[Review] Peter Godfrey-Smith. *Metazoa: Animal Life and the Birth of the Mind*. New York: Farar, Straus and Giroux, 2020. 336 pp.

David Herman
Crescent Lake Research Lab
animalcultures@gmail.com

Building on Godfrey-Smith's acclaimed 2016 study of *Other Minds: The Octopus, the Sea, and the Deep Origins of Consciousness*, this book adopts a wider-scope perspective on questions about how evolutionary history has both shaped and been shaped by the emergence of animal minds. Extensively researched, beautifully written, and vividly illustrated by Alberto Rava and Rebecca Gelernter, *Metazoa* does, like the author's previous book, draw on the philosopher's explorations of underwater environments while scuba diving; and Godfrey-Smith again discusses, in strikingly vivid terms, cephalopods vis-à-vis other animal kinds. The new book, however, investigates the nature and contours of animal intelligence not by concentrating on just a few focal species, but rather by engaging with a broad range of multicellular life forms. These life forms, in contrast with unicellular Protozoa (part of the kingdom Protista), make up the kingdom Animalia, also known as Metazoa. Thus, the book develops a biological-evolutionary approach to longstanding issues in the philosophy of mind – How are minds related to brains? What is the nature of consciousness? How does subjectivity relate to agency, or sensation to action? Is human intelligence different in kind from other forms of animal intelligence? – by synthesizing research on a variety of animals with whom *Homo sapiens* shares common ancestors. These animals are more or less proximate to humans on the evolutionary tree whose branching structure corresponds to the development of life on earth.

Accordingly, one of the author's main projects in this powerfully integrative study is to suggest how the lifeways and mindways of humans have origins in common with those of other animals, many of them predating the emergence of mammals some 200 million years ago. In order to outline this natural history of animal minds, Godfrey-Smith considers, among other creatures, sponges, coral reefs, flatworms, comb jellies, several kinds of shrimp and crabs, lizards, sharks, fish, dolphins, whales, flies, bees, rats, and primates, including humans. He also discusses plants, contrasting their evolutionary pathways with those charted by the members of Metazoa. Opening the book with an invitation to readers to accompany him on a dive into an undersea sponge garden ('Sound recedes with gravity and light fades to soft green as you dip beneath the surface' [3]), and starting with animals who are, phylogenetically speaking, among humans' most distant kin, the author begins by establishing some of the key themes around which his many creatural case studies are organized. As Godfrey-Smith notes, it is difficult to reconcile Cartesian mind-body dualism with an evolutionary perspective based on the premise of continuity between humans and other animals. But even if philosophers of mind choose Darwin over Descartes, it is still necessary for them to build a bridge leading from materialist understandings of biological phenomena to a materialist account of thoughts, experiences, and feelings in terms of physical and chemical processes. The author's one-sentence description of the needed bridge, of which the remainder of the book goes on to provide a more detailed scale model, runs as follows: 'The evolution of complex life naturally gives rise to the mind, through the growth of purposeful action and sensitivity to the environment' (12).

A first step in constructing the bridge linking evolutionary processes to the domain of the mental, and thereby showing how 'a universe of processes that are not themselves mental, or conscious, can organize themselves in a way that gives rise to felt experience' (19), involves uncoupling subjective experiences from humans. For Godfrey-Smith, *Homo sapiens* affords one reference point for biological-evolutionary studies of mind, but should not be treated as a benchmark for animal intelligence as such. A human is, rather, one kind of experiencing subject among other kinds, meaning that 'we need to continually avoid falling into the habit of thinking that all forms of experience must be human-like in various ways' (18). After characterizing cells as selves in their own right, because of the way they organize and control storms of electrical

activity, the philosopher turns to the more complex selves known as animals, which consist of many cells living as a unit. He begins with sponges and corals to suggest how animals without the 'evolutionary inventions' associated with *Homo sapiens*, such as brains, hearts, and backbones, nonetheless respond adaptively to their environments. At least some kinds of sponges demonstrate an action potential made possible by electrical signaling that moves as a pulse through their entire bodies, and corals, which assume the form of polyps, can unfurl and close in a manner that calls to mind hands reaching and grasping for things – though in reality these movements unfold at a rate 'faster than [would be possible for] a plant, but slower than the [temporal] scale of familiar busy animal behaviors' (52).

