek, 2003). Wallace (2013) summarizes the modern Everettian view as relying heavily on decoherence to identify the quasi-classical structures that function as branches, though this remains philosophically contested.

On this view, branches are not fundamental extra entities added to quantum mechanics. They are emergent, approximate structures within the universal wavefunction. A branch is not like a separate universe floating somewhere else. It is a dynamically stable pattern in the total quantum state.

For present purposes, the preferred-basis problem can be bracketed without being ignored. Hemmo and Shenker (2022), for example, argue against treating decoherence alone as a complete solution. The argument here assumes only the weaker claim that Everettian quantum mechanics, if viable at all, supplies a robust multiplicity of quasi-classical histories. That is enough for the present purpose. The issue is not exactly how many branches there are, or exactly where one branch splits

from another. The issue is whether reality contains many actual macroscopic histories rather than only one.

The argument is therefore conditional on that minimal Everettian claim. If the usual decoherence-based picture is broadly correct, then Everett supplies the kind of history-level multiplicity relevant to the argument from life.

3 Where Could the Rarity Enter?

The actuality of life might be surprising at several different levels.

At the lowest, most fundamental level, the laws and constants might be finely tuned for complexity. If the strengths of forces, particle masses, or cosmological parameters had been different, perhaps stable matter, stars, heavy elements, or chemistry would not have existed. The general thought that the basic structure of the physical world depends delicately on a small number of microphysical constants has a long history in anthropic reasoning (Carr and Rees, 1979). If the main improbability lies here, then Everettian branching within a fixed low-energy physics may not be enough.

At a higher, more contingent level, perhaps the laws allow complexity, but cosmological history must go a certain way. Stars must form. Heavy elements must be produced. Planets must arise in suitable environments. Usable sources of free energy must exist. If those conditions are rare across possible histories under fixed laws, then a many-history ontology becomes more relevant.

Higher up still, perhaps planets and chemistry are common, but abiogenesis is extremely unlikely. The first self-maintaining, reproducing systems may require an extraordinary sequence of chemical accidents. If so, then even a universe with many planets might usually remain lifeless. Existing evidence from Earth's early life does not settle this issue. Spiegel and Turner (2012) argue that early emergence is compatible with low abiogenesis rates once observation-selection effects are included, while Kipping (2020) finds only modest support for rapid abiogenesis and some support for rare intelligence.

If abiogenesis depends on such a sequence, then scientific explanation may eventually bottom out in historical contingency. We might reconstruct the chemical pathway by which life arose, while still having to say that the required accidents happened. That would not make the explanation unscientific, but it would leave the actuality of a life-bearing history as a further explanatory question. Indeed, the more the origin of life appears to depend on an extremely unlikely sequence of contingent events, the more the actuality of a life-bearing history itself becomes abductive evidence for an ontology that actualizes many histories rather than only one.

A different bottleneck may lie not at the origin of life, but in the transition from simple life to complex life. Maybe prokaryotic life is common, while eukaryotes, multicellularity, nervous systems, or open-ended ecological complexity are rare. That would make the argument more specific, but the same structure would remain.

The key point is this: the actuality of life supports a many-history theory only to the extent that life is rare at a level where that theory supplies multiplicity.

If the bottleneck is history-level contingency under fixed laws, Everett is directly relevant. If the bottleneck lies in the laws or constants themselves, then ordinary Everettian branching under a fixed low-energy Hamiltonian may not be enough by itself: it supplies many histories governed by the same effective laws, not automatically many sets of laws or constants. But that limitation should not be overstated. In a deeper quantum-cosmological theory, the universal quantum state

might include superpositions over different vacuum states, compactifications, field configurations, or effective constants.

Susskind (2007) presents the string-theory landscape as one important setting in which a vast diversity of possible low-energy vacua is taken seriously and explicitly connected to anthropic reasoning. Shaya (2025) proposes enlarging quantum-cosmological configuration space to include theory-defining parameters themselves, so that the universal wavefunction has support over worlds with different effective physical laws.

