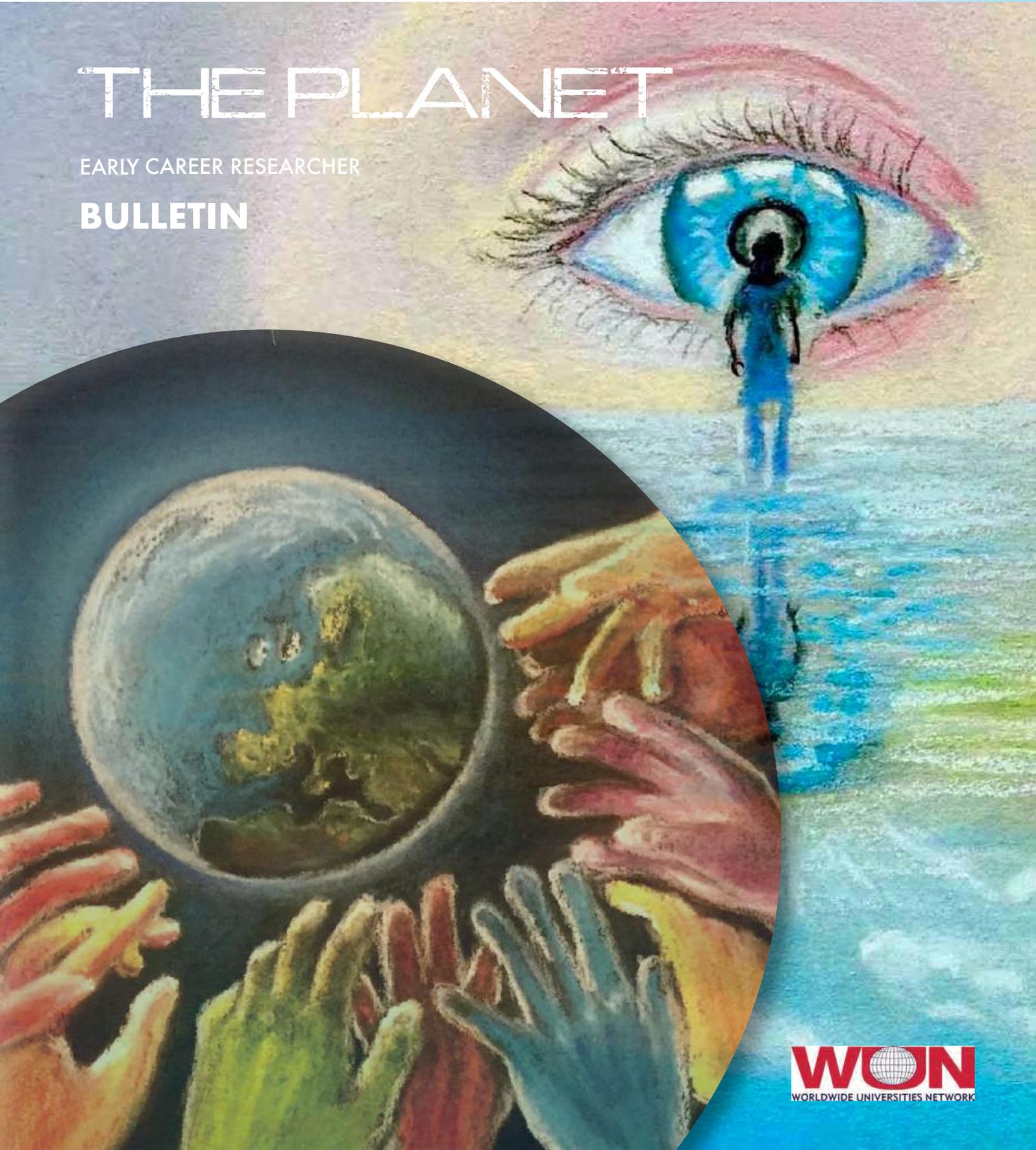


THE PLANET

EARLY CAREER RESEARCHER

BULLETIN



THE PLANET

The Planet is an Early Career Researcher (ECR) Bulletin published on a quarterly basis by inVIVO Planetary Health. *The Planet* contains global and local planetary health news stories, *Spotlight* - an ECR interview or article, advice from senior researchers, events and quizzes!

