

The octopus mind and the argument against farming it

Commentary on [Mather](#) on *Octopus Mind*

Jennifer Jacquet

Department of Environmental Studies
New York University

Becca Franks

Department of Environmental Studies
New York University

Peter Godfrey-Smith

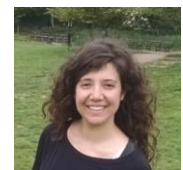
Faculty of Science
University of Sydney

Abstract: Mather is convincing about octopuses having ‘a controlling mind, motivated to gather information,’ but stops short of asking what having that mind means for octopus moral standing. One consequence of understanding the octopus mind should be a refusal to subject octopuses to mass production. Octopus farming is in an experimental phase and supported by various countries. We argue that it is unethical because of concerns about animal welfare as well as environmental impacts.

[Jennifer Jacquet](#), assistant professor in the Department of Environmental Studies at New York University and part of NYU Animal Studies, works on large-scale environmental problems, including overfishing, climate change, and the Internet wildlife trade. [Website](#)



[Becca Franks](#), visiting assistant professor in the Department of Environmental Studies at New York University, studies well-being and motivation, with a focus on aquatic animal welfare. [Website](#)



[Peter Godfrey-Smith](#) is Professor of History and Philosophy of Science at University of Sydney. His main research interests are philosophy of biology and philosophy of mind. His books include *Other Minds: The Octopus, the Sea, and the Deep Origins of Consciousness*. [Website](#)



Mather (2019a) presents ample evidence that octopuses have personalities, causal reasoning, get bored, and have imaginations. These are features we humans understand. She also describes unique aspects of octopuses’ ‘way of being’ — such as a nervous system distributed

mostly throughout eight arms and the ability to camouflage themselves using chromatophores. Mather also argues convincingly that octopuses have ‘a controlling mind, motivated to gather information.’ Yet she stops short of asking what possessing that mind means for octopus moral standing (see commentaries of Browning 2019 and King & Marino 2019).

One consequence of understanding the octopus mind should be a refusal to subject octopuses to mass production. This is in an experimental phase today and supported by various countries, including Spain, Mexico, China, and Japan. Octopus farming is unethical because of concerns about animal welfare as well as environmental impact ([Jacquet et al., 2019](#)).

Mass production of octopus would mean controlled, sterile, and monotonous environments (probably experienced in isolation) combined with set diets and regimented feeding schedules, all designed to maximize biomass, not wellbeing. Few studies have considered octopus welfare in farmed settings (for an overview see Castanheira, 2019), but these have reported high rates of cannibalism and aggression at higher stocking densities (Pham & Isidro, 2009), parasitic infections (Ladineo & Ozić, 2005), and problems with digestion (Sykes et al., 2017). Intensive farm systems are inevitably hostile to the positive experiences octopuses are likely to seek, including high levels of cognitive stimulation (Mather & Dickel, 2017), opportunities to explore, manipulate, and control their environment (Finn et al., 2009; Levy et al., 2015; Steer & Semmens, 2003), and social interaction (Boal, 2006; Caldwell et al., 2015; Scheel et al., 2017).

Beyond welfare concerns, commercial octopus farming would also be ecologically unsustainable. Octopuses are carnivores and require protein from other animals in their diet. Octopuses in captivity grow best on a diet consisting primarily of crab, but diets of mackerel (Pham & Isidro, 2009) or squid and hake have also been tried (Cerezo Valverde & García García, 2016). Rather than alleviating pressure on wild aquatic animals, farming octopus would increase pressure. As with any captive carnivore, farming octopus is inefficient: it would feed people but the result would be a net loss of animal protein.

Ecologists have emphasized that farming carnivores is unsustainable (e.g., Ackefors & Rosén, 1979; Naylor et al., 2000). Aquaculture is a valuable and probably inevitable part of the future of human food consumption, but it can be implemented more or less responsibly. From a sustainability perspective, farming should not focus on carnivores but on organisms lower on the food chain that we do not need to feed, such as mussels and oysters (Jacquet et al., 2017), seaweeds, and other options. Owing to concerns about environmental impact as well as human health, experts have argued that human diets should be composed predominantly or exclusively of plants (Willett, 2019). Although the argument that ‘people have to eat’ has been used to justify the development of octopus farming (including by Mather, 2019b) the human diet need not include farmed octopus. Unlike the octopus, humans have immensely flexible diets.

