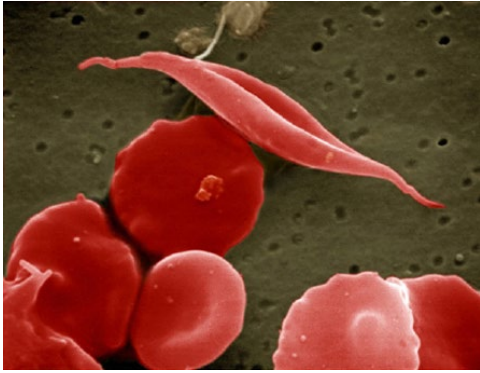




# Disease and Human Evolution

ANTH B317, Fall 2026

Tuesdays 7:10-9:30 PM, Dalton 212A

Maja Šešelj, she/her

Dalton 310

msejelj@brynmawr.edu

Student drop-in hours:

Class Zoom link (if needed at any point) is posted on Moodle

*DISCLAIMER: Syllabus subject to change! All changes will be announced via e-mail, and I will provide an updated version of the syllabus on Moodle.*

**Course description:** Humans have been evolving and adapting to their environments since the beginning of our species – so why do we get sick? How come we have not evolved resistance to diseases that have been affecting us for thousands of years? This course provides an introduction to evolutionary medicine, a field that recognizes that evolutionary processes and human evolutionary history shape health among contemporary human populations. The field of evolutionary medicine emphasizes ultimate explanations, such as how natural selection and other evolutionary forces shape our susceptibility to disease, and how we have adapted to resist disease. This perspective complements that of biomedicine, which generally focuses on identifying the proximate mechanisms that give rise to diseases and malfunctions. The evolutionary medicine approach has provided insights into why diseases occur at all, and has produced valuable insights on treatment strategies. This course will examine a variety of diseases using an evolutionary perspective, from infectious diseases to mental health issues. The course will emphasize chronic diseases, such as cardiovascular disease, obesity, and diabetes, and will focus particular attention on the role of systemic, social, and environmental factors in the development, progression, and prevalence of these conditions.

**Course objectives:** By the end of this course, the students will:

- Understand key concepts of evolutionary medicine;
- Be able to recognize evolutionary problems in medicine;
- Be able to critique existing and novel hypotheses in evolutionary medicine;
- Know how susceptibility to disease and adaptation to resist disease has shaped our bodies and physiology;
- Understand how an evolutionary perspective can help medical professionals in developing treatment strategies for diseases and malfunctions that affect us today.

## **Course materials:**

There is no textbook for this class. Selected readings from the classic work of Nesse and Williams (1996): *Why We Get Sick: The New Science of Darwinian Medicine*, along with recent scientific articles, will be on Moodle. Additional books that may be of interest to you throughout the semester have been placed on course reserve in Canaday library.

**Student responsibilities:** The course meets two and a half hours per week (this will include a short break halfway through each class). You are expected to attend class and to be prepared to ask questions and participate in discussions, having done the readings *beforehand*, both in class and on

Moodle. In case of an absence, you are responsible for any work you miss. If you know you will have to be absent (e.g., for a religious holiday), please let me know in advance. If you are feeling under the weather, please let me know that you're not well if and when you can, and for everyone's sake, please stay at home and rest! We have several means of interacting and participating online via Moodle, in ways that are not time-sensitive. Please let me know if you find yourself in need of a covid-19/flu rapid test or masks.

**Important note:** If at any point in the semester you find yourself having difficulties that may affect your ability to participate in this course, please let me know! If you're comfortable doing so, you can reach out to me directly. Alternatively, please notify your Dean or another person of trust, so that they could act as an intermediary as we work together on a solution.

**Evaluation:** Your grade will be based on written assignments and participation in, and moderation of, class discussions. You need to complete all of these assignments in order to complete the course.

