Reviews in Quantitative Biology

Introduction: reading, writing and reviewing scholarship

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6 November 2026

Today’s programme

- 09:15 — Introduction
- 10:15 — Crispr-i screens and reproducible human biology
  - Adriaan van der Graaf (EPFL)
- 11:15 — The co-evolution of foundation models and biological databases
  - Ana Claudia Sima (SIB)
- 12:10 — Lunch and group discussion
- 13:15 — How to write a review
- 14:15 — Plain English, peer review and EasyChair
- 15:15 — Editing and responding to reviewers

Where are you starting from?

- Show of hands: have you…
  - Read a scientific review?
  - Written a literature review?
  - Peer-reviewed someone else's manuscript?
  - Published a review?

Learn by completing the scholarly cycle

- **Read**: understand a field and question its claims
- **Write**: turn the literature into an argument
- **Review**: evaluate someone else's argument
- **Revise**: strengthen your work in response

Why review the literature?

- Discover and learn new topics
- Identify relevant research questions
- Build upon existing work

Why write a review?

- Introduce proposals, research plans, theses, papers…
- Improve your writing skills
- Improve your science communication skills
- Think/understand through writing

Why peer review?

- Be a good citizen
- Stay at the forefront of research
- Sharpen your critical thinking skills
- Impress the editor

Tutorial assignment: key dates

- Today (6 Nov): choose topics and form teams
- 9–22 Nov: write the review
  - Submit by 22 Nov, 23:59, through EasyChair
- 23–25 Nov: indicate peer-review preferences
- 26 Nov–6 Dec: peer-review another manuscript
  - Submit by 6 Dec, 23:59, through EasyChair
- 7–15 Dec: revise in response to the reviews

What is a review for?

- For readers: make a complex field intelligible
  - What is known, disputed and still missing?
- For authors: think critically through writing
  - Identify better questions and sharpen your judgement
- For the field: change what researchers know, believe or do

A review is not one fixed format

- Different reviews make different intellectual contributions
- Some assess what conclusions can reliably be drawn from existing research
- Some explain how ideas or methods fit together
- Some interpret the past or advocate a future direction
- Think about what the purpose of your review should be

Choose a format on two dimensions

- How is the evidence selected?
  - Explicit, reproducible protocol: systematic or scoping review
  - Selective, justified curation: narrative review or essay
- What is the article trying to achieve?
  - Map evidence; explain concepts; interpret results; argue for change
- These dimensions can be combined; labels vary by journal

Evidence-focused review formats

- **Systematic review**: answer a narrowly defined question
  - Reproducible search and selection; assess study quality or bias
- **Scoping review**: map the breadth of a research area
  - Identify topics, evidence types, concepts and gaps
- **Meta-analysis**: quantitatively combine compatible estimates
  - An analytical method, often part of a systematic review

Explanatory review formats

- **Narrative review**: help readers understand a field
  - Select important studies and organise the emerging story
- **Critical review**: resolve tensions and evaluate claims
  - Compare evidence, assumptions, limitations and contradictions
- **Technical review, tutorial or primer**: teach a usable framework
  - Explain methods, trade-offs and when to use what

Argument-led review formats

- **Perspective**: offer a new interpretation or conceptual lens
  - “Here is a new way to look at the problem”
  - Example: *data provenance may matter more than model scale*
- **Essay**: develop a reflective intellectual argument
  - “Here is an idea worth thinking deeply about”
  - Example: *why prediction is not the same as explanation*
- **Opinion or comment**: advocate a timely position
  - “Here is what I think the field should do, and why”
  - Example: *benchmarks must disclose data leakage*
- A viewpoint still needs evidence and counterarguments

Historical accounts and roadmaps

- **Historical account**: explain how the field got here
  - Turning points, forgotten alternatives, changing assumptions
  - More than a chronological list: offer an interpretation
- **Roadmap or forward look**: argue where the field should go
  - Bottlenecks, priorities, dependencies, testable next steps
- Both require documented, defensible reasoning

