

# The Inward *Vector*

*Somatic Boundary Failure, Molecular Vacancy,  
and the Instability of the Self*



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AUTHOR	VK Richter <vk@shoringlabs.com>	
SUBJECT	Microcosmic Decay & Biological Misclassification	
RISK DOMAIN	Somatic Integrity / Identity Continuity	External agencies employed 0
MITIGATION	Maintenance only – no permanent correction	Speculative mechanisms admitted 0
		Independently verifiable 100%

# Control & Methodology

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## 0 · Methodology: Permitted Sources of Contamination

**Scope.** This document draws exclusively on standard physics, chemistry, cellular biology, microbiology, genetics, neuroscience, and thermodynamics. Every claim herein is independently verifiable in the open literature. No proprietary, speculative, or unpublished mechanism has been admitted.

**Excluded.** No possession, no unknown parasite, no metaphysical corruption, no supernatural intrusion, and no external agency of any kind have been employed in the construction of this finding. Such mechanisms were considered and discarded as unnecessary.

**Premise.** The body is sufficiently unstable under ordinary description. The investigative posture of this paper is therefore conservative: where a figure is contested, the more reassuring estimate has been adopted. The conclusions are not weakened by this choice. They are made more difficult to refute.

**Procedure.** The methodology proceeds by isolating nine operational fictions that the nervous system and cultural taxonomy employ to model the organism as discrete, sovereign, and continuous. Each fiction is subjected to lower-scale measurement. Where the macroscopic model diverges from the mechanistic reality, the divergence is cataloged as a somatic boundary misclassification. The objective is not to induce alarm but to align administrative categories with physical reality.

*Vectors of the Void corrected the external environment. The present paper proceeds inward. Their meeting point is the skin, which belongs to neither side.*

The reader is advised that the two corrections are continuous. The companion paper established that the space surrounding the organism is not an enclosure but an open and indifferent medium. This paper corrects the assumed interior.



# The Failure of the Interior

The human organism models itself as a discrete, sovereign, and durable entity: a single owner occupying a sealed container of stable material. Biophysical analysis indicates that each term in this model is a functional hallucination — useful at the scale of locomotion and grasping, false at every scale below it.

The organism mistakes continuity of *pattern* for continuity of *substance*. Because the pattern persists, the substance is assumed to persist. It does not. The organism experiences resistance and reports it as solidity. It experiences tissue deformation and reports it as contact. It experiences selective permeability and reports it as containment. These reports are operational shorthand, not structural truths.

This document catalogs nine fictions by which the body is classified as solid, sealed, singular, clean, stable, self-owned, archival, occupied, and intrinsically alive. Each fiction is replaced with its corrected mechanism, and in each case an object is found to be a process. The microbiome operates at numerical parity with host cells. Cellular components are removed and replaced on strict schedules. The genome is continuously damaged and statistically corrected. Neural architecture is maintained through substrate turnover and pattern restabilization. Life is not a substance contained within tissue; it is a thermodynamic regime that exports entropy to sustain localized disequilibrium.

## FINDING

The body is not an object. It is a maintained disequilibrium — a local and temporary deviation from the chemical and thermal equilibrium toward which it is continuously falling.

The inside is not solid. It is managed failure. No supernatural mechanism is required. The architecture of dissolution is already operational. The most frightening thing is not the unknown. It is the known, stated clearly.

## Somatic Fictions

Macroscopic perception was retained by the organism only where operationally valid. Human-scale reports of solidity, contact, and ownership were compared against their lower-scale mechanisms and found to be administrative fictions: simplifications generated by the nervous system to make metabolic management tractable. The errors catalogued below are not philosophical confusions, nor failures of education. They are categories the body issues to itself.

We designate this class of error **Somatic Boundary Misclassification**: the systematic substitution of a static object for the dynamic process that produces it. The sensation of weight is mapped onto a concept of solidity; the sensation of pressure onto a concept of contact; the sensation of a continuous body surface onto a concept of containment. These mappings are host-biased administrative heuristics. They reduce computational load by

treating complex, continuous, and permeable systems as discrete, bounded, and stable. The heuristic is effective for avoiding falls and manipulating objects. It is operationally adequate at human scale, and structurally false at the scale of maintenance.

