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Slimes and cyborgs: stretching the boundaries of life

Mark Miller and Kathryn Nave

Abstract
The extension of the organism into the environment, suggested by some interpretations of autopoiesis, can seem disconcerting. Yet we argue that Villalobos and Razeto-Barry’s attempt to reinscribe the organism inside the physical body, via the criterion of autopoietically produced material coherence, cannot account for the dynamical and highly changeable nature of life. A successful science of life must do justice not only to the life forms that enjoy clear boundaries but also to the squishy, the strange and the technologically modified.

Keywords
Enactive cognition, process ontology, extended life

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1. Review
Villalobos and Razeto-Barry (2019) propose a distinction between living bodies and extended autopoietic systems. Living bodies, unlike extended systems, are delimited by their material cohesion. They write, ‘if a given aggregation of matter offers null (or near to null) resistance to disaggregation, then that aggregation is not a body’ (p. 6). This distinction allows enactivists to accept that the networks of activity involved in an entity’s maintaining itself might extend into the environment, while denying the organism (as a body) extends.

However, if the authors wish to provide a clear-cut physical form for living organisms, then we worry this notion of an autopoietic body is not up to the task. The resilience to external forces the authors rely upon here is not nearly as dichotomous as they suggest. Air clearly offers no resistance to disaggregation, and gold offers plenty, but what of a heap of clay or a ball of slime? And what, for that matter, of slime bacteria?

Myxococcus xanthus is one of many examples in which multiple independent organisms temporarily combine to form larger autopoietic systems. When swarming, the Myxococcus bacterial cells move as an integrated collective – yet these transient clusters also split apart with minimal resistance. The question then is at what level of material cohesion does a colony transition from a collection of independent autopoietic bodies, participating in a shared autopoietic system, to becoming a single autopoietic body? The jellied mass of polyps forming the man o’ war seems to fall on one side, and a disconnected trail of ants on the other. Yet even independent ants may, like the Myxococcus, cluster into structures offering some resistance to disaggregation.

And it’s not only basic life forms that enjoy flexible boundaries, humans are notorious body-modifiers too. Consider the artificial pancreas. Developed for diabetics, this device monitors blood sugar levels and administers insulin or glucose into the bloodstream as needed. Placed partially under the skin, the device is both physically and homeostatically integrated with the organism, clearly marking it as part of the living body under the author’s account. Now, it’s easy to imagine these sorts of bioengineering devices being integrated with a variety of even more external technologies, such as smartphones, smart-refrigerators and so on. If the living body can stretch beyond the skin, why not much further?
The fact is, simple lifeforms are often too squishy and unpredictable in their life preservation tactics to be easily captured by a firm boundary, while complex life forms are often too smart to be caught by them. It would be a shame if enactivism turned out to only offer an account of life in the predictable middle, while excluding its stranger extremes. But this reading is not inevitable. Rather, we suggest that the controversy over extended organisms reflects a deeper tension within the author’s programme – that is, the attempt to develop an autopoietic account of organisms within what amounts to a substance ontology. Thankfully this is not the only option. Why not instead begin from a process ontology, prioritising dynamical organisation over physical stability? This would be to view the organism as a process that softly assembles various conveniently extractable lumps of matter at different points in time. Identity here loses the firm physical edges of a substance ontology, but we gain an account that matches the flexibility of life itself.

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Reference
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