Issue 4. Vol 1 December 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.

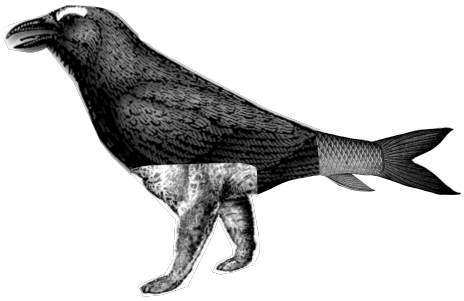
Since its founding in 2011, the MGSE has aimed to sustainably improve the curricula of the disciplines involved. It has demonstrated that doctoral training in a multi-disciplinary research landscape can be structured based on a unifying conceptual framework. Thereby, the MGSE serves as a role model or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

Hello there and welcome to issue 4 of the Eyebrow–the magazine designed, produced, and edited by the Münster Graduate School of Evolution. This is the final issue of the year – just in time for Christmas.

It's been a busy year for the Eyebrow. Issue 1 launched in February with just 16 pages, in June this expanded to 20 pages and in October we added our first colour pages. The Eyebrow blog has been visited by people in nearly 40 countries. We also ran our first photography competition with Nature around you as the theme.

This issue continues the variety we've had in the previous three issues. We have articles on important academic topics such as scientific publication (see Selling Knowledge by Natalie Effelsberg) and interdisciplinary research (Inferiority complex by Nina Kranke). In Life in a protein coat Matteo Rizzato investigates the question of whether or not a virus should be considered alive. On the note of complex topics, we also have a piece that should appeal to system biologists, About self-organization and complexity.

In true Christmas spirit, Jasmin Kurafeiski presents a selection of Santa themed science, while in Winter is coming, Nadja Haarmann mixes science and fantasy to tell the tale of the world's first resurrected test-tube dragon.

If you are looking for a Christmas present for a scientifically minded friend perhaps the Anonymous Reader's book review will provide inspiration.

So with winter setting in, and the days growing shorter and shorter - grab your hot (alcoholic) beverage of choice, find a cozy spot and peruse the musing of the members of the MGSE.

Until next year,

Daniel Dowling
Editor in Chief

CONTRIBUTORS

Art work
Miao Sun, Bianca Brüggen

Layout
Lai Ka Lo, April Kleppe

Texts
Nadja Haarmann, Jasmin Kurafeiski, Natalie Effelsberg, Nina Kranke, Matteo Rizatto, and two anonomyous authors.

News
Taylor Rystrom, April Kleppe, with assistance from Vanessa Kloke and Kristina Wensing

Scrabble
Shrey Ghandi, Brennen Heames

Typo and linguistics
Nikki Demandt, Sergio Avila, Alexandra Mutwill, Taylor Rystrom, Daniel Dowling, Brennen Heames, April Kleppe

News

Upcoming Conferences

11 December 2018
The MGSE General Assembly will take place at 15:00 in the Kavaliershäuschen.

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.

Upcoming Courses, Workshops, and Lectures

The MGSE Reading Club meets every three weeks to discuss thought-provoking papers. All with an interest in evolutionary biology are welcome; contact Marko Bracic at bracic@uni-muenster.de to be added to the mailing list.

The MGSE hosts the public lecture series "The Growth of the Evolutionary Thought". These occur Monday evenings at 17:00 in the northern Kavaliershäuschen. This lecture series is ongoing and runs through 28 January 2019, with a break for the winter holidays. More information can be found on the MGSE website.

The SFB-TRR 122 NC3 hosts a seminar series with the theme "Individualisation in Behaviour, Ecology and Evolution". These lectures occur biweekly on Fridays at 11:15 and alternate between Bielefeld University and University of Münster. More information can be found on the website of the SFB-TFR 212 NC3.

Science Pub: These talks are given on the third Monday of the month at 19:15 at Aposto from December through March and are intended to promote understanding of and enthusiasm for science in the public. More information can be found on the MGSE website.

21 – 22 February 2019
There will be a workshop on Experimental Evolution hosted by EvoPAD. Register with Ana Lindeza (lindeza@uni-muenster.de) or Nina Kranke (nina.kranke@uni-muenster.de) by January 18th.

2018 – 2019 Evolution Think Tank Fellows

From March – April 2019 Sarah Schaack from the Department of Biology at Reed College will visit as a Fellow of the Evolution Think Tank. Sarah's work focuses on spontaneous mutations, mobile DNA, and genome evolution.

