PhilInBioMed

THE MAGAZINE

- October 2019 -

Come together

Dear PhilInBioMed members,

Many of you have made their way to Bordeaux this month to attend the 2nd PhilInBioMed meeting. Those who could not attend can read about the meeting here. Other PhilinBio news include publications, meetings and a turtle.

If you would like to share anything with the network write to contact@philinbiomed.org.

Cordially, your
PhilInBioMedMagazine team

For the first time a poster session was held at the PhilInBioMed meeting. The posters were also on display during coffee and lunch breaks, leaving ample time to study and discuss them.

Successful 2nd PhilInBioMed Meeting in Bordeaux

For the second time the international PhilInBioMed community met in Bordeaux to present, discuss and share new research initiatives and interdisciplinary projects. Plenary speaker Eugene Koonin (NIH) got the meeting started with a talk on the *Evolution of Complexity through Conflict and Cooperation*. Other presentations explored the robustness of the Weismann barrier in germ line regeneration, looked at a change of perception in phylogenetics or delved in to the mysteries of sexual desire in the lab and in the clinic.

The day was concluded with a poster session, a first for a PhilInBioMed meeting. Though not yet a common feature of philosophy conferences, many candidates accepted the challenge of showcasing their research in a condensed and graphical form. The success of the session vindicated their efforts. Livley discussions were held not only during the official poster session, but also during the coffee and lunch breaks, where the posters were on display.

The second day of the PhilInBioMed meeting was opend by Elliott Sober who presented ways how CRISPRs can be used to fight malaria. Other talks ranged from the importance of the mobility of immune cells to the importance of being the right size. At the end of the day a round table was held to discuss the possibilites of building a career at the interface between philosophy and science. While some orators were optimistic that interdisciplinary positions were out there, others cautioned that it was easier to be hired as a philosopher and then turn to science, than to look for an interdisciplinary position right away. In the end everybody agreed that most of all you have to like what you do, for only then will you be good at it. The meeting was closed by Richard Creath, who is organizing the 2020 PhilInBioMed meeting, which will be held in Arizona.

How we give value to data

The journal *Nature* celebrates its 150th Birthday this year and on this occassion the editors have invited a number of anniversary articles on how the past 150 years have shaped the science system. PhilInBioMed member Sabina Leonelli has been invited to reflect on the evolution of data.

In the comment Leonelli highlights how data have turned from stable entities collected by individuals into global goods, used to address political, societal and environmental issues. The collection of data has increased in scale by the turn of the twentieth centry as the rise of nations and global trade demanded for a quantification and comparison of societies and goods.

Today huge sets of data are seen as a mining field for discovery and the task of keeping data collections up to date and well annotated, is not only costly and laborious, but becomes more and more essential to any kind of research. With more data circulating, the risk of manipulation and false information increases. But even if the interpretation of data happens in good faith, it is never a neutral act.

Keeping track of when and under which circumstances data has been collected, can help build more robust records of judgement. Therefore, Leonelli urges to reevaluate the role of data stewards (technicians, archivists and curators) who merely preserve the information to knowledge creators who can enhance the accountability of future data.

Upcoming

November 2019

18th - 19th Conference Mind-Body, Bordeaux, France

20th Federica Russo, What can technology do for you?, Bordeaux, France

December 2019

17th Phyllis Illari, Why do we need evidence of mechanisms?, Bordeaux, France

January 2020

20th -21st 2nd Philosophy of Cancer Biology Workshop, Bordeaux, France

February 2020

17th Workshop on aging with Thomas Kirkwood, Bordeaux, France

Call for submissions to a topical collection on replicability

Reproducibility of research findings has always been considered the cornerstone of experimental science. Yet, in the last decade, the so-called "replicability crisis" has put this principle into question, plunging science into a deep epistemological crisis. If scientific studies are not reproducible, can we trust them?

So far, the discourse about causes, extent and solutions of the replicability crisis has been firmly in the hand of (meta-)scientists and methodologists. However, the crisis is entangled with core philosophical problems, such as the foundations of statistical inference, the role of values and bias in scientific reasoning, and the social structures and conventionsof science.

The *European Journal of Philosophy of Science* (EJPS) is now preparing a topical collection on the Philosophical Perspectives on the Replicability Crisis. The volume is edited by Mattia Andreoletti and Jan Sprenger, both from the University of Turin. Submissions are accepted until the 31st of December 2019.

This special edition will show how philosophical analyses shed light on the causes, the nature, and the consequences of the crisis. It will also provide a critical perspective on existing solutions and contribute to developing new ways out of the crisis. In this way, philosophers can demonstrate the relevance of philosophical analysis for scientific practice, enter a constructive dialogue also with (meta-)scientists and methodologists, and pave the way for fruitful cross-disciplinary collaborations.