Research paper or "un-essay" project: 25%

Research presentation: 10%

Readings feedback: 25%

Discussion moderation: 15%

Participation: 15%

*Fact or fiction?* report: 10%

***Research paper or un-essay:*** Instead of exams, you will have a choice of either writing a 10-12-page research paper, or doing an "un-essay" that would convey this information in a creative format. In the paper you should bring together the principles of evolutionary medicine by applying them to a specific disease or manifestation of disease (see some suggestions below). For this assignment, you will first meet with me to discuss your ideas, and no later than the week of October 5<sup>th</sup> submit an outline of your chosen topic and an initial list of at least 5 references (ideally journal articles and/or book chapters) that will form the foundation of your independent research into this topic (i.e., the articles should be in addition to any that are on the class reading list). I will provide feedback and suggestions based on your outlines. You can choose any disease, symptom or health problem that interests you, as long as I approve the topic. Here are some suggestions:

|                            |                                        |                                     |
|----------------------------|----------------------------------------|-------------------------------------|
| Hypertension               | Prion diseases                         | Depression                          |
| Inflammatory bowel disease | Preeclampsia                           | Dengue                              |
| West Nile virus            | Rheumatoid arthritis                   | Lupus                               |
| Osteoarthritis             | Gout                                   | Precocious puberty                  |
| Hepatitis                  | Muscular dystrophy                     | Zika                                |
| Marfan syndrome            | Acne                                   | Psoriasis                           |
| Hemophilia                 | Peptic ulcers                          | Hemochromatosis                     |
| Osteoporosis               | Specific allergies                     | HIV/AIDS                            |
| Tuberculosis               | Dementias (various forms)              | Opportunistic nosocomial infections |
| PMOS (formerly PCOS)       | Obsessive-compulsive Disorder & PANDAS | Panic attacks                       |
| Sleeping sickness          | Dengue hemorrhagic fever               | Schizophrenia                       |
| Multiple sclerosis         | Asthma                                 | Toxoplasmosis                       |
| Coronary heart disease     |                                        |                                     |

**If you are writing a paper:** You will submit a final draft of your paper by November 24<sup>th</sup>. By the next class meeting, I will have gone through these final drafts as if they were your final submission, provided comments, and assigned you a grade for the draft that I will keep to myself. You will have around two

weeks to make any alterations to your final draft based on my feedback, and submit your final paper during exam week. Your final grade for the paper will be based on your draft grade, the amount of improvement from the draft to the final version, and the quality of your final submission. If you are doing an un-essay: you can use any medium of expression, as long as you run it by me first. Past examples include comics, paintings, sculptures, crochet, embroidery, mock interviews, mock dating apps, listicles, and videos. The creative piece should be accompanied by a 250-500 word abstract (a recap) describing your un-essay and a complete bibliography. Additionally, you will do an informal presentation of your un-essay on the last day of class (5 minutes max). For this, you'll need to bring your un-essay (if possible) to our last class meeting and talk us through your process; no separate PowerPoint presentation necessary.

*Research presentation*: You will make a brief presentation of your research topic and present it during the last three weeks of class. Every student will have 10 minutes, so plan on doing a 7-8 minute presentation followed by 2-3 minutes of Q&A. This is not a very long period of time, so make sure your presentation is brief and to the point. Make sure you distinguish between proximate and ultimate explanations for the topic of your choice, but emphasize the latter. I highly recommend you practice delivering your presentation, so that you would be more comfortable with the content and would not run over time.