The argument does not require these proposals to be correct. They serve a narrower role: they illustrate how quantum superposition might apply not just to events within a fixed universe, but also to the structures that determine what kind of universe a branch contains. The more careful claim is that Everett most directly helps with history-level rarity under fixed physics, while Everett combined with a landscape or quantum-cosmological framework may also bear on law-level rarity.

4 The Relevant Datum

The argument should not begin from an imagined view from nowhere, as though I first survey a space of possible worlds and then ask what fraction, or what measure, of them contain life. That is not our actual epistemic situation. I do not first inspect possible histories and then infer that one of them contains organisms. I begin from within this life-bearing history.

More carefully, the only thing I have absolutely direct evidence of is experience itself. Experience is immediate. Everything else is inferred. But some inferences are so basic and so overwhelmingly supported that denying them would be less reasonable than accepting them. From within experience, I have overwhelming evidence of a living body, a biological environment, other organisms, reproduction, evolution, and a world structured by life. Life is not given with the same indubitability as experience, but it is part of the world disclosed through experience with overwhelming force.

That is the epistemic starting point. The next question is how to describe the datum for purposes of explanation. It would be too weak to say merely that some possible world contains life. It would also be too strong to require an explanation of this exact biological history in every detail. The relevant datum lies between these extremes:

$$E = \text{a life-bearing evidential situation is actual.}$$

That formulation matters. The existence of life is not an optional theoretical posit added after the fact. It is part of the evidential standpoint from which theory choice begins. I am not starting from nowhere and asking where I should expect to land. I am starting from the brute fact that this life-bearing evidential situation is actual. The question is which ontology makes that actuality less surprising.

This also explains why consciousness matters without making consciousness the whole point. Consciousness is epistemically privileged because experience is where evidence begins. But the thing to be explained is broader than consciousness: the actuality of a physical history containing life, including cells, metabolism, reproduction, ecosystems, organisms, and eventually beings capable of reflecting on the fact that such a history is actual.

Once the datum is framed this way, the relevant contrast is not between this exact history and all others. Every exact world-history would be highly specific. The relevant contrast is between

histories that contain life and histories that do not. The question is whether the broad class of life-bearing histories is rare.

That distinction is crucial. The actuality of a life-bearing history could be surprising in the way a royal flush is surprising. The actuality of this exact biological history would be merely surprising in the way every exact shuffle is surprising.

5 The Conditional Argument

The core argument can now be stated more precisely.

Suppose that, under the actual laws of physics and the theory's natural measure over possible histories, life-bearing histories have extremely small measure. Then a single-history ontology faces a straightforward problem: it actualizes only one history. If almost all of the measure is concentrated on lifeless histories, then it is surprising that the one actual history contains life.

A many-history ontology changes the picture. If many physically possible histories are actualized, then life-bearing histories need not be the one selected history. They need only occur somewhere in the physically real structure of histories.

In Everettian quantum mechanics, this becomes especially interesting. If the universal quantum state contains branches corresponding to life-bearing histories, then those histories are not merely possible. They are actual branches of the total physical state. A single-history theory may assign such histories a very low probability of becoming actual. An Everettian ontology says instead that they are actual, provided they occur in the branching structure at all.

The conditional argument can therefore be stated as follows:

1. We find ourselves in a life-bearing history.

2. If life-bearing histories have extremely small measure in a single-history rival's probability distribution over histories, then single-history ontologies make the actuality of life surprising.

3. Everettian quantum mechanics, if interpreted realistically and without collapse, actualizes many quasi-classical histories rather than one.

4. Therefore, if life-bearing histories are sufficiently rare, the actuality of life provides evidence for Everettian or otherwise many-history ontologies.

The conclusion is conditional and abductive. Its force depends on whether life is actually rare.

6 Objections and Qualifications

The argument just stated is conditional in several ways. Three objections are especially important. First, anthropic reasoning challenges whether the actuality of life should be treated as evidence rather than conditioned on from the beginning. Second, Everettian Born measure raises the worry that the mere existence of low-weight life-bearing branches cannot do the explanatory work required. Third, even if the argument succeeds, it does not uniquely favor Everett, since other many-trial hypotheses may supply similar multiplicity. We address those three issues in turn.

