

Checklists for refereeing a paper in mathematical biology

Technical Considerations

A well-written paper will have all of the following attributes:

1. A sufficient description of the biological background.
2. A thorough literature review. (placing work in context, correct citations)
3. A clear and well-justified description of:
 - (a) the assumptions made in developing the mathematical model
 - (b) the derivation of the mathematical model
 - (c) how the mathematical model relates to the biology
 - (d) the analytical tools used
 - (e) any simplifying assumptions introduced to make the analysis tractable
4. Any mathematical analysis is correct.
5. Any numerical methods used are clearly described and explained, including a discussion of the accuracy and stability of the methods.
6. A clear description of the provenance of, and a justification of, all parameter values quoted.
7. A clear description of the results presented together with a discussion of why these particular results are of biological interest.
8. A clear explanation of the effects of any "control" parameters from both a mathematical and a biological perspective.
9. A full discussion of the mathematical and biological importance of the work and its contribution to the field.

General Considerations

You should also ask yourself the following more general questions in making your decision about whether the paper is publishable, and in giving feedback to the authors in an attempt to improve the paper. You may need to take advice from colleagues on some aspects of the following:

1. Is the work original?
2. Is the work described in an engaging manner?
3. Are any aspects of the paper unclear/poorly explained?
4. Is the work of sufficient biological and/or mathematical merit to warrant publication? (may be old mathematics, but a new application to biology for example.)
5. Could the work be reproduced by a qualified researcher from the information given in the paper (perhaps in tandem with previous publications by the same authors)?
6. Is the paper suitable for this particular journal/audience?

Taken from notes prepared by David Gavaghan, Computing Laboratory, University of Oxford. <http://web.comlab.ox.ac.uk/oucl/people/david.gavaghan.html>