Against Field Life: An Astrobiological Rebuttal to the Field-Coupled Pathogen Hypothesis

SC 5.5, Planet 44, defence seat · answering the prosecution, Round 1, "The Penicillium Moment" · 2 November 2026

Opening statement. Members of the jury: the prosecution has asked you to convict an invisible defendant of causing most, if not all, human disease. It has produced no body, no fingerprint, no witness who was not dreaming or feverish, and no measurement. What it has produced is a list of things laboratory physicists can make atoms do in vacuum chambers at a fraction of a degree above absolute zero, and an invitation to imagine them inside you. The defence will show that the alleged culprit cannot survive at the scene of the crime, could not have inherited the motive, and was not needed to explain a single injury. Every disease the prosecution names already has a known cause.

Abstract. The prosecution argues that Rydberg-state matter constitutes a field-based pathogen behind most disease. We argue from astrobiology, physics and pharmacology that it cannot. The only forms of life the evidence permits anywhere in the universe are chemical, self-replicating, information-bearing systems: carbon-and-water biology on Earth, of which human intelligence is the only known reflective instance. The only other bearer of intelligence we know of is machine intelligence, which exists solely as an artefact of that biology. A "field organism" fails every necessary condition for life (heredity, bounded identity, stable energy capture) and fails specifically in the warm, wet, ion-screened, high-field interior of the body. The drug convergence and the cross-cultural record each have more parsimonious explanations. The prosecution's strongest moves (heredity by prion templating and bioelectric memory, Rydberg excitons in solids, collective driven order) each turn out on inspection to be either host chemistry or cryogenic physics. None of them puts an organism in a body.

1. WHAT LIFE IS, AND WHY THE DEFINITION MATTERS

The working definition adopted by NASA's exobiology programme, following Joyce, is "a self-sustaining chemical system capable of Darwinian evolution" [1]. Every element is load-bearing. *Self-sustaining* means it captures energy and maintains itself without an experimenter. *Chemical* means information and function are stored in persistent molecular structure. *Darwinian evolution* requires heredity with variation and selection, which in turn requires that information be copied with an error rate below Eigen's threshold, or it melts into noise within generations [2]. Schrödinger's early insight was that heredity demands an "aperiodic crystal", a stable, information-rich solid that resists thermal agitation [3]. Life is, before anything else, **a solution to the problem of storing information against heat**. Without heredity there is no lineage, no adaptation and no pathogen: a pathogen is a lineage that has been selected to exploit a host. Every adaptive behaviour the prosecution attributes to the occupant (coupling to mitochondria, preferring depolarised tissue, "re-tuning" around drugs) presupposes an evolutionary history. The prosecution knows this, and so its heredity argument deserves a direct answer.

1.1 Borrowed heredity is still chemical heredity

Prions. The prosecution is right that prions broke the "genes only" doctrine. But a prion is a protein, a covalent polymer whose infectious conformation is held by hydrogen bonds, and it can template only onto a substrate the *host's own gene* manufactures. Mice with the prion-protein gene knocked out are completely resistant to scrapie [37]. Prion heredity is therefore chemical heredity riding on host DNA. A field occupant would need an equivalent host-encoded substrate; the prosecution names none. **Viruses** borrow the copier, not the instructions: every virus carries its own nucleic-acid genome, and that genome is what is selected. **Planarian memory** is a genuine discovery, but the remembered pattern is stored in ion channels and gap-junction networks, proteins in the host's membranes, and was reset with a gap-junction blocker (octanol) [38]. It is the host's own physiological state, transmitted to no other animal. **Long-range tumour induction** in the Chernet–Levin experiments required injected mutant oncogene mRNA, and the voltage effect was traced to a chemical relay, butyrate transport and histone deacetylase inhibition [39]. These are landmark findings for bioelectric medicine, and they argue *for* the conventional account: host tissue holds and propagates voltage states chemically. None shows a pattern that originates outside the host, persists outside it, or passes from one host to another, which is what a pathogen must do.