6.1 The Anthropic Objection

A standard reply is that we could not observe a lifeless world. Of course we find ourselves in a life-bearing history, because only life-bearing histories contain observers who can ask the question.

That response is partly right. There is a selection effect. We should not be surprised that our evidence comes from a world compatible with the existence of evidence-gatherers. Observation-selection effects are central to anthropic reasoning (Bostrom, 2002). They also connect to the self-indication assumption, according to which one's existence can favor hypotheses containing more observers, though that principle remains controversial (Bostrom and Ćirković, 2003).

But the selection effect does not automatically dissolve the question. It explains why we should not expect to observe a lifeless world. It does not, by itself, explain why any life-bearing evidential situation is actual in the first place.

The dispute is about whether life-bearing actuality should be treated as evidence or simply conditioned on from the beginning. One position says that, once we condition on the existence of observers, the presence of life is no longer evidentially relevant. The opposing position says that this conditions away the very thing at issue. The existence of a life-bearing standpoint is itself part of the data. A theory that makes such standpoints fantastically unlikely should be penalized; a theory that makes them less surprising should be favored.

The argument in this essay assumes the second approach. It treats the actuality of a life-bearing history as evidentially relevant. The rest of the argument therefore depends on rejecting a fully deflationary anthropic stance.

6.2 Born Measure and the "Too Cheap" Objection

The most serious Everett-specific objection concerns Born measure. In Everettian quantum mechanics, branches are not normally counted equally. Branch weights play the role that probabilities play in ordinary quantum predictions. But because all outcomes with nonzero amplitude occur, the ordinary meaning of probability is not straightforward. This is the probability problem: how can the Born rule make sense in a deterministic theory in which all possible outcomes occur? Wallace treats this as one of the central challenges for Everettian quantum mechanics (Wallace, 2013).

The objection is powerful because Everettian confirmation cannot simply ignore measure. A low-weight branch containing some observation should not automatically count as strong support merely because that branch exists. Otherwise Everett would make every low-weight anomaly evidentially cheap. If life-bearing branches have extremely small Born measure, then one might object that Everett has not really made life less surprising. It has only said that some tiny-weight branch contains life.

This objection parallels the anthropic objection, but at the level of branch weight rather than observation selection. The tempting reply is to say that, if life-bearing branches have tiny Born measure, then I should not expect to find myself in one. That may be right if the question is one of self-location among branches. Sebens and Carroll (2018), for example, argue that self-locating credence in Everettian quantum mechanics should follow the Born rule rather than treating branches as equiprobable.

But the present argument is not primarily a self-location argument. It is not asking where a randomly located observer should expect to find herself. It is asking whether the actuality of any life-bearing evidential standpoint is less surprising under an ontology that actualizes many

histories than under one that actualizes only one. In a single-history ontology, if life-bearing histories have tiny measure, then probably no life-bearing history is actual. In an Everettian ontology, if life-bearing histories occur in the branching structure, then they are actual, even if their total Born measure is small.

This does not make Born measure irrelevant. Born measure remains central to ordinary prediction, typicality, and empirical confirmation within Everett. It also blocks the crude claim that every nonzero branch is equally explanatory. The narrower claim is only that Born measure does not obviously exhaust the evidential question at stake here. If the question is, "What should a typical observer expect to see?" then Born measure is unavoidable. If the question is, "Why is there a life-bearing evidential situation at all?" then Born measure limits the argument but does not by itself defeat it.

6.3 Other Many-Trial Hypotheses

The conclusion, if sound, is not uniquely Everettian.

A cosmological multiverse might also supply many opportunities for life. So might an infinite spatial universe, a cyclic cosmology, or some deeper physical theory with many domains governed by different effective parameters. If any of these theories actualize many life-attempting histories, they could receive similar support. Tegmark's multiverse hierarchy is useful here because it distinguishes different kinds of multiplicity: distant spatial regions, inflationary regions with different effective constants, Everettian quantum branches, and more radical mathematical variation (Tegmark, 2009).