More generally, in Godfrey-Smith's account, action potential or agency, coupled with the possibility of having sensations that in part defines subjectivity, point to critical waystations in the emergence of animal minds. The author connects the evolution of nervous systems, which first took shape in cnidarians such as corals, anemones, and jellyfish, with 'the coordinated contraction, and relaxation, of massive sheets of cells' involved in acting. He describes agency, in general, as 'by-me-ness,' or 'a matter of doing, trying, initiating' (59), and in the early stages of animal evolution, the 'transforming factor' was action on a new scale – that is, the 'large-scale, muscularly controlled action' (58) that was possible for cnidarians but not for sponges. In turn, sensing, which is 'a matter of seeming,' a 'for-me-ness' that gives meaning to the concept of subjectivity, has 'its raison d'être in the control of action' (59). Drawing on work by Fred Keijzer, Godfrey-Smith argues that although the evolution of mind involves 'the coupled evolution of agency and subjectivity', these linked innovations do not necessarily develop in lockstep, such that a new modality of agency can emerge alongside of, and reshape, simpler sensory capacities (59). For example, new forms of action require animals to sense the difference between actions of which they are the source and other, external events or processes by which they are affected.

In the next stage of the underwater adventure on which Godfrey-Smith leads readers, the author encounters a banded shrimp, noting that the term *shrimp*, like the term *crustacean*, in fact refers to animals situated on several branches of the evolutionary tree, and that the inclusive term for all these animals is *arthropod*. The shrimp, which can see and manipulate objects, and

which can move fast, has for Godfrey-Smith 'a different relationship to its surroundings, a different mode of being, from any others discussed so far' (79). Tracing the emergence of arthropods back to the Cambrian period, starting about 540 million years ago, the philosopher emphasises the evolutionary pressures exerted by scavenging and then predation, which required improved vision (in the shape of image-forming eyes) and locomotion. These evolutionary innovations, in turn, allowed for new modes of coordination between sensing and acting, sharpening animals' ability to discriminate between sensory changes brought about by their own actions and those caused by something going on externally. Crucially, as the author points out, animals could now sense 'the world in a way that tracks the divide between self and other, between the animal itself and everything else' (87), including other agents. In a striking later formulation that builds on these comments, Godfrey-Smith argues that when animals acquire, through this newly enhanced interplay between sensing and acting capacities, what amounts to a point of view, and when they begin to act from that point of view, 'the evolution of animal agency brings with it the origin of subjects' (105).

The octopus is next up in the author's multispecies survey of (or guided dive among) animal minds, and here the in-depth research informing *Other Minds* stands Godfrey-Smith in good stead. Reviewing a wealth of findings related to octopus evolution and physiology, he homes in, in particular, on issues raised by this animal's decentralized nervous system, which is organized such that about two-thirds of the neurons can be found in the octopus's arms rather than the animal's brain, itself 'a vaguely defined region' (129). As the author remarks, once all the machinery (i.e., the arrangement of organized cellular arrays) is in place for seeing, moving, and coordinating these two capacities, new evolutionary options arise, depending on whether the animal uses separate streams of information to control behavior or integrates all of the incoming information into a single stream – or does both. These issues go to the heart of Godfrey-Smith's account of subjectivity itself, which he characterizes in terms of point of view. Bringing research on split-brain (human) patients into dialogue with his own observations of octopuses in the wild, the author poses the question of what it might be like to be an octopus, whose behavior seems to involve both central and peripheral control. Three possibilities suggest themselves, and the author tags them as 1, 1+8, and 1+1: respectively, a fully integrated or

centralized self; an interplay between a primary or most complex self (the central brain) and eight smaller or more localized selves situated in the arms; and an interplay between the central brain and a second brain formed by a network of connections linking the arms with one another as well as the central brain. Drawing on studies of humans whose corpus callosum has been severed to prevent epileptic seizures, the author explores a scenario involving fast switching between and partial unity among octopuses' centers (or non-centers) of control. In this scenario, the 'glimmer of autonomy' associated with the animal's arms can be submerged or lost when an exigent situation requires the octopus to pull itself together and act with 'whole-animal centeredness' (159).

By contrast with octopuses, fish can be described as highly centralized animals. As gregarious beings, fish live in complex social environments, which has made it advantageous for them to develop capacities for visual recognition, memory, and strategic problem solving. Furthermore, in contrast with octopus bodies, fish bodies are singular wholes, built for motion and other forms of coordinated action. With an integrated nervous system located in the head between 'camera eyes', fish pioneered the 'centralized vertebrate brain' (182; see also Shubin). In discussing fish neuromasts, or collections of cells capable of detecting movements of water in a way that blurs the line between the senses of touch and hearing, Godfrey-Smith returns to the dialectical interplay between sensing and action, given that a fish must be able to distinguish its own wake from the effects of other creatures' motions. He also links neuromasts to the electrosensing capabilities of sharks, and thence to research on the electrical activity of the human brain – including the early-twentieth-century studies by Hans Berger and others that contributed to the development of EEG technology. The author points out that electrical activity of the sort found in human and other brains has both a local profile, involving currents and chemical reactions, and a more global or holistic profile that can be described in terms of fields. Extending invisibly through space, these fields are generated by local electrical events, and they highlight the significance of large-scale dynamic properties of the brain. Together with the subjectivity arising from self-other interactions between animals and their environments, such

properties are part of the bridge that stretches from biological processes to conscious experiences – a bridge that, in Godfrey-Smith's account, was engineered by the evolution of animal agency.