Collaboration chronicle: Ecology, evolution and the genome

In this edition of the collaboration chronicle philosopher Stefan Linquist and biologist Ryan Gregory both Associate Professors at the University of Guelph in Ontario, Canada share their interdisciplinary work experience.

Members of the genome ecology working group are, from left, PhD student Tyler Elliott, Prof. Stefan Linquist, Philosophy; Profs. Ryan Gregory and Karl Cottenie, Integrative Biology; PhD student Brent Saylor; and Prof. Stefan Kremer, director of the School of Computer Science. Photo by Martin Schwalbe

Stefan Linquist is a philosopher of science whose research interests include ecology, genomics, evolution, and psychology. Ryan Gregory, an evolutionary biologist by training, leads a lab that focuses on the evolution of the genome at large and the cellular, organismal, and evolutionary implications thereof.

Both of them are part of an interdisciplinary working group focusing on genome ecology. The group brings together philosophers, biologists and computer scientists. They meet regularly to elucidate how an organisms' genetic machinery is assembled and operated.

Could you explain in a few words the topic of your collaboration?

Ryan: We have worked together on a number of different topics (much of it as part of a very productive interdisciplinary working group), with the main ones having to do with transposable elements and "junk DNA" within genomes. This touches on several major philosophical topics such as levels of selection in evolution, concepts of function, adaptive vs. non-adaptive explanations in biology, the distinction between "ecology" and "evolution", and the history of genetics.

Stefan: Our research collaboration started with an analysis of the distinction between junk vs functional DNA. Ryan drew my attention to the various uses and abuses of function concepts in the fields of molecular biology and bioinformatics. Our first paper was a criticism of these sloppy habits. We then expanded our research group to include an ecologist (Karl Cottenie) and a computer scientist (Stefan Kremer) along with two of their grad students at the time (Tyler Elliott and Brent Saylor). Our research expanded accordingly and we continue to meet on a weekly basis. As a group we have published articles on the existence of ecological laws, on the distinction between ecology and evolution, and several papers on genome-level ecology. That is, on the application of ecological concepts, models, and methods to structures within the genome, especially to mobile genetic elements (i.e. transposons).

How did you meet?

Stefan and Ryan: Our first introduction was through a colleague here at the University of Guelph. In 2009, we both volunteered to be on the organizing committee to celebrate the bicentennial anniversary of Charles Darwin's birthday, which coincided with the 150th anniversary of *The Origin*. We soon realized that we had a number of common interests, and not long after we began co-teaching a graduate course in Philosophy of Biology, which has been offered almost every year since. We also started working together on various conceptual projects relating to evolutionary biology and genomics.

Could you each describe what your collaborator brings to this joint work?

Ryan: Philosophers have specific skills and approaches that are extremely useful when dealing with complex conceptual issues. A few examples would include the ability to critically assess a claim and to identify its

underlying assumptions, having a broad knowledge of how relevant conceptual questions have been tackled in philosophy, and synthesizing ideas from a range of disciplines. Philosophers also do a lot of reading and thinking about the basis of ideas – much more than the average scientist does. Stefan brings all of that to the table, along with an ability to converse effectively in scientific terms.

Stefan: We have overlapping interests in a surprising number of theoretical subjects and our "methods" (so to speak) for investigating those topics are very similar. Ryan is effectively a philosopher as far as I am concerned, only he runs a lab as a part of his day-job, and knows more biology than most philosophers whom I interact with. However, there is something essential which he brings to our collaboration. Ryan is up-to-speed on fast moving scientific debates, which is likewise true of the other scientists whom I collaborate with. It isn't just that scientific debates move rapidly. More important is that key theoretical objections are often not recorded in print because scientists aren't rewarded for publishing criticisms of one another. So if my access to scientific debates were limited to publications, my understanding of the issues would be impoverished and my contributions would run the danger of being outdated. This is a blind spot for many of us in philosophy. Rarely does a questionable philosophical idea go unchallenged in print so we assume that things must be the same in other disciplines. In fact the opposite is often true. So I greatly rely on my scientific collaborators to keep our work current and for introducing new research topics.

What are the obstacles that you have met during your collaborative work?

Stefan: We spend a lot of our working time developing a shared vocabulary. Any philosopher of biology knows that theoretical terms in evolution, ecology, and molecular biology are open for refinement. At the same time, some of the terms that we use routinely in the philosophy of science (e.g. reduction, law, information, computation, selection, functional) can have specific but different meanings in a given scientific discipline. So it is easy to talk past one another, but very important not to do so.

