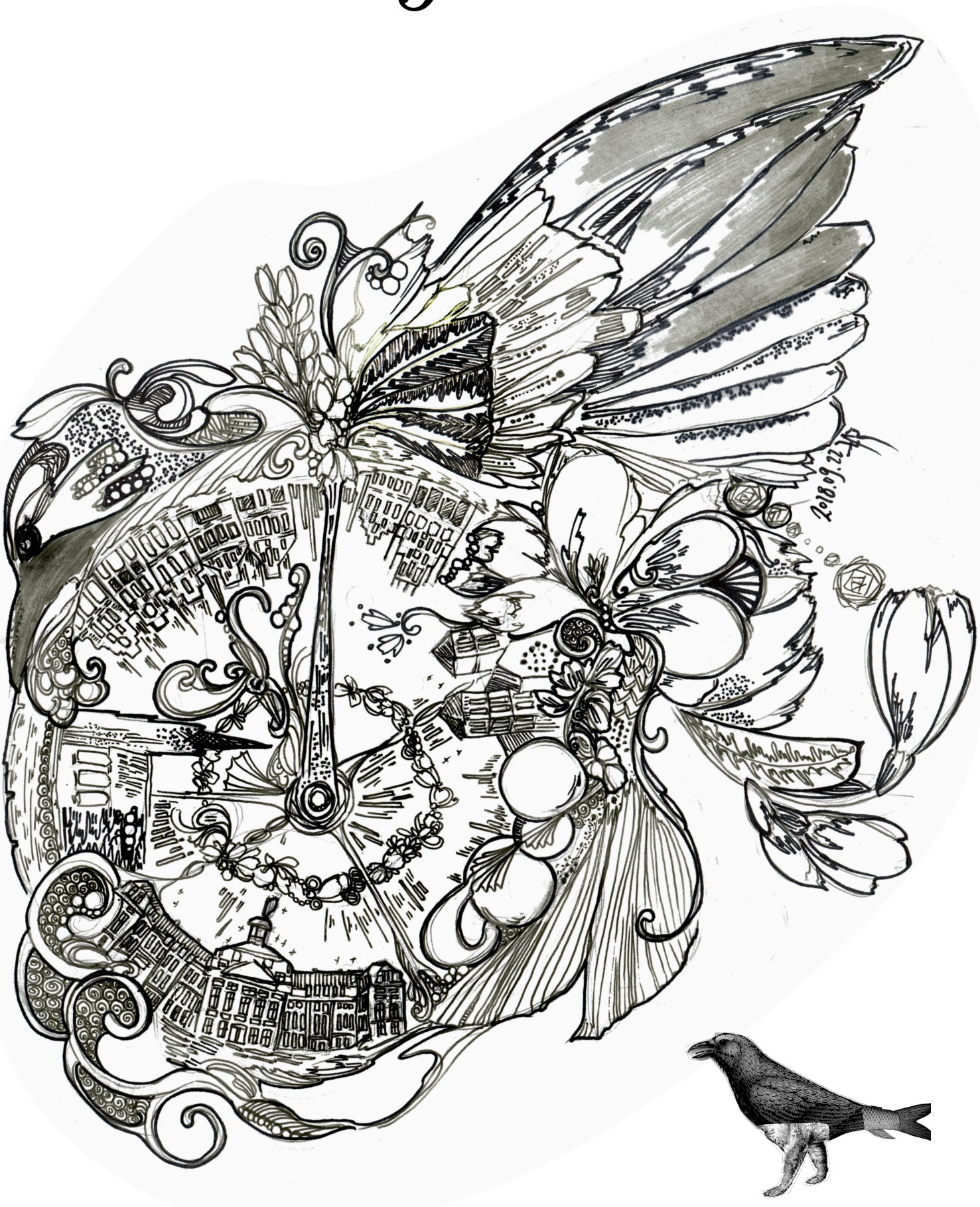
Issue 3 October 2018

# The Eyebrow



## About the MGSE

The Münster Graduate School of Evolution (MGSE) is an interdisciplinary association of researchers of the WWU, bridging the Faculties of Biology, Medicine, Geosciences, Philosophy, and Mathematics. Combining the already existing strength in evolutionary research at the WWU, the MGSE provides an interdisciplinary network of scientists working on diverse topics in evolution.

The MGSE provides a structured study program for doctoral students of the different faculties in the general field of evolution. The program ensures interdisciplinary networking. The doctoral students of the MGSE address a broad range of questions, from the evolution of earth to the evolution of evolutionary theory.

Since its founding in 2011, the MGSE has aimed to sustainably improve the curricula of the disciplines involved. It has demonstrated that doctoral training in a multi-disciplinary research landscape can be structured based on a unifying conceptual framework. Thereby, the MGSE serves as a role model or a novel approach to doctoral training.

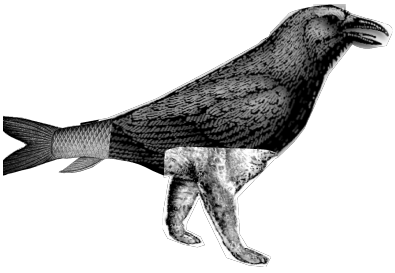
A central element of the MGSE is the Evolution Think Tank (ETT). Similar to an idea mining approach, the ETT provides a framework for the development of sustainable interdisciplinary research and education structures. Activities within the ETT include the invitation of internationally outstanding scientists and the organisation of workshops and symposia for scientific exchange.

The Eyebrow is financially supported by the Evolution Think Tank of the MGSE and the DFG Research Training Group 2220 EvoPAD.

The opinions expressed in the Eyebrow are those, solely, of the contributors themselves and do not, necessaraly, reflect the views of the editorial board, the MGSE, the University of Münster, or funding bodies.

## the GMO bird

Gruntled Majestic Organism - that is the name of the Eyebrow's logo. As the stories will have it, it began with the maddening of scientists. The farmers stood with their hayforks and barrels of oil, yet the madmen in their ivory tower refused to listen. "Nay!", they said. "We shall combine the best of beasts into a single creation!". The legs of the cheetah, the fins of the fish, the wings of the crow - fly, run and swim. Fantastic it was. And bestowed upon it, the greatest trait of humanity - the human eyebrow.



# MÜNSTER GRADUATE SCHOOL OF EVOLUTION

RTG 2220 EvoPAD

Santander UNIVERSITIES

## About the Eyebrow

The magazine is intended to function as a platform and forum for interaction between PhD students and associated labs of the MGSE. The Eyebrow is a magazine that is primarily intended for PhD students to express their ideas, or lack of them.

The magazine is intended to inform about upcoming and past events that are of relevance of the MGSE environments. Moreover, we will have a lab reportage in each issue where the work of an associated MGSE lab will be featured. This will preferably be done in context to the theme of the given issue and by the MGSE PhD student belonging to the lab in question. There is intention to include reportage articles (eg stress in academia), next to essays in future issues.

We need diversity of skills and interests. If you enjoy drawing, layout, poetry, popular scientific book/film review, editing, comics, but not writing essays or articles, you are still very welcome and needed. You can contribute just once and that is fine, you can even contribute multiple times.

If you are a PhD student - within or outside the MGSE - and want to write or express something, or for any questions you may have, make contact: eyebrow.mgse@gmail.com.

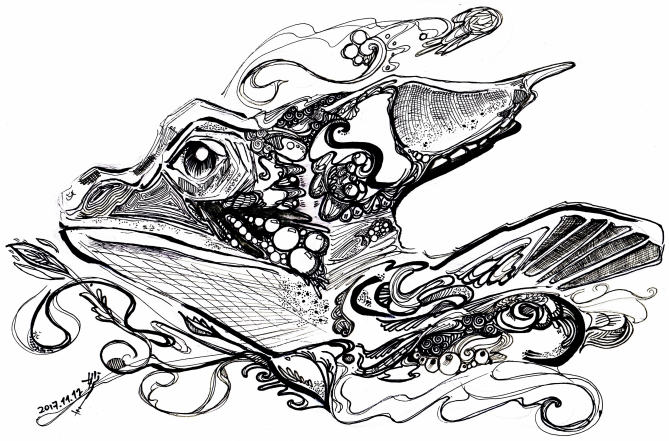
EDITORIAL

Welcome to the third issue of the Eyebrow

We wanted to focus on science in Münster in this issue as many of you who hold the magazine are novel to the Eyebrow, and perhaps even to Münster itself. Being a student driven magazine, molded and yielded from the interdisciplinary environment of the MGSE graduate school, also this issue is a solid mix of perspectives and backgrounds. We have made the Münster Evolution Meeting (MEM) our theme, to entertain also new readers. The MEM conference is the first of its kind and has an aim to strengthen the bonds that exist within evolutionary research, primarily the network within Germany. Science is ultimately an international endeavour and academia an international workplace. It is however not to be ignored that geography matters as infrastructure and logistics are instrumental in bringing people together and enabling discussions. Despite the high hopes of technology and the treasures of well written literature, one needs the solid discussions to take place in real life to push forward. Therefore we, the Eyebrow, feel glad that the many established evolutionary biologists elsewhere may come to our city. We hope this issue may enlighten you of the graduate schools, a little bit of Münster, as well as entertain you if you would feel alienated during a talk of a far away topic. More than anything, we hope you will encourage your own associates to write.