2. WHY CHEMISTRY, AND WHY CARBON AND WATER

Pace argued that biochemistry is likely universal in its fundamentals: the same thermodynamic and chemical constraints that shaped terrestrial life will shape life anywhere, favouring carbon-based polymers in a liquid solvent [4]. Benner and colleagues surveyed alternative chemistries and concluded that while variations are conceivable, a common chemical model built on covalent polymers and a solvent is strongly favoured [5]. Bains catalogued the broadest set of alternatives (silicon, other solvents, extreme environments) [6]. Even this most permissive survey stays within *chemistry*: covalent or ionic structures holding information in bonds. No serious astrobiological framework includes plasma or field organisms as a candidate class, and not from timidity. Plasma has no bonds to hold information, only transient correlations that dissipate on the timescale of particle collisions. Sagan's warning against "carbon chauvinism" [7] applies to rival *chemistries*, never to non-chemical life.

3. THE PHYSICS VETO INSIDE THE BODY

Field ionisation. A hydrogen-like Rydberg state is classically ionised by an applied field of about $F \approx 1/(16n^4)$ atomic units, where one atomic unit is 5.14×10^{11} V/m [8]. The prosecution's own figure for the mitochondrial inner membrane carries about 3×10^7 V/m. Solving for n gives $n^4 \approx 1{,}100$, so $n \approx 6$. **Any Rydberg state above about $n = 6$ is ripped apart instantly in the very field Round 1 names as the coupling site.** The "carrier" is a shredder.

Solid-state Rydberg excitons. The prosecution's best physics reply is real: Kazimierczuk et al. observed excitons up to $n = 25$ in cuprous oxide [40]. Look at the conditions. The crystals were rare, ultra-pure natural gemstones, cooled to about 1.2 K; the high-n lines broaden and vanish as temperature or impurity density rises. Room-temperature excitonic series in two-dimensional semiconductors exist only at low n (about 1–5), with binding energies of tens to hundreds of meV, far from the microwave-addressable, meV-scale states the resonance argument needs. Condensed matter can host Rydberg states, but only when it is cold, pure and crystalline. Cytoplasm is warm, impure and liquid.

Collective, "flame-like" persistence. A flame is chemistry: combustion of a fuel. The room-temperature Rydberg time crystals the prosecution cites persist only under narrow-line, frequency-stabilised laser excitation tuned to a specific transition; turn off the laser and the order dies in microseconds. Driven-dissipative order requires a *coherent* drive at the right frequency, not just energy.

Collisions. In liquid water each molecule experiences on the order of 10^{12}–10^{13} collisions per second. Isolated Rydberg atoms in a *dilute room-temperature gas* already lose coherence in microseconds; in condensed phases, high-n states do not exist as such at all, because the orbit (0.5 μm at $n = 100$) would enclose roughly 10^9 water molecules. There is no "inside" for the electron to orbit in.

Blackbody radiation. At 310 K, thermal radiation peaks in the infrared and drives transitions and photoionisation of high-n states, limiting effective lifetimes to tens to hundreds of microseconds even in vacuum [9]. In tissue, the thermal bath is the medium itself.

Debye screening. Physiological saline (about 150 mM) has a Debye length below 1 nm. Static electric structure is screened within a nanometre, and externally applied radiofrequency fields are attenuated within millimetres to centimetres of tissue depending on frequency. A field-organised structure in interstitial fluid would be electrostatically invisible to the rest of the body beyond nanometres, which forecloses the "remote antenna" coupling Round 1 invokes in §5.1.

Energy bookkeeping. A drain must take energy from somewhere and put it somewhere; tumour energy budgets under Warburg metabolism [10] close without a missing term. An occupant draining measurable vitality would appear as unexplained heat or unexplained free-energy loss. None is reported.