Subsequent chapters shift the focus from life in the sea to life on land – though, as the author comments, 'life and mind began in water, and we carry the sea with us in all our cells' (203). Beginning with a discussion of insects' coevolution with land plants, this part of the book contrasts bees' tendency to master tasks through internal computation with octopuses' preference for exploratory manipulation, and notes that flying insects in general create a feedback loop between action and sensation that contributes to a point of view. In turn, questions about insect subjectivity lead Godfrey-Smith into a discussion of pain, emotions, and moods both among insects like bees and flies and among gastropods such as slugs and snails (208-220); this discussion opens onto ethical issues to which the author returns in his final chapter. Meanwhile, other branches of life on land involve vertebrate evolution, with 'adventurous fish [initiating] an ongoing radiation of terrestrial animals, including mammals and birds' (229). As Godfrey-Smith puts it, 'evolution in the sea … produced a capacity for manipulation, openness of bodily action, and centralized braininess, but no sea animal evolved with all of these at once. That is the combination we see at last in land vertebrates' (233), which branched into dinosaurs (including those that survived as birds) and mammals.

The last chapter opens with a discussion of the contrast between online and offline processing; these two ways of modeling the world relate differently to the nexus of sensing and acting. If online processing involves the construction of world models and action strategies based on what is sensed, in offline processing, exemplified by the dreaming activity of humans during REM sleep, the models in question are not a direct response to sensory experience; nor do they entail actions based on such experience (253). Godfrey-Smith reviews evidence of offline processing by cephalopods and rats during REM-like sleep patterns, suggesting further commonalities between human and other-than-human minds. The author then returns to ethical issues raised by what he describes as his 'idea of widespread animal experience' (267) – an idea that requires, in turn, a broad account of what makes not just humans but also other animals experiencing beings (269). As the philosopher notes, his approach to sentience warrants an

extension of consideration to many more animals than currently receive it. Yet surely the bridge between biology and minds that the author himself has begun to model via research on the evolution of animal agency, like his discussion of studies attributing experiences of pain, emotions, and moods as well as forms of offline processing to diverse creatural kinds, calls for a much stronger statement than the following: 'Extension of consideration is not the same as extension of rights, or trying to establish some kind of equality of status; the aim of this book is not to install mosquitos, midges, and aphids as fellow citizens, or to argue that we need to radically change our behavior toward animals of those kinds' (273).

Precisely by accompanying the author on his undersea journey among animal minds, readers have acquired the wherewithal to critique this statement as, in effect, settling for half-measures. Or, to frame the critique in different terms: Godfrey-Smith's own most careful arguments, which use detailed evolutionary and physiological analyses to engage in a philosophical reimagining of the nature and origins of minds, point toward conclusions that he here seems to disavow. The net result of his evolutionary approach is to locate humans in a more-than-human community of experiencing selves, underscoring the need for a different, more expansive understanding of all animals as kindred creatures, fellow citizens of a trans-species society of minds. The trendline of the author's account therefore runs opposite to that of the statement just quoted. Rather than establishing a putative threshold for animal intelligence and assigning a lower status to the animals who fall below that threshold, the author makes prolific and inclusive allocations of the possibility for subjective experience – for richly contextualized and organism-specific encounters with the world – across the boundary separating humans from other kinds of animals (see also Herman 202-32). Accordingly, however he describes the implications of his own account for interspecies ethics (compare Willett), Godfrey-Smith places a heavy burden on upholders of anthropocentric assumptions and traditions. The onus is now on them to justify the parsimonious allocations of subjective experiences – and the denial of the rights grounded in those experiences – that have given impetus to the environmental crises, including the loss of biodiversity, now threatening all life on earth.

Works Cited

Godfrey-Smith, Peter. *Other Minds: The Octopus, the Sea, and the Deep Origins of Consciousness*. William Collins, 2016.

Herman, David. *Narratology beyond the Human: Storytelling and Animal Life*. Oxford University Press, 2018.

Keijzer, Fred. 'Moving and Sensing Without Input and Output: Early Nervous Systems and the Origins of the Animal Sensorimotor Organization.' *Biology and Philosophy*, vol. 30, 2015, pp. 311-31.

Shubin, Neil. *Your Inner Fish: A Journey into the 3.5-Billion-Year History of the Human Body*. Vintage, 2009.

Willett, Cynthia. *Interspecies Ethics*. Columbia University Press, 2014.