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Background art throughout *The Planet* by Susan Prescott



Spotlight

Early Career Researcher Article



Name: Brent Erickson BA, MA

Discipline: Interdisciplinary (microbiology; psychology)

Article title: Phage Therapy and Antibiotic Resistance Genes Transfer - Creating Monsters or Miracles?

Microbiology has been one of the most exciting research areas of the past decades. Currently, research into the diverse roles of bacteriophages (commonly called phages) in bacteria's evolution and life cycles is generating a host of compelling narratives.

A large number of investigations have evidenced a high prevalence of gene transfer between bacterial species and the bacteriophages which infect them. This supports the theory that bacteria/phage coevolution may be key to understanding how natural environments (those seen as free from high levels of anthropogenic impact) can serve as reservoirs for antibiotic resistance genes (ARGs) previously thought to be largely due to bacterial species evolutionary reaction to human's profligate production, use, and dispersal of antibiotics.

Evidence of the "Phageome's" role in bacteria's evolutionary success in acquiring gene sequences that confer resistance to the broad range of medically useful antibiotics, is alerting the scientific community to a previously hidden and potentially dangerous source of "killer bacteria" genes. It also provides intrepid scientists with genetic material with proven abilities to eradicate similarly antibiotic resistant pathogenic (infectious) bacteria.

The explosion of novel research utilizing advanced genetic sequencing methods capable of detecting virus/phage genomes is highlighting the potentially unheralded role bacteriophages play in microbial coevolution, and in turn human health.

However, the research community is embroiled in controversy surrounding recent experimental advancements and theories as novel sequencing techniques yield extremely variable results depending on the methods employed. Many researchers are publishing research using divergent methodology, in turn questioning everything from the veracity of phage counts in samples to the potential gene transfer and evolutionary drive or pressure exerted on bacteria.

See next page for 'Contested Research Highlights!'



Spotlight

Early Career Researcher Article

**Article: Phage Therapy and Antibiotic Resistance Genes Transfer -
Creating Monsters or Miracles? By Brent Erickson**



Contested Research Highlights

1. Documentation of ubiquitous prevalence in broadly varied environments including areas with relatively low anthropogenic impact. Counterpoints demonstrate the potential fallibility of these results due to the high variance observed in what are essentially speculative novel research methods [1,2,3,4].
2. Antibiotic resistance gene transfer rates from phages to bacteria appear to be very significant in some models - possibly contributing to twenty percent of genomes and frequently conferring resistance to host defenses upon bacteria, including resistance to modern and classic antibiotics. These findings indicate a potentially critical role in bacteria/phage co-evolution and bacterial evolution contra human hosts [1,5,6].
3. Increasing exploration of novel clinical applications to counter bacteria's evolutionary acquisition of ARGs: including co-treatment with phages and antibiotics and the development of artificially derived phage-like antibacterial treatments, an area of significant promise and potential perils [5,7,8,9,10].

As a recent review article concluded bacteriophages are the "Known Unknown", confounding researchers fervent efforts to understand the complex influences human gut microbiomes exert on wellness [11]. Across the world of bacteriophage research, numbers of experiments, samples, and mapped "Phageome" sequences are too small to generate significant levels of confidence in results and their implications. However, the contested narratives that have arisen remain compelling - a boom of exciting new research seems to be the only sure result!

1. Calero-Cáceres, W., Ye, M., & Balcázar, J. L. (2019). Bacteriophages as environmental reservoirs of antibiotic resistance. *Trends in microbiology*.
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3. Sutton, T., Clooney, A. G., Ryan, F. J., Ross, R. P., & Hill, C. (2019). Choice of assembly software has a critical impact on virome characterisation. *Microbiome*, 7(1), 12.
4. Swift, B. M., Bennett, M., Waller, K., Dodd, C., Murray, A., Gomes, R. L., ... & Mitchell, L. J. (2019). Anthropogenic environmental drivers of antimicrobial resistance in wildlife. *Science of the Total Environment*, 649, 12-20.
5. Asija K, Teschke CM (2018) Lessons from bacteriophages part 2: A saga of scientific breakthroughs and prospects for their use in human health. *PLoS Pathog* 14(5): e1006970.
6. Chanishvili, N., & Aminov, R. (2019). Bacteriophage therapy: coping with the growing antibiotic resistance problem. *Microbiology Australia*.
7. Divya Ganeshan, S., & Hosseini-Doust, Z. (2019). Phage Therapy with a Focus on the Human Microbiota. *Antibiotics*, 8(3), 131.
8. De Sordi, L., Lourenço, M., & Debarbieux, L. (2019). The battle within: interactions of bacteriophages and bacteria in the gastrointestinal tract. *Cell host & microbe*, 25(2), 210-218.
9. Chan, B. K., Sistro, M., Wertz, J. E., Kortright, K. E., Narayan, D., & Turner, P. E. (2016). Phage selection restores antibiotic sensitivity in MDR *Pseudomonas aeruginosa*. *Scientific reports*, 6, 26717.
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Spotlight

