GenAI Learning Lab – Topic 2:
Exploring Microsoft Copilot

How to Use it Securely, and Effectively!

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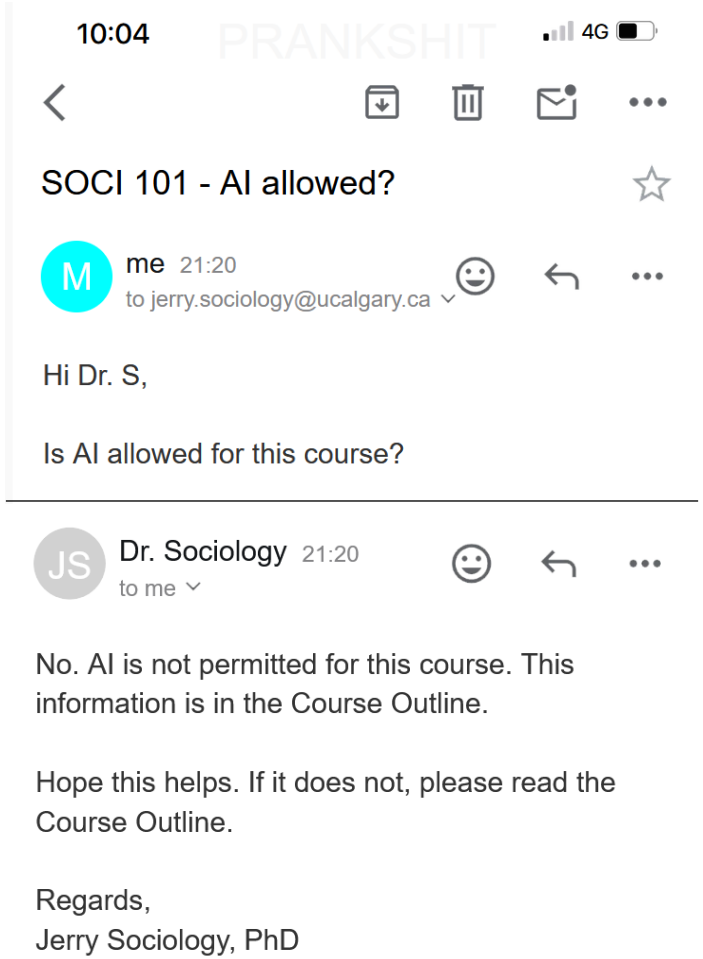
Before Using GenAI:

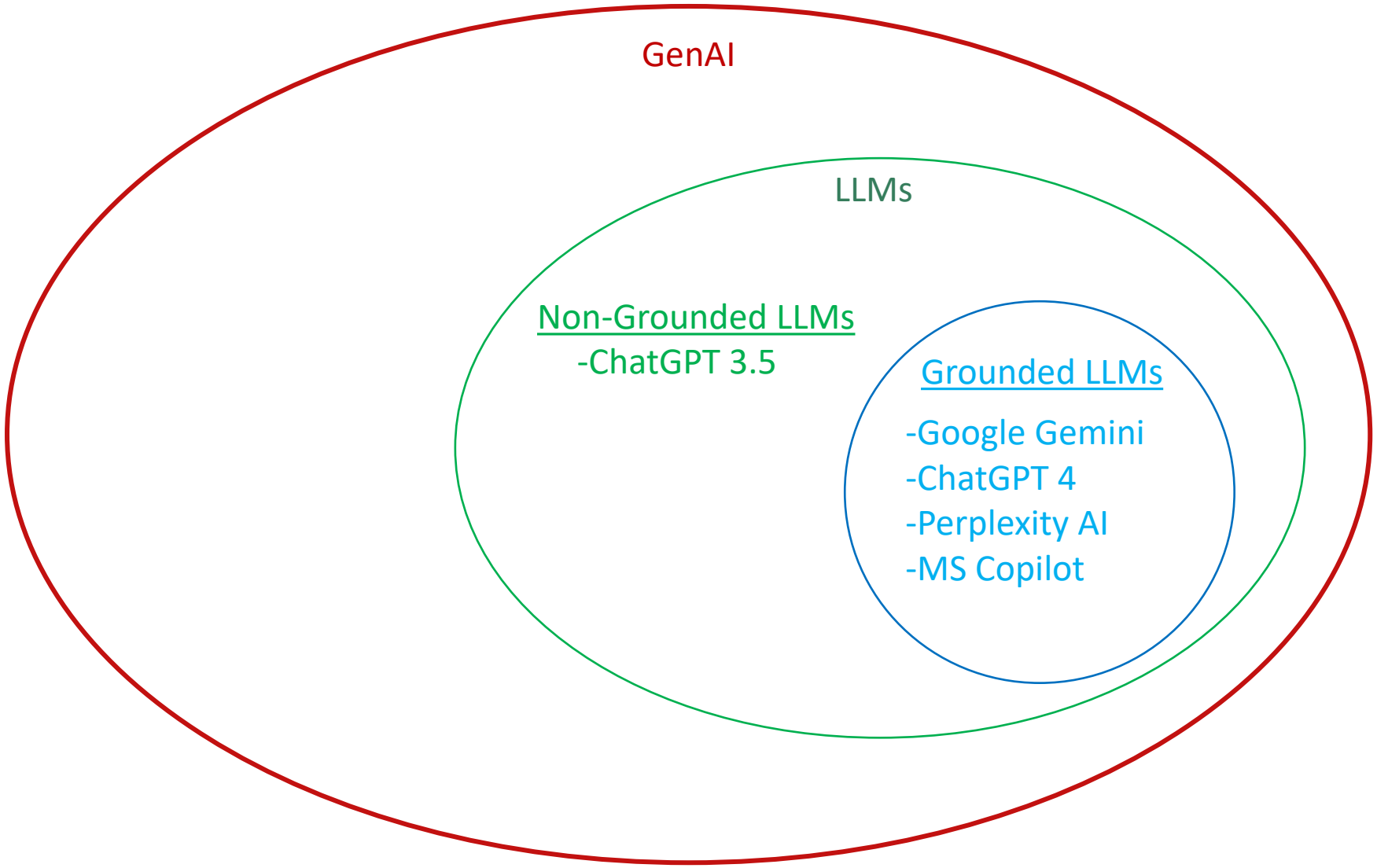


- Ensure use of AI is permitted for your course!
- Not sure where to find this info?
  - →Consult the Course Outline/Syllabus
  - →Ask your professor

Exploring Microsoft Copilot

- 1) How to Use it **Securely**
- 2) How to Use it **Effectively**
- 3) Considerations Going Forward

What is Copilot?



Non-Grounded LLMs

-Rely on PARAMETRIC memory (e.g. only the dataset it was trained on)
→prone to "hallucination"

⚠
Limitations

Limited knowledge of world and events after 2021

Grounded LLMs

-Retrieve EXTERNAL memory (e.g. from online databases)
→less prone to "hallucination"

What is Copilot?

Grounded LLMs

-Google Gemini
-ChatGPT 4
-Perplexity AI
-MS Copilot

Grounded LLMs

-Retrieve EXTERNAL memory
(e.g. databases online)
→less prone to “hallucination”

BUT, even with access to the internet, they still often hallucinate, especially:

→ If there are GAPS in the literature you’re asking it about
→ In LONGER exchanges (can lose track of context)

SO… always remain *VIGILANT* and *CRITICAL* when using GenAI ☺

Exploring Microsoft Copilot

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Using Copilot Securely

Understanding Information Security at UCalgary

UCalgary classifies information into four security levels to ensure proper protection

1
Level 1 (public)

Safe to share with anyone (e.g. website content).

PUBLIC version

2
Level 2 (internal)

For UCalgary use only, but not highly sensitive (e.g. internal de-identified reports).

e.g. unpublished research data

3
Level 3 (confidential)

Restricted to specific groups, unauthorized access could cause harm (e.g. personal information of students, faculty or staff).

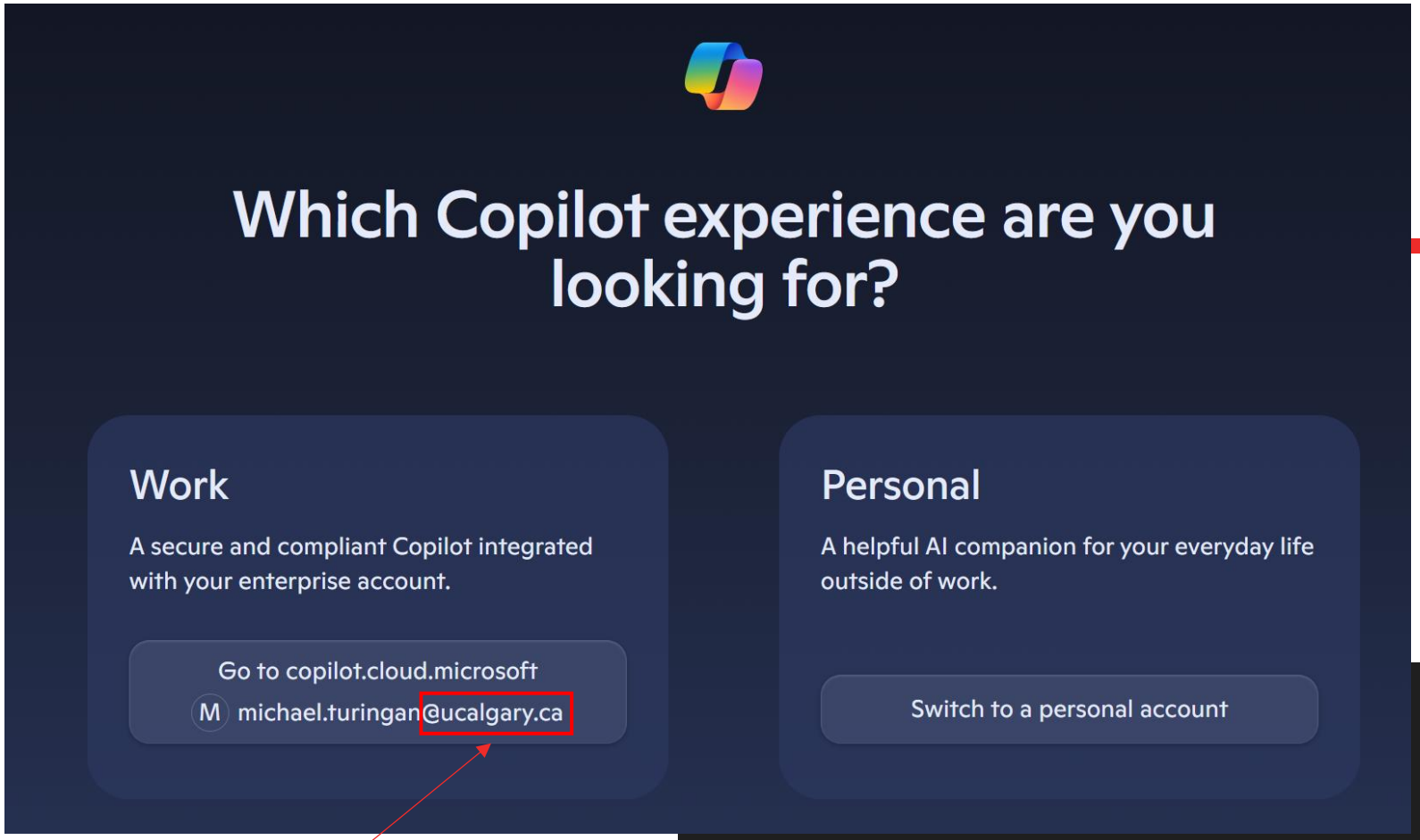
e.g. admissions applications (med school applications, etc.)