4. WHAT THE LABORATORY RECORD ACTUALLY SHOWS

Round 1 claim	What the experiment was	Why it does not transfer to tissue
Memory (scars) [11, 12]	51 Rb atoms in optical tweezers, μK temperature, ultra-high vacuum, laser-prepared initial state; revivals for ~μs	Requires isolation from environment by design; scars are fragile, special eigenstates, not stored information; vanish with any decoherence

Homeostasis (SOC) [13]	Ultracold potassium gas, continuously laser-driven, in vacuum	Self-tuning occurs only under the experimenter's drive; stops when the laser stops
Rhythm (time crystals) [14–16]	Room-temp alkali vapour in a glass cell, ~10^{-7} bar, pumped by stabilised narrow-line lasers at specific detunings	Dilute gas, not liquid; resonant optical pumping is not present in the body; oscillation ends in microseconds without the lasers
Field sensitivity [17]	Engineered vapour cells with two-photon laser excitation to prepare the Rydberg state	The sensitivity is created by the lasers; no natural process prepares high-*n* populations in tissue
Lifelike plasma [18]	Numerical simulations of dusty plasma	Not observed experimentally as self-replicating; no heredity
Natural Rydberg matter [19]	Claims of a single research group	Not independently replicated; inconsistent with standard atomic physics according to critics
Ball lightning [20]	One spectroscopic recording	Lasted ~1.6 s; composition = vaporised soil; consistent with chemical combustion models; no reproduction, no persistence

Table 1. The capabilities are real; the conditions are the opposite of a body. Every row is a laser, a vacuum or a simulation.

Round 1 frames the 2017–2024 sequence as a march toward biological conditions. It is a march toward *room-temperature dilute vapour under optical pumping*, a regime that differs from tissue by roughly six orders of magnitude in density and requires an engineered energy source that biology does not provide. Ambient RF is broadband and incoherent, and microwave photons drive transitions *between* Rydberg levels. They cannot lift a ground-state atom 4–5 eV into one. The resonance arithmetic of Round 1 §4.1 is correct and irrelevant: a ladder is useless if no one can reach the first rung.

4.1 NO ORIGIN, NO ECOLOGY, NO FOSSIL

Every organism has an origin story constrained by chemistry. For carbon life we have prebiotic syntheses of nucleotides and amino acids, an RNA-world scenario with experimentally evolved ribozymes, and a fossil and isotopic record reaching back about 3.5–3.7 billion years [29, 30]. A field organism needs a comparable account. How did the first self-maintaining Rydberg structure arise, what selected it, and where are its ancestors? Natural Rydberg populations exist in interstellar space, where radio recombination lines at n of several hundred are observed in very low-density ionised gas [31]. That is precisely the regime (densities of about 10^2–10^4 cm^{-3}, no walls, no collisions for seconds) that a body is not. A parasite must outlive its host's immune system, find new hosts and transmit. Round 1 offers no transmission route, no reservoir and no vector, and the epidemiology of cancer (age, carcinogen exposure, inherited mutations, viral oncogenesis such as HPV and HBV) is already explained to a high degree by known causes [32].

Somatic genetics closes the case. Large-scale tumour sequencing has catalogued driver mutations and mutational signatures in tens of thousands of cancers. These signatures map onto identifiable processes such as tobacco smoke, ultraviolet light, APOBEC enzymes, defective DNA repair and ageing clocks [33]. Cancer behaves as a disease of heritable cellular information, the chemical heredity Round 1's occupant lacks. The "nest" is a clone of mutated cells, and its lineage can be read base by base. An external organiser is not needed to explain why tumours persist, adapt to drugs and evolve resistance: Darwinian selection among cells explains it, and resistance mutations are routinely sequenced in relapsed patients.