Early Career Researcher Profile



Name: Ayten Salahi MS

Discipline: Nutrition Interventions

Profile

Ayten Salahi is an MS in Food and Nutrition Policies and Programs with a specialization in Nutrition Interventions: Design, Operation, and Management from the Tufts Friedman School of Nutrition Science and Policy, co-founder of the Friedman Food Policy Action Council (FFPAC) in Boston, MA, and founder of the budding international food and climate justice organization, the Planetary Health Collective.

She began her career as a researcher, volunteer, and medical observer at the Duke University Medical Center, where she studied the neurobiological pathways involved in mind-gut pathologies and observed world-class practitioners providing advanced care to high-acuity patients. Following her time at Duke, she continued her professional development as a Clinical Research Specialist examining the effectiveness of an “artificial pancreas” system to improve glycemic control for patients with type 1 diabetes and quickly discovered the ubiquitous role of food and nutrition in producing individual, societal, and environmental health. To align with her passion to use food as a vehicle for systemic change, Ayten completed a Master of Science in Food and Nutrition Policy and Programming at Tufts University and is near completion of her Didactic Program in Dietetics at Simmons University. During her masters, she worked with the Tufts Food Aid Quality Review (FAQR) and United States Agency for International Development’s Office of Food for Peace to author a field report on how to improve the efficiency and effectiveness of international nutrition assistance programs. Locally, she completed a public health nutrition practicum as a kitchen assistant at Community Servings, preparing medically tailored meals for critically ill patients in greater Boston, and engaged in food policy activities to connect individuals receiving supplementary nutrition assistance with locally-produced agricultural goods through a dollar-for-dollar match program.

Her passion for planetary health nutrition blossomed after the release of the Eat-Lancet report. She noted the crucial and often underplayed role of dietitians and other food, nutrition, policy, and agricultural professionals in improving both clinical and environmental outcomes, and founded the Planetary Health Collective under the principle that active engagement of everyone’s unique gifts are required to generate lasting social change at the population level. In under one year, the Planetary Health Collective has grown to include 250+ food, nutrition, and culinary professionals passionate about generating creative solutions to waste less and build a healthier, more sustainable food future in communities around the world.

Find Ayten @ www.planetaryhealthrd.com or Instagram @[planetaryhealthrd](https://www.instagram.com/planetaryhealthrd)

Planetary

Health in the News



The Global Risks Report 2020

The World Economic Forum's Global Risks Report 2020 "presents the major risks the world will be facing in the coming year. It stresses the need for a multistakeholder approach to addressing the world's greatest challenges, and comes ahead of the World Economic Forum's 50th Annual Meeting in Davos-Klosters, where the focus is Stakeholders for a Cohesive and Sustainable World". Biodiversity loss and climate change are listed in the top 5 risks to civilisation. "The global economy is facing an increased risk of stagnation, climate change is striking harder and more rapidly than expected, and fragmented cyberspace threatens the full potential of next-generation technologies – all while citizens worldwide protest political and economic conditions and voice concerns about systems that exacerbate inequality. The challenges before us demand immediate collective action, but fractures within the global community appear to only be widening. Stakeholders need to act quickly and with purpose within an unsettled global landscape".

The logo for the World Economic Forum, featuring the text "WORLD ECONOMIC FORUM" in a bold, sans-serif font. A thin, curved line arches over the text, resembling a stylized smile or a bridge. The logo is set against a dark blue background with a blurred image of a mountain range and a lake.

WORLD
ECONOMIC
FORUM

More on this report here: <https://www.weforum.org/reports/the-global-risks-report-2020>

THE PLANET'S

3 Tips from the Top

Name: Professor Philip Weinstein

Institution: University of Adelaide

Discipline: Ecology and Public Health

Tip 1:

For PhD students, the single most important thing about your PhD is to take ownership of it and enjoy the opportunity! There is no question there will be hard work, but the joy of discovery should be driving that effort.