In the mid-spread we announce the winners of the Eyebrow photography competition. We congratulate the winners and have published the winning photographs in colour. Yes! We stretched the budget this time, for the pictures are truly impressive. Moreover, we report on a new study program, NC3, that involves many current and future PhD students of the MGSE. As always, there are essays and articles from contributing PhD students, but we now declare that the Eyebrow is open to all – whether you are a PhD student or not and we welcome guest writers from other universities. We, as Münster itself, wish to expand the network. However, we encourage undergraduates, master students, PhDs, and postdocs. We seek the rough diamonds with the unpolished truths.

Speaking of diamonds - in the last issue we received lots of praise for the artwork that accompanied many of the texts. We are again so fortunate to receive artwork from Miao Sun. In this issue, however, we dedicated two pages entirely for her work as it deserves full scale admiration. We hope this pleases as well as inspires our readers.



By Miao Sun

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With the exception of the GMO bird, pictures that are uncredited are all from Pixabay.

Scrabble Brexit map originates from the BBC and manipulated multiple times via twitter.

# News

## UPCOMING CONFERENCES

### 1st Münster Evolution Meeting, 4-6 October 2018, Schloss

The Münster Evolution Meeting (MEM) aims to be a forum addressing questions for evolutionary biologists across different fields (e.g. botany, zoology, microbiology, medicine, philosophy) and levels, from molecules to societies. Besides having the opportunity to share and learn about excellent research in evolutionary biology, MEM also aims to bring together evolutionary biologists working in German-speaking countries in a smaller setting to allow for networking and discussion. For more information, visit the website at:
https://www.uni-muenster.de/Evolution/MEM/main.shtml

### Women in Science Network Conference 2018

26-27 November 2018, Max Planck Institute for Molecular Biomedicine, Münster
EvoPAD is partner of the Women in Science Network Conference Münster 2018. The WiS Network conference will include keynote presentations, scientific talks, poster presentations, and networking receptions with refreshments including a speed-dating. This meeting will be an opportunity for all people interested in gender diversity and at all stages of their career to participate and share their science and personal career experience in a supportive and encouraging environment. For more information, visit the website at:
https://wis-2018.wwucampus.de/singlecongress/wis

## UPCOMING COURSES, WORKSHOPS, AND LECTURES

### MGSE lecture series "The Growth of the Evolutionary Thought"

The lecture series will start on 29.10 with a talk by Prof. Dr. Harald Strauß titled "Early earth, early life – Co-evolution of life and the environment recorded in the rock record". Lectures take place on Monday evenings (17:00) in Seminar Room 1 of the Northern Kavaliershäuschen (Schlossplatz 6).
The program can be found online at: https://www.uni-muenster.de/Evolution/mgse/seminars/tgotet.html

### Science Pub

15 October 2018, 19:15 at Aposto (Alter Steinweg 21)
Dr. Erwin Amann (Chair of Microeconomics at the University of Duisburg-Essen) will give a talk titled "Internationale Verhandlungen im Kontext der Unverbindlichkeit". More information about the Science Pub can be found at: https://www.uni-muenster.de/Evolution/mgse/sciencepub/index.html

### Retreats

MGSE Retreat 6 – 8 November 2018
The MGSE PhD Student Retreat will take place in Dortmund. This annual event is an opportunity for the PhD students in the MGSE to present and discuss their research with peers.

## LOOKING AHEAD

21 – 22 February 2019
There will be a workshop on "Experimental Evolution" hosted by EvoPAD. More information will follow in the coming months.

28 – 29 March 2019
There will be a joint Symposium of MGSE, RTG 2220 EvoPAD, and CRC-TRR 212 NC3. More information will follow in the coming months.

May – July 2019

From May – July 2019 Professor Sara Brownell from the School of Life Sciences at Arizona State University will visit as a Fellow of the Evolution Think Tank. Sara is a trained neuroscientist turned full-time education researcher who teaches undergraduate biology while studying biology education. You can find her website here: https://sols.asu.edu/sara-brownell

# MGSE workshop 25-26 June 2018

by Nicolle Demandt

On the 25th and 26th of June 2018 the MGSE workshop "It's not my fault: How the social environment shapes individual behaviour and vice versa", was held and organised by the ETT-fellows Christina Grozinger and Michael Hennessy.

Around 20 participants attended the two-day event that offered scientists working on social behaviour in both invertebrates and vertebrates the opportunity to address how the social environment shapes, and is shaped by, the behaviour of the individual. In addition to PhD students and PI's of the MGSE, Clare Rittschof, assistant professor at the University of Kentucky, was invited to participate as a guest in the workshop and give a public lecture.

Three public lectures were given on the first day of the workshop. Michael Hennesy kicked off the lecture series, followed by Clare Rittschof and last but not least Christina Grozinger. The two-day workshop was unofficially ended by a seminar giving by Dr. Jolle Jolles, whose talk about the interplay of personality types and shoaling behaviour touched on many of the topics discussed during the workshop and was therefore the perfect ending to a very productive workshop.

The first day started with an introduction to the topics that would be addressed during the workshop, in the format of three 'big questions'. Participants wrote down questions that fit within the scope of these broader questions, which were then used to start the discussion rounds during the rest of the workshop. The workshop received unusually high praise by the participants for being well organized, but especially for offering a stimulating and informal environment that encouraged all attending to actively participate. Ultimately, this led to a very fruitful and educational workshop, in which all participants learned something new and new interests were sparked.

# Establishment of SFB-TRR 212 NC3 - Niche Choice, Niche Conformance, Niche Construction

by Taylor Rystrom

The niche concept has been explored from increasingly narrow angles, beginning with the idea of an ecological niche occupied by a species introduced by Grinnell in the early 20th century to the more recent explorations of the variety of niches occupied by individuals. Now, with the establishment of the new DFG-funded Collaborative Research Center coined "NC3" in January 2018, researchers from Münster, Bielefeld, and Jena will integrate experimental data and theoretical work across 17 projects, with the goal to redefine the niche concept at the individual level. NewhD students have arrived the last 6 months for projects within the NC3, and wave joined the MGSE. The projects will primarily investigate how individuals are able to adaptively adjust their niche in response to environmental change to maximize their fitness via three mechanisms: niche choice, niche conformance, and niche construction. Niche choice refers to the process by which an individual chooses a niche that matches their phenotype, and niche conformance is therefore the process by which an individual adapts their phenotype to match the environment. Niche construction is the process by which individuals alter the environment to increase their fitness, and they can additionally adapt to the altered environment. These processes act on both ecological and social aspects to form an individualized niche, which is a subset of the species' niche determined by the interaction of the individual with the environment. This CRC has brought an influx of new PhD students to the MGSE from various NC3-aligned projects within the Department of Behavioural Biology, the Institute for Evolution and Biodiversity, and the Department of Philosophy at the University of Münster.

Lena Bohn and Marko Brcaic at the Department of Behavioural Biology are investigating whether individuals that differ in cognitive bias (optimism vs. pessimism) prefer to live in different environments (niche choice), how cognitive bias affects the adjustment to a particular ecological context (niche conformance), and the role of gene-by-environment interactions in becoming an optimist or pessimist, using the laboratory mouse (Mus musculus) as a model species.

Alexandra Mutwill and Taylor Rystrom at the Department of Behavioural Biology are focusing on the social environment to determine how individuals are able to adjust their behavioral and endocrine profile to maximize their fitness in a particular social niche within a dominance hierarchy (niche conformance) in a highly social rodent, the domestic guinea pig (Cavia aperea f. porcellus).

Laura Japke at the Institute for Evolution and Biodiversity will study how different larval and early-life social environments affect the reproductive phenotype of Drosophila melanogaster (niche conformance). By using experimental evolution and chemical ecological and molecular biological methods, Lai Ka Lo and Reshma R at the Institute for Evolution and Biodiversity will explore the impacts of individual immune experience on niche construction and the evolutionary capacitance of the group in the red flour beetle Tribolium castaneum and the role of these processes in evolutionary adaption. For a philosophical perspective, Behzad Nematipour at the Department of Philosophy will focus on the ideas of functionality and fitness benefits to connect how functional phenotypes increase fitness at the individual level through the processes of niche choice, niche conformance, and niche construction, thus working towards the definition of an individualized niche.

We are looking forward to progressing toward an understanding of the many facets of the individual niche over the next three years!

by Miao Sun

# How to choose and attend a conference

Nadja Haarmann

Starting a PhD is a great adventure. One of the most adventurous parts is to prepare, choose, and visit conferences. It is not just the scientific aspect which makes these events something special. Many small things contribute to this experience.

Dear Diary [day √1 ],
I just started my PhD today. It is so exciting! New people, new labs, and my boss told me to choose one from the following conferences: 3rd International Conference on Evolution & Bioengineering (Munich), 15th Conference on Adaptation and Beakology (Galapagos Islands), or the very first Münster Evolution Meeting. It is very hard to decide if you ask me. Well, let's google the cities…

Dear Diary [day Π],
I have decided! Have you ever tried to book a reasonably-priced hotel in the city center of Munich? They don't exist! Especially since we have a budget, and I have to pay everything in advance. The budget and the length of the flight to Galapagos (~3200 €, ~35 hours) are the reason why I will not go there either. It's a pity though because beakology is such a fascinating topic, and our Postdoc Dr. Anon Ymous will have a poster there. Prof. Dr. Bill Smith, founder of Beakology and Beakology Letters, and his former student Dr. Robin Jones will give revolutionary talks. In Germany we say "wie einem der Schnabel (=beak) gewachsen ist" if we talk about something this freely.