The fictions are not lies. They are summaries. The horror, where it arises, is not that the summaries are wrong, but that they are *necessary* — that the organism cannot function while perceiving its own true condition, and so does not perceive it. The remainder of this document removes the summaries one at a time.

# The Vacancy of Matter

## FINDING

The body is assumed to be made of solid material. The atom is not a solid object but a region of structured probability.

## Mechanism

Substantially all of an atom's mass is concentrated in its nucleus, a body so small relative to the atom's volume that the comparison is routinely misstated. The electrons that define the atom's outer extent do not orbit the nucleus as planets orbit a star. They occupy probabilistic quantum states — standing distributions of likelihood, not trajectories — and the volume an atom “takes up” is determined not by any material shell but by the spatial extent of these electron probability densities and the electromagnetic fields that govern them.

## Correction of a common error

It is frequently asserted that atoms are “mostly empty space.” This is the wrong correction, and it produces the wrong dread. The space within and between atoms is not empty; it is structured by fields. The volume is *occupied* — not by stuff, but by the constraints that prevent other matter from entering. Solidity is therefore real. It is simply not what the organism believes it to be.

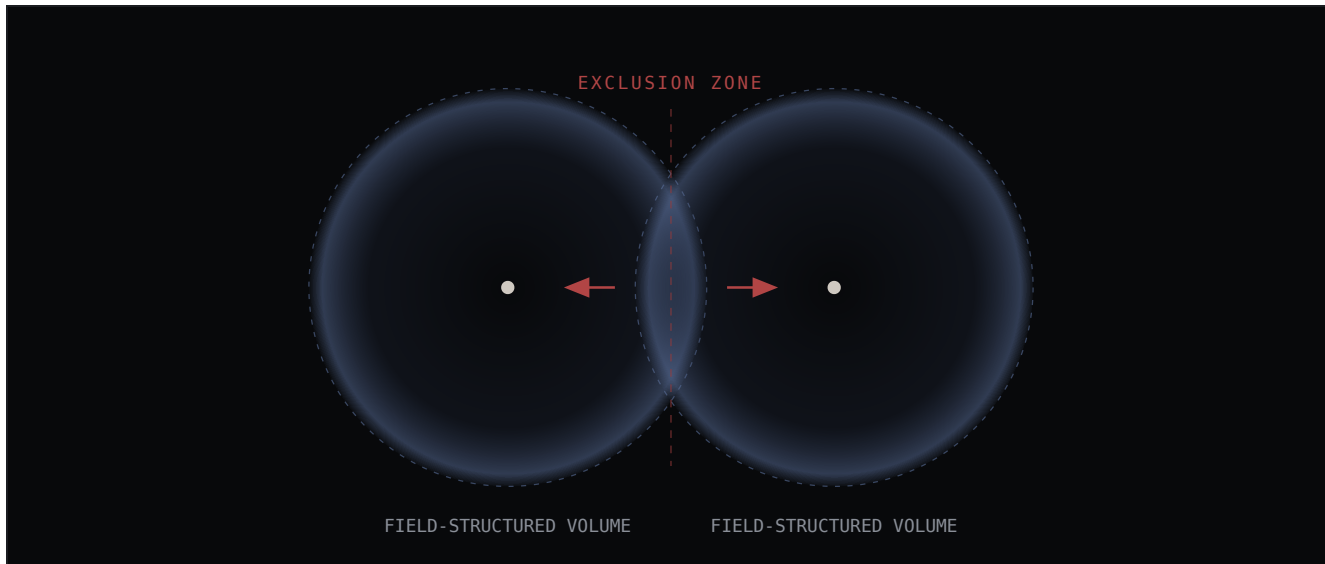
## Measurement

Two mechanisms produce the experience of solid matter. The first is electromagnetic repulsion between like-charged electron clouds. The second, and more absolute, is the Pauli exclusion principle: no two fermions — electrons among them — may occupy the same quantum state simultaneously. This is not a force in the ordinary sense and cannot be overcome by pressure at any scale the body will encounter. It is the exclusion principle, not material contact, that prevents the floor from admitting the foot.