Tip 2:

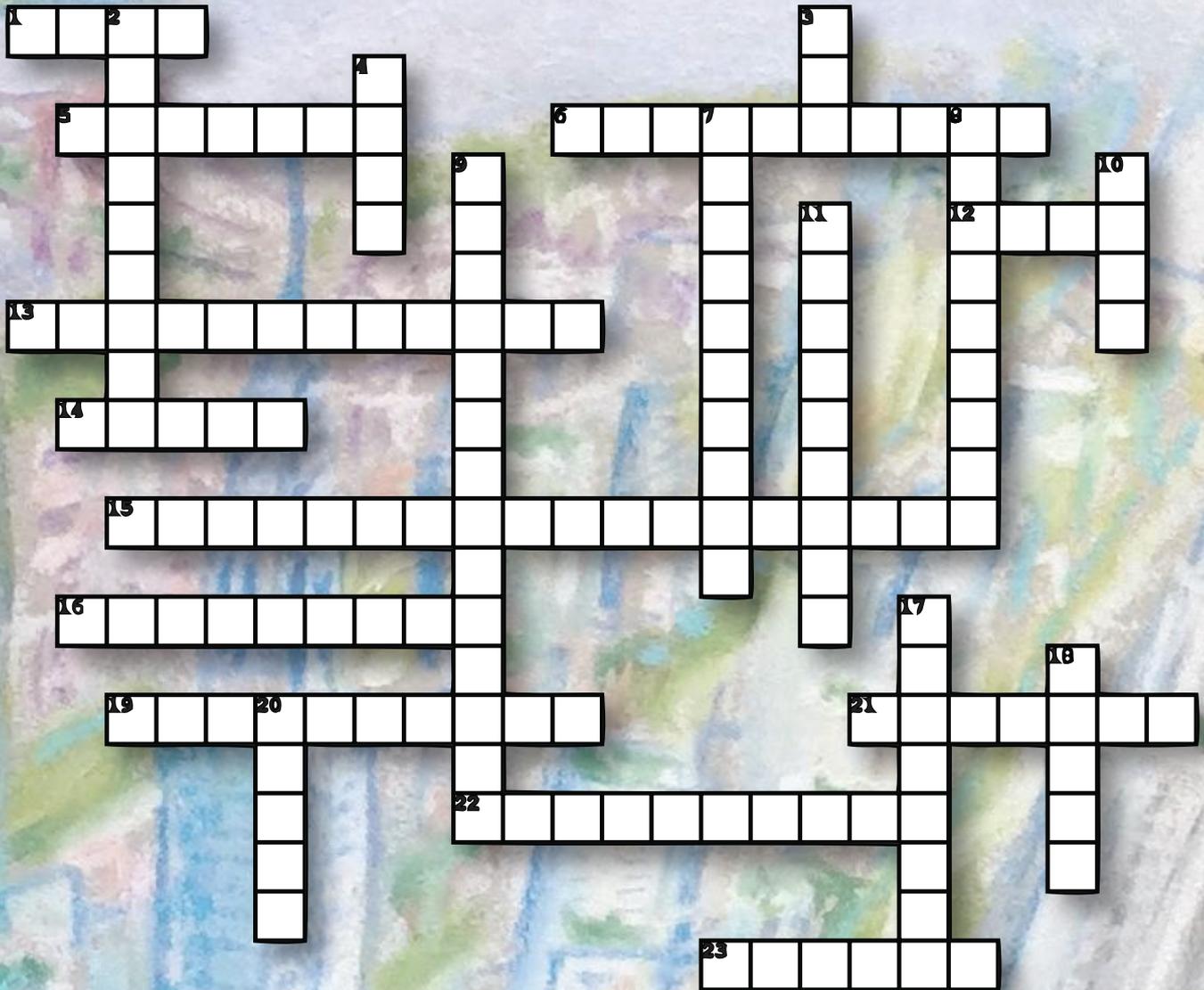
Adaptive management is critical to life after PhD. Your first employment opportunities are unlikely to be ideal, but the strategy is to progressively increase the percentage of time spent doing what you want to do.

Tip 3:

The strength of historical disciplinary boundaries is inversely proportional to the strength of research contribution to planetary health. Collaborate across disciplines if you want to make a difference!

