Returning to Life Itself: A Biological Antidote to "Cognition" and "Consciousness"

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Names are guests of reality.
— Zhuangzi

Don't think, but look!
— Wittgenstein

"Such is the original constitution of our frame, that the mind or sentient principle is, in consequence of uneasy sensations, instantly determined to produce such motions or changes in the body, as naturally tend to remove or lessen them."
— Robert Whytt, 1751

Contemporary biology has a peculiar problem. The data keep arriving — striking, reproducible, hard to dismiss — and the arguments keep circling without resolution. *Physarum polycephalum*, a slime mold without a single neuron, habituates to repeated stimulation and transfers that habituation through cell fusion to individuals that have never experienced it (Boisseau et al., 2016). The same organism constructs spatial memory from its own extracellular slime trails and uses them to navigate mazes (Reid et al., 2012). Plants under herbivore attack release volatile signals that prime the defenses of neighbors before any attack reaches them. *Dictyostelium discoideum* self-organizes through cAMP oscillation into coordinated multicellular bodies capable of directed movement (Schaap, 2016).

Nobody disputes the observations. What gets disputed — endlessly, and without resolution — is whether these observations *count*. Does slime mold habituation qualify as learning? Does plant signaling deserve to be called cognition? Does any of this have anything to do with consciousness?

This pattern is itself the most important datum. When a biological fact must

wait for terminological authorization before its significance can be understood, something has gone wrong — not in the biology, but in the words being used to talk about it.

The words arrived before the biology did.

Cognition traces back to the Indo-European *gno-* — to know. In Homer, the word still carried its most immediate sense: Odysseus's dog *recognized* his returning master; a warrior *recognized* an enemy's armor. This knowing was sensory, immediate, bodily. At its origin, to know was to *feel a difference*. Aristotle preserved this: in *De Anima*, sensation is the root of cognition, not its inferior substitute. The spectrum from sensation through memory to reason is continuous. They are one process at different degrees of development.

Descartes broke this continuity. Genuine cognition, in his framework, belongs exclusively to *res cogitans* — the immaterial thinking substance, purely rational, sealed off from the body. Animal behavior, however sophisticated, is mere mechanism. Sensation, once the root of knowing, became philosophically suspect — something that happens to bodies, not something that constitutes understanding. The cognitive revolution of the twentieth century appeared to reverse Descartes by restoring internal processes to scientific respectability. But it did not restore sensation. It replaced the rational soul with the computer. Cognition became information processing — equally disembodied, equally sensation-free, only now mechanical rather than spiritual. The ghost had been traded for the machine.

Consciousness has a different genealogy but arrives at the same impasse. Ancient Greek had no word for it in our sense. The closest, *suneidēsis*, meant shared moral knowledge — the voice of conscience, not the theater of subjective experience. Descartes built that theater. His *cogito* made the mind's awareness of its own operations the foundation of all certainty. Locke completed the architecture: consciousness is “the perception of what passes in a man's own mind.” The inner enclosure was sealed.

What neither noticed is that this reflexive self-awareness — knowing that one is knowing — is itself a form of sensation. Consciousness is not sensation's opposite. It is sensation turned back upon itself. The rupture Descartes created was artificial. The two things he separated had never actually been apart.

Both words, then, began at the same root — the felt difference, the immediate bodily response to a changed world — and were progressively abstracted until that root became invisible. They became shadows of shadows. And now, when these shadow-words are carried into biological debates, they generate arguments that feel substantive but are, at bottom, arguments about the history of their own abstraction. The living organism that originally cast them has been left behind.

Wittgenstein saw this clearly: when words are removed from their ordinary contexts and pressed into theoretical service, they no longer do their proper work. They generate puzzles that feel profound but dissolve the moment you stop thinking and start looking. Zhuangzi saw the same thing two millennia earlier: *names are guests of reality*. When the guest occupies the master's seat, the master is forgotten.

In 1751, a Scottish physician took a different road.

Robert Whytt did not begin with definitions. He began with an observation: when light enters the eye, why do the circular muscles of the iris contract rather than the longitudinal ones? He did not derive the answer from a theory of the soul. He observed: because contraction of the longitudinal fibers would not relieve the discomfort caused by excess light — it would intensify it. Contraction of the circular muscles reduces the aperture and removes the source of disturbance. From this he induced a principle:

"Such is the original constitution of our frame, that the mind or sentient principle is, in consequence of uneasy sensations, instantly determined to produce such motions or changes in the body, as naturally tend to remove or lessen them."

The direction is the opposite of the philosophical tradition: from phenomenon to principle, not from principle to phenomenon. Whytt did not define the sentient principle and then judge whether the pupillary reflex qualified as its expression. He observed the reflex fully and induced the principle from what he saw. The sentient principle is not a metaphysical entity.

It is a functional description of how living systems are originally constituted: they sense conditions that disturb them, they are moved by what they sense, and they generate directed activity toward resolution.

A century later, Darwin followed the same road. Without any knowledge of genetics, he induced the principle of natural selection from observations of variation, inheritance, and differential survival. No one questioned the scientific validity of natural selection on the grounds that Darwin could not directly measure it. The principle was valid because it was induced from rigorous observation and generated testable predictions. Whytt's sentient principle stands on the same methodological ground.

The principle holds at every scale of living organization.

Escherichia coli: surface receptors detect chemical gradients; the signal drives flagellar rotation; rotation direction determines whether the bacterium tumbles randomly or swims toward the favorable. Sense the disturbing difference, be moved, generate directed motion toward its resolution. No nervous system. No deliberation. The functional structure is complete.

