

CHAPTER 14: ALTRUISM IN THEORIES OF EVOLUTION

1. Darwin, C., *The Descent of Man, and Selection in Relation to Sex*, Vol. 1, John Murray, 1871, p. 90, <http://darwin-online.org.uk/>.
2. *Ibid.* p. 100.
3. E. Sober, in Davidson, R. J., & Harrington, A., *Visions of Compassion: Western Scientists and Tibetan Buddhists Examine Human Nature*, Oxford University Press, 2002, p. 50.
4. I am grateful to Frans de Waal for clarifying this point for me.
5. See especially Trivers, R. L., *Social Evolution*, 1985, Benjamin-Cummings.
6. Memoirs of the Society of Naturalists of St. Petersburg. Quoted in Peter Kropotkin, *Mutual Aid: A Factor of Evolution*, London: Freedom Press, 2009.
7. Nowak, M. A., & Highfield, R., *SuperCooperators: Altruism, Evolution, and Why We Need Each Other to Succeed*, Simon & Schuster, 2011, pp. 274–275. Bourke, A. F. G., *Principles of Social Evolution*, Oxford University Press, 2011. See also the excellent article summarizing these arguments by Candau, Joël. *Pourquoi coopérer. Terrain* (1), 2012, pp. 4–25.
8. We know, for instance, that over five hundred species of bacteria colonize the teeth and mucous membranes of humans, offering an obvious potential for cooperation as well as for competition. But it has been demonstrated that it is cooperation between these bacteria that allows them to survive in an environment where a single species is incapable of proliferating. See Kolenbrander, P. E. Mutualism versus independence: Strategies of mixed-species oral biofilms in vitro using saliva as the sole nutrient source. *Infect. Immun.*, 69, 2001, 5794–5804. Concerning bacteria, see also Koschwanez, J. H., Foster, K. R., & Murray, A. W. Sucrose utilization in budding yeast as a model for the origin of undifferentiated multicellularity. *PLoS Biology*, 2011, 9(8).
9. See especially Aron, S., Passera, S. & L., *Les Sociétés animales: évolution de la coopération et organisation sociale*, De Boeck University, 2000, as well as Wilson, E. O., *The Social Conquest of Earth* (1st edition), Liveright, 2012.
10. Candau, J. (2012), *op. cit.*, and Henrich, J., & Henrich, N., *Why Humans Cooperate: A Cultural and Evolutionary Explanation*, Oxford University Press, 2007.
11. Darwin, *The Origin of Species*, Chapter 8, <http://darwin-online.org.uk/>.
12. *Ibid.*, Chapter 6, <http://darwin-online.org.uk/>.

13. Darwin, C., *The Descent of Man, op.cit.*, p. 82. <http://darwin-online.org.uk/>.
14. Sober, E., & Wilson, D. S., *Unto Others, op. cit.*, pp. 201–205.
15. Dugatkin, L. A., *Cooperation Among Animals*, Oxford University Press, 1997.
16. Hamilton, W. D. (1963). The evolution of altruistic behavior. *American Naturalist*, 97(896), 354–356. Hamilton, W. D. (1964). The genetical evolution of social behaviour. *Journal of Theoretical Biology*, 7(1), 1–16.
17. Wilson, E. O., *The Insect Societies*, Harvard University Press, 1971.
18. Clutton-Brock, T. H., O’Riain, M., Brotherton, P., Gaynor, D., Kinsky, R., Griffin, A., & Manser, M. Selfish sentinels in cooperative mammals. *Science*, 284(5420), 1999, p. 1640.
19. It has also been verified among alpheid shrimp, the naked mole-rat, certain wasps, bees, Coleoptera, and, based on recent discoveries, among certain Trematoda worms. The first of these confirmations came thirteen years after the publication of Hamilton’s first article, following research by Robert Trivers and Hope Hare: Trivers, R.L., & Hare, H. Haplodiploidy and the evolution of the social insects. *Science*, 191(4224), 1976, 249–263.
20. See the biography of George Price: Harman, O. S., *The Price of Altruism*, Norton, 2010.
21. Hamilton, W. D. (1970). Selfish and spiteful behaviour in an evolutionary model. *Nature*, 228, 1218–1219.
22. Price, G. R., & others. (1970). Selection and covariance. *Nature*, 227(5257), 520.
23. Hill, K. R. (2002). Altruistic cooperation during foraging by the Ache, and the evolved human predisposition to cooperate. *Human Nature*, 13(1), 105–128; Kelly, R. L., *The Foraging Spectrum: Diversity in Hunter-Gatherer Lifeways*, Smithsonian Institution Press, 1995.
24. Richerson, P. J., & Boyd, R., *Not by Genes Alone: How Culture Transformed Human Evolution*, University of Chicago Press, 2004. Wood, W., & Eagly, A. H. (2002). A cross-cultural analysis of the behavior of women and men: Implications for the origins of sex differences. *Psychological Bulletin*, 128(5), 699.
25. Trivers, R. L. (1971). The evolution of reciprocal altruism. *Quarterly Review of Biology*, 35–57; Axelrod, R., & Hamilton, W. D. (1981). The evolution of cooperation. *Science*, 211(4489), 1390; Boyd, R., & Richerson, P. J. (1988). An evolutionary model of social learning: The effects of spatial and temporal variation. *Social Learning: Psychological and Biological Perspectives*, 29–48.