The conclusion is therefore broader than Everett: rare life would favor many actualized trials over one actualized trial.

Everett is special because it is not an ad hoc multiplier. Its multiplicity arises from a serious interpretation of an already successful physical theory. It does not say, "Let us invent many worlds so life is less surprising." It says, "If quantum mechanics applies universally and there is no collapse, then the physical state already contains many quasi-classical branches."

That gives Everett a privileged role among many-history views without making it the exclusive candidate.

7 The Single-History Challenge and the Fermi Paradox

A defender of a single-history ontology can challenge the argument at its most important empirical premise: perhaps life-bearing histories are not actually rare. There are two main ways to press this challenge. First, perhaps physics itself favors life. Maybe stable matter, chemistry, planetary systems, usable sources of free energy, and eventually abiogenesis are natural outcomes of the laws. On this view, life is not a cosmic accident. Once the right physical structure exists, life-bearing histories may be common enough that a single actual history is not surprising.

Second, even if life is unlikely at any particular site, perhaps a single actual universe contains enough ordinary trials. The universe is not one laboratory flask. It may contain vast numbers of planets, moons, oceans, hydrothermal systems, impact environments, and chemical experiments across billions of years. Even if abiogenesis is rare per site, the number of sites may be large enough that life is likely somewhere in one actual history.

Both replies face the same observational pressure: if life is common enough to make our existence

unsurprising in a single actual history, why have we seen no clear evidence of it elsewhere? This is the Fermi-paradox pressure. Classically, the paradox concerns the absence of evidence for extraterrestrial technological civilizations, despite the apparent likelihood that such civilizations might exist; Hart (1975) argued that the absence of extraterrestrials on Earth requires explanation if technologically capable civilizations are common, and Brin (1983) later surveyed the "Great Silence" controversy. The point here is broader but weaker. The silence is not direct evidence that abiogenesis is rare. It is strongest as evidence against abundant detectable technological life, and only indirect pressure against the broader claim that life itself is common. Still, it prevents the single-history "life is probably common" reply from being automatic.

This point can be connected directly to the many-history argument. Let K be the number of independent origins of life within a single quasi-classical history. Here K counts independent origins, not merely multiple inhabited locations. If life arises once and then spreads by panspermia or technological dispersal, that is still $K = 1$ for present purposes. We can then ask how the measure is distributed among histories with no life, exactly one independent origin of life, and two or more independent origins:

$$\mu(K = 0), \mu(K = 1), \mu(K \geq 2).$$

The relevant question is not only whether life occurs somewhere in the total structure of reality. It is also whether a given life-bearing history should be expected to contain exactly one independent origin of life or multiple independent origins.

Suppose a history contains N possible sites or opportunities for life, and each site has a small independent probability, or branch-measure contribution, p, of producing life. Then K is binomially distributed. When N is large and p is small, with $\lambda = Np$, this is well approximated by a Poisson distribution:

$$\mu(K = k) \approx e^{-\lambda} \frac{\lambda^k}{k!}.$$

Expanding to second order in λ, we have:

$$\mu(K = 0) \approx 1 - \lambda + \frac{\lambda^2}{2},$$

$$\mu(K = 1) \approx \lambda - \lambda^2,$$

and

$$\mu(K \geq 2) \approx \frac{\lambda^2}{2}.$$

Unconditionally, histories with two or more independent origins are second-order in λ, while histories with exactly one origin are first-order.