4
Level 4 (restricted)

Highly sensitive information requiring strict security measures (e.g. credit card or personal health information).

SECURE version

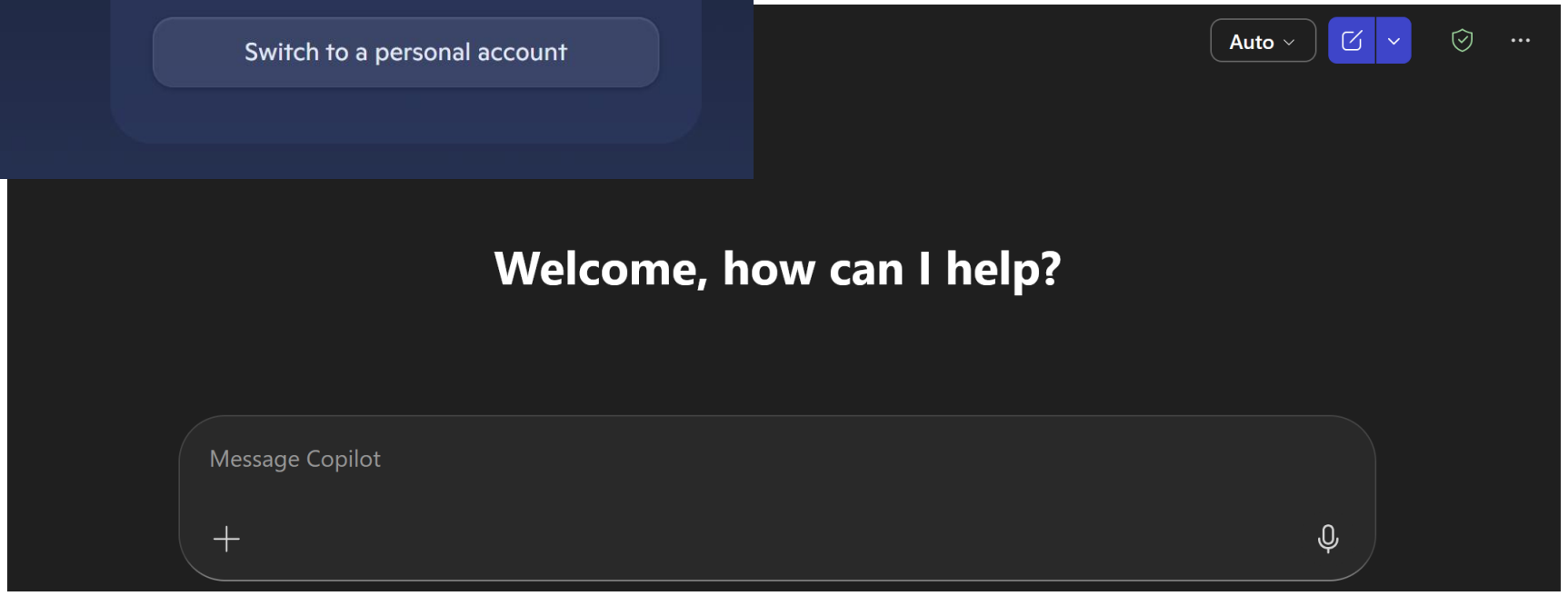
https://it.ucalgary.ca/it-security/microsoft-copilot-chat#classification