26. Hill, K. R., Walker, R. S., Božičević, M., Eder, J., Headland, T., Hewlett, B., Hurtado, A. M., *et al.* (2011). Co-residence patterns in hunter-gatherer societies show unique human social structure. *Science*, 331(6022), 1286. The researchers notably studied the Inuit of Labrador, the Ache of Paraguay, the Australian Wanindiljaugwa, and several other communities.
27. Dawkins, R., *The Selfish Gene*, Oxford University Press, (2d ed.), 1990.
28. *Ibid.*, p. ix.
29. *Ibid.*, p. 3.
30. *Ibid.*, p. 139.
31. Warneken, F., & Tomasello, M. (2009). The roots of human altruism. *British Journal of Psychology*, 100, 455–471.
32. Goodall, J., & Berman, P. L. *Reason for Hope: A Spiritual Journey*, Grand Central Publishing, (1999), p. 121.
33. Waal, F. D. de, *The Age of Empathy*, p. 42.
34. McLean, B., & Elkind, P., *The Smartest Guys in the Room: The Amazing Rise and Scandalous Fall of Enron*, Penguin, 2003. Quoted in Waal, F. B. M. de (2009), p. 39. Clarke, T. (2005). Accounting for Enron: shareholder value and stakeholder interests. *Corporate Governance: An International Review*, 13(5), 598–612.
35. “The Very Human Heroes of Fukushima,” *The Guardian*, Thursday, March 24, 2011.
36. Wilson, E. O. (1971). *Op. cit.*
37. Wilson, E. O., *The Social Conquest of Earth*, Liveright, 2012.
38. Cavalli-Sforza, L. L., & Feldman, M. W. (1978). Darwinian selection and “altruism.” *Theoretical Population Biology*, 14(2), 268–280.
39. Nowak, M. A., & Highfield, R. (2011). *Op. cit.*, p. 106.
40. See the detailed “Supplementary Information,” doi: 10.1038/nature09205, available at www.nature.com/nature, which accompanies the main article by Nowak, M. A., Tarnita, C. E., & Wilson, E. O. (2010). The evolution of eusociality. *Nature*, 466(7310), 1057–1062. George Price’s covariance equation is also included in this new analysis, which explains it as a mathematical tautology.
41. Hunt, J. H., *The Evolution of Social Wasps*, Oxford University Press, 2007; Gadagkar, R., & Gadagkar, R., *The Social Biology of Ropalidia Marginata: Toward Understanding the Evolution of Eusociality*, Harvard University Press, 2001.
42. Johns, P. M., Howard, K. J., Breisch, N. L., Rivera, A., & Thorne, B. L. (2009). Nonrelatives inherit colony resources in a primitive termite. *Proceedings of the National Academy of Sciences*, 106(41),

- 17452–17456. The ethologist Elli Leadbeater has also demonstrated that *Polistes dominulus* wasps built new nests every spring, and often do so in small groups of females that are not all related. She observed that the females who take part in building the nests had more offspring than solitary wasps. Leadbeater, E., Carruthers, J. M., Green, J. P., Rosser, N. S., & Field, J. (2011). Nest inheritance is the missing source of direct fitness in a primitively eusocial insect. *Science*, 333(6044), 874–876.
43. See the recent books by these two authors, Wilson, E. O., *The Social Conquest of Earth*, Liveright, 2012, and Nowak, M., & Highfield, R., *SuperCooperators*, The Free Press, 2011 which contain all the pertinent scientific references.
 44. Nowak, M. A., Tarnita, C. E., & Wilson, E. O. (2010). *Op. cit.* For one of the reactions to this article, see Abbot, P., Abe, J., Alcock, J., Alizon, S., Alpedrinha, J. A. C., Andersson, M.,... Balshine, S. (2011). Inclusive fitness theory and eusociality. *Nature*, 471(7339), E1–E4. For the authors' reply, see Nowak, M. A., Tarnita, C. E., & Wilson, E. O. (2011). Nowak *et al.* reply, *Nature*, 471(7339), E9–E10.
 45. After the publication of the book by Williams, G. C., *Adaptation and Natural Selection*, Princeton University Press, 1966 which set forth an uncompromising criticism of group selection.
 46. These writers offer offer a fascinating general view of the question of altruism in evolution in their book: Sober, E., & Wilson, D. S., *Unto Others*.
 47. Hamilton, W. D. (1975), Innate social aptitudes of man: An approach from evolutionary genetics. *Biosocial Anthropology*, 133, 155.
 48. That does not require the group to remain in the same place. If a foreign explorer sits down at their table, he does not form part of their group. On the other hand, a member of the group can decide not to take part in the expedition and can remain at home in order to oversee the logistics of their trip from a distance.
 49. Bowles, S., & Gintis, H., *A Cooperative Species: Human Reciprocity and Its Evolution*, Princeton University Press, 2011.
 50. We should remember, as we read what follows, that to evolution specialists the word “altruism” designates “behavior that is beneficial to others.” It is only when these authors use the expression “psychological altruism” that they refer to the sense of the word “altruism” as Daniel Batson and the present author mean it in these pages.
 51. Nowak, M. A., & Highfield, R. (2011). *Op. cit.*, pp. 262–263.