Now condition on being in a life-bearing history at all:

$$K \geq 1.$$

Then:

$$\mu(K = 1 \mid K \geq 1) = \frac{\lambda e^{-\lambda}}{1 - e^{-\lambda}},$$

while:

$$\mu(K \geq 2 \mid K \geq 1) = \frac{1 - e^{-\lambda}(1 + \lambda)}{1 - e^{-\lambda}}.$$

For $\lambda \ll 1$, these become:

$$\mu(K = 1 \mid K \geq 1) \approx 1 - \frac{\lambda}{2},$$

and:

$$\mu(K \geq 2 \mid K \geq 1) \approx \frac{\lambda}{2}.$$

If life is sufficiently rare, then given that we are in a life-bearing history, we should expect that history to contain exactly one independent origin of life. This conditional result applies equally to single-history and many-history ontologies. The relevant contrast is not about solitude conditional on life, but about the actuality of life in the first place. In a single-history ontology, rare life makes the actuality of any life-bearing history surprising; in a many-history ontology, life can be actual somewhere while most life-bearing histories still contain only one independent origin.

The structure of the argument is therefore as follows. Single-history plus rare life predicts apparent solitude conditional on life, but makes the actuality of life surprising. Single-history plus common life makes the Fermi-paradox pressure sharper. Many-history plus rare life offers a third possibility: life is rare enough that our apparent solitude is unsurprising, while still being actual somewhere because many histories are actualized.

The evidential force of this argument is limited in two ways. First, the Fermi paradox may tell us more about the rarity of technological civilizations than about the rarity of microbial life; it also depends on assumptions about detectability, timescales, communication, colonization, extinction, and search coverage. The point is not to infer $\lambda \ll 1$ merely from the fact that we have observed no second origin. Rather, the point is conditional: if independent origins are sufficiently rare, then the absence of a second origin is not surprising, and does not count against a many-history explanation of why life is actual somewhere. Second, the Poisson model assumes approximate independence. If there is some global feature of a history that makes life easy everywhere once it is possible anywhere, then the probability of multiple origins need not be suppressed in the simple way described above.

But if the relevant bottleneck is local and independent, such as abiogenesis at particular sites, then the scaling is exactly what one should expect. One origin is rare. Two or more independent origins are much rarer still.

Thus the Fermi paradox helps sharpen the conditional claim. The argument is strongest if reality has the following structure:

$$\mu(K = 0) \approx 1, \quad \mu(K = 1) \ll 1, \quad \mu(K \geq 2) \ll \mu(K = 1).$$

In words: almost all of the measure lies on lifeless histories; a tiny fraction lies on histories containing life once; an even tinier fraction lies on histories containing life multiple times. A single-history ontology then makes our life-bearing situation surprising. A many-history ontology can make life actual somewhere while also making our apparent solitude unsurprising.

8 Conclusion

The question is not why this exact world exists. Every exact world would be improbable. The question is whether life-bearing histories as a class are rare. If they are not rare, then the actuality of life provides little support for many-history ontology. A single-history universe would be enough.

But if life-bearing histories are extremely rare, then the fact that one is actual becomes evidentially significant. A single-history ontology actualizes only one path through physical possibility. A many-history ontology actualizes many. Everettian quantum mechanics is a natural candidate for such an ontology because its multiplicity is not invented for anthropic purposes; it emerges from taking universal quantum mechanics without collapse seriously.

The Fermi paradox sharpens rather than weakens this point. If life is common, our apparent solitude becomes more puzzling. If life is rare, then a single-history ontology makes our existence more puzzling. A many-history ontology offers a distinctive middle position: life can be rare within almost every individual history, so that most life-bearing histories contain only one independent origin, while still being actual somewhere because many histories are actualized.

The resulting claim has clear limits. It is conditional on the empirical rarity of life, on the viability of quasi-classical branching, on a non-deflationary treatment of life-bearing actuality as evidence, and on the claim that Born measure does not exhaust the evidential question at stake. It also supports many-history ontology more directly than Everett specifically. If a deeper quantum-cosmological theory includes superpositions over effective laws or parameters, the same style of reasoning may apply higher up the explanatory chain, though that extension is more speculative than ordinary Everettian branching.

The final claim is therefore narrow but substantive: if life-bearing histories have sufficiently small measure in a single-history rival's probability distribution over histories, then the actuality of life gives abductive support to physically grounded many-history ontologies.

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