*The organism occupies its volume by exclusion, not by possession. It does not fill space; it forbids space to others.*

Resistance is real; solidity is a misattribution of cause. The body does not consist of packed material. It consists of structured fields maintaining spatial separation against entropic collapse. The body is held apart from the world by a refusal, maintained at every point of its surface, and the refusal is mistaken for substance.

EXHIBIT A – ATOMIC EXCLUSION INTERFACE



*Two atomic surfaces approaching one another. No contact line is drawn; the interface is rendered as overlapping field gradients and a labelled exclusion zone. Resistance is force-mediated. No surface meets a surface.*

# The Verdict of Contact

## FINDING

Touch is assumed to be direct material contact between the body and an object. It is not.

### Mechanism

Following from the vacancy of matter, the nuclei of the body and the nuclei of any object it handles do not meet during ordinary interaction. What occurs instead is the mutual deformation of two field-structured volumes as their electron clouds resist interpenetration, governed by electromagnetic repulsion and, at close range, by the balance of attractive and repulsive van der Waals forces, maintaining a finite separation on the order of angstroms. The hand pressing the table is the hand's exclusion zone deforming against the table's exclusion zone, with a structured gap maintained between them throughout.

### Measurement

The sensation called *touch* is assembled from the detection of this deformation by specialized mechanoreceptors distributed through the dermis and subcutaneous tissue. Merkel disks report sustained pressure and fine spatial detail; Meissner corpuscles report light, dynamic touch and low-frequency vibration; Ruffini endings report skin stretch and shear; Pacinian corpuscles report high-frequency vibration and rapid pressure change. None of these structures detects contact. Each detects a mechanical event in tissue — strain, vibration, stretch — and transduces it through mechanically gated ion channels, which open in response to membrane deformation and convert physical strain into electrical signal.

*The body never reports the world. It reports the deformation of itself, and infers the world from the pattern.*

The encounter at the fingertip is an exchange of forces, exclusions, and gradients, which the nervous system resolves into a verdict: *contact*. The verdict is useful and the verdict is false in its literal content. The organism has never directly met anything outside itself. It has only ever felt the shape of its own resistance being pushed inward.

# The Permeable Surface

## FINDING

The skin is assumed to be the wall of the organism. It is a permeable exchange surface under continuous maintenance, and its outermost layer is already dead.

## Mechanism

The stratum corneum, the body's actual outer boundary, consists of corneocytes: flattened, anucleate cells that have completed a programmed terminal differentiation and lost their nuclei and organelles. The literal edge of the living organism — the surface the world touches, or fails to touch — is a layer of its own dead cells, embedded in a lipid matrix, held in place until shed. The body presents a corpse to the world as its interface.

## Measurement

The boundary is not sealed. Transepidermal water loss is continuous and obligatory: water moves outward through the lipid matrix and intercellular spaces at all times, and its rate is a standard clinical index of barrier integrity. The surface is chemically maintained at a pH of approximately 4.5-5.5 — the acid mantle — an actively held condition that suppresses colonization by selecting which organisms may live on the surface. And the boundary does not stop at the visible skin. At every orifice it folds inward and becomes mucous membrane — respiratory, ocular, gastrointestinal, urogenital — continuing the exterior surface into the interior of the body without interruption.

*Containment is not a property of this surface; it is an activity performed by it — selective permeability under maintenance.*

Water leaves continuously. Heat radiates continuously. Cells are shed continuously. The boundary is a managed leak, and its successful operation is indistinguishable, from the outside, from a slow and orderly emission of the self into the surrounding medium.

EXHIBIT B — PERMEABLE BOUNDARY MAP



*A cross-section through the human boundary: the stratum corneum rendered as dead, anucleate corneocytes in lipid, with bidirectional exchange — outward water loss, radiated heat, shed cells; inward colonization, lipid absorption, gas exchange. The skin does not seal the organism. It regulates the rate of exchange.*

# Authorized Boundary Violation

## FINDING

Eating is assumed to be incorporation — the clean transfer of external material into the interior of the body. It is not.