Luckily, Münster is a beautiful city with a lot of history and nice bars. I've been told that there is a whole street with bars! Furthermore, it is the first meeting, so we are going to write history in evolution! And I have heard they have a special magazine called The Eyebrow that is written by PhD students. I certainly need one of those! I do not get what the evolutionary significance of the eyebrow is but anyway: Hurray, I am going to Münster!
Well first they need to accept my abstract, but that will not be a problem.

Dear diary [day $2^2$],
Working on the abstract: Let's see, my first experiment did not work – of course not. Hmm, the second partially worked. I think I can make something out of it. I just have to optimize it…
…it is 10 in the evening and I am getting closer. I have done this experiment 27 times already. I changed the conditions 25 times. But the set up works now. I just have to manage three biological replicates. Maybe four or five are better, just to be safe.

The sun is rising and the experiments are done. At last! Now I just have to analyze them. The submission deadline is approaching fast.

Dear diary [dies sex (lat.)],
I think I analyzed the data correctly. I am not exactly sure how to interpret the results, but Anon said it makes perfect sense. At least, there is one person who sees any sense in them. I have to write the abstract. Deadline is tomorrow…

Anon corrected the abstract and it feels like I have to write everything again. Since he was very busy today, it is already six in the evening. A long night ahead of me again…

Dear Diary [Sunday],
The abstract is submitted. Finally. I am going to sleep and maybe I should eat something too. Hmm, maybe not, sleep is more essential.

Dear Diary [Oh happy day],
My abstract has been accepted! I am going to have a poster. It is such an honour! I hugged Anon today and he was slightly confused. I recognized that his nose is shaped like the beak of a cactus finch. Really sweet. And he smells like lilies of the valley.

What I really need now are new clothes. I might meet important people and I do not want to look like a fledgling.

Shopping was really successful! I have three new blouses, four new jackets, two trousers, new shoes and faked glasses. I am very happy, even if I have to starve until the rest of the month (no money left for food). I want to look beautiful and intelligent. Especially because Anon is giving a talk. He is such a big bird in this field.

Now I just have to finish all the experiments I already talked about in my abstract and then I have to make the poster.

Dear Diary [day ?]
Sorry, I have not written for so long. I do not even know which day it is. I'm up late again and the sun is rising. The experiments are done. The rings beneath my eyes are as dark as the feathers of a crow and there are three more days to make the poster. I hope there is some creativity left in my scientific soul!

Dear diary [day ?+3]
Poster is printed. Anon picked it apart several times but maybe his beak is just better than mine.
Even if I could fall asleep while standing, this MEM was the best conference of my PhD life!

# Welcome to Münster

Lars A Eicholt

The famous local musician and professor at the university, Götz Alsmann, once told the story of his mother's first night in Münster. She could not sleep because of a thunderstorm and therefore got up, looked out of the window in the middle of the night and immediately understood
Münster. What she saw was a nun on a bike, carrying an umbrella, riding through the never ending rain. The perfect allegory for Münster: churches, rain and bikes, bikes and even more bikes.

Or in numbers: 500,000 bikes, average 190 rain days per year, and more than 60 churches.
But do not get bothered by the rain. More than 60,000 students from 9 different universities do not mind it and they are -by the way- possibly also the main reason for most of the bikes.
The biggest one of these universities is the University of Münster (Westfälische Wilhelms-Universität Münster in German), which is also the home of the Department of Biology with more than 1,700 students.

The possible most important persona of this faculty was Bernhard Rensch (*1900, † 1990). The professor for zoology and director of the zoological institute of the WWU came to Münster in the first place in 1937 as director of the state museum for natural sciences before he became a professor in 1947.

He was one of the co-founders of the synthetic theory of evolution with his book "Das Prinzip geographischer Rassenkreise und das Problem der Artbildung" ("The principle of geographic superspecies and the problem of speciation") in 1929 while he was a museums curator in Berlin. A position he had to leave later in 1937 as he refused to join the Nazi party.

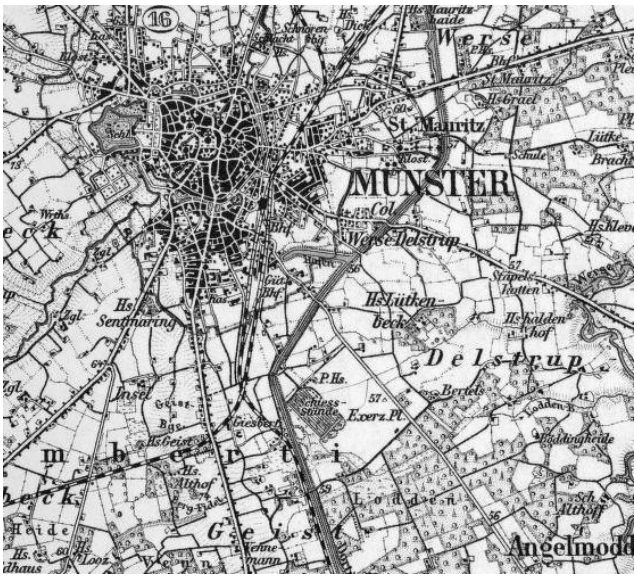
In his book he shed new light on how to define a species (as fertile inter se and morphologically identical). He defined the term "superspecies" as a group of local forms that evolved from one another. Closer local forms in this superspecies are fertile with each other, but not with local forms more distant in the same superspecies. He therefore contributed a lot to the concept of specification dependent on geographically isolation. This work was mostly inspired by a large zoological expedition in 1927 to the Sunda Islands in the Malay archipelago. He also contributed the Rensch´s rule to explain the relation of the extent of sexual size dimorphism and which sex is the larger one.

On his 80th birthday the Department of Biology launched the annual Rensch lecture to honour his work and invited a range of great speakers in the last years like Christiane Nüsslein-Volhard, Bert Hölldobler, Ernst Mayr and Diethard Tautz to name just a few.

The biggest "biological highlight" can be found in the LWL-Museum for natural sciences. Its foyer is the home of the largest petrified ammonoid in the world (174.2 cm diameter!). It was found in 1895 in a quarry close to Münster and was descripted as Pachydiscus seppenradis by Hermann Landois (*1835, †1905), one Bernhard Rensch´s predecessor as Zoology professor. He was also founder of the first local zoo, whose remaining buildings can still be found between the Institute of Evolution and Biodiversity and the Aasee.

The zoo was later relocated to an area at the city border to have more space and is now next to the LWL Museum for Natural Sciences (the one with the fossils!). Both are really worth a visit, especially because they can be combined so easily.

But when strolling through the zoo, do be wise as a nun; bring an umbrella, just in case. Just joking, we are prepared: it is an "all-weather zoo".




Snippet from map of Münster, by Reichsamt fur Landesaufnahme, published 1893. You can notice that the Aasee is not yet present.

# Max Planck in Münster

Maryna Samus

Dear Readers,

Welcome to the imaginary tour of Münster Science. Our next stop is the institute which has a name instantly associated with exciting discoveries and high-quality science – the Max Planck Institute or the MPI. It is part of the Max Planck Society, which has gained its world-leading reputation and recognition by the 33 Nobel Prizes that have been awarded to its researchers. The MPI in Muenster has not had any Nobel Prize winners. Yet. But it is only a matter of time, since the MPI has attracted scientists who are world-recognized experts in their research fields. Founded in 2001 as the Max Planck Institute for Vascular Biology, it later expanded and changed to its current name the Max Planck Institute for Molecular Biomedicine. Nowadays it has three departments (Tissue Morphogenesis, Cell and Developmental Biology, and Vascular Cell Biology) and nine research groups working in fields such as vascular biology, stem cell research, regulatory genomics, RNA biology, and biomaterials. The MPI currently hosts more than 150 scientists. Germans, Indians, Koreans, Mexicans, Chinese, Japanese, Spanish, Dutch: All together, researchers of approximately 30 different nationalities work daily side by side, bringing their own way of thinking and vision in answering scientific questions.

Research at the MPI is tightly integrated into Münster science, with fruitful collaborations established between the MPI and the University of Münster. One of such examples is a CiM-IMPRS PhD graduate program, which is the fusion project between the graduate school of the 'Cells in Motion' Excellence Cluster and the International Max Planck Research School. The program is famous far beyond Münster and Germany, with more than 1000 applications received each year. The lucky selected ones not only join the research groups within the MPI or the University, but also visit various lectures, seminars, workshops, and career talks. Apart from that, the graduate school students organize the annual interdisciplinary CiM-IMPRS Graduate School Meeting, held at the MPI, where they invite expert scientists from different fields, including Nobel Prize winners, to give talks.