For instance

- Protein language models: six different articles
  - **Systematic**: are variant-effect predictions accurate?
  - **Scoping**: which tasks and datasets have been evaluated?
  - **Technical**: how do leakage and calibration affect benchmarks?
  - **Historical**: from sequence profiles to language models
  - **Perspective**: why data provenance may matter more than scale
  - **Opinion**: a leaderboard is not biological truth

Worthy reviews constitute original scholarship

- **New knowledge:** derive previously unrecognised conclusions from existing evidence
- **New synthesis**: connect previously separate findings
- **New conceptual model**: organise observations in a new framework
- **New evaluation**: expose bias, assumptions or contradictions
- **New research agenda**: identify and prioritise testable directions
- All these constitute potential original intellectual contributions!

One approach to review conceptualisation

- **List**: what has been published?
- **Compare**: where do studies agree and disagree?
- **Explain**: why do the findings diverge?
- **Reframe**: which new distinction or model makes sense of them?
- **Direct**: what should the field test or change next?

What is your point?

Three routes to an original angle

- Find a contradiction
  - Why do credible studies reach different conclusions?
- Reveal a hidden connection
  - Which ideas from different fields illuminate one another?
- Identify a consequence
  - What would change if your interpretation were correct?

Some success stories

Review | Open access | Published: 20 November 2019

Structural variant calling: the long and the short of it

Medhat Mahmoud, Nastassia Gobet, Diana Ivette Cruz-Dávalos, Ninon Mounier, Christophe Dessimoz & Fritz J. Sedlazeck

Genome Biology **20**, Article number: 246 (2019) | Cite this article

86k Accesses | **97** Altmetric | Metrics

Cited by 961 (google scholar, Nov 26)

HGG Advances

REVIEW

From pharmacogenetics to pharmaco-omics: Milestones and future directions

Chiara Auwerx,[1,2,3,4,5] Marie C. Sadler,[2,3,4,5] Alexandre Reymond,[1,*] and Zoltán Kutalik[2,3,4,*]

Cited by 101 (google scholar, Nov 26)

Review | Open access | Published: 14 October 2024

When less is more: sketching with minimizers in genomics

Malick Ndiaye, Silvia Prieto-Baños, Lucy M. Fitzgerald, Ali Yazdizadeh Kharrazi, Sergey Oreshkov, Christophe Dessimoz, Fritz J. Sedlazeck, Natasha Glover & Sina Majidian

Genome Biology **25**, Article number: 270 (2024) | Cite this article

2370 Accesses | **23** Altmetric | Metrics

Cited by 32 (google scholar, Nov 26)

Journal of Molecular Evolution (2025) 93:740–764
https://doi.org/10.1007/s00239-025-10277-1

Cited by 11 (google scholar, Nov 26)

REVIEW

Check for updates

Reconstructing Evolutionary Histories with Hierarchical Orthologous Groups

Garance Sarton-Lohéac[1] · Nikolai Romashchenko[2,3] · Clément Marie Train[2] · Sina Majidian[4] · Natasha Glover[3,2]

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How to use AI

- Principles:
  - AI assistance is generally acceptable (but check specific the course and journal rules)
  - Use AI without outsourcing the intellectual work
    - Be specific in your prompts: provide context, audience and desired feedback
  - Take full responsibility of what you produce
    - Never include claims you do not understand or stand behind. (be careful with ”Claude says…”)
    - Verify facts, references and scientific interpretations against original sources
  - Beware of the value of originality (and perception)
    - Be transparent about substantive AI assistance
    - Keep in mind that everyone else can use AI as well. What is the added value of your work?
    - Preserve your own voice and intellectual contribution

What may be the uses of AI?

- As a writing assistant
  - Provide a detailed outline and ask AI to generate prose
  - Carefully verify, revise and take ownership of the result
- As an editor
  - Write your own draft, then ask AI to improve clarity, conciseness and flow
  - Compare individual sentences and learn from the suggestions
- As a writing coach
  - Ask AI to identify weak arguments, unclear passages or missing transitions
  - Ask for explanations rather than automatic rewrites

Take-home points

- Make a point.
- Choose a format that serves the question
- Contribute a synthesis, interpretation or argument
- Support it with traceable, critically assessed evidence