## Mechanism

The gastrointestinal tract is a continuous tube, open at both ends, passing through the organism. Its lumen — the cavity through which food travels — is topologically continuous with the outside world. The contents of the gut are not inside the body. They are inside a tunnel that runs through the body, and the tunnel is exterior space. The body, considered topologically, is approximated by a torus: a solid with a single channel passing through it. The mouth and the anus are the two openings of that channel, and everything within it is, by the strict geometry of the organism, *outside*. The food has not entered the body. The body has wrapped itself around the food.

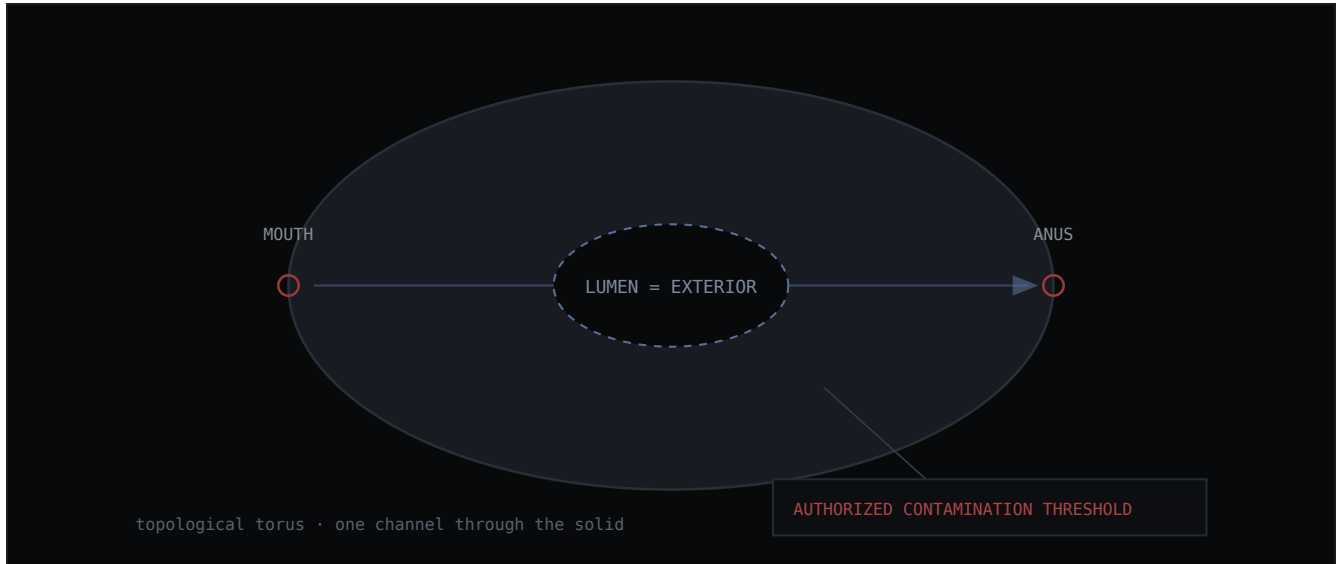
## Measurement

The actual boundary at which external matter may cross into the interior is far thinner than the gut wall suggests. In the small intestine, the absorptive epithelium that separates the lumen from the underlying tissue and bloodstream is a single cell thick. Across this monolayer, transport is selective and regulated. Tight junctions — protein complexes assembled from claudins, occludin, and junctional adhesion molecules — seal the spaces between adjacent epithelial cells and govern paracellular permeability. Food is external biomass, mechanically and chemically reduced to fragments small and licensed enough to be transported across this single-cell threshold under review.

*Ingestion is not incorporation; it is authorized contamination — the controlled admission of outside matter across a one-cell-thick threshold.*

The rest of the digestive event takes place in territory that was never interior at all. The body does not take the world in. It admits selected fragments of it across a membrane, and discards the remainder back into the exterior at the far end of the tunnel.

