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**One Sentence Summary:**

**Abstract:**

**Main Text:**

**References and Notes** (followed by a numbered list)

**Acknowledgements:**

**Fig. #:** (Begin each figure caption with a label, “**Fig. 1**.” for example, as a new paragraph.).

**Table #:** (Begin each table caption with a label “**Table 1.”**, etc.) as a new paragraph.

**Supplementary Materials:** a list of the supplementary materials, followed by the actual text of the Supplementary Materials.

Several of these headings are optional, for example, not all papers will include a one-sentence summary, figures or tables, or supplementary material.

Please use the .docx format if possible (all version after Word 2007).

More specific formatting instructions are provided in the actual template, which follows.

Selection and Genetic Drift Drive Emergent Diversity in a Simulated Prochlorococcus Metacommunity

**Authors:** Ben A. Ward1\*, Sinéad Collins2, Boris Sauterey3, C. Robert Young4

**Affiliations:**

1Ocean and Earth Science, University of Southampton, Waterfront Campus, Southampton, UK.

2Institute of Evolutionary Biology, School of Biological Sciences, University of Edinburgh, Edinburgh, UK.

3Ecole Normale Supérieure, PSL Research University, Institut de Biologie de l’Ecole Normale Supérieure (IBENS), 46 rue d’Ulm, F-75005 Paris, France.

4National Oceanography Centre, Southampton, UK.

\*Correspondence to: b.a.ward@soton.ac.uk

**Abstract**: The abstract should be about 100-150 words, and organized in this structure: An opening sentence that sets the question that you address and is comprehensible to the general reader, background content specific to this study, results, and a concluding sentence. It should be one paragraph only.

**One Sentence Summary:** A brief summary of the main result of your paper, without excessive jargon and less than 150 characters.

**Main Text:** In general, this should include a brief (1-2 paragraph) introduction, followed by a statement of the specific scope of the study, followed by results and then interpretations. Please avoid statements of future work or claims of priority, and avoid repeating the conclusions at the end. All of the Figures and Tables should be cited in order, including those in the supporting online material (which should be cited as, for example, figure S1, and table S1). You can include page breaks if you would like to place the figures within the text.

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| **Figure 1:** |

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| Figure 2: |

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| Figure 3: |

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| Figure 4: |

**Subheads**. These can be included in Research Articles or Reviews and should be brief.

References should be cited in parentheses with an italic number (*1*). Multiple reference citations are separated by commas (2, 3) or if a series, dashes (4-6). References are cited in order by where they first are called out, through the text, then the notes, captions, then through the supplementary material.

Equations can be included. We do not recommend using the native Word 2007, 2008, 2010 or 2011 equation editor. This can in some cases produce less reliable MathML, the online markup language we use, which may result in display errors. Instead, use the legacy equation editor in word (Insert menu; select insert object; select word equation) or use Mathtype (recommended). If you enter equations in simple LaTeX, check that they will convert accurately (Word 2007 and higher can convert simple LaTeX equations).

References and Notes:

1. There is only one reference list spanning the text, figure captions and supplementary materials. Do not include a second reference list in the supplementary materials section. Reference only cited in the supplementary materials section are not counted toward length guidelines.
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**Acknowledgments:** The acknowledgments should include a statement about where the data reported in the paper are presented, archived, or available (for example, in the Supplementary Materials or in a community archive). If in an archive, include the accession number or a placeholder for it. Please also include relevant funding information such as grant numbers and funding agencies. You can also include a statement of author contributions here or in the Supplementary Materials.

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**Fig. 1**. The figure caption should begin with an overall descriptive statement of the figure followed by additional text. They should be immediately after each figure. Figure parts are indicated with capital letters (**A**). If you prefer, you can place both the actual figures and captions logically through the text near where they are cited rather than at the end of the file (but not both). If a paragraph in the main text begins with the name of a figure, write out “Figure” in full (e.g., <para>“Figure 1 shows….”)

**Fig. 2.** You can place graphics above each equation as part of this file.

**Table 1.** Start this caption with a short description of your table. Format tables using the Word Table commands and structures. Do not create tables using spaces or tabs characters.

Supplementary Materials:

**Methods**

The model tracks the abundance of distinct *Prochlorococcus* types within a spatial grid of locations spanning the surface of the global ocean (Figure S1).

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| **Figure S1:** Mean December *Prochlorococcus* abundance from [Ref for ECCO-Darwin?]. Monthly abundances interpolated to daily resolution were used to define the carrying capacity, . Boundaries of the model grid are shown with black lines. |

The 77 *Prochlorococcus* types are assigned a range of thermal optimum, linearly distributed between -2 and 36°C (Figure S2). The relative fitness, , of each type is defined as a function of the local temperature, .

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|  |  | S1 |

such that when . The width of the thermal tolerance curves is set uniformly to .

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| **Figure S2:** Thermal tolerance curves of the 77 modelled Prochlorococcus phenotypes, as defined by Equation S1. The thermal tolerance curve of the 35th phenotype () is highlighted in black. |

The abundance of all phenotypes in all locations is represented in the population matrix, (Figure S3a,b). At each timestep, each population is assumed to reproduce clonally, with a small fraction of reproduction being diverted to populations with slightly higher and lower thermal optima. This is achieved by applying the tridiagonal 'mutational growth matrix', , which diverts a small fraction of cells in each population to adjoining populations in the trait space (Figure S3c).

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|  |  | S2 |

Populations are also transported in physical space by the ocean circulation. This is achieved by applying a oceanic 'transport matrix' that describes the volume transport attributable to advection, diffusion and parameterised sub-grid-scale processes of the GCM (Khatiwala et al. 2005). Equation S2 can therefore be updated to include physical transport, with the form

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|  |  | S3 |

Both the mutational matrix () and the transport matrix () are conservative, such that the total number of cells remains unchanged from to .

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| **Figure S3:** | |

We assume that each grid box supports a predefined carrying capacity of  *Prochlorococcus* individuals (Figure S1). We can therefore define the local phenotypic frequency, , as the relative fraction of each phenotype in each location.

The number of individuals surviving in each new generation is drawn randomly from the local population community, with probability a function of the local phenotype frequency, , and the selection coefficient, .

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Under these assumptions, the expected population size in each generation is given by the multinomial distribution,

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For large , equation 3 is reasonably approximated by the normal distribution.

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where and .

Each of the 77 phenotypes is defined by a unique temperature optimum, as indicated in Figure S1.

The local carrying capacity of *Prochlorococcus* is defined from the output of a global ecosystem model, and at each generation (1 day),

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Figures S1-S#

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| **Figure S?:** |

Tables S1-S#

Movies S1-S#

Audio Files S1-S#

External Databases S1-S#

References (*##-##*)

Supplementary Materials:

This section includes the actual text of the Supplementary Materials, which can include any or all of the preceding items, and figure captions and tables that can easily be incorporated into one supplementary material file. Please edit the list above as appropriate and include it at the end of your main paper. If there are additional files that cannot be easily accommodates (e.g., movies or large tables), please include captions here.

**Materials and Methods:** Can include the Materials and Methods here. Additional references should be cited here and included in the main reference list.

**Any Additional Author notes:** For example, author contributions or a list of group authors.