*Reading feedback*: we will use Perusall to foster a social reading experience that provides an additional way to actively participate in this course. Perusall is like an e-reader that allows you to highlight and annotate the readings, but in a way visible to the instructors and all other students in the class. You can also tag people, post GIFs, etc. In your readings on Perusall each week, please make note of anything you may have found confusing or have questions about. You are encouraged to engage with your classmates' comments and questions as you do your own. Maybe you can share some insight on something someone else had found confusing, or you have a different take on an argument? Maybe you found the same reading confusing, or the same quote really resonated with you too? Make a note of it! I will receive feedback on aspects of the readings the students found confusing, so we can make sure that we work through that during our in-class discussion. Participating through Perusall is an important way to engage with the readings and gain a richer understanding of the course subject matter, and it allows me to contextualize your participation in this class beyond what may be apparent during class time. To get full credit for participation, you will need to have done all the readings, and provided at least one substantive comment or question (either engaging with the readings directly, or with your peers' comments or questions) per week. To make sure I have the time to read your questions and comments before class, please post your feedback by end of day Sunday. However, you can continue to comment or post questions on the readings at any time throughout the semester.

*Discussion moderation*: Each week, one or a pair of students will moderate the discussion. Discussion leaders will use some of the issues you have brought up on Perusall as the basis for directing the conversation during that week's class. Moderating a discussion means leading the discussion by offering your critical evaluations of the assigned readings. This does not mean simply rephrasing or summarizing the content of the papers. Rather, you should take a position on the work and present it. Foster debate by presenting opposing views on a subject. In leading discussion you should give a brief overview of the discussion papers/chapters, prepare questions (questions without a definite answer are often better, as they promote discussion), involve everyone in the discussion, and provide a brief wrap up at the end that synthesizes the readings and the ideas presented in the discussion. You are

welcome to come up with activities and/or to bring in additional materials (e.g., videos) to class as they pertain to the week's topic.

*Participation:* There are multiple forms of participation in this course, starting with attending class meetings. You are expected to do the readings and look over the comments on Perusall before each class meeting, and be ready to discuss them in class. If you find it challenging to speak up in class, preparing questions or discussion points (e.g. on Perusall) might be helpful. In addition to in-class participation, you will be expected to participate in online discussions on a Moodle forum concerning relevant events and stories that have appeared in popular media, and tie them to what are covering in this class (I will provide an example). Reports of resilience especially welcome!

*Fact or fiction? report:* The readings for this course consist of a mix of review articles, book chapters, and original research articles. To get us all to think about how the results of scientific research are (mis)represented in popular media, particularly in the age of AI-generated content, you will find an article on a topic relevant to this course in a popular science outlet (e.g., LiveScience, Smithsonian Mag, Scientific American, etc.) and mass news media (e.g., NYT, WaPo, BBC, CNN, The Guardian, The Conversation, The Atlantic, etc.). You will also locate the original study and compare the results and interpretation in the original study with the reports in popular science and news media, paying attention to selective reporting, placement of emphasis, clickbait titles, (in)accurate reporting of the results, and especially the interpretation and implications of the results. This report should be 4-5 pages (double-spaced) in length, and is due by November 3<sup>rd</sup> (via Moodle).

**Technology use:** Multiple studies have shown that multitasking on a laptop has adverse effects not just on your own learning, but it also interferes with the learning process of people seated around you. Therefore, out of respect for all participants in the class, please refrain from using laptops, tablets, etc. during lectures, if possible (this does not apply to students with different learning needs with assistive devices). All phones should be put away and on silent for the duration of the class. Please refrain from texting, checking social media, and the like! If you have extenuating circumstances and need to urgently answer a call or text, please step outside the classroom to minimize disruption.

**Social Media Policy:** Student participation is a critical component of Anthropology classes. The Department of Anthropology envisions our classrooms as spaces where both students and faculty can freely exchange ideas and voice opinions on a range of topics without fear of being disparaged or ridiculed in public or online. Thus we ask you to refrain from posting on social media things you hear or observe in our classes that are explicitly attributed or could be tracked back to a fellow student or faculty member. Doing this would have a chilling effect on classroom discussion, as we would all be more hesitant to freely express ourselves if we have to worry about online repercussions. If you have an issue with someone's behavior during class, please let me know in private so that we can work together to maintain a productive learning environment.