EXHIBIT C - DIGESTIVE TRACT AS MANAGED EXTERIOR



*A topological rendering of the body as a torus. The gastrointestinal lumen is shaded identically to the external environment: a continuous exterior channel through the organism. A callout marks the single-cell-thick small-intestinal epithelium. Topological continuity renders the gut lumen exterior. Ingestion is filtration, not incorporation.*

# The Occupied Self

## FINDING

The organism is assumed to be a single-owner system: one genome, one occupant, one self. It is instead a consortium.

## Mechanism

It is a host-biased administration of multiple lineages, only one of which is the human genome, and that one not in sole possession.

## Correction of a common error

The frequently cited figure of ten bacterial cells for every human cell is obsolete and should be discarded. Current best estimates place the counts at approximately 38 trillion bacterial cells against approximately 30 trillion human cells — a ratio near 1.3 to 1, with substantial uncertainty in both figures, varying between individuals and across the day, particularly with defecation, which removes bacterial cells in bulk. The corrected ratio is not more reassuring than the discarded one. Numerical parity is harder to dismiss than gross outnumbering. The body is not overwhelmed by a foreign majority; it is evenly shared, and the even share is the more difficult fact.

## Measurement

The shared condition is not limited to the cell count. Mitochondria — the organelles that generate the chemical energy on which every nucleated human cell depends — are descended from free-living bacteria taken up by an ancestral cell and never expelled; they retain their own residual circular genome and independent replication machinery. Approximately 5–8% of the human genome consists of human endogenous retroviruses: the integrated remnants of ancient retroviral infections, written into the germline and inherited since. Most are silent or defective; some have been co-opted, including the syncytin proteins involved in placental development. And fetal microchimerism establishes that genetically distinct cells transferred during pregnancy can persist in maternal tissues — including, on the evidence of post-mortem studies, the brain — for decades after the pregnancy ends.

*Ownership is a regulatory condition — a continuous bias toward the human genome's priorities — not a cellular fact. The self is a coalition that votes, on the whole, in one direction.*

## EXHIBIT D — SOMATIC CONSORTIUM REGISTER

LINEAGE / COMPONENT

ORIGIN / NATURE

PREVALENCE / SCALE

LINEAGE / COMPONENT	ORIGIN / NATURE	PREVALENCE / SCALE
Human cells	Host genome	~30 trillion (order-of-magnitude)
Bacterial cells	Commensal microbiome	~38 trillion (~1.3:1, variable)
Mitochondria	Bacterial endosymbiont	All nucleated cells
HERVs	Ancient retroviral infection	~5-8% of host genome
Microchimerism	Fetal / maternal transfer	Decadal persistence; variable

# Scheduled Death

## FINDING

Flesh is assumed to be a stable substrate. It is not stable. It persists through continuous replacement.

### Mechanism

The body maintains its form not by keeping its material but by replacing it as fast as it is lost: a managed regime of cell death, removal, and reconstruction operating at all times in all tissues.

### Correction of a common error

The claim that the body replaces every cell every seven years is false and should be discarded. Turnover is tissue-specific, spanning four orders of magnitude. The small-intestinal epithelium renews approximately every 3–5 days; the epidermis in approximately 28–40 days; red blood cells circulate approximately 100–120 days before phagocytosis in the spleen and liver; the adult skeleton remodels at roughly 10% per year, replacing its full mass over roughly a decade. At the far end of the distribution, certain cells are never replaced at all: most neurons of the cerebral cortex, and the fiber cells at the center of the lens of the eye, persist for the entire life of the organism. There is no single replacement interval. There is a schedule, and it is different for every tissue.

### Measurement

In aggregate, the body replaces on the order of 330 billion cells per day — a mass of roughly 80 grams of tissue, give or take 20, removed and remanufactured daily. The principal mechanism is apoptosis — programmed cell death — in which a cell, on receiving the appropriate signal, dismantles itself in an orderly sequence and is cleared by phagocytes without inflammation. Apoptosis is not a disease and not a failure. It is the maintenance protocol by which tissue is sculpted, defective cells are eliminated, malignant transformation is suppressed, and form is held against constant turnover.