The nascent octopus farming industry has also argued that octopus farming will meet global demand for octopus. However, as with aquaculture in general, which has not been a substitute for capture fisheries but has added to the global supply of seafood (e.g., Longo et al., 2019), octopus farming would probably result in creating demand for octopus.

The octopus industry has also said octopus farming will create jobs. Any new enterprise, including going to war or building prisons, is likely to create jobs. The question is at what cost. Farming oysters, seaweed, or lentils would also create jobs without subjecting ‘a controlling mind’ to mass production. We must ultimately ask ourselves whether farming the octopus — an

undomesticated, sentient, and sophisticated carnivore — is the right thing to do. We believe it is not. The following scholars (signing as individuals, not on behalf of their institutions) agree:

Signatures

1. [ABRAMS](#) Peter, University of Toronto, Canada
2. [AINLEY](#) David, Marine Ecologist, USA
3. [AL-ABDULRAZZAK](#) Dalal, Vericatch, Canada
4. [ALAVA](#) Juan Jose, Institute for the Oceans and Fisheries, University of British Columbia, Canada, & Fundacion Ecuatoriana para el Estudio de Mamiferos Marinos (FEMM), Ecuador
5. [ARECHAVALA-LOPEZ](#) Pablo, Mediterranean Institute of Advanced Studies, Spain
6. [ATHANASSAKIS](#) Yanoula, New York University, USA
7. [BAKER](#) Liv, Hunter College, USA
8. [BEKOFF](#) Marc, University of Colorado, USA
9. [BERGHMANS](#) Federico, University of Buenos Aires, Argentina
10. [BERGSTROM](#) Carl, Department of Biology, University of Washington, USA
11. [BOLGER](#) Niall, Columbia University, USA
12. [BROAD](#) Kenneth, University of Miami, USA
13. [BROOKS](#) Cassandra, University of Colorado Boulder, USA
14. [BROTZ](#) Lucas, Institute for the Oceans and Fisheries, University of British Columbia, Canada
15. [BROWNING](#) Heather, Australian National University, Australia
16. [CASAL](#) Paula, Catalan Institution for Research and Advanced Studies, Spain
17. [CARRETERO-GONZÁLEZ](#) Margarita, Universidad de Granada, Spain
18. [CHAUDHURI](#) Una, New York University, USA
19. [CLARK](#) Stephen R.L., University of Liverpool (Professor Emeritus), UK
20. [CRAMER](#) Katie, Scripps Institution of Oceanography, USA
21. [DAVIES](#) Ben, University of Oxford, UK
22. [DELON](#) Nicolas, New College of Florida, USA
23. [DENNETT](#) Daniel, Tufts University, USA
24. [DONALDSON](#) Brianne, Rice University, USA
25. [DOYLE](#) Rebecca, University of Melbourne, Australia
26. [ESTES](#) James, University of California, Santa Cruz, USA
27. [FENTON](#) Andrew, Dalhousie University, Canada
28. [FISCHER](#) Bob, Texas State University, USA
29. [FONSECA](#) Rui, Centro de Investigação e Estudos de Sociologia (CIES-IUL), Portugal
30. [FRASER](#) David, Animal Welfare Program, University of British Columbia, Canada
31. [FROESE](#) Rainer, GEOMAR Helmholtz Centre for Ocean Research, Germany
32. [GAGLIANO](#) Monica, University of Sydney, Australia
33. [GLASER](#) Sarah, One Earth Future, USA
34. [GRUEN](#) Lori, William Griffin Professor of Philosophy, Wesleyan University, USA
35. [GUPTA](#) Kristin, Rice University, USA
36. [HALTEMAN](#) Matthew C., Calvin College, USA
37. [HAYEK](#) Matthew, Harvard University, USA
38. [HERRMANN](#) Kathrin, Johns Hopkins Bloomberg School of Public Health, USA
39. [HIGGINS](#) E. Tory, Columbia University, USA
40. [HINTZE](#) Sara, University of Natural Resources and Life Sciences Vienna BOKU, Austria
41. [HOROWITZ](#) Alexandra, Barnard College, USA
42. [ILEA](#) Ramona, Professor of Philosophy, Pacific University Oregon, USA