Ryan: Philosophers and scientists do not always speak the same language, as it were. We have learned that sometimes a debate has more to do with how a particular term is used in our respective disciplines than any actual disagreement. There is also a need to become more familiar with the literature, ideas, and methods outside of one's professional comfort zone, which takes some time.

Do you have suggestions as to how to improve collaborations between scientists and philosophers?

Stefan: It needs to start with undergraduate education. My sense is that it would be fairly easy to convince most biology departments to incorporate philosophy courses into their curricula. I don't mean courses in ethics, although those can obviously be useful as well. Rather, I am thinking about courses that cover topics in the philosophy of science as well as in the philosophy of nature (to use a helpful distinction from Godfrey-Smith). The harder sell, I suspect, will be to philosophy departments which must supply those resources. Philosophy chairs and faculty members sometimes regard such "service" courses as of secondary importance. However, I suspect that greater integration with the sciences might actually be necessary for philosophy's survival as a professional discipline.

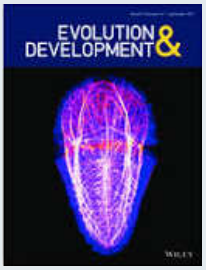
Ryan: Mutual respect is key. There are scientists who consider philosophy antiquated and unproductive, and there are philosophers who are skeptical of the efficacy or even the motives of science. I think both attitudes are deeply misguided. Likewise, a deference to the other field can be problematic. There are still scientists who consider Popper to be the authority on what counts as good science, and there are philosophers who build their work around scientific examples that are actually far from universally accepted among researchers. It has been fascinating to discover the (sometimes opposite) ways that philosophy and science perceive each other and to realize how useful they can be to each other with a proper level of mutual understanding.

What are the most exciting questions that you would like to address in your future collaborations?

Ryan: Many of the concepts and questions that we have explored in the context of genomes can be extended to other areas. For example, I am quite interested in applying our ideas about levels of selection and the ecology/evolution distinction to the issue of cancer. There are also some very interesting historical and sociological questions relating to the way "junk DNA" has been treated and described by scientists with different training backgrounds and over time. I suspect that we will be kept busy by our collaborative work for a while yet.

Stefan: We have developed a useful framework for distinguishing ecological from evolutionary approaches that applies nicely to genome-level ecology. Meanwhile, ecological thinking seems to be branching out in other areas, such as in in microbial ecology and the ecology of cancer. To me, it looks like some of the same obstacles that were plaguing genome-level ecology are currently plaguing these fields. Hence I can foresee some productive applications of our existing theoretical work to these domains. More ambitious perhaps, I would like to co-author a book with Ryan on philosophy for biology (as opposed to philosophy of biology), which would be directed at science students and researchers.

The influence of symbiosis on evolution in general and herbivors in particular



Two new articles have been published by Scott Gilbert. The first entitled developmental symbiosis facilitates the multiple origins of herbivory, was published three months ago in *Evolution & Development* (DOI: 10.1111/ede.12291). It details how developmental bias towards particular evolutionary trajectories can be facilitated through symbiosis. Gilbert takes the cases of herbivory and posits that the behavioral and morphological manifestations of herbivorous phenotypes must be preceded by the successful establishment of a community of symbiotic microbes that can digest cell walls and detoxify plant poisons. The ability of holobionts to digest plant materials can range from being a plastic trait, dependent on the transient incorporation of environmental microbes, to becoming a heritable trait of the holobiont organism, transmitted through the maternal propagation of symbionts or their genes.

The second article was published recently in the Journal of Experimental Zoology (DOI: 10.1002/jez.b.22903) Here Gilbert revisits the four essential transformations in the evolution of life as stated by John T. Bonner: the emergence of the eukaryotic cell, meiosis, multicellularity, and the nervous system. Using the notion of the holobiont life cycle, the paper attempts to show that these evolutionary transitions can be accomplished through various means of symbiosis. In the conclusion Gilbert argues that he holobiont life cycle is a critical node and pleads to search for more ways to promote the survival and thriving of diverse life on this damaged planet.

Unhinged

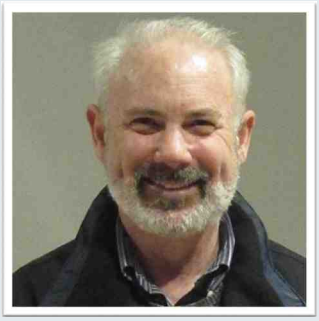
Biomarkers for health, aging and healthy aging

The dictonary defines aging as the process of becoming older. But what does becoming older imply? What are universal indicators for aging and how can the rate of aging be measured? Answers to these questions are essential if the effectivness of treatments ment to slow aging are to be assessed.

The book Biomarkers of Aging highlights current biomarkers in use, with all their benefits and shortcomings. The volume comprises five chapters, one of which was written by PhilInBioMed members Jonathan Sholl and Suresh Rattan from the University of Aarhus.