Physarum polycephalum: repeated salt exposure shifts sensory thresholds through material changes in the tubular network — the physical substrate of habituation (Boussard et al., 2019). Habituated individuals show intracellular sodium concentrations ten times higher than controls. When two individuals with different histories fuse, the habituation transfers. Past sensing is encoded in material structure and can be transmitted. The organism also deposits extracellular slime trails that function as externalized spatial memory — the sensing-behavior loop extended into the surrounding environment (Reid et al., 2012).

Plants: volatile compound release upon herbivore damage primes neighboring defenses. Vascular signaling coordinates systemic responses across the whole organism. The sensing-behavior loop operates without neurons, across scales from molecular to ecological.

None of this requires the word “cognition” to be meaningful. None of it

requires a verdict on “consciousness.” The observations stand on their own. What they share — across bacteria, slime molds, plants, and the nervous systems of animals — is Whytt's functional structure: the original constitution of living frames, in which disturbing conditions drive directed activity toward their resolution. Call it the *“Sentient Principle”* (Wu J., 2026) if a name is needed. But the name is secondary. The phenomenon is primary.

The standard debates fail because they ask the wrong questions.

When researchers ask whether slime mold habituation “qualifies as learning,” they are applying a concept derived from observations of humans and higher animals. The definition of learning already embeds a standard. Slime mold behavior is then evaluated against a criterion that was never derived from slime mold behavior. The conclusion is contained in the definition. This is not scientific evaluation. It is conceptual tautology.

The conflation of sentience with consciousness compounds the problem. Taiz and colleagues (2019) are correct that plants lack consciousness — they lack the neural integration complexity that consciousness requires. But “lacks consciousness” is silently taken to imply “lacks sentience,” and this implication is false. Sentience — the capacity to sense disturbing conditions and be moved toward their resolution — is not the same as consciousness. Consciousness is one form sentience takes when the organism's nervous system becomes complex enough to take its own operations as objects of sensation. It is not the whole of sentience. Confusing the two makes it impossible to think clearly about what any organism below the threshold of consciousness actually does, and why it matters.

The boundary between sentience and mere physical responsiveness is equally important — and equally clear. A stone responds to force. But the stone has no internal reference that shifts with experience, no threshold dynamics, no directed motion toward the resolution of a disturbing condition. It deforms; it does not *respond*. The bacterium has an internal reference. The deviation from a favorable condition drives directed motion toward restoration. The cycle closes. For the stone, there is no cycle. This is the functional boundary between the living and the non-living — not the presence of neurons, not the capacity for

verbal report, not the ability to pass a mirror test. The boundary is the sensing-behavior loop itself.

This boundary does not slide toward the view that stones have feelings or that thermostats deserve moral consideration. It draws a principled line — not where convention has drawn it, but where the biology actually requires it.

At sufficient complexity, the cycle turns inward.

In organisms with sufficiently elaborated nervous systems, neural activity itself becomes an object of sensation. The brain takes its own operations as inputs — through reentrant signaling, the flow of reasoning, the emergence of a memory, the feeling of understanding something become objects of sensing rather than merely its products. This is what consciousness is, seen from within the continuum rather than imposed upon it from outside. It is not a separate phenomenon requiring a separate explanation. It is the sensing-behavior loop at the degree of complexity where the organism's own internal states become the primary objects of its sensing.

The “hard problem of consciousness” — why physical processes should be accompanied by subjective experience — is a product of the Cartesian rupture. Once sensation was severed from cognition, the question of how they reconnect became unanswerable within the framework that generated it. But if the rupture was artificial — if sensation and knowing were never separate but one continuous process that Descartes forced apart — then the hard problem is not a discovery about the nature of mind. It is a symptom of a three-century-old conceptual error. The path out is not through the framework but behind it, to the point before the severance.

The methodological inversion is simple to state.

Instead of: *define the concept, then judge whether the phenomenon qualifies —*

Begin with: *describe the phenomenon, characterize its functional structure, locate it within the continuum of living organization.*

This is what Whytt did. This is what Darwin did. It is not a lower standard of rigor. It is a higher standard of honesty about what observation can and cannot establish.

Applied to the current debates: the question is not whether slime mold habituation qualifies as learning. The question is what the functional structure of slime mold habituation actually is — what dimensions of the sensing-behavior loop it engages, how threshold adjustment in *Physarum* compares functionally to synaptic plasticity in a vertebrate, not in order to judge which is "real" but in order to understand both more precisely by seeing what they share and where they diverge. These questions are answerable. They generate genuine comparative biology rather than terminological gatekeeping.

The biological evidence of the past three decades is sufficient to establish the sensing-behavior loop as a universal feature of living organization. That evidence does not need the imprimatur of "cognition" or "consciousness" to be taken seriously. It needs only to be seen clearly, described precisely, and followed where it leads.

Where it leads is back to what was visible before the conceptual freight accumulated — back to Whytt's observation in 1751 that the original constitution of living frames is to sense disturbing conditions and be driven toward their resolution; back to the recognition, available to anyone who watches a bacterium navigate a chemical gradient or a slime mold solve a maze, that life is not mechanism, has never been mechanism, and cannot be understood as mechanism without losing precisely what makes it life.

The words "cognition" and "consciousness" are guests. They have been useful guests. But they have occupied the master's seat for too long. The master — the sensing, driven, living organism — has been waiting outside.

It is time to open the door.

The theoretical framework underlying this analysis — the Sentient Principle as a universal organizing feature of living systems — is developed at length in a separate work by the author.

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