Society often has a very romanticized idea of what scientific research is, and the MPI in Muenster is one of the places where reality does live up to expectations. Have you ever wondered how immune cells communicate with endothelial cells of blood vessels in order to pass into the tissue and fight the infection? Have you been excited about the molecular mechanisms that drive blood vessel formation and regulate this process during development and in the context of disease? Or maybe you are interested in how cells navigate through the complex interplay of transcription factors and chromatin remodeling to go all the way from totipotency to differentiation and how one can reverse this process? These and many more questions keep the MPI scientists awake at night. By the way, if you have heard rumors that the researchers here often stay at the institute overnight, as an insider, I can say that this is normally not the case. However, when the experiments require staying longer or coming to the lab on the weekend, the MPI researches won't look at the clock. For their work they will give time, effort, and sometimes even blood (when needed for human cell isolation) without hesitation.

The Godess Minerva, the Max Planck symbol, provided by the author

But while the scientists here are 'burning' for their projects, the MPI, with its spacious bright labs equipped with the modern machines and devices, takes care to ensure that its 'worker bees' have excellent conditions for their research. The MPI also has its own Mass Spectroscopy Facility, Electron Microscopy Facility, the BioOptic Service Unit, the Flow Cytometry Unit, and the 3D-Printing Service, which provide analysis and support to all scientists in the institute. Since research here is often done on animals, there is also the Zebrafish Facility and the Animal House, which hosts various strains of mice, some rabbits, and a couple of rats. On the latter no experiments are done; apart from being the favorites of the animal caretakers, they are used to teach students how to handle rats. Work in such excellent conditions combined with the endless dedication, persistence, and enthusiasm of the MPI scientists, usually results in research papers published in prestigious scientific journals such as Nature, Cell, Blood, and Journal of Experimental Medicine, and each year the most outstanding MPI researcher is selected to receive the MTZ®-MPI-Award, consisting of a certificate and prize money of € 2,500.

With that being said, our imaginary tour is slowly coming to an end. But if you are among those who seek knowledge, are curious about nature, and are passionate about research, you are always welcome to join the MPI team or simply visit us here at the MPI, where the warriors of science turn today's unknown into tomorrow's discovery.

# PHOTO COMPETITION

In April 2018 we opened our photography completion to students, staff, and friends of the University of Münster with the theme of "Nature around you". We received a many excellent images capturing the beauty of the natural world. All photographs were judged by the Fachschaft Biologie whom we thank for their effort. The top three winning photographs are printed below and photographers prize is a jar of honey, generously sponsored by Dr. Uli Ernst by his bees in Münster at the IEB. Congratulations to all winners!

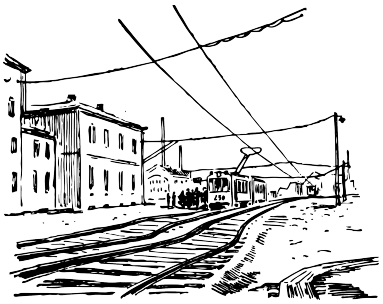
Second place – Liliya Doronina

Third place – Maren Dobslaw

First place – Linda Ebbert

# Philosophy in science for the world

Nina Kranke, Institute of Philosophy, University of Münster



"Wow", I thought, "this really is philosophy of science in practice". Sabina Leonelli, professor of philosophy and history of science based at the University of Exeter (UK), had impressed me once again with her energetic personality and professional achievements. Sure, she is a big shot in the field of practice-based philosophy of science, but until today I had not been aware of the extent of her remarkable work that far exceeds the academic realm. It was my first SPSP (Society for Philosophy of Science in Practice) conference and I had just attended Sabina's plenary lecture. A truly inspiring talk.

This year's SPSP meeting took place in Ghent, a lovely city in the west of Belgium with a beautiful historic city centre. The Society for Philosophy of Science in Practice is an informal and young institution which had its introductory meeting in November 2006. Since the early days of SPSP the interest in practice-oriented philosophy of science has grown continually. With 220 registered participants from 24 countries, this year's conference has been the largest SPSP so far. The program contained plenary lectures, contributed talks, symposia, and a poster session covering a wide range of topics such as modelling, realism, values, interdisciplinarity, expertise, policy, (big) data, and success. The participants discussed approaches to integrating history and philosophy of science, ways of collaborating with scientists, and scientific practices in mathematics, anthropology, palaeontology, cosmology, neurosciences, biology, medicine, chemistry, and physics as well as engineering practices.

But what is philosophy of science in practice? Some philosophers (of science) like to think of themselves as detached and distant observers which corresponds with the popular image of the philosopher sitting in an armchair in her ivory tower drinking red wine, immersed in deep thoughts. From this point of view, doing philosophy of science could mean to study science from an outside perspective and analyse scientific theories or concepts. For many practice-oriented philosophers of science, however, their job not only entails reading scientific articles, but also hanging out with scientists, talking to them, and engaging in collaborations. Some courageous philosophers of science even find their way out of the ivory tower into science labs where they either observe scientific practices or participate in them. In interdisciplinary projects philosophers also practise philosophy for scientists which means that they help scientists to reflect their practices, theories, and concepts, teach them philosophy of science, and introduce them to philosophical reasoning. According to Sabina, philosophy of science is philosophy in science. She understands her job as a philosopher as an active contribution to scientific practices and firmly believes that instead of trying to take ourselves out of the picture, we should reflect the role we play in the very systems we study. In this sense, we face the same challenges as scientists because the researcher is always already situated in the world that she is trying to understand, not detached from it.

In her talk Sabina emphasised another aspect of philosophy of science in practice, namely the philosophers' responsibility towards society. She suggested that our knowledge and skills should be used to make an impact. Philosophy in science for the world. In Sabina's case this means to engage with policy makers, industries, and institutions involved in the governance of multidisciplinary research. Among other activities, she is a member of the Open Science Policy Platform, a group that advises the European Commission on questions relating to open science and open data. At the conference I met other philosophers who stand out because they actively apply their philosophical and scientific knowledge in extra-academic contexts. Marten Van Dyck (University of Ghent), for example, curated the exhibition "Under Time's Spell" and wrote an accompanying e-book which is freely accessible online. The exhibition introduces visitors to scientific and philosophical puzzles about time. Adrian Currie (University of Cambridge) and Derek Turner (Connecticut College) are part of a group of philosophers who maintain a philosophy of palaeontology blog called "Extinct" which provides weekly posts on subjects at the intersection of palaeontology and philosophy. All of these activities show that doing philosophy can be so much more than writing books or research articles and giving talks at conferences. They make philosophy visible and accessible to a broader audience and cultivate philosophical reflections outside of philosophy institutes.

Just like scientists, philosophers of science should reflect their approaches, concepts, beliefs, and impact on societies and policies. It is great that SPSP not only provides a platform for discussing scientific practices and methods and approaches for studying science but also encourages self-reflection. On the train on my way back to Münster I think about the impacts I have already made by teaching philosophy seminars, talking to scientists, and as a student representative of the EvoPAD steering committee. And I start planning additional activities. Maybe I could blog or write other non-academic texts, maybe write an essay for The Eyebrow...

# Astrobiology and the search for extraterrestrial life

Berta Canal Domenech

The search for exoplanets is one of the most exciting fields in astronomy and will perhaps one day reveal if we are alone in the universe. Astrobiology research encompasses biological, planetary, and cosmic phenomena, and relationships among them. Astrobiology also includes other relevant disciplines that are necessary to push forward in this field, such as evolutionary biology, chemistry and geology.
However, exoplanets are very difficult to detect because they do not emit significant light of their own and are completely obscured by their extremely bright parent stars. Nevertheless, the advances of science and the development of new techniques for detecting exoplanets have made this research possible.

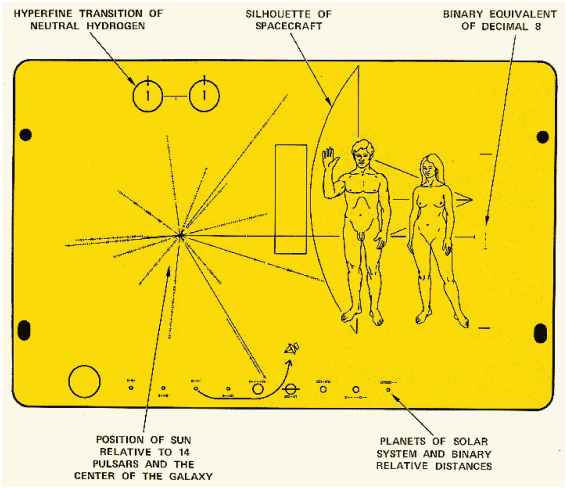
The search for life outside our solar system focuses on finding planets with characteristics that mimic that of Earth. Finding a habitable zone planet comparable to Earth in size is a major step forward. With the NASA's Kepler Space Telescope, astronomers have discovered the first Earth-size planet orbiting a star in the "habitable zone". The discovery of this exoplanet confirmed that planets the size of Earth exist in the habitable region of stars other than our Sun. Furthermore, several properties need to be considered when we talk about planetary habitability. The first one is the habitable zone. The habitable zone is the range of distances from a star where liquid water can exist on a planet's surface. It is not something static, as it moves as the star changes and evolves. The more massive stars have relatively short lifespans, so the life around them probably would not have enough time to evolve. The habitable zones of small stars face a different problem. Besides being narrow, they are relatively close to the star. A hypothetical planet in such a region would be tidally locked (synchronous rotation). That means that one half of it would always face the star and be extremely hot, while the opposite side would always be facing away and freezing. Such conditions are not very favourable for life.