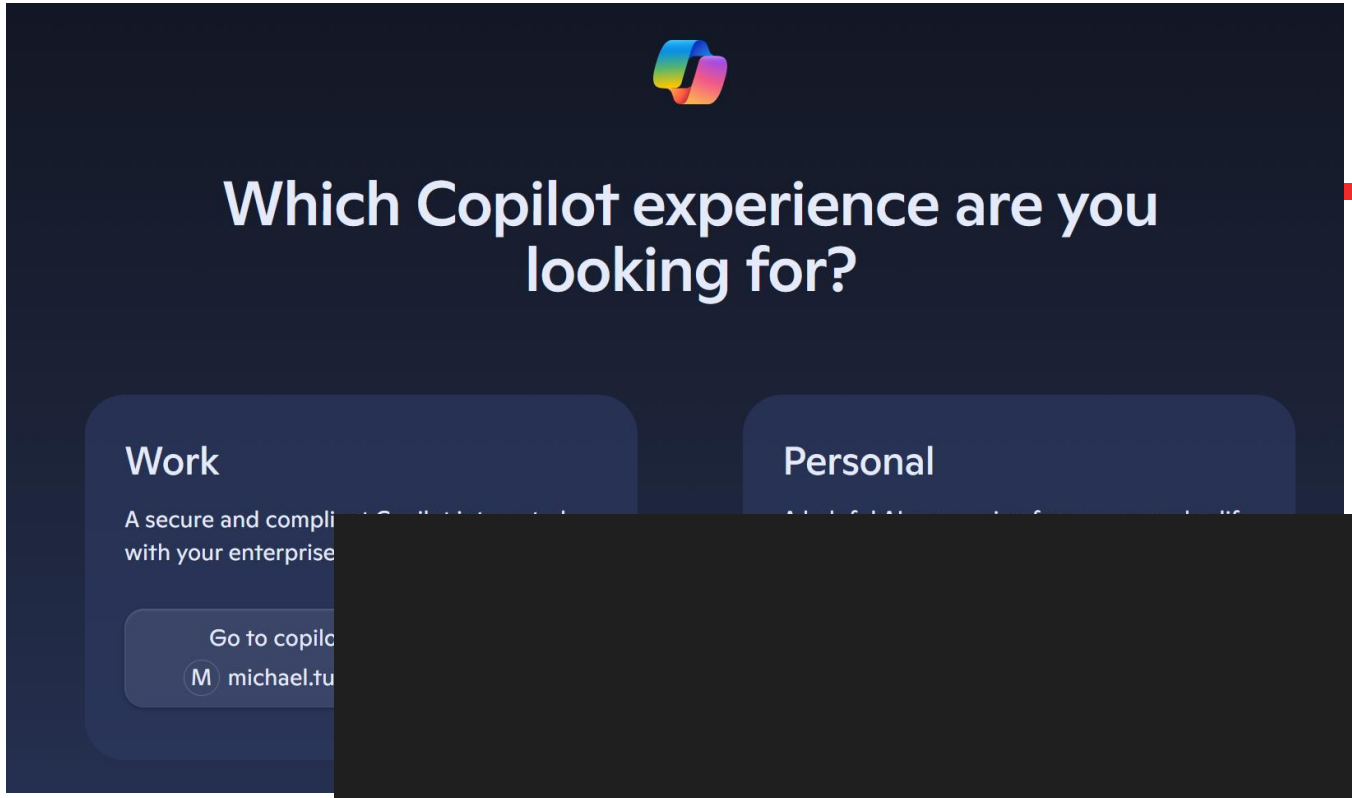


https://it.ucalgary.ca/it-security/microsoft-copilot-chat

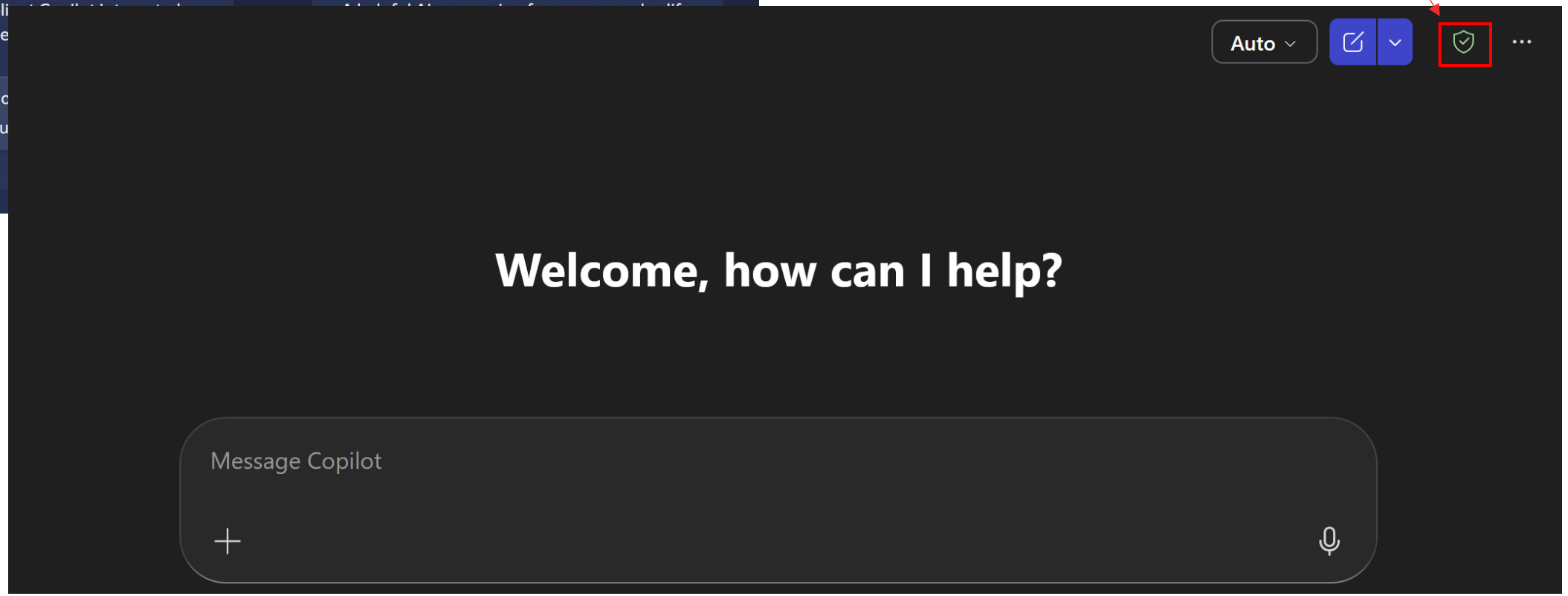
Use this link to log in

Log in using your UC Credentials





This means you are using the secure version of Copilot (URL will read “copilot.**cloud**.microsoft)”