**AI use:** you should not use generative AI, LLMs, chatbots etc. for written assignments in this course, unless explicitly stated otherwise. Besides the myriad ethical concerns about what AI is doing to our societies and the planet, the goals of the work assigned here is for you to develop and further hone your own skills and abilities, and not to outsource them to AI. It may be helpful to think about this as [work vs. the gym](#): is the point of the task that it gets done, regardless of how, or that you yourself do the work? Unsurprisingly, faculty see our class assignments as gym for your brain! We also care more to read what you think and have to say as a unique individual, rather than what is the most probable, anodyne, predictive response. While AI may be helpful in some contexts, your written work in this class

will not be assessed relative to some hypothetical, AI-enhanced standard. Furthermore, for the most part, AI is not actually good at things you're being asked to do. Even if one were to ask it to "do research", the sources an AI generates, besides hallucinations, are simply those that are statistically likely to contain something to do with the prompt given, but may not actually claim what AI states they do, nor be an appropriate source material (because AI doesn't actually read them). You will be more effective doing your own research, starting with reputable scientific journals (despite Google now being fully AI-powered and much worse than, say, 10 years ago, [Google Scholar](#) is still the most user-friendly, and best search engine specifically for scientific papers). Please note, if you're used to using apps such as Grammarly, many of them are now AI, too; a lot of note-taking apps are as well. However, there are versions that run entirely locally (on your computer, not the cloud), and don't even need an internet connection (e.g. Snaply, Spokenly), which also come with fewer negative implications regarding privacy. If you have questions or are unsure whether using AI for some course-related task would be ok, please don't hesitate to ask me!

**Students with different learning needs:** If you have a disability, whether apparent or non-apparent, please do not hesitate to contact me to discuss the ways in which I can facilitate your learning and participation in this course. While students need to arrange academic accommodations through Access Services (see below), I am committed to maintaining an inclusive learning environment beyond what is mandated by law. If during the course of the semester you find any of the course materials to be challenging (e.g., pdfs not accessible to assistive devices, choice of topic, etc.), please let me know so I can rectify that and come up with an alternative, if needed.

Bryn Mawr College is committed to providing equal access to students with a documented disability. Students needing academic accommodations for a disability must first speak with Access Services. Students can email [accessservices@brynmawr.edu](mailto:accessservices@brynmawr.edu) to request an appointment to begin this confidential process. If eligible for accommodations as per Access Services, students should schedule an appointment with the professors as early in the semester as possible to share their verification form and make appropriate arrangements. Please note that accommodations are not retroactive and require advance notice to implement.

Any student who has a disability-related need to record this class must first be found eligible to do so by Access Services and must share this eligibility with us, the instructors. Class members need to be aware that this class may be audio recorded.

More information can be obtained at the respective Tri-Co Access Services websites:

- Bryn Mawr: <http://www.brynmawr.edu/access-services/>
- Haverford: <https://www.haverford.edu/access-and-disability-services/>
- Swarthmore: <https://www.swarthmore.edu/office-academic-success/welcome-to-student-disability-services>

**Academic integrity:** You are welcome to discuss course content (both readings and assignments) with your classmates. However, any written work or assignment must be completed individually, and should be the product of your own thoughts and ideas on the topic. Academic dishonesty (e.g., misrepresenting someone else's work as your own) can result in 0.0 for the assignment or for the course, as well as other institutional consequences in keeping with the Bryn Mawr College [Honor Code](#). If you have any questions or concerns regarding academic integrity, please feel free to contact me.

