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Parasite-mediated selection promotes small body size in yellow dung flies

Rodrigo Medel

Laboratory of Evolutionary Ecology, Faculty of Science, University of Chile, Santiago, Chile
rmedel@uchile.cl
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A recommendation of

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Body size has long been considered as one of the most important organismic traits influencing demographical processes, population size, and evolution of life history strategies [1, 2]. While many studies have reported a selective advantage of large body size, the forces that determine small-sized organisms are less known, and reports of negative selection coefficients on body size are almost absent at present. This lack of knowledge is unfortunate as climate change and energy demands in stressful environments, among other factors, may produce new selection scenarios and unexpected selection surfaces [3].

In this manuscript, Blanckenhorn [4] reports on a potential explanation for the surprising 10% body size decrease observed in a Swiss population of yellow dung flies during 1993 - 2009. The author took advantage of a fungus outbreak in 2002 to assess the putative role of the fungus *Entomopthora scatophagae*, a specific parasite of adult yellow dung flies, as selective force acting upon host body size. His findings indicate that, as expected by sexual selection theory, large males experience a mating advantage. However, this positive sexual selection is opposed by a strong negative selection on male and female body size through the viability fitness component. This study provides the first evidence of parasite-mediated disadvantage of large adult body size in the field. While further experimental work is needed to elucidate the exact causes of body size reduction in the population, the author proposes a variation of the trade-off hypothesis

raised by Rantala & Roff [5] that large-sized individuals face an immunity cost due to their high absolute energy demands in stressful environments.

Reference

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[2] Schmidt-Nielsen K. 1984. Scaling: why is animal size so important? Cambridge University Press, Cambridge.

[3] Ohlberger J. 2013. Climate warming and ectotherm body size: from individual physiology to community ecology. Functional Ecology 27: 991-1001. doi: 10.1111/1365-2435.12098

[4] Blanckenhorn WU. 2017. Selection on morphological traits and fluctuating asymmetry by a fungal parasite in the yellow dung fly. bioRxiv 136325, ver. 3 of 20th June 2017. doi: 10.1101/136325

[5] Rantala MJ & Roff DA. 2005. An analysis of trade-offs in immune function, body size and development time in the Mediterranean field cricket, *Gryllus bimaculatus*. Functional Ecology 19: 323-330. doi: 10.1111/j.1365-2435.2005.00979.x

Appendix

Reviews by Rodrigo Medel and an anonymous reviewer: http://dx.doi.org/10.24072/pci.evolbiol.100027