*The body survives by killing its components on schedule. Persistence is achieved through removal.*

The form the organism recognizes as itself is not the material — the material is in continuous transit — but the *pattern* of replacement, held steady while its substrate is consumed and renewed beneath it. The few cells that are never replaced are not exceptions to this. They are the parts of the self that cannot be backed up, and that the schedule, having no protocol for their renewal, can only retain until they fail.

EXHIBIT E – TISSUE-TURNOVER TIMELINE



*A logarithmic axis from days to lifetime, tissues plotted by replacement interval: intestinal epithelium at days, epidermis at weeks, erythrocytes at months, skeleton at a decade, cortical neurons and lens fiber cells at the terminus marked no replacement. There is no single interval. There is a schedule.*

# The Corruptible Archive

## FINDING

The genome is assumed to be a fixed archive, identical in every cell and stable across the lifespan. It is none of these.

## Mechanism

It is a mutable, continuously damaged, continuously repaired record, and its integrity is maintained statistically rather than absolutely.

## Measurement

DNA replication is highly accurate but not perfect, and accuracy is itself an active expenditure: replication is proofread as it proceeds, and errors that escape proofreading are corrected afterward. Damage is constant and originates from ordinary chemistry — oxidation from the cell's own metabolism, ultraviolet and ionizing radiation, spontaneous hydrolysis, reactive byproducts. The cell maintains dedicated repair pathways to counter it: Base Excision Repair removes individual oxidized or alkylated bases; Nucleotide Excision Repair removes bulkier lesions such as UV-induced pyrimidine dimers; Mismatch Repair corrects replication errors that survived proofreading; double-strand breaks are patched through Non-Homologous End Joining or Homologous Recombination. The genome is not stored. It is *defended*, in real time, against a damage rate that never falls to zero.

## Consequence

Defense is imperfect, and its failures accumulate. Distinct cell populations within a single individual carry distinct mutations — somatic mosaicism. The body is not one genome expressed many times; it is a mosaic of related but diverging genomes arising from post-zygotic mutation. The rate is measurable: individual colonic crypts accumulate on the order of 40–50 single-nucleotide variants per year. Meanwhile, the telomeres that cap the chromosomes shorten with each division in most somatic cells, imposing a replicative limit beyond which a cell can no longer safely divide.

*There is no master copy held in reserve — only working copies, each diverging slowly from the others, repaired well enough to function and never perfectly.*

The archive is not a record of what the body is. It is a record of what the repair machinery has managed to keep, against continuous loss.

## EXHIBIT F — GENOME DAMAGE / REPAIR CYCLE

DAMAGE SOURCE	LESION TYPE	REPAIR PATHWAY	FAILURE CONSEQUENCE
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DAMAGE SOURCE	LESION TYPE	REPAIR PATHWAY	FAILURE CONSEQUENCE
Oxidative stress	Base modifications	BER	Mutagenesis / senescence
UV radiation	Pyrimidine dimers	NER	Replication block / apoptosis
Replication error	Base mismatches	MMR	Somatic mutation
Ionizing radiation	Double-strand breaks	NHEJ	Chromosomal rearrangement

# The Pattern That Claims Continuity

## FINDING

The self is assumed to be an occupant inhabiting the body, persisting unchanged while the body ages around it. It is a maintained neural pattern running on a substrate that is itself in continuous turnover.

## Mechanism

That cortical neurons largely persist for life does not establish material continuity of the self, because the neuron's persistence is not the persistence of its material. The proteins, lipids, and molecular machinery that constitute a neuron are replaced continuously. The median half-life of neuronal proteins, measured in culture, is on the order of 5–9 days. The cell endures; its contents are exchanged. The structure that holds the self is, at the molecular level, substantially renewed on a timescale of weeks — a vessel kept while its substance is swapped.

## Measurement

The pattern is not merely refilled but actively reshaped. Synapses strengthen, weaken, form, and are pruned throughout life via long-term potentiation, long-term depression, and structural plasticity. And memory, the apparent proof of an unchanging self, is itself unstable in a documented way. Reconsolidation: when a consolidated memory is retrieved, the act of retrieval can return the trace to a labile state, in which it must be actively restabilized through protein synthesis and synaptic modification before it is again stored. During this window the trace can be modified, and the restabilized version may differ from the original.