## Course schedule

| Date                     | Topic                                                                                                                                                                                                        | Readings                                                                                                       |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Sept 1<br><b>Week 1</b>  | What is evolutionary medicine, and why study it?                                                                                                                                                             | Nesse & Williams (Preface & Ch. 1); Nesse (2016); Power et al. (2020); Ogbunugafor & Jackson (2023)            |
| Sept 8<br><b>Week 2</b>  | Are disease symptoms in fact adaptations to disease?                                                                                                                                                         | Nesse & Williams (Ch. 3); Alcock (2018); Wrotek et al. (2020)                                                  |
| Sept 15<br><b>Week 3</b> | Host-pathogen interactions: an evolutionary arms race without end?                                                                                                                                           | Nesse and Williams (Ch. 4); O'Brien (2012); Fridman et al. (2014); Qu et al. (2023)                            |
| Sept 22<br><b>Week 4</b> | What's evolution ever done for us? Gifts from our evolutionary ancestors & relatives                                                                                                                         | Sankararaman et al. (2014); Zeberg & Pääbo (2020); Zhang et al. (2021); Vespasiani et al. (2022)               |
| Sept 29<br><b>Week 5</b> | Paleodiet or paleofantasy? How diet affects health                                                                                                                                                           | Pontzer & Wood (2021); McGrosky et al. (2025); Alcock et al. (2021); Dorsey & Miller (2023)                    |
| Oct 6<br><b>Week 6</b>   | Our microbes, ourselves?<br><b>Research paper outlines due</b>                                                                                                                                               | Adler et al. (2013); Alcock et al. (2014); Amato & Carmody (2023); Carboni et al. (2026)                       |
| Oct 13                   | Fall break – no class!                                                                                                                                                                                       |                                                                                                                |
| Oct 20<br><b>Week 8</b>  | How do human-environment interactions affect (our susceptibility to) disease?                                                                                                                                | Friant (2023); van Doren (2022); Colucci et al. (2026); Savage et al. (2021); Howells et al. (2025)            |
| Oct 27<br><b>Week 9</b>  | How have pandemics affected human evolution?                                                                                                                                                                 | van Doren (2025); Brinkworth & Rusen (2022); Cleaver & Non (2024); Gravlee (2020)                              |
| Nov 3<br><b>Wk 10</b>    | How does stress affect human health? Why does race play a role in human health?<br><b>Fact or fiction? analysis due</b>                                                                                      | Madhusoodanan (2022); Brinkworth & Shaw (2022); Cuevas et al. (2023); Gildner (2023); Ivey Henry et al. (2023) |
| Nov 10<br><b>Wk 11</b>   | How does health early in our development affect adult outcomes?                                                                                                                                              | Felitti et al. (1998); Kim et al. (2023); Kuzawa & Kim (2022); Rosenbaum & Kuzawa (2023)                       |
| Nov 17<br><b>Wk 12</b>   | Can evolution help explain chronic diseases?                                                                                                                                                                 | Kolinski et al. (2024); Brassington et al. (2024); Watowich et al. (2026); Lenover & Shenk (2024);             |
| Nov 24<br><b>Wk 13</b>   | Can evolution explain cancer?<br><b>Research paper final drafts due</b><br><i>Research presentations I</i>                                                                                                   | Greaves & Aktipis (2016); Dujon et al. (2021); Wu et al. (2026)                                                |
| Dec 1<br><b>Wk 14</b>    | How do mental health and cognitive issues fit into the evolutionary picture?<br><i>Research presentations II</i>                                                                                             | August et al. (2025); Nesse (2022); Aftab (2025)                                                               |
| Dec 3<br><b>Wk 15</b>    | <b>Research paper drafts returned</b><br><i>Research presentations III</i><br><i>Un-essay presentations</i>                                                                                                  |                                                                                                                |
| Dec 13-18                | Exam period<br>Research paper final version due electronically by noon on Friday, December 18 <sup>th</sup><br>Un-essay final projects due by noon on Friday, December 18 <sup>th</sup> (coordinate with me) |                                                                                                                |

## Bibliography for the reading list

(all readings are on Perusall and linked on Moodle)

Adler, C.J. et al. (2013): Sequencing ancient calcified dental plaque shows changes in oral microbiota with dietary shifts of the Neolithic and Industrial revolutions. *Nature Genetics* 45, 450–455

Aftab, A. (2025) Why Did Evolution Leave Us Vulnerable to Mental Disorders? A Q&A with Randolph Nesse. <https://www.psychiatrymargins.com/p/why-did-evolution-leave-us-vulnerable>

Alcock J. (2018) The Emperor Has No Clothes? Searching for Dysregulation in Sepsis. *Journal of Clinical Medicine*, 7(9):247.