In addition, low-mass M-type stars are magnetically active and can experience violent super-flares that could have a negative impact on habitability. Flares are enormous outbursts of high-energy (X-ray and UV) radiation and could potentially be sterilising. But they could also stimulate evolution by increasing the mutation rate.

Habitability also depends on the stellar parameters and the planetary system. We know that life needs energy to maintain metabolism, cell growth, cell division, etc. This energy is mainly provided by the central star of a planetary system as planets themselves do not produce much energy. Hence, the properties of the central star of a planetary system - mass, temperature, luminosity, age and activity - are important parameters of stars that strongly influence the location and extension of the habitable zone.

For life to evolve to higher forms, the planet must be continuously in the habitable zone that slowly progresses outward due to stellar evolution. This leads to the definition of a continuously habitable zone which is the region in space where a planet remains habitable for some long time period. Since the time that was needed on Earth for complex life to evolve is about 4 Gyr, the same or a similar value is usually taken.

Until now we have demonstrated the importance of the energy source in habitability. We focus now on the object that receives this energy. Accordingly, other important aspects to consider for habitability on exoplanets are the albedo and the greenhouse effect. These two parameters play important roles on the planetary atmosphere, crucial to maintain the temperature of the planet. Other factors like geological activity are also important for habitability. Geological activity is thought to be important for the origin of life and for maintaining planetary habitability by controlling climate stability.




Pioneer plaque, placed on board of the 1972 Pioneer 10 and 1973 Pioneer 11 spacecraft, presenting a pictorial message, in case they are intercepted by extraterrestrial life. Image Credit: NASA/Kepler Mission.

We have seen that with the recent detection of Earth-like exoplanets, humanity is coming closer to answering questions about the origins and future of life on Earth and in the Universe. But the question of why we cannot see evidence of alien life is still unclear and remains in our minds. Several hypotheses are currently debated. One of them - that also solves the Fermi paradox (the contradiction between the lack of evidence and high probability estimates for the existence of extraterrestrial civilisations) - is the Zoo hypothesis. It says that intelligent extraterrestrial life exists, but is simply ignoring us. It assumes that alien life is more advanced and doesn't want to interact with our primitive society, avoiding interplanetary communication. In other words, it would be comparable to imagining ourselves trying to maintain a conversation with non-intelligent creatures on Earth, like birds or insects.

# The biggest Meme

Brennen Heames

In 1976, Richard Dawkins published The Selfish Gene - a book which was last year voted as the most influential science book of all time. In the face of ongoing debate as to the level at which natural selection acts, the gene-centric view of evolution that Dawkins advocated proved to be hugely influential.

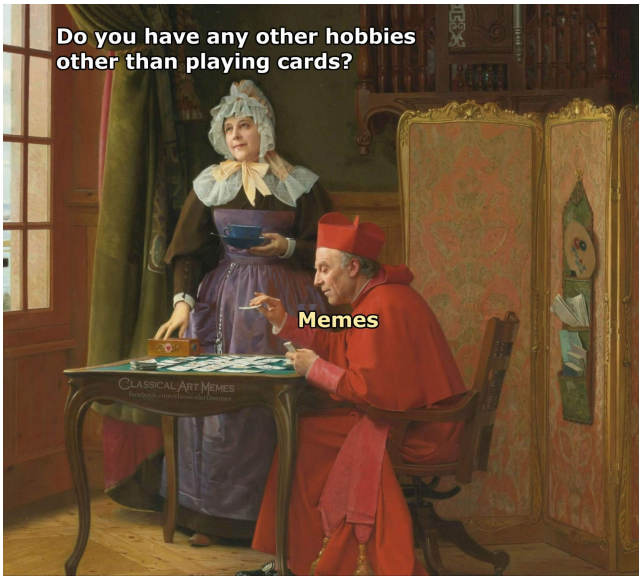
In one of the closing chapters, Dawkins coined the term "meme" (from the Greek mimeme, meaning "imitated thing") to describe a unit of selection analogous to a gene. Just as a gene represents the fundamental unit of genetic inheritance, so a meme represents the fundamental unit of cultural inheritance; in other words, pieces of cultural information that are replicated with a high degree of fidelity. Assuming that the general requirements for evolution (variation, replication, and selection pressure) also hold true for memes, then it might be expected that our memes are evolving in the same way as our genes.

But while attempts have been made to explain phenomena as complex as religion and consciousness in terms of meme evolution, the science of memetics has so far struggled to find a place at the centre of sociobiology. Unlike the gene, which has a concrete definition and replicates by well-understood mechanisms, it's much harder to pin down exactly what a meme can - and cannot - look like. While it is possible to provide rational explanations for a range of ideas and behaviours in terms of meme spread, a scientific theory with the ability to make useful and testable predictions has yet to be realised. The Journal of Memetics, first published in 1997, existed for a brief eight years before being shut down due to lack of submissions. In the words of the editor, "[memetics] has been a short-lived fad whose effect has been to obscure more than it has been to enlighten". However, for a metaphor initially meant to explain how a gene replicates and evolves, the meme had arguably had a good run.

As it turned out, the "meme" was a very effective meme in its own right - and towards the end of the 2000's was poised for a breakthrough. At some point during the rise of internet culture, the word meme was co-opted to mean what most of us first think upon hearing the term: the image macro, featuring bold white text on a background image. Distinct from the original concept of a meme, today's internet memes are probably best described as a genre. Dawkins himself has commented on how the "meme" meme has developed from his own imagining:

"[T]he very idea of the meme, has itself mutated and evolved in a new direction. An internet meme is a hijacking of the original idea. Instead of mutating by random chance, before spreading by a form of Darwinian selection, internet memes are altered deliberately by human creativity. In the hijacked version, mutations are designed – not random – with the full knowledge of the person doing the mutating." - Richard Dawkins (Wired Magazine, June 2013).

The dynamics of internet-meme spread is a research area in its own right, and may provide a new home for the science of memetics. The image macro is a meme with fixed parameters that can mutate and evolve, restricting many of the unknown variables. Another form of meme is the hashtag - even easier to study given the accessibility of data through Twitter's API. Recent papers have suggested that the dynamics of a tweet early in its lifetime are a useful predictor of how popular it will become - and that a combination of competition for user-attention and underlying network structure is sufficient to reproduce the online behaviour of hashtags and retweets (where only a small fraction go viral).




Over seventy percent of American adults are active on Facebook and consuming viral content on a daily basis. And given the apparent influence of Russian troll factories in a string of recent political outcomes, understanding the spread of memes and other online content has become more than just a quest to find the next Grumpy Cat. While posts targeted at American users in the run-up to the 2016 presidential election may not have been memes in the strict sense (for the most part they were just targeted propaganda), full-scale 'meme-warfare' is potentially sitting just around the corner. It is already possible to see examples of 'weaponised' memes, such as those based on Pepe the Frog, which was commandeered by the alt-right to spread white supremacist ideology.

Whatever lies in store for the "meme" meme, it doesn't appear to be going away: a quick Google Trends comparison shows that 'meme' overtook 'Jesus' as a search term sometime in late 2014. For now, it looks like internet memes will remain the first thought when we hear the word 'meme'. But in fifty years time we may be back to discussing memes in their original sense - and studying their evolution just as with genes today. Whereas today's biologists study how genes evolve on fitness landscapes, more interesting for future generations may be to ask how memes evolve on the 'memescape'.

# Self deception by cognitive bias

April S. K.

Disbelief in evolution by natural selection is seemingly not taken too seriously by academics, as it is foremost advocated by and associated with religious ideology. Rather than an intellectual dispute, it seems to be an emotional conflict within the individuals who follow a religious culture. This seems to be the overall attitude among most academics. However, during a recent MGSE lecture by Dr Helge Gresch on the education of evolution in German schools, it was discussed how children continuously as a default explain events in nature by "intentional improvement", which aligns itself closely to Lamarckism. Through the educational system, this type of explanation is confronted, and it appears that the Darwinian understanding of nature is prevailing. However, it was briefly mentioned that the refusal of science may not be culturally dependent, but may rather be innate to our own biology due to a so-called 'cognitive bias' when approaching the world. This caught my attention, as I wonder how this affects self-proclaimed Darwinians. You might claim to trust Darwin - but can you trust yourself? Staring into the abyss of papers on cognitive bias, I found massive quantity of data, yet limited enlightenment on the topic. This prevailed until I went to the mother authority of all human disciplines and academia: physics. You seldom hear of the "Aristotelians against Newtonians", as the Newtonic understanding of the world stands robust. It is Newtonian mechanics that sent our species to the moon and that underlies all computers and selfie-making apps, and which paved the way for quantum mechanics. However, quantum mechanics seems to challenge human sanity!