Exploring Microsoft Copilot

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Exploring Microsoft Copilot

2) How to Use it **Effectively**

- Example 1: Generating Flashcards
- Example 2: Literature Overview using “Deep Research” Mode

Exploring Microsoft Copilot

2) How to Use it **Effectively**

- Example 1: Generating Flashcards
- Example 2: Literature Overview using “Deep Research” Mode

How to Use Copilot Effectively?

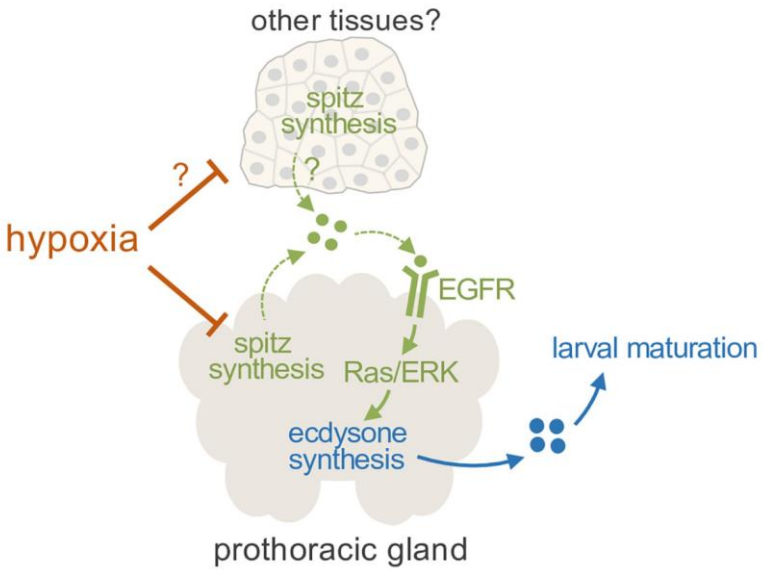
PLOS GENETICS

RESEARCH ARTICLE

Hypoxia delays steroid-induced developmental maturation in *Drosophila* by suppressing EGF signaling

Michael J. Turingan, Tan Li, Jenna Wright, Abhishek Sharma, Kate Ding, Shahoon Khan, Byoungchun Lee, Savraj S. Grewal*

Clark H Smith Brain Tumour Centre, Arnie Charbonneau Cancer Institute, Alberta Children's Hospital Research Institute, and Department of Biochemistry and Molecular Biology Calgary, University of Calgary, Alberta, Canada



journal.pgen.10...

Create a flashcard deck about the attached journal article. Format the output as comma-separated values (CSV) with the format: Question,Answer. Do not include any other text in the response

Copilot

Coding and executing

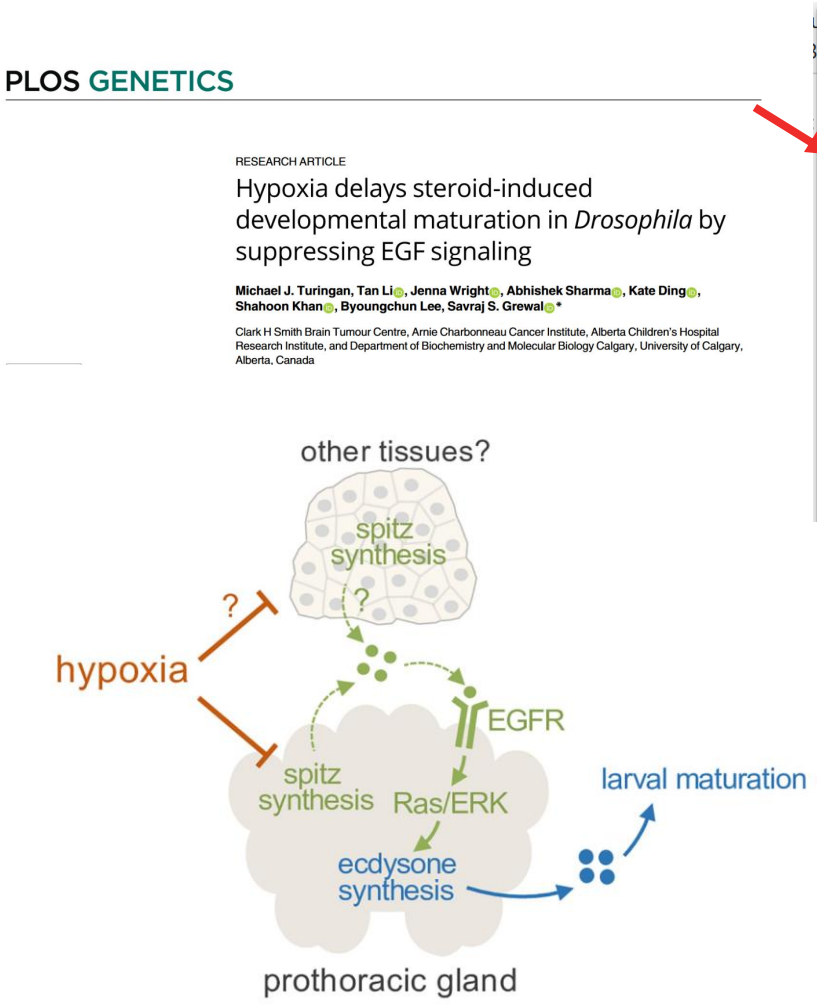
Your downloadable CSV is ready!