Alcock, J., Maley, C.C. and C.A. Aktipis (2014): Is eating behavior manipulated by the gastrointestinal microbiota? Evolutionary pressures and potential mechanisms. *Bioessays* 36: 1–10

Alcock, J., Carroll-Portillo, A., Coffman, C. & H.C. Lin (2021) Evolution of human diet and microbiome-driven disease. *Current Opinion in Physiology*, 23:100455, <https://doi.org/10.1016/j.cophys.2021.06.009>

Amato, K.R. and R.N. Carmody (2023) Gut Microbial Intersections with Human Ecology and Evolution. *Annual Review of Anthropology* 2023 52:1

August, I., Gagneux, P., Semendeferi, K. and Marchetto, M.C. (2025) Evolution of Human Susceptibility to Alzheimer's Disease: A Review of Hypotheses and Comparative Evidence. *Evolutionary Anthropology: Issues, News, and Reviews*, 34: e22054

Barton, A.R., Santander, C.G., Skoglund, P. et al. (2025) Insufficient evidence for natural selection associated with the Black Death. *Nature* 638, E19–E22.

Brassington, L., Arner, A.M., Watowich, M.M., Damstedt, J., Ng, K.S., Lim, Y.A., Venkataraman, V.V., Wallace, I.J., Kraft, T.S. and Lea, A.J. (2024). Integrating the Thrifty Genotype and Evolutionary Mismatch Hypotheses to understand variation in cardiometabolic disease risk. *Evolution, Medicine, and Public Health*, 12(1), pp.214-226.

Brinkworth, J.F. & R.M. Rusen (2022) SARS-CoV-2 Is Not Special, but the Pandemic Is: The Ecology, Evolution, Policy, and Future of the Deadliest Pandemic in Living Memory. *Annual Review of Anthropology* 51:527-548.

Brinkworth, J. F., & Shaw, J. G. (2022). *On race, human variation, and who gets and dies of sepsis. Yearbook Biological Anthropology*, 178(Suppl. 74), 230–255.

Carboni, S, Asangba, A.E. and A.D. Melin (2026) Microbial Contributions to Primate Reproduction, *Evolutionary Anthropology* 35: 1-20

Cleaver P, Non AL. (2024). Were fewer boys born in the United States during the early months of the COVID-19 pandemic? A test of the Trivers–Willard hypothesis. *Evolutionary Anthropology*, 33, e22043.

Colucci, M., Leonardi, M., Blinkhorn, J., Irish, S.R., Padilla-Iglesias, C., Kaboth-Bar, S., Gosling, W.D., Snow, R.W., Manica, A. and Scerri, E.M. (2026) Malaria shaped human spatial organization for the past 74 thousand years. *Science Advances*, 12(17), p.eaea2316.

Cuevas AG, Krobath DM, Rhodes-Bratton B, et al. (2023) Association of Racial Discrimination With Adiposity in Children and Adolescents. *JAMA Network Open* 6(7):e2322839.

- Dorsey AF, Miller EM. (2023) Revisiting geophagy: An evolved sickness behavior to microbiome-mediated gastrointestinal inflammation. *Evolutionary Anthropology*; 32: 325-335
- Dujon AM, Aktipis A, Alix-Panabières C, et al. (2021) Identifying key questions in the ecology and evolution of cancer. *Evol Appl.* 14: 877–892.
- Felitti, V.J. et al. (1998) Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American journal of preventive medicine* 14(4): 245-258.
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- Fridman, O. et al. (2014): Optimization of lag time underlies antibiotic tolerance in evolved bacterial populations. *Nature*
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