There is a ravishingly refreshing paper in arXiv (1) that discusses how an understanding of quantum mechanics has eluded many physicists, as it contradicts most of our understanding and knowledge of reality. I highly encourage everyone to read the paper, as I believe all are capable of understanding the main points from it. I, myself am not a physicist, was greatly entertained by it. There are two prevailing interpretations of quantum mechanics, the first being the "Copenhagen interpretation" by Bohr and Heisenberg, the second being the "many-worlds interpretation", first proposed by Hugh Everett. The aforementioned paper (1) elegantly describes how the first is counter-intuitive whereas the second "tries to recover from this counter-intuitiveness". Evidently, this "mental recovery" is not the goal, yet by elegantly going through six steps of intuitive beliefs that children are thought to be born with, the authors show how the first interpretation appears counter-intuitive, whereas the second appears intuitive. Indeed, Niels Bohr famously stated "those who are not shocked when they first come across quantum theory cannot possibly have understood it" (on a side note, that is how I feel about most things in life). As the authors themselves state, to which I concur, "partiality does not necessarily mean that these physicists are incorrect; they are simply biased." Irrespective of the validity, the intuitiveness of an hypothesis may serve to recruit scientists to its cause more successfully than a counter-intuitive hypothesis.

Curiously, findings of intuitive beliefs about motion, have more in common with Aristotelian mechanics than classic Newtonian mechanics (see 1), which is also reflected in students taking physics classes (2). But if humans struggle to truly understand Newtonian mechanics, adaptive evolution and quantum mechanics – how does it then play out when we biologists are facing non-adaptive processes – such as genetic drift? Drift is, in my opinion and experience, poorly and overlooked in basic biology education and rarely given its deserved attention in research. Partially this is due to the lack of appreciation of it. The search for "genetic drift" in google scholar yields about 570,000 results, whereas "adaptive selection" yields more than two million results. In all fairness, genetic drift was formulated decades after 'the Origin of Species'. However, I wonder if there will be more than two million publications given another 64 years (Sewall-Wright first proposed genetic drift in 1929). Drift matters tremendously when studying neutral evolution, when acting upon neutral mutations (read Kimura, 1986). However, is this a less studied field than others – and if so, is it because we find it hard?

I am not claiming that human intuition is a source only of academic nonsense, but it may be a source of great delay and distractions if trusted blindly - or if it goes unaddressed. I recently overheard a professor in particle physics at the Bohr Institute claim that it might be beneficial to teach physics assuming your student is an Aristotelian – as default – to ensure that the student truly understands. To my knowledge nobody does this today It is however an interesting idea, possibly applicable to biologists if assuming a Lamarckian default. Shaming laymen for a innate Lamarckian or Aristotelian approach might unfortunately scare people away from natural sciences. If cognitive bias - looking for intention - is a result of some adaptive advantage when initially becoming speculative and bipedal apes, we are ultimately shaming the process that led us to our current knowledge. By acknowledging our cognitive bias(es) we may learn something about our evolutionary psychology, but foremost elevate the teaching quality and reach a wider audience for science beyond academia itself.

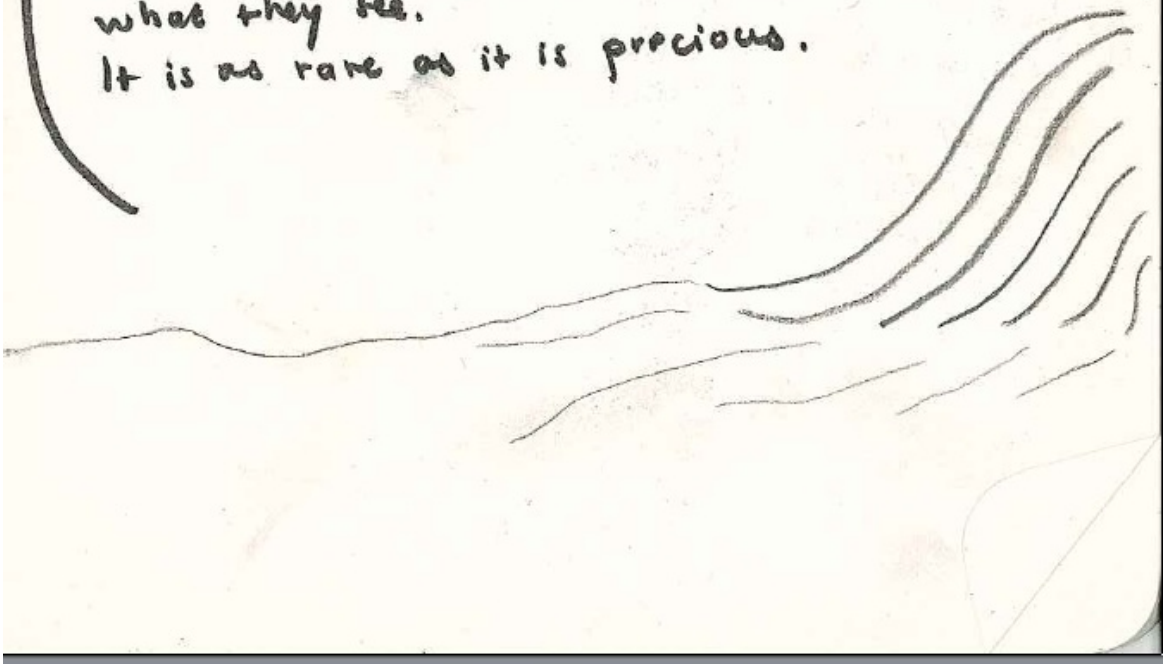
In the "defense of intuition", Nils Bohr famously and supposedly dreamt that the atomic model is alike to a planetary system, which thereon aided him to find his way to methodologically pin down the mathematical reality. I would claim that what we humans call "intuition" is simply not-yet processed information that is lurking about. Rather than fearing intuitions and biases, perhaps we should give an extra effort to dissect them rather than blindly avoid or follow them. Perhaps stating "why exactly does this (not) make sense to me" may not only lead to novel discoveries about the world and evolutionary biology, but also one's own biases and need for proof.

(1) https://arxiv.org/pdf/1602.06821.pdf
(2)https://onlinelibrary.wiley.com/doi/pdf/10.1207/s15516709cog0601_2

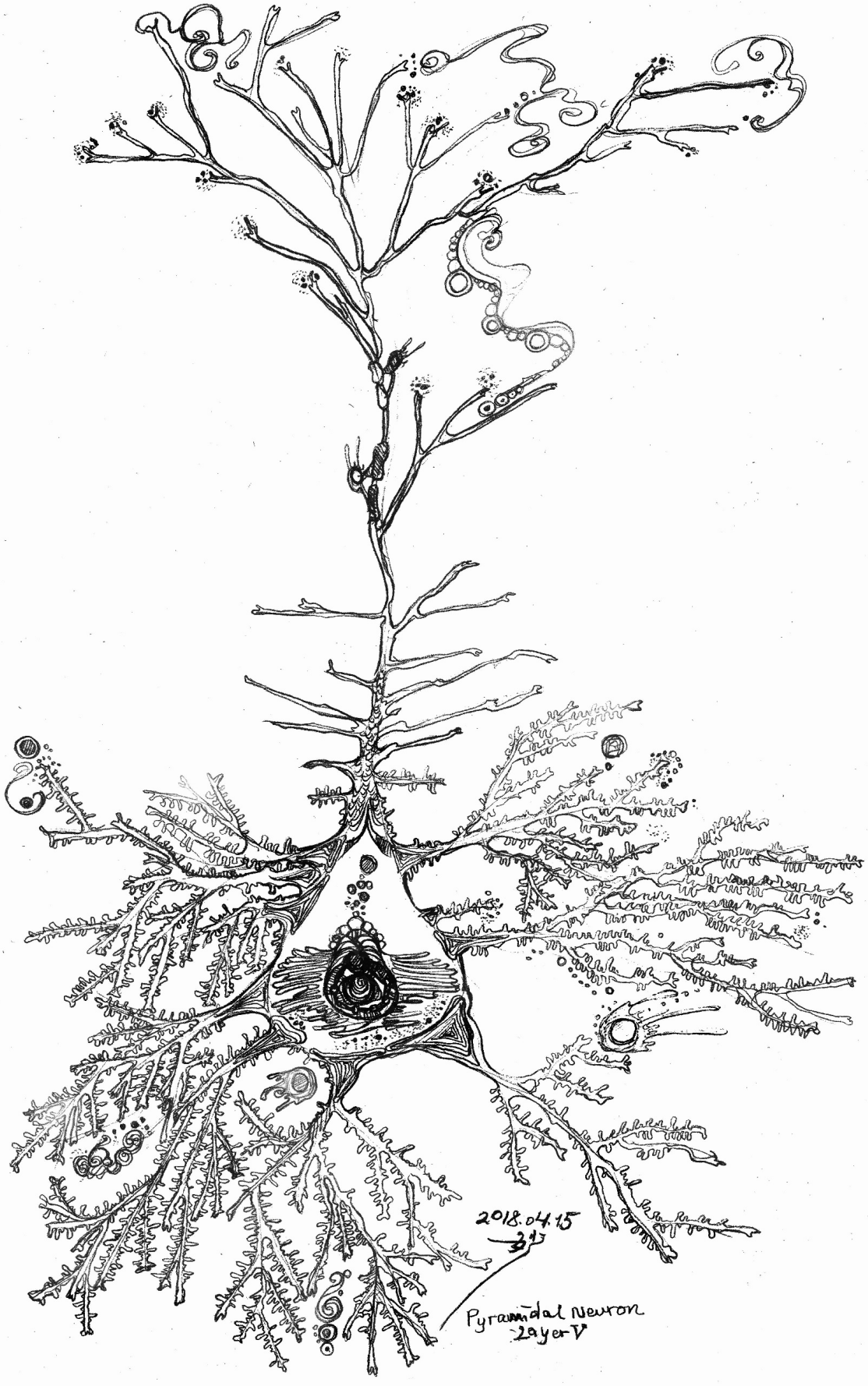
He said

" I discovered it was only I, and it is only I, who care about my research question. That is fine in itself, but I did not foresee that it could feel so pointless, as I have none to share my discoveries with. It ultimately feels lonely. "

This, she thought, is the very essence of life. You live, experience, observe, feel, think and you want to share this. You do not desire life as a lonely visitor in a museum. An empty chamber of wonderous sights. You want to interact with the world, whether that world is a single or hundred individuals. You seek that mutual interaction where your observations are observed by another, who fully understands what they see.
It is as rare as it is precious.