43. [JACKSON](#) Jeremy B.C., Scripps Institution of Oceanography, USA
44. [JAMIESON](#) Dale, Department of Environmental Studies, New York University, USA
45. [JEROLMACK](#) Colin, New York University, USA
46. [JOHN](#) Tyler M., Philosophy, Rutgers University-New Brunswick, USA
47. [JOHNS](#) Brandon, California State University - San Bernardino, USA
48. [JOHNSON](#) Ayana, Ocean Collectiv, USA
49. [JOHNSON](#) Syd, Michigan Technological University, USA
50. [JOST](#) John T., New York University, USA
51. [KILLOREN](#) David, Australian Catholic University, Australia
52. [KNEBA](#) Elliot, Veterinarian, England
53. [KRISTENSEN](#) Bjørn, University of Oregon, USA
54. [LERNER](#) Adam, New York University Center for Bioethics, USA
55. [MAKOWSKA](#) Joanna, University of British Columbia, Canada
56. [MARINO](#) Lori, Kimmela Center for Animal Advocacy, USA
57. [MCCAULEY](#) Douglas, University of California Santa Barbara, USA
58. [MCCLLENACHAN](#) Loren, Colby College, USA
59. [MCDERMID](#) Sonali, New York University, USA
60. [MELOTTI](#) Luca, University of Münster, Germany
61. [MIGUENS](#) Sofia, University of Porto, Portugal
62. [MILINSKI](#) Manfred, Max-Planck-Institute for Evolutionary Biology, Plön, Germany
63. [MULÀ](#) Anna, Foundation Franz Weber, Spain
64. [NAGY](#) Kelsi, Colorado State University, USA
65. [NOTARBARTOLO DI SCIARA](#) Giuseppe, Tethys Research Institute, Milano, Italy
66. [ORMANDY](#) Elisabeth, Animals in Science Policy Institute, Canada
67. [OVEN](#) Alice, University of Winchester, UK
68. [PAEZ](#) Eze, University of Minho, Portugal & UPF-Centre for Animal Ethics, Spain
69. [PALOMARES](#) Deng, Institute of Oceans and Fisheries, University of British Columbia, Canada
70. [PARDALOU](#) Androniki, School of Biology, Aristotle University of Thessaloniki, Greece
71. [PAULY](#) Daniel, University of British Columbia, Canada
72. [PENG](#) Guo, Philosophy Department, Shandong University, China
73. [PICKETT](#) Susana, University of Leicester, UK
74. [POLICARPO](#) Verónica, Instituto de Ciências Sociais (ICS), Universidade de Lisboa, Portugal
75. [PROUDFOOT](#) Kathryn, Ohio State University, USA
76. [PULEO](#) Alicia, Philosophy Department of the Universidad de Valladolid, Spain
77. [RADER](#) Priscilla, Animal League Defense Fund, USA
78. [RAJAN](#) Kanaka, Princeton University, USA
79. [REISS](#) Diana, Hunter College, USA
80. [RIESER](#) Alison, University of Hawaii, USA
81. [ROBERTS](#) Callum, University of York, UK
82. [RYAN](#) Erin, British Columbia Animal Welfare Program, Canada
83. [SAFINA](#) Carl, Stony Brook University, USA
84. [SALA](#) Enric, National Geographic Society, USA
85. [SARAIVA](#) Joao L., Fish Ethology and Welfare Group, CCMAR, Portugal
86. [SCHANZ](#) Lisa, University of Natural Resources and Life Sciences (BOKU) Vienna, Austria
87. [SCHENKENFELDER](#) Josef, University of Natural Resources and Life Sciences Vienna, Austria
88. [SCHLOTTMANN](#) Christopher, Department of Environmental Studies, NYU, USA
89. [SEBO](#) Jeff, New York University, USA
90. [SHRIVER](#) Adam, Oxford Uehrio Centre for Practical Ethics, UK

91. [SINGER](#) Peter, Princeton University, USA
92. [SMUTS](#) Barbara, Psychology, University of Michigan (Professor Emeritus), USA
93. [SOMMERS](#) Tamler, Philosophy, University of Houston, USA
94. [SUDER](#) Billo Heinzpeter, President, Guarantor Fish Ethology and Welfare Group, Germany
95. [TAFALLA](#) Marta, Philosophy Department, Universitat Autònoma de Barcelona, Spain
96. [TAVELLA](#) Elizabeth, University of Chicago, USA
97. [THIYAGARAJAN](#) Nandini, New York University, USA
98. [TSIKLIRAS](#) Athanassios, Aristotle University of Thessaloniki, Greece
99. [TUMINELLO](#) Joseph, McNeese State University, USA
100. [VENTURA](#) Beth, University of Minnesota, USA
101. [VOLSTORF](#) Jenny, Fish Ethology and Welfare Group, Germany
102. [VOLTES](#) Adrià, Antropologia de la Vida Animal (Institut Català d'Antropologia), Spain
103. [WATLING](#) Les, University of Hawaii, USA
104. [WEBB](#) Christine, Department of Human Evolutionary Biology, Harvard University, USA
105. [WINCKLER](#) Christoph, University Natural Resources & Life Sciences Vienna, Austria
106. [WINTER](#) Drew, Rice University, USA
107. [ZAVITZ](#) Tayler, University of Victoria, Canada
108. [ZOLLITSCH](#) Werner, University of Natural Resources and Life Sciences Vienna, Austria
109. [ZOZAYA](#) Stephen, James Cook University, Australia
110. [CONLEY](#) Dalton, Princeton University, USA
111. [KING](#) Barbara J., College of William and Mary, USA