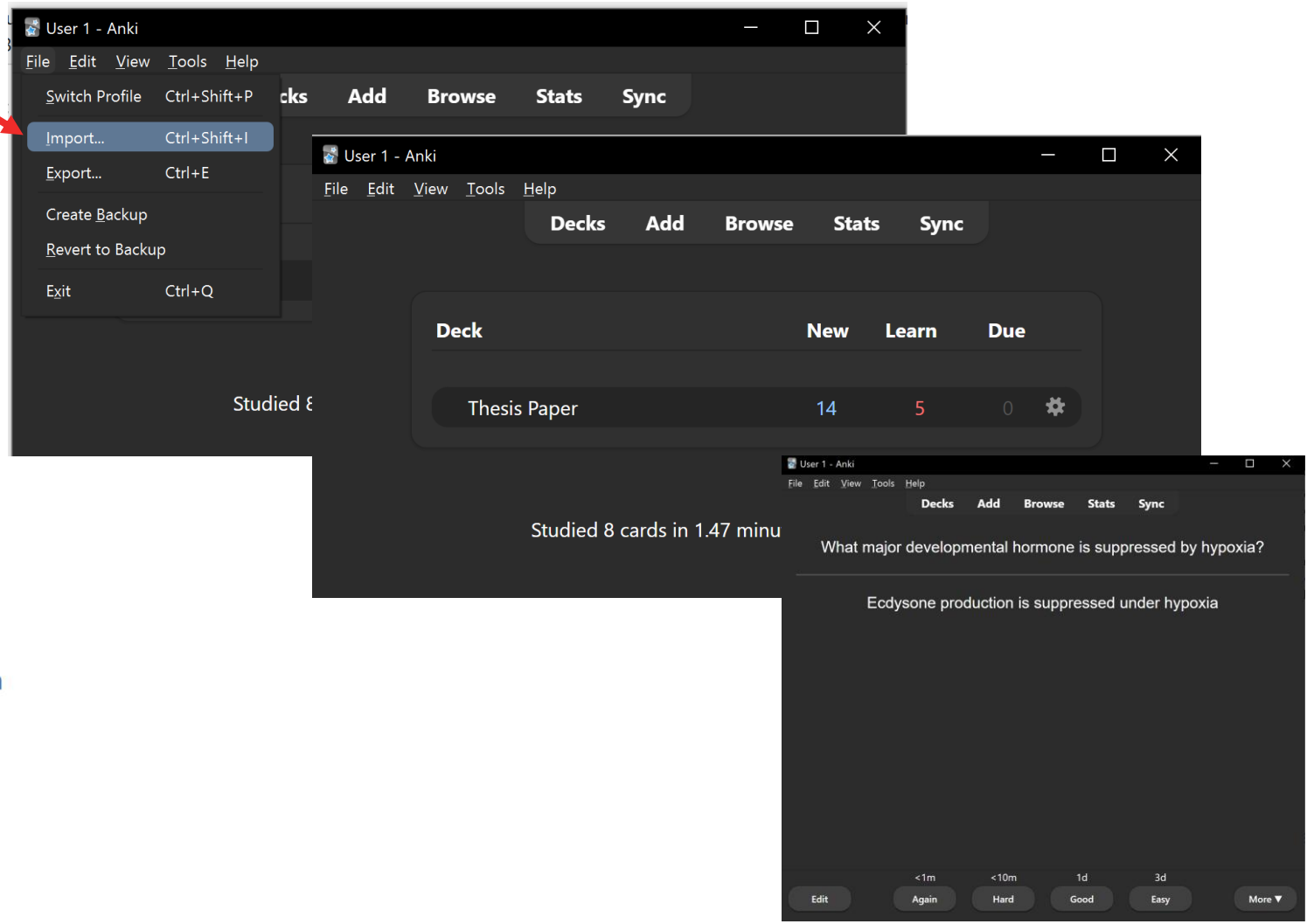
Click below to download:

flashcards.csv

If you'd like it reformatted, expanded, or turned into Anki-compatible files, just let me know!

How to Use Copilot Effectively?





Exploring Microsoft Copilot

2) How to Use it **Effectively**

- Example 1: Generating Flashcards
- Example 2: Literature Overview using “Deep Research” Mode

How to Use Copilot Effectively?

Assignment 1 (30%) :

Write a Literature Review on The Use of *Drosophila* (fruit flies) as a model system to study hypoxia (low oxygen).

Ensure your review offers a unique perspective of the topic.

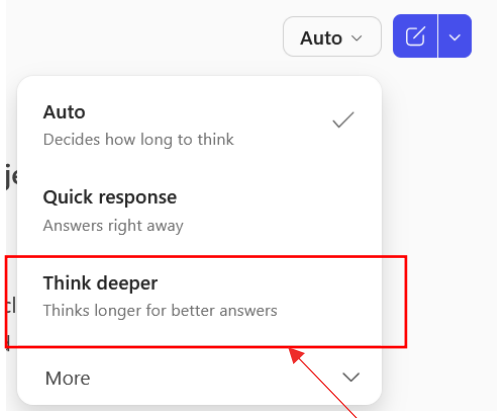
How to Use Copilot Effectively?