By P. Seudonym




By Miao Sun

# Review: The Science of the Discworld. Ian Stewart, Jack Cohen, and Terry Pratchett

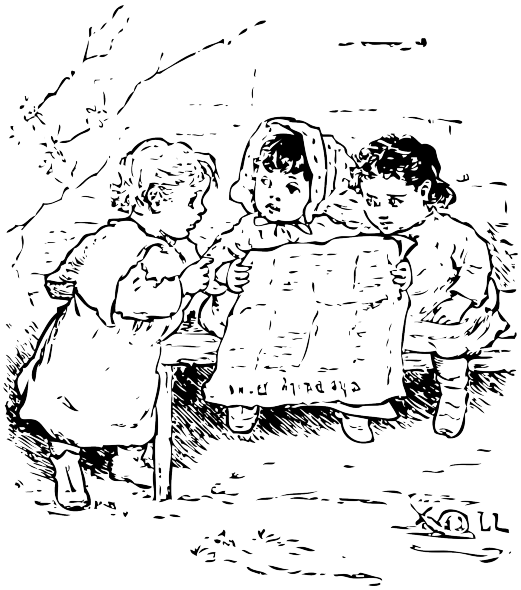
by Jasmin Kurafeiski

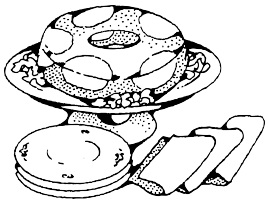
Popular science books are an important tool to help a broad spectrum of people understand scientific concepts. Some of you might be wondering 'How can I make science more appealing?'. If you thought 'How about we include a story about a university filled with wizards who accidentally created our universe!', then I may have the perfect series of books for you!

"The Science of Discworld" series by Ian Stewart, Jack Cohen, and Terry Pratchett consists of chapters alternating between fantasy novel and scientific explanations related to the events of the previous chapter. The Discworld is a flat world, situated on the backs of four elephants that stand on the back of the turtle Great A'Tuin. Due to the element "narrativum", everything that happens on Discworld happens in a way that makes for a good story. It all begins with an accident at the Unseen University in the city Ankh-Morpork. A magical reactor that was meant to be an alternative energy resource creates a massive amount of excess energy, which gets diverted and then acts as the Big Bang creating the universe containing the Roundworld. The books dive the physics of our universe as the Wizards try to understand the universe they created. In the follow-up "The Science of Discworld II: The Globe," elves interfere with human society - eventually leading to its destruction. The Wizards, who had grown rather fond of the humans on Roundworld, decide to fight the elves and return human history to how it was intended to turn out.

The book deals with anthropology, human imagination, and the tendency of thinking in ways including narratives ("The anthropologists got it wrong when they named our species Homo sapiens ('wise man'). In any case it's an arrogant and bigheaded thing to say, wisdom being one of our least evident features. In reality, we are Pan narrans, the storytelling chimpanzee."). For a while the Wizards assumed humans to be safe, so they just stored the Roundworld's universe in the office of the Wizzard Rincewind, the egregious professor of cruel and unusual geography. But once again things went awry for mankind, this time ("The Science of Discworld III: Darwin's Watch") with Darwin failing to write "On The Origin of Species". As a consequence, scientific progress was slowed down significantly, leading to the demise of humans due to another ice age. In typical Sci-Fi interpretations of the multiverse theory there are many possible timelines where Darwin dies, doesn't write the book, or writing the wrong book- and only one where he writes the right book at the right time. The scientific chapters deal with the importance of making knowledge accessible for the general public, Darwin's life, evolution, and a little sprinkle of time travel. I'd also like to tell you about the fourth book "The Science of Discworld IV: Judgement Day" but I have not yet read it.

The Science of Discworld series manages to fuse fantasy and science in a unique way, with a nice balance between the chapters. Pratchett liked to parody our world with the Discworld novels, and the Wizards of the Unseen University are his satirical take on our universities ("'How does it work?' said Archchancellor Mustrum Ridcully, the Master of Unseen University. This was the kind of question that Ponder Stibbons hated almost as much as 'How much will it cost?' They were two of the hardest questions a researcher ever had to face."). As with all Discworld novels, knowledge of previous books is nice but not necessary to understand and enjoy the story... though I would still recommend having a look at them as well!





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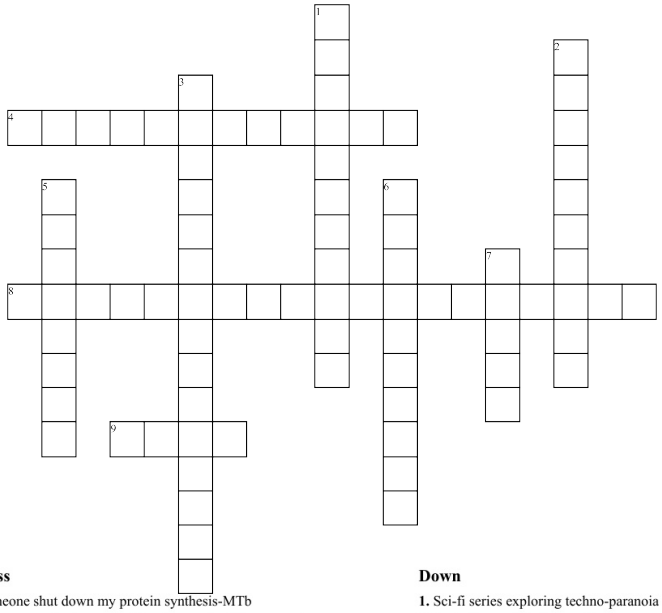

**Across**

**4.** Someone shut down my protein synthesis-MTb

**8.** Lost connection between all background and foreground disease genes

**9.** What's common between a book and electrophoresis

**Down**

**1.** Sci-fi series exploring techno-paranoia

**2.** Let's fit a straight line to this messy scatterplot

**3.** Theory of punctuated equilibrium

**5.** Be my epitope, lets conjugate

**6.** It's time for Merry-go-round at 4°C

**7.** Recent viral outbreak in South India

E P E K Y W M W G X V W A U W T I
C A X T F W C A D M E B X M F B B
N C T R N T P R X A E E Z Y N U H
E A L W Y L K Y S P E Q H G A Q F
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F R W C V H E L O S M N N E R I S
N O I S S E R G O R T N I C G M F
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C D Y E R Y I C G U B M E M E T L
P G L R B H R U E W S O X Z D I B
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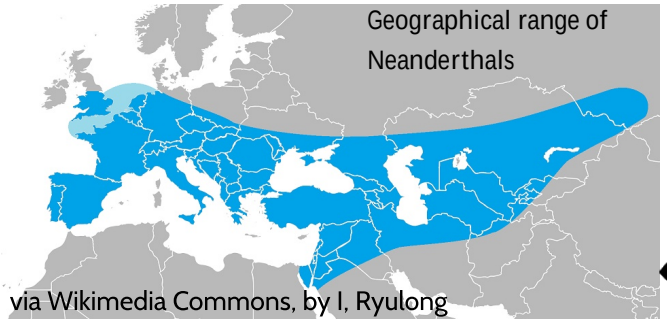
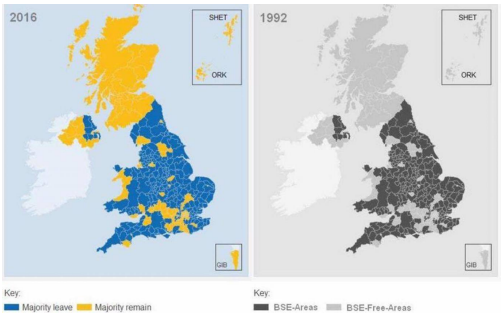
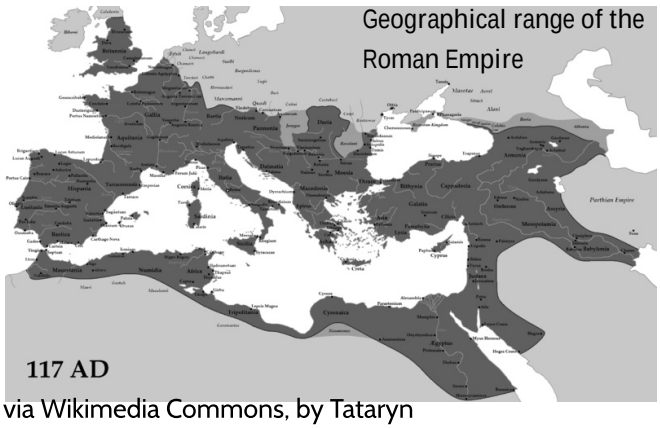
## Most probably very bad deductions




via Wikimedia Commons, by I, Ryulong



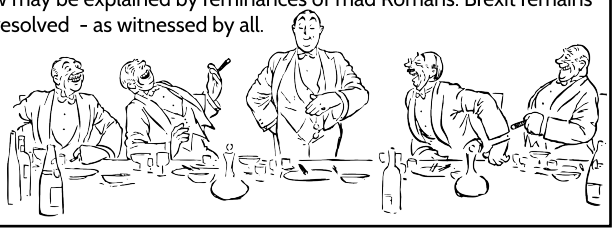




via Wikimedia Commons, by Tataryn

One deduces:

- The Romans, more than anything, sought to recapsulate the former range to their great Neanderthal ancestor, and sought neither glory nor fame - merely back to the Neanderthal nostalgic roots. That is why they left Scandinavia alone and thrived around the black Sea and southern Great Britain. Roman expansion case solved!