References

- Ackefors, H., & Rosén, C.G. (1979). Farming aquatic animals: the emergence of a world-wide industry with profound ecological consequences. *AMBIO*, 8, 132–143.
- Boal, J.G. (2006). Social Recognition: a top down view of cephalopod behavior. *Vie et Milieu – Life and Environment*, 56(2), 69–79.
- Browning, H. (2019). [What is good for an octopus?](#). *Animal Sentience* 26(7).
- Caldwell, R.L., Ross, R., Rodaniche, A., & Huffard, C.L. (2015). [Behavior and body patterns of the Larger Pacific Striped Octopus](#). *PLoS ONE*, 10(8), 1–17.
- Castanheira, M.F. (2019). [Octopus vulgaris](#). In: FishEthoBase, ed. Fish Ethology and Welfare Group.
- Cerezo Valverde, J., & García García, B. (2017). High feeding and growth rates in common octopus (*Octopus vulgaris*) fed formulated feeds with an improved amino acid profile and mixture of binders. *Aquaculture Research*, 48(7), 3308-3319.
- Finn, J.K., Tregenza, T., & Norman, M.D. (2009). Defensive tool use in a coconut-carrying octopus. *Current Biology*, 19, 1069–1070.
- Jacquet, J., Franks, B., Godfrey-Smith, P., & Sanchez-Suarez, W. (2019). The case against octopus farming. *Issues in Science and Technology*, 35(2), 37–44.
- Jacquet, J., Sebo, J., & Elder, M. (2017). Seafood in the future: Bivalves are better. *Solutions*, 8, 27-32.
- King, B.J., & Marino, L. (2019). [Octopus minds must lead to octopus ethics](#). *Animal Sentience* 26(14).
- Ladineo, I.M., & Ozić, M.J. (2005). Aggregata infection in the common octopus, *Octopus vulgaris*,

- Cephalopoda: Octopodidae, reared in a flow-through system. *Area*, 46, 193–199.
- Longo, S.B., Clark, B., York, R., & Jorgenson, A.K. (2019). [Aquaculture and the displacement of capture fisheries](#). *Conservation Biology*, 33(4), 832-841.
- Mather, J. (2019a). [What is in an octopus's mind?](#) *Animal Sentience* 26(1).
- Mather, J. (2019b). [Octopus farming \(response\)](#). *Issues in Science and Technology*, 35(3).
- Mather, J.A., & Dickel, L. (2017). Cephalopod complex cognition. *Current Opinion in Behavioral Sciences*, 16, 131–137.
- Naylor, R.L., Goldburg, R.J., Primavera, J.H., Kautsky, N., Beveridge, M.C.M., Clay, J., Folke, C., Lubchenco, J., Mooney, H., & Troell, M. (2000). Effect of aquaculture on world fish supplies. *Nature*, 405, 1017–1024.
- Pham, C.K., & Isidro, E. (2009). Growth and mortality of common octopus (*Octopus vulgaris*) fed a monospecific fish diet. *Journal of Shellfish Research*, 28, 617–623.
- Scheel, D., Chancellor, S., Hing, M., Lawrence, M., Linquist, S., & Godfrey-Smith, P. (2017). A second site occupied by *Octopus tetricus* at high densities, with notes on their ecology and behavior. *Marine and Freshwater Behaviour and Physiology*, 50, 285-291.
- Sykes, A.V., Almansa, E., Cooke, G.M., Ponte, G., & Andrews, P.L.R. (2017). The digestive tract of cephalopods: A neglected topic of relevance to animal welfare in the laboratory and aquaculture. *Frontiers in Physiology*, 8, 1–16.
- Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., & Garnett, T. (2019). [Food in the anthropocene: The EAT–Lancet Commission on Healthy Diets from Sustainable Food Systems](#). *The Lancet*, 393, 447–492.