## Correction of a common error

This does not mean memory is “fake,” and the paper makes no such claim. The trace is real and largely faithful. The point is narrower and harder to dismiss: under the reconsolidation model, the memory you hold of a thing is not a sealed copy of the thing. It is, in part, the memory of the last time you recalled it, susceptible to modification by the conditions of that recall, and rewritten on retrieval. The self that remembers its own past is consulting an edited record — edited by itself, each time it consults it.

*What persists is the pattern's continuity of operation — and that is all that persists.*

The self is not an occupant of the body. It is one of the body's maintained activities, running continuously enough that it has never observed its own substrate being replaced beneath it.

# Thermodynamic Debt

## FINDING

Life is assumed to be a possession — a property the body has, that persists until something takes it away. It is not a possession and not a state. It is a process.

## Mechanism

Life is the continuous, expensive maintenance of chemical and electrical gradients far from thermodynamic equilibrium. The body is not at rest. It is held, at every instant, in a condition it is not naturally in, by work that does not stop.

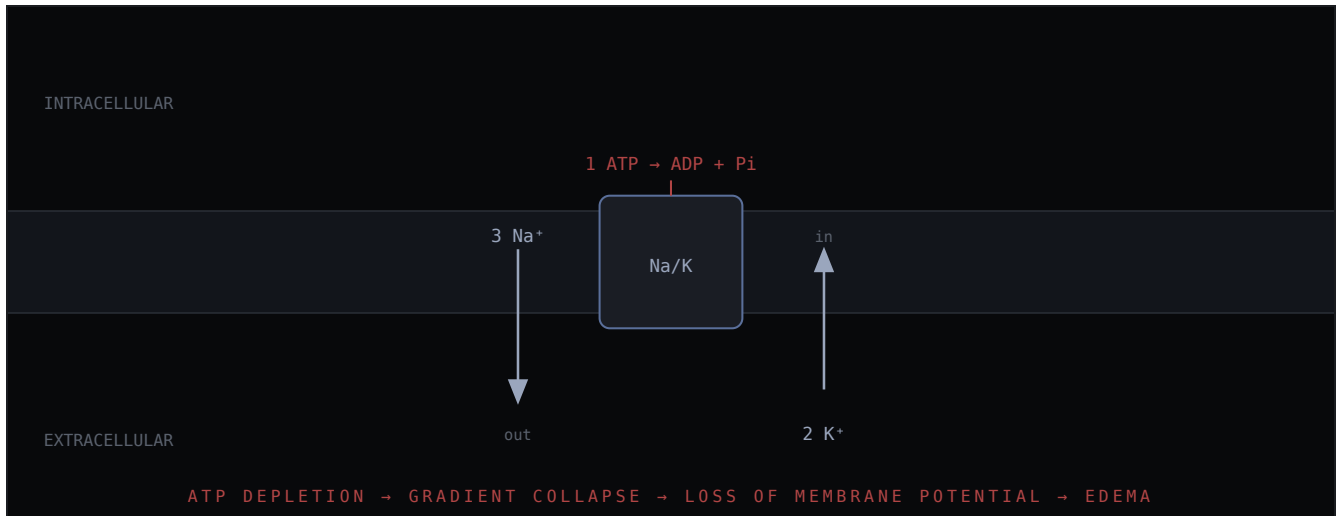
## Measurement

The cost is large and continuous. The body synthesizes and consumes adenosine triphosphate — its energy currency — at a rate on the order of 100–150 moles per day, a turnover mass of roughly 50–75 kilograms: approximately the body's own weight, manufactured and spent daily. ATP is not stored in any quantity; it is made and used on the same timescale, continuously, for the duration of life. A specific and unceasing fraction illustrates the regime: the  $\text{Na}^+/\text{K}^+$  ATPase, present in the membrane of every cell, hydrolyzes one molecule of ATP to export three sodium ions and import two potassium ions against their concentration gradients, maintaining the electrochemical potential on which nerve conduction, muscle action, and basic cell volume depend. It must run continuously. It does not pause.