- Brexit may be explained by mad cow (verified by twitter), yet mad cow may be explained by reminances of mad Romans. Brexit remains unresolved - as witnessed by all.



# 1st Münster Evolution Meeting (MEM)

4th - 6th October 2018, University of Münster

## Thursday, 4th October 2018

| | |
|---|---|
| 12:00 - 13:00 | Registration & Coffee |
| 13:00 - 13:15 | Opening remarks by MEM chair Jürgen Gadau |
| 13:15 - 13:45 | Diethard Tautz *Mutual genomic introgression and immune* |
| 13:45 - 14:00 | Stephan Drukewitz |
| 14:00 - 14:15 | Anne Kupczok |
| 14:15 - 14:30 | Shuqing Xu |
| 14:30 - 15:00 | Coffee break |
| 15:00 - 15:30 | Erich Bornberg-Bauer |
| 15:30 - 15:45 | Katrin Hammerschmidt |
| 15:45 - 16:00 | Francesco Catania |
| 16:00 - 16:15 | Michael Hiller |
| 16:15 - 16:30 | Neel Praph |
| 16:30 - 16:45 | Chen Xie |
| 16:45 - 17:15 | Coffee break |
| 17:15 - 17:30 | Welcome address by Vice-Rector Monika Stoll |
| 17:30 - 18:45 | Opening lecture: Peter Hammerstein |
| 18:45 - 21:00 | 1st Poster session (even numbers) & Reception with finger food buffet |

## Friday, 5th October 2018

| | |
|---|---|
| 09:00 - 09:30 | Julia Fischer |
| 09:30 - 09:45 | Sandra Steiger |
| 09:45 - 10:00 | Claudia Fricke |
| 10:00 - 10:15 | Klaudia Witte |
| 10:15 - 10:45 | Coffee break |
| 10:45 - 11:15 | Ralf Sommer |
| 11:15 - 11:30 | Joshua Payne |
| 11:30 - 11:45 | Gregor Bucher |
| 11:45 - 12:00 | Nico Posnien |
| 12:00 - 12:15 | Gregor Rolshausen |
| 12:15 - 13:30 | Lunch break (self-catering) |
| 13:30 - 14:00 | Hinrich Schulenburg |
| 14:00 - 14:15 | Christian Kost |
| 14:15 - 14:30 | Lonardo Oña |
| 14:30 - 14:45 | Joachim Kurtz |
| 14:45 - 15:00 | Carolin Wendling |
| 15:00 - 15:30 | Coffee break |
| 15:30 – 16:00 | Judith Korb |
| 16:00 – 16:15 | Susanne Foitzik |
| 16:15 – 16:30 | Lukas Schrader |
| 16:30 – 16:45 | Jos Kramer |
| 16:45 – 17:15 | Wolfgang Stephan |
| 17:15 – 17:30 | Stefan Laurent |
| 17:30 – 18.00 | Evolution in Germany |
| 18:00 – 20.00 | 2nd Postersession (odd numbers) with beer and snacks |

Dinner (self-organized)

## Saturday, 6th October 2018

| | |
|---|---|
| 09:00 - 09:30 | Susanne Renner |
| 09:30 - 09:45 | Susann Wicke |
| 09:45 - 10:00 | Stefan Abrahamczyk |
| 10:00 - 10:15 | Harald Letsch |
| 10:15 - 10:45 | Coffee break |
| 10:45 - 11:15 | Axel Meyer |
| 11:15 - 11:30 | Thomas Schmitt |
| 11:30 - 11:45 | Oliver Niehuis |
| 11:45 - 12:00 | Liliya Doronina |
| 12:00 - 12:15 | Johannes Steidle |
| 12:15 - 13:30 | Lunch break (self-catering) |
| 13:30 - 14:00 | Katja Nowick |
| 14:00 - 14:15 | Ulrich Krohs |
| 14:15 - 14:30 | Panagiotis Provataris |
| 14:30 - 14:45 | Robert Peuß |
| 14:45 - 15:00 | Camilo Barbosa |
| 15:00 - 15:30 | Coffee break |
| 15:30 - 15:45 | Maryam Keshavarz |
| 15:45 - 16:00 | Jürgen Gadau |
| 16:00 – 17:00 | Farewell and closing of the conference |

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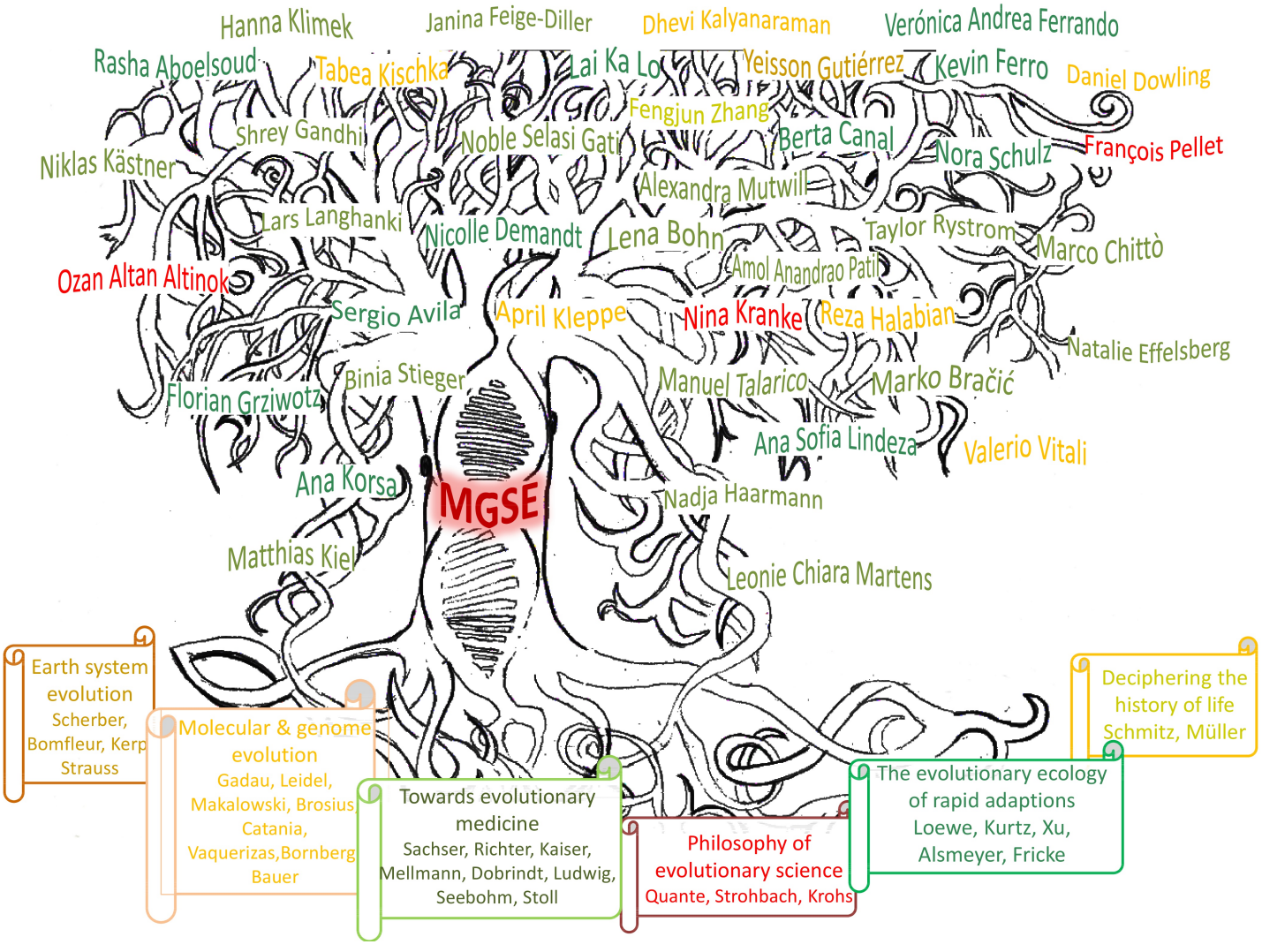
At the Münster Evolution Meeting (MEM) there are multiple members and associated members of the MGSE, PIs giving talks and PhD students who present posters. The tree map below is made by Nadja Haarmann with aid from Shrey Ghandi.