4.2 "MOST, IF NOT ALL, DISEASE": THE CHARGE SHEET COLLAPSES

The broad charge is the weakest. Medicine has proven causes, with the cure as the proof, for whole classes of illness the prosecution would assign to the occupant. Scurvy, beriberi and pellagra vanish with vitamin C, thiamine and niacin. Cystic fibrosis, sickle-cell disease and Huntington's disease follow single mutations with Mendelian precision. Tuberculosis, syphilis and cholera satisfy Koch's postulates and yield to antibiotics that kill the bacterium and nothing else. Smallpox was eradicated by a vaccine against one virus; HPV vaccination is now abolishing cervical cancer in vaccinated cohorts [41]. Lung cancer rises and falls with tobacco consumption decades earlier. If an occupant were the common cause, curing the vitamin deficiency or killing the bacterium would not end the disease. It does. Mitochondrial dysfunction recurs across diseases because mitochondria are where nearly every injury eventually shows up, not because something is feeding there: it is a final common pathway, not a culprit.

5. THE DRUG CONVERGENCE HAS A MUNDANE EXPLANATION

Convergence on mitochondria and microtubules is not an anomaly. It is the most common outcome of cytotoxicity screens. Mitochondria and tubulin are the two most frequent off-target liabilities in drug discovery, because rapidly dividing, metabolically stressed cancer cells are uniquely sensitive to anything that perturbs energy supply or mitosis. Many unrelated compounds in many screens therefore "converge" on these targets, which is why so many repurposing candidates exist [21]. Second, in-vitro anticancer concentrations of ivermectin are typically in the low micromolar range, whereas plasma levels at standard antiparasitic doses are in the tens of nanomolar, roughly two orders of magnitude lower [22]. A receptor-agnostic "resonant" mechanism does not rescue this. Round 1's catalytic-quench argument is unfalsifiable as stated, since any dose can be declared sufficient after the fact. Third, the clinical evidence remains anecdotal. Case series without controls cannot separate drug effect from concurrent therapy, selection, or the well-documented phenomenon of spontaneous regression [23]. Tumour Treating Fields and hyperthermia work by known mechanisms (disruption of the dipolar mitotic machinery, heat-shock and immune effects) that do not require an occupant [24].

The RF carcinogenicity record cuts both ways. IARC's 2B category is a statement of limited evidence; it also includes aloe vera extract and pickled vegetables. The NTP schwannoma finding occurred in male rats only, at whole-body exposures far above typical human levels, and exposed males lived longer than controls, complicating interpretation [25]. A Rydberg-feeding mechanism is not required to explain an uncertain, exposure-dependent rodent signal.

6. THE HISTORICAL RECORD IS EVIDENCE OF MINDS, NOT OF OCCUPANTS

Convergent descriptions are strong evidence when observers are independent and the phenomenon is external. Neither condition holds well here. All humans share a nervous system with the same agency-detection biases, the same sleep paralysis, the same hypnagogic intrusions, the same experiences of fever delirium, and the same diseases. The cognitive science of religion explains the cross-cultural recurrence of invisible agents, including their typical properties, as a by-product of hyperactive agency detection and of minimally counter-intuitive concepts that spread well [26, 27]. The specific phenotype Round 1 highlights (fire or air bodies, feeding on vitality, residence in the host) is exactly what a pre-scientific culture would infer from the shared human experience of wasting illness (tuberculosis, cancer cachexia, parasitic disease) combined with fever and invisible contagion. Convergent testimony establishes a shared *experience*, not its *cause*.

6.1 A framework is not evidence

The prosecution builds on its own Everything Theory and maps scripture onto physics: smokeless fire becomes plasma, the eye-gate becomes an optical port, the prince of the power of the air becomes the radio spectrum. A mapping drawn after the fact will always fit, because the source texts are poetic and the physics vocabulary is large. The test is whether the framework predicted anything before it was known, and it did not. The specific links also fail on their own terms. The retina absorbs visible photons of about 2 eV in a few pigment molecules; preparing a Rydberg state takes narrow-line excitation tuned to a specific atomic transition, which screens and daylight, broadband and incoherent, do not supply. The jury should weigh the framework as the prosecution's motive for looking, not as proof of what it found.