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.

From July – December 2019 Jack Werren from the Department of Biology at the University of Rochester will visit as a Fellow of the Evolution Think Tank. Jack's research takes a multidisciplinary approach (which combines molecular, genetic, genomic, evolutionary, and ecological perspectives) to study basic questions in biology, genetics and evolution.

Special announcement

MGSE Graduates:

6 December 2018, 11:00, Seminar room at the Department of Behavioural Biology
Niklas Kästner will defend his thesis titled "Of anxious males and angry females: how genes related to serotonergic neurotransmission, social experience, and the female reproductive cycle affect anxiety-like and social behaviour in mice". He belongs to the Department of Behavioural Biology at the Institute for Neuro- and Behavioural Biology (University of Münster).

12 December 2018, 10:00, North Kavaliershäuschen
Nora Schulz will defend her thesis titled "The role of nucleic acid methylating enzymes in the red flour beetle Trilobium castaneum". She belongs to the Animal Evolutionary Ecology Group at the Institute for Evolution and Biodiversity (University of Münster).

We wish them both the best of luck!

2018 in review

February

Launch of the Eyebrow issue 1. The GMO was revealed to the world in Darwin's birth month.

March

Joint MGSE/EvoPAD Symposium. PhD students presented their research in talks and posters at this 2-day symposium hosted by the Institute for Evolution and Biodiversity. Special guests included Michael Lynch, Leo Beukeboom and Paula Stockley.

June

Eyebrow issue 2 hit the shelves and coffee rooms of Muenster.

July

Terrible heatwave. The Aasee turned green and all the fish died.

September

EvoPAD summer school. Members of the EvoPAD research train group attended a summer school in Huell (Lower Saxony) on the topic of evolutionary medicine. Researchers in microbiology, genetics, parsitology, animal behaviour, and philosophy presented lectures and workshops on the importance of evolution in understanding disease. A wide range of topics were addressed, including the question of whether an understanding of evolutionary biology helps in out understanding of disease and its treatment, what pathogenicity is, and the philosophy of disease.

October

Eyebrow Issue 2 resurrects after the summer's heatwave and hit the shelves and coffee rooms in Münster.

Münster Evolution Meeting. The first MEM was held in the University's Schloss building. Evolutionary biologists from across Germany (and beyond) filled the aula listening to talks and swarmed the foyer in search of beer (and poster sessions). The Eyebrow was delightfully present as well.

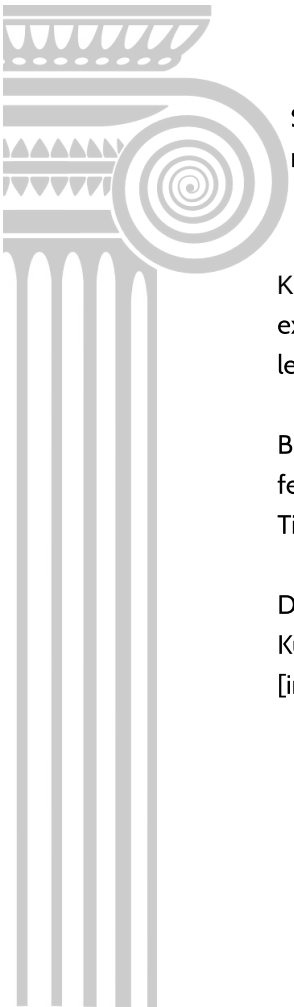
November

MGSE retreat. From 6 - 8 November 2018, the PhD students of the MGSE met for their third PhD Student Retreat at the Jugendgästehauses Dortmund. The PhD students got together to present their research, exchange ideas with their peers and get familiar with the other group's work. They were joined by MGSE PI Prof. Dr. Shuqing Xu and the Spokesman of the Collaborative Research Centre Transregio NC³, Prof. Dr. Oliver Krüger, from the University of Bielefeld. Both professors presented their current research and provided the PhD students with valuable feedback on their presentations.

December

Eyebrow Issue 4 hit the shelves in Münster before hibernation takes over.

For indidvidual workshops, ETT-fellows, and seminars, please see the website of the mgse and evopad.



Some brave PhD students of the MGSE allowed us to shine some glitter on their publications by also announcing their achievements here. MGSE students have their names marked in bold.