Using Deep Research Mode, Give me an overview of the review articles covering the use of Drosophila to study the effects of hypoxia

Copilot

Reasoned for 1s

Compiling a thorough overview



I) Most relevant review (and review-style) papers

> *Notes:* I prioritize works that either (a) are explicitly labeled as reviews or (b) are highly cited research articles with substantial, field-defining **review-style introductions/discussions** that synthesize prior literature.

1. **Quadros-Mennella, Lucin & White (2024), Frontiers in Cellular Neuroscience** — *What can the common fruit fly teach us about stroke? Lessons learned from the hypoxic-tolerant Drosophila melanogaster* (open access). A contemporary, translationally-oriented review emphasizing CNS hypoxia tolerance, metabolic suppression, and pathway crosstalk (HIF, Notch, NF-κB/Relish, Wnt, Hippo). openai
2. **Zhou, Visk & Haddad (2009), Pediatric Research** — *Drosophila, a Golden Bug, for the Dissection of the Genetic Basis of Tolerance and Susceptibility to Hypoxia* (classic review). Establishes *Drosophila* as a premier genetic system for hypoxia, summarizing forward genetics, overexpression screens, and early experimental evolution, with emphasis on **Notch** as a conserved hypoxia-tolerance pathway. nature +1
3. **Harrison & Haddad (2011), Annual Review of Physiology** — *Effects of Oxygen on Growth and Size: Synthesis of Molecular, Organismal, and Evolutionary Studies with Drosophila melanogaster* (scholarly review). Integrates molecular through evolutionary lenses on how oxygen affects growth, body size, feeding, protein synthesis, and molting; highlights HIF and guanylyl cyclase signaling in moderate hypoxia. annualreviews
4. **Harrison, Greenlee & Verberk (2018), Annual Review of Entomology** — *Functional Hypoxia in Insects: Definition, Assessment, and Consequences for Physiology, Ecology, and Evolution* (broad insect review; heavy *Drosophila* relevance). Defines "functional hypoxia," compares metabolomic vs transcriptional approaches, and synthesizes stage-specific sensitivity, tracheal plasticity, and life-history trade-offs. nsf +1
5. **Stobdan et al. (2024), International Journal of Molecular Sciences** — *The Pupa Stage Is the Most*

Associated themes distilled across the reviews

Conserved oxygen-sensing & stress pathways (HIF and beyond)

- HIF-1α/sima remains central, but reviews emphasize **Notch**, **NF-κB/Relish**, **insulin/TOR**, and increasingly **Wnt** and **Hippo** in coordinating tolerance and recovery. These nodes are conserved, making fly findings translationally relevant to mammalian ischemia and systemic hypoxia. openai +1

Metabolic suppression as a survival signature

- Hypoxia-tolerant flies exhibit global down-shifts in metabolic gene expression; **hairy** acts as a transcriptional switch to reduce glycolytic and anabolic load, aligning with organism-wide energy conservation during low O_2. plos

Experimental evolution validates mechanism

- Long-term selection yields hypoxia-tolerant lines with selection signatures in **Notch** and allied networks; these evolutionary "experiments" corroborate pathway importance derived from single-gene studies. jstor +1

Functional hypoxia: life-stage specificity and context

- Insects (including *Drosophila*) regularly experience **functional hypoxia**, with graded, age/tissue-dependent responses; reviews synthesize when/where hypoxia is most consequential (eggs, late instars, molts), while **pupae** emerge as a particularly vulnerable stage. nsf +1

Developmental timing, growth, and body size

- Oxygen modulates **feeding, protein synthesis, imaginal cell size, molting**, and neuroendocrine controls of growth; moderate hypoxia can curb size without ATP collapse, via signaling-mediated remodeling. annualreviews

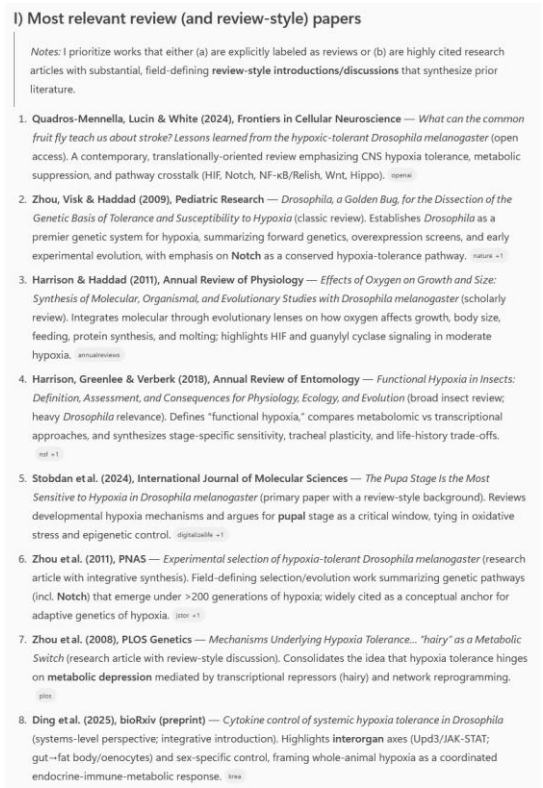
Systems physiology and interorgan communication

- Emerging synthesis reframes hypoxia tolerance as **organ-to-organ coordination** involving cytokines

How to Use Copilot Effectively?