Sholl, a philosopher, and Rattan, a biogerontologist, take a look at biomarkers for health and healthy aging. Together they reflect on survival, aging, age-related diseases and death. Leading ultimatley to the conclusion that the most effective strategies for healthy aging may come from the outside.

Turtle of honor



PhilInBioMed member Scott Gilbert was given a rare distinction: a newly discovered species of fossil baenid turtles was named after him.

The turtle *Saxochelys gilberti* was discovered in the North American Hell Creek Formation. It is one of 26 turtle species that were found so far in this series of fresh and brackish-water clays, mudstones, and sandstones.

Saxochelys gilberti is described by Lyson *et al.* in the *Journal of Vertebrate Paleontology.* It is estimated to have lived 66-million-years ago and presents sexual dismorphism with larger females.

Gilbert, who became a turtle enthousiast when studying the development of the turtle shell, felt it was a wonderful honor that had been bestowed upon him.

Picture by Andrey Atuchin showing a pair of Saxochelys gilberti *in their presumed natural habitat with its contemporaries.*

Share what works

The aim of the PhilInBioMed network is to promote the cooperation of philosophers with scientists and medical doctors. But it is one thing to want to collaborate with researchers from a different field, it is yet another to find partners interested in such an interdisciplinary exchange.

However, it is possible to get scientists excited about philosophy and vice versa. The members of our network are interacting with reserachers outside their own domain every day. But how did they get started?

The PhilInBioMed magazin is therefore starting a new series of "best practices: share what works". Tell us in a few words what you found the most successful strategy to get others interested in a collaboration.

If you would like to share what worked for you or if you have an idea of what could work, please write to contact@philinbiomed.org.

3 questions for Diane Pataki

Diane Pataki is a Professor of Biology, Vice-President for Research and Adjunct Professor for City & Metropolitan Planning at the University of Utah. Her research focuses on human-environment interactions related to urban vegetation, resource use and landscape design. She has won several awards, notably in 2008 the James B. Macelwane Medal from the American Geophysical Union.

1. What sparked your interest for philosophy of science?

I'm an urban ecologist who studies the functioning of cities from an ecological perspective. My sub-discipline largely grew out of the biological sciences, but most scientists who study cities as ecosystems quickly encounter limits in the application of the natural sciences for understanding complex configurations of human and nature. Urban ecology sits squarely at the interface of nature and culture, and ultimately challenges the concepts of nature on which ecology is based. I've found philosophy of science to be enormously informative for analyzing solutions to problems at the nature-culture interface, and also for grappling with the ethical issues that are emerging as ecologists and other scientists increasingly participate in urban planning and design. The integration of ecological science and planning / design has potential for finding new solutions to urban problems, but ecologists will need to learn lessons from other disciplines to navigate expanded roles as scientists-practitioners.

2. What is your main research focus?

I study the role of vegetation in cities in terms of the impact of urban landscapes on the physical environment, as well as other plant-human interactions that affect human well-being. My lab measures urban landscape water use in irrigated and water-limited cities, quantifies the role of plants and soils in carbon and nitrogen cycles, and collaborates with social scientists to understand human perceptions of biodiversity, plant functional types, and ecological processes. While we often study the impacts of urban designs post hoc, we also engage in projects in which scientific experiments are incorporated into urban plans and designs a priori. This is a rapidly expanding field that is increasingly concerned with social equity, social justice, and modes of community engagement. Like most ecologists, my training is largely in the natural sciences and the historical traditions of studying natural or lightly managed ecosystems. Incorporating ecological science into understanding, and also designing, human-dominated and built urban spaces can offer new solutions to the challenges of living in modern cities, but it also requires adaptations in the practice of ecological science.

3. What are the topics you want to explore in the future?

I'm interested in methods of understanding concepts and human experiences of managed, unmanaged, and designed urban nature. While it's common in urban ecology to link methods and epistemologies in social and natural sciences, I think the study of urban nature could further benefit through collaborations with the humanities. Actor-network theory can provide an interesting lens to study human-nature interactions from this perspective. Increasingly, I've found that urban nature impacts humans in ways that are not easily accessed through objective methods. Furthermore, "col-laborations" between humans and nature, such as the mutualisms that led to plant and landscape domestication, may provide new explanations for the ecological assembly of urban landscapes. I'm also interested in exploring the ethical dimensions of scientist-practitioner models, as urban scientists increasingly engage in decision-making and design processes. Ecologists help create urban spaces by designing experiments that serve a dual purpose: to produce knowledge but also to provide viable social and livable places. We'll need to explore the implications of these methods both for the practice of science and for their ethical ramifications in terms of human outcomes.