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## All living organisms are sentient

Commentary on [Rowan et al.](#) on *Sentience Politics*

**Arthur S. Reber**, University of British Columbia

**František Baluška**, University of Bonn

**William B. Miller, Jr**, Independent Researcher, Phoenix, Arizona

**Abstract:** We argue that all living organisms, from the simplest unicellular prokaryotes to *Homo sapiens*, have valenced experiences—feelings as states of preference—and are capable of cognitive representations. Bacteria can learn, form stable memories, and communicate, hence solve problems. Rowan et al.'s statement that "*Subjective feelings are just that — subjective — and are available only to the animal (or human) experiencing them*" is true but irrelevant. When we see a fish flopping about in the bottom of a boat we immediately recognize suffering without having a glimpse of the nature of piscine distress. Some controlled anthropomorphism can go a long way without stumbling into the philosophical "first person" problem. Incumbent on a species with such gifts are countervailing responsibilities.

[Arthur S. Reber](#), Broeklundian Professor of Psychology, Emeritus, CUNY and Visiting Professor, Psychology, University of British Columbia. His research is on implicit learning: knowledge acquired largely independently of awareness. [Website](#)



[František Baluška](#), IZMB, University of Bonn, integrates plant cell biology and physiology with sensory ecology and electrophysiology in the emerging field of plant neurobiology. He edits [Plant Signaling & Behavior](#) and [Communicative & Integrative Biology](#), and the book series *Signaling and Communication in Plants*. [Website](#)



[William B. Miller, Jr.](#), is a physician, evolutionary biologist, and lecturer on the new science of the [hologenome](#) and the impact of the microbial sphere on evolutionary development. [Website](#)



Our religious, cultural, and scientific heritages place humans at the apex of all living organisms. This anthropocentrism has led us to conspicuous anthropomorphism regarding any traits and skills identified and characterized first in *Homo sapiens* (Chapman & Huffman 2018). The prime example, and the one having the most serious consequences for all other organisms, is our persistent belief that only a human-type mind should be associated with feelings, sentience, and actual cognition. This alienation from the true nature of consciousness has triggered severe problems imperiling our future. This hubristic self-regard is resulting in unprecedented

exploitation of all planetary ecosystems, endangering our civilization, and the well-being of all other living creatures.

Rowan et al. (2022) have courageously stepped into this debate by focusing on animal sentience, and, as usual, they begin with human experience as the sine qua non of sentience. At further issue is whether animals have experiences and internal valenced states that are reflective of and on a continuum with our own. Our own research suggests that if that debate is properly conducted from the level of sentient cells forward, the issue of animal sentience is easily clarified.

One of the most widely known definitions of animal cognition comes from comparative psychologist Sara Shettleworth (2010, p. 4): "Cognition refers to the mechanisms by which animals acquire, process, store, and act on information from the environment. These include perception, learning, memory, and decision-making."

Our work suggests that this definition is unduly limiting if it is merely applied to animals. We have argued in a number of recent papers and books (Baluška & Reber, 2019; Baluška, et al. 2022; Miller, 2018; Reber, 2019; Reber & Baluška. 2020) that life and sentience are coterminous: All living organisms, from the simplest unicellular prokaryotes to *Homo sapiens*, have valenced experiences -- feelings as states of preference -- and are capable of cognitive representations. There is ample evidence that bacteria can learn, form stable memories, and communicate. By doing so, they efficiently problem-solve, both individually and collectively.

These displays of learning at the level of cells are sufficient to make the case for basal sentience as a "scale-free" phenomenon. For example, slime molds can navigate pathways dotted with aversive acids at arbitrary points by learn to avoid contact with the acidic points (Boisseau et al., 2016 ). Mitchell et al. (2009) fed bacteria a sequence of sugars, with lactose followed by maltose and then back to lactose again. The test was the sequence LMLMLLL. The uptake of the last lactose was inefficient because the bacteria had already begun shifting basic metabolic functions in anticipation of maltose. It's difficult to imagine such behaviors (and many others, see Reber & Baluska, 2020) taking place in a nonsentient species since a complex suite of interrelated problem-solving behaviors is demonstrated, enabling them to make predictions.

Accordingly, in our view, all the animals discussed by Rowan et al. are sentient and hence have welfare. In fact, this extends to all other living species, including fungi and plants (Baluška & Mancuso 2020). Experiments confirm that fungal organisms perceive their outer world in a way that is very similar to how animals sense their environment (Adamatzky, et al., 2022). Laboratory studies demonstrate that fungi produce patterns of electrical activity quite similar to neuronal activity. Furthermore, fungi exhibit surprisingly complex behaviors and wide-ranging sensory capacities, establishing stable memories that enable learning and decision-making.

Therein lie the difficult questions about ethical conduct, welfare, precautionary principles (Birch 2017), distribution of suffering, and a host of other concerns. We do not want to end up where Ng (2016) would take us: "For nonsentient species, we do not have to care about their welfare, as they do not have any welfare."

Based on our own research, we are supportive of Rowan et al.'s overall stance, but with the caveat that the issues go deeper than the focus on welfare for animals used by humans for food. There is a deeper truth here. Apart from various unicellular species that are content with just sugar, every organism survives by damaging and killing and eating other organisms or waiting for another to do the deed and then coming in to feed. This applies to plant life as well. The interconnectedness of living creatures being sacrificed to succor another is a planet-wide reality.

It would be remiss of us to fail to note that Rowan et al.'s statement that "Subjective feelings are just that—subjective—and are available only to the animal (or human) experiencing them" is true but irrelevant. When we see another person in pain, we empathize immediately without actually experiencing their pain. When we see a fish flopping about in the bottom of a boat we immediately recognize suffering without having a glimpse of the nature of piscine distress. A modicum of controlled anthropomorphism can go a long way here without stumbling into the philosophical "first person" problem.

Scientific evidence affirms that all animals are sentient, problem-solving organisms with their own form of inner life. It is also true that our human-specific cognitive faculties have granted us unmatched influence over our fellow planetary companions. Incumbent on a species with those gifts are countervailing responsibilities. Foremost among these should be an insistence that any debate about ethical standards as they pertain to animal welfare must be based on rigorous scientific evidence rather than any historically garnered deep-rooted presumption that sentience is the sole provenance of humankind.

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