1) ***READ***/Skim these papers

While thinking about these themes



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5. **Stobdan et al. (2024), International Journal of Molecular Sciences** — *The Pupa Stage Is the Most Sensitive to Hypoxia in Drosophila melanogaster* (primary paper with a review-style background). Reviews developmental hypoxia mechanisms and argues for **pupal** stage as a critical window, tying in oxidative stress and epigenetic control. digitalcolville +1
6. **Zhou et al. (2011), PNAS** — *Experimental selection of hypoxia-tolerant Drosophila melanogaster* (research article with integrative synthesis). Field-defining selection/evolution work summarizing genetic pathways (incl. **Notch**) that emerge under >200 generations of hypoxia; widely cited as a conceptual anchor for adaptive genetics of hypoxia. jstor +1
7. **Zhou et al. (2008), PLOS Genetics** — *Mechanisms Underlying Hypoxia Tolerance... "hairy" as a Metabolic Switch* (research article with review-style discussion). Consolidates the idea that hypoxia tolerance hinges on **metabolic depression** mediated by transcriptional repressors (hairy) and network reprogramming. plos
8. **Ding et al. (2025), bioRxiv (preprint)** — *Cytokine control of systemic hypoxia tolerance in Drosophila* (systems-level perspective; integrative introduction). Highlights **interorgan** axes (Upd3/JAK-STAT; gut→fat body/oenocytes) and sex-specific control, framing whole-animal hypoxia as a coordinated endocrine-immune-metabolic response. krea

II) Associated themes distilled across the reviews

1. **Conserved oxygen-sensing & stress pathways (HIF and beyond)**
   - HIF-1α/sima remains central, but reviews emphasize **Notch**, **NF-κB/Relish**, **insulin/TOR**, and increasingly **Wnt** and **Hippo** in coordinating tolerance and recovery. These nodes are conserved, making fly findings translationally relevant to mammalian ischemia and systemic hypoxia. openai +1
2. **Metabolic suppression as a survival signature**
   - Hypoxia-tolerant flies exhibit global down-shifts in metabolic gene expression; **hairy** acts as a transcriptional switch to reduce glycolytic and anabolic load, aligning with organism-wide energy conservation during low O_2. plos
3. **Experimental evolution validates mechanism**
   - Long-term selection yields hypoxia-tolerant lines with selection signatures in **Notch** and allied networks; these evolutionary "experiments" corroborate pathway importance derived from single-gene studies. jstor +1
4. **Functional hypoxia: life-stage specificity and context**
   - Insects (including *Drosophila*) regularly experience **functional hypoxia**, with graded, age/tissue-dependent responses; reviews synthesize when/where hypoxia is most consequential (eggs, late instars, molts), while **pupae** emerge as a particularly vulnerable stage. nsf +1
5. **Developmental timing, growth, and body size**
   - Oxygen modulates **feeding, protein synthesis, imaginal cell size, molting**, and neuroendocrine controls of growth; moderate hypoxia can curb size without ATP collapse, via signaling-mediated remodeling. annualreviews
6. **Systems physiology and interorgan communication**
   - Emerging synthesis reframes hypoxia tolerance as **organ-to-organ coordination** involving cytokines (Upd3), endocrine tissues (fat body/oenocytes), and immune-metabolic crosstalk; sex-specific requirements underscore whole-organism design principles. krea
7. **Translational relevance to human disease (especially CNS)**
   - Modern reviews tie fly hypoxia tolerance to **stroke** and **reperfusion** injury: metabolic suppression, oxidative stress modulation, and pathway crosstalk illuminate mammalian neuroprotection strategies. openai
8. **Methods, metrics, and definitions matter**
   - The insect-centric functional hypoxia review stresses the **complexity of assessing hypoxia** (PO_2 manipulation vs omics readouts; compensatory ventilation/tracheal plasticity), which is crucial for comparing studies and designing interventions. nsf +1

2) ***IDENTIFY***

Try to Identify a Missing Theme/Perspective Across these Review Articles

- *e.g.* Maybe a lot of reviews take a **clinical perspective** while there are few of an **ecological perspective**

3) ***VERIFY***

Search the Literature through this new lens to ***verify*** that this is a novel perspective!

Considerations Going Forward

- *Microsoft Copilot* is a useful tool in academia… it can:
  - *STREAMLINE* your study process
  - *GUIDE* your writing process
  - … its utility is only limited by YOUR creativity!

- But…
  - It *can't* and *shouldn't* replace your discretion and critical thinking

Additional Resources

- UCalgary SSC: A Quick Guide to Microsoft Copilot Chat
- A Quick Guide to Microsoft Copilot Chat

https://ucalgary.ca/news/quick-guide-microsoft-copilot-chat

- UCalgary Centre for Artificial Intelligence Ethics, Literacy and Integrity: CAIELI

References

Ucalgary. https://www.ucalgary.ca/legal-services/acceptable-use-electronic-resources-and-information-policy

IBM. https://www.ibm.com/think/topics/ai-hallucinations

Ucalgary. https://ucalgary.ca/news/quick-guide-microsoft-copilot-chat

Thank You for Your Attention!

Questions?

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