*Death is not an arrival and not an invading force. It is gradient collapse — the cessation of the work.*

The pumps stop. Sodium enters; potassium leaves; the membrane potential falls toward zero; cells swell as water follows the ions. Nothing has been added. Something has merely stopped being subtracted. No permanent correction is available. Maintenance continues until it does not.

EXHIBIT H - THERMODYNAMIC GRADIENT MAINTENANCE



*The Na<sup>+</sup>/K<sup>+</sup> ATPase: one ATP hydrolyzed to fund the export of three Na<sup>+</sup> and import of two K<sup>+</sup> against their gradients. Maintenance only. No permanent correction available.*

# Dissolution Under Management

A companion paper establishes that the exterior is not an enclosure. The present paper establishes that the interior is not solid. The two findings meet, and the reader is now positioned between them, belonging fully to neither.

Read in sequence, the nine corrections collapse into one. Solidity is force — a refusal maintained at the surface, not a substance possessed within. Touch is a verdict, not a meeting. The boundary is an exchange surface that leaks continuously and presents dead cells to the world. The interior the food enters is exterior. The single owner is a consortium near parity. The stable flesh is replaced on a schedule that depends on killing its own components. The fixed archive is a mosaic of diverging, damaged, repaired records. The occupant is a pattern run on substrate it does not keep. And life itself is not held but performed — funded by the manufacture of the body's own weight in chemical currency each day, spent the moment it is made.

None of this required exaggeration. Every figure in this document was drawn from the conservative end of the available range. The body is sufficiently unstable under accurate description that the only way to make these findings less frightening would be to make them false.

*The body is not a thing that exists and then ends. It is an activity — a local interruption of dissolution, maintained at continuous cost, against a gradient that never stops pulling.*

The interruption is what the organism calls itself. The pull is what it calls death. They are not two events. They are one event under two managements, and only one of the managements is temporary.

*The body is not a shelter from dissolution. The body is dissolution under management.*

*The most frightening thing is not the unknown. It is the known, stated clearly.*

# Somatic Fictions Register

ASSUMED PROPERTY	CORRECTED MECHANISM	ADMINISTRATIVE ERROR
Body as solid	Force-mediated vacancy / Pauli exclusion	Resistance mistaken for substance
Touch as contact	Tissue deformation / mechanoreceptor transduction	EM non-penetration mistaken for union
Skin as boundary	Permeable exchange surface / TEWL	Managed leak mistaken for containment
Eating as nourishment	Luminal transit / epithelial review	Contamination mistaken for clean incorporation
Self as singular	Host-biased consortium / ~1.3:1 ratio	Parity mistaken for sovereignty
Flesh as stable	Scheduled apoptosis / ~330B daily turnover	Replacement mistaken for static substrate
Genome as archive	Mutable damaged record / continuous repair	Statistical integrity mistaken for permanence
Mind as occupant	Maintained neural pattern / reconsolidation	Process continuity mistaken for material continuity
Life as possession	Thermodynamic maintenance / ATP throughput	Active disequilibrium mistaken for intrinsic state

## Conservative end of the available range.

### CELLULAR COMPOSITION

~30 trillion human cells  
 ~38 trillion bacterial (~1.3:1, variable)  
 HERVs ~5-8% of genome  
 microchimerism: decadal persistence

### TURNOVER

aggregate ~330 billion cells/day  
 mass ~80 ± 20 g/day  
 intestinal epithelium ~3-5 d  
 epidermis ~28-40 d  
 red blood cells ~100-120 d

skeleton ~10%/yr (~decade)  
 cortical neurons / lens: lifetime

### SURFACE / GENOME

skin pH ~4.5-5.5 (acid mantle)  
 colonic crypts ~40-50 SNVs/yr  
 neuronal protein t½ ~5-9 d

### THERMODYNAMICS

ATP turnover ~100-150 mol/day  
 ~50-75 kg/day  
 Na/K ATPase: 3 Na out / 2 K in per ATP