Dear Nature Editorial Board,

Please find attached the manuscript "Darwin's Dream: Unifying ecological and evolutionary change", which I hope you will consider for publication as an article in Nature.

The most important and enduring advances in scientific theory reveal broad and universal principles about the natural world. These theoretical advances can often be expressed in simple, elegant equations that serve as a foundation for further scientific enquiry. Examples include Newton's second law of motion, Maxwell's equations, the Schrödinger equation, and the Price equation. The Price equation is the fundamental equation that completely describes evolutionary change in any evolving system. Its discovery by George Price was first published in Nature in 1970.

Historically, evolutionary theory has been developed largely separate from ecological theory, despite widespread recognition of the inseparability of ecological and evolutionary phenomena stretching all the way back to Darwin. Recent efforts have been made to synthesise eco-evolutionary theory through modelling, but a true foundation of eco-evolutionary change has been missing. **Here, as part of the joint FRB- and sDiv-funded UNICOP project, we fill this gap with a fundamental equation of eco-evolutionary change, which defines change for any possible evolving population and from which the fundamental equations of both ecology and evolution can be derived.**

We expect that our unifying equation will serve as a starting point for a richer synthesis of ecology and evolutionary biology, including a synthesis between social evolution and density-dependent population change. It also demonstrates fundamental links between eco-evolutionary change and ecosystem function, and derives the relationship between population growth and evolutionary fitness from first principles.

We recommend the following individuals as potential referees:

Prof David Quller

Dept. of Biology

Washington University

Email: queller@wustl.edu

Prof Steven Frank.

Dept. Ecology and Evolutionary Biology

University of California.

Email: safrank@uci.edu

Prof Andy Gardner.

School of Biology

University of St Andrews.

Email: andy.gardner@st-andrews.ac.uk

This manuscript includes an abstract of 167 words and main text of 5186 words (including boxes, acknowledgements, and references). It includes 2 boxes, 0 figures, 0 tables, and 62 references. We certify that this manuscript is original work and not under review at any other journal or book; a pre-print version of this manuscript is available on arXiv ( https://arxiv.org/abs/2409.10766 ).

Sincerely,

A. Bradley Duthie University of Stirling, Stirling, UK

Victor J Luque University of Valencia, Valencia, Spain