7. THE ONLY TWO KINDS OF MIND

From the astrobiological standpoint the census of known intelligence is short. There is biological intelligence, which arose once on Earth through four billion years of chemical evolution, and machine intelligence, which arose in the last decades as an artefact of that biology, running on silicon, powered by human-built grids and copied by human-designed processes. Machine intelligence is the strongest available counter-example to Round 1, not support for it. It shows what a non-carbon information-processor actually requires: fabricated, error-corrected, stable solid-state memory; regulated power; and an external replicator, the human economy that manufactures it. Every one of these is absent from a plasma. Postulating a third, physically unsupported category of field minds, locally present in every human body and in every culture's past, multiplies entities far beyond what the evidence requires, on a planet where even chemical intelligence may be rare [28].

7.1 THE THERMODYNAMIC PRICE OF A MIND

Landauer showed that erasing one bit of information dissipates at least kT ln 2 of energy [34]. Any system that computes, remembers and acts, which is what Round 1's occupant must do to "prefer", "re-tune" and "feed", must therefore maintain a persistent, low-entropy memory and pay for it in steady dissipation. Both work because their memory is held in structures whose energy barriers far exceed kT: synaptic proteins and lipid membranes, or silicon transistors and magnetic domains. A Rydberg electron at $n = 100$ is bound by about 1.4 meV, roughly **one-twentieth of *kT* at body temperature** (26.7 meV). Every bit stored in such a state is erased by thermal agitation faster than it can be read. A mind built from states bound more weakly than the heat bath around it is not a speculative mind. It is a contradiction in terms.

The same argument disposes of the claim that the occupant could be a "machine intelligence" or the product of one. Machine intelligence is constrained exactly as biological intelligence is. It requires an engineered substrate whose barriers exceed thermal noise, error correction, a power supply and a manufacturing chain. If a future technology ever built Round 1's weapon, it would be a *device*: detectable, traceable, attributable, and subject to the same physics of shielding and screening set out in §3. It would not be a self-sustaining species.

7.2 BETTER EXPLANATIONS FOR THE PHENOTYPE

Round 1 §7.1 lists a clinical phenotype of fatigue, cachexia, sleep disturbance, sensory intrusion and episodic relapse, and treats it as a signature. It is the signature of systemic inflammation. Tumour-derived cytokines (IL-6, TNF-α, IL-1) drive muscle wasting and fat loss through well-mapped pathways [35]; the same cytokines cause sickness behaviour (lethargy, anhedonia, sleep change) through vagal and blood-brain signalling [36]. Inflammation explains the energy "drain", the relapse-remission course and the response to drugs with anti-inflammatory or mitochondrial effects, without an occupant. A theory that adds a field organism on top of an inflammatory mechanism that already predicts every listed feature has no explanatory work left to do.

8. THE PROSECUTION'S TESTS, AND THE DEFENCE'S PREDICTIONS

The prosecution proposes five tests. The defence accepts all of them and states its predicted outcomes in advance: (1) potency will track known molecular targets and proliferation rate, not a unique field-state signature; (2) intermittent dosing advantages, where present, will be explained by pharmacokinetics, toxicity recovery and immune effects; (3) Rydberg electrometers near tumour tissue will record thermal noise and instrument artefacts only; (4) RF shielding will have no effect on tumour growth at non-thermal exposures; (5) dipole-bound electron affinity will not predict potency once receptor activity is controlled. If any of these predictions fails under preregistered, blinded conditions, we would revise. Until then, the field-coupled pathogen remains a metaphor that has been mistaken for a mechanism.

9. CONCLUSION

Life is information held against heat by chemistry and passed on by replication. Plasma holds nothing against heat. It is heat. The Rydberg record is a triumph of engineering isolated quantum matter, and its lesson for biology is the opposite of Round 1's: lifelike order in Rydberg systems exists *only* where experimenters exclude everything a body is made of. The universe, on present evidence, contains chemical life, of which humans are the thinking instance, and the machines that life has built. The rest is the human mind doing what it has always done, finding an agent behind suffering. The four repurposed drugs deserve proper trials on their own pharmacological merits. They do not need a ghost to justify them.

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