THE PLANET

CROSSWORD



Across

1. Grounds for believing that something good may happen (4)
5. Southern oscillation; warm phase (2, 4)
6. Opposite of investment (10)
12. A woody perennial plant (4)
13. The science and study of the microbiome (12)
14. An overflow of a large amount of water (5)
15. Let nature be thy medicine (5, 12)
16. Entheogenic brew (9)
19. Sympathy and concern for the sufferings or misfortunes of others (10)
21. The state of being in agreement or concord (7)
22. Opposite of the period of human dominance known as the Anthropocene (10)
23. Subject to pressure or tension (6)

Down

2. Relating to the government or public affairs of a country (9)
3. Creative output (3)
4. An intense feeling of deep affection (4)
7. Greek for human flourishing (10)
8. The science that interprets food in relation to health (9)
9. The science of collecting and analysing complex biological data (14)
10. Unit of heredity (4)
11. A biological community of interacting organisms and their physical environment (9)
17. A disease in which the body's ability to produce or respond to the hormone insulin is impaired (8)
18. Linking disease in later life with environmental conditions in early life (5)
20. Freedom from disturbance (5)

The inVIVO 2020 Meeting

We're organising an Urban Farm Cycle Tour on the afternoon of Wednesday 17th June 2020. Amsterdam's urban farmers will take us on a tour of community gardening projects and we'll have chance to socialise and taste some seasonal snacks. The tour will be 3 hours long and will cost approximately 40 euros pp and this includes the bike hire fees (through a different organisation).

If you'd like secure a place on the Urban Farm Cycle tour, please email Jake Robinson at jmrobinson3@sheffield.ac.uk



A few inVIVO attendees will be camping at the Vliegenbos site in Amsterdam (kindly organised by Dr Jenni Cole). We can't promise but there may be some places still available so if you're interested, send Jake an email to find out more!

To find out more about inVIVO, visit the website:

www.invivoplanet.com

Planetary Health Events

11th Annual CUGH Conference 2020

'Global Health in a Time of Worldwide Political Change'

Washington Hilton Hotel

17-20 April 2020

Washington DC, US

Netherlands Annual Ecology Meeting

11-12 February 2020

Conference Centre "De Werelt", Westhofflaan 2, Lunteren, NL



Planetary Health Alliance (PHA) Northern Europe Regional Hub

Students at Royal Holloway, University of London have created a website to help planetary health students in touch with each other:
<https://studentsforplanetaryhealth.com/>

There are also plans for a workshop on student campus action for planetary health at the inVIVO meeting in June!

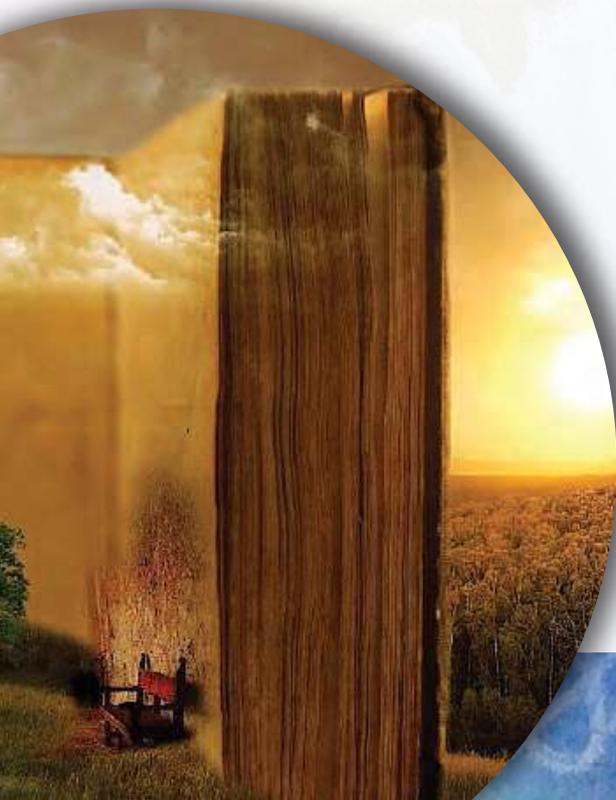
THE PLANET'S

Media Picks

Media Recommendation:

Check out the new Planetary Health reading list on the inVIVO ECR network page:

www.invivoplanet.com/early-career-network



THE PLANET'S

ECR Competition!

Congratulations to Danielle McCarthy - PhD student at Queens University Belfast who won The Planet's crossword prize!

The prize: Free Registration to the inVIVO Planetary Health Conference in Amsterdam 2020!

To find out more about inVIVO, visit the website:

www.invivoplanet.com

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