Kästner, N; Richter, SH; Bodden, C; Palme, R; Kaiser, S; Sachser, N (2018): Varying social experiences in adulthood do not differentially affect anxiety-like behavior but stress hormone levels. Frontiers in Behavioral Neurosciences: 12:72.

Böhnert, M. & Kranke, N. (2018), "Riot Grrrl Primatology. Über Forscherinnen, Feminismus und feministische Wissenschaften." In: Wunsch, M., Böhnert, M., Köchy, K. (Eds.) Philosophie der Tierforschung. Bd. 3: Milieus und Akteure. Freiburg: Karl Alber, pp. 325-374. [in German]

Doronina, L. & Kranke, N. (2018), "Das Verwandtschaftsnetz von Fledermaus, Pferd, Hund und Kuh." In: Biologie in Unserer Zeit, 48(5), pp. 287-288, https://doi.org/10.1002/biuz.201870505 [in German]

MGSE PHD GRADUATES of 2018

Kristina Wensing

Title of thesis: ''Sex-specific contributions of sexual selection and sexual conflict to male-female coevolution in Drosophila melanogaster''
(Evolution & Sexual Conflict Group, Institute for Evolution and Biodiversity)

Susanne Sangenstedt

''The adaptive significance of shaping behavioral and endocrine phenotypes to the early social environment''
(Department of Behavioural Biology, Institute for Neuro- and Behavioural Biology)

Rasha AboeIsoud

''RNA interference (RNAi) as a tool for testing the role of heat shock protein 90 (HSP90) as an evolutionary capacitor in the model insect Tribolium castaneum (Coleoptera: Tenebrionidae)''
(Animal Evolutionary Ecology Group, Institute for Evolution and Biodiversity)

Aarón Lecanda Sánchez

''Bioinformatic Tools and Strategies for the Study of Translation Regulation During Neuronal Cell Differentiation Using Ribosome Profiling''
(RNA Biology/Regulatory Genomics, Max Planck Institute for Molecular Biomedicine, Münster)

Matthias Kiel

“Genome comparison of pathogenic Escherichia coli”
(Microbial Genome Plasticity, Institute of Hygiene)

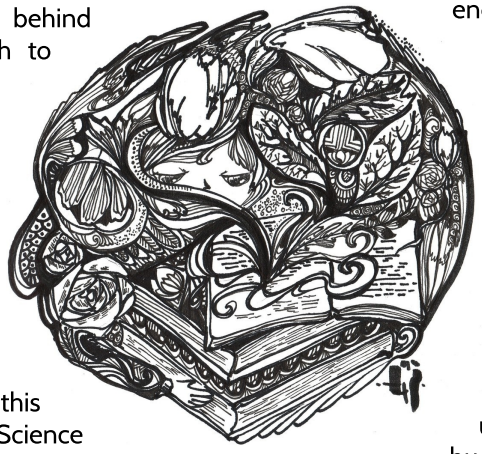
The Eyebrow editorial board is very happy and proud of their peers. We wish the fresh Doctors the best of future endeavours and all good things to come.

Selling knowledge

Natalie Effelsberg

When starting out on an academic career, one of the major credos you are taught is "publish or perish". Publications are the currency of science. The initial idea: Share scientific insights, make them publicly available and what's more – verifiable. Scientific journals, managed and distributed by publishing houses, serve as a medium for the communication of knowledge. Nowadays, the administration of scientific publications has become a profitable business and the annual turnovers of big companies such as Elsevier, Springer Nature and Wiley run into billions.

During the last years, the system has been questioned by more and more people. Their central issue is the absurd financing system. Public institutions pay enormous subscription fees to access knowledge produced by publicly funded researchers. Nevertheless, the information is hidden behind paywalls for all those not lucky enough to belong to a subscribing institution.



In the spotlight of the debate: Elsevier. The Dutch publishing house has been immensely criticised for its combative pricing policy. In Germany, public attention on the issue peaked during this summer, when thousands of scientists lost access to recent Elsevier publications. The reason was the failure of the DEAL project negotiations. Within this project, led by the German Alliance of Science Organisations, people tried to negotiate new conditions that balance information accessibility with cost efficiency. The aim is a nationwide licence for the complete portfolio of E-Journals at a reasonable price, which is adjusted to the amount of publications. Authors should pay a fee for publishing, while reading of the articles should be free of charge for everyone (1). In order to increase pressure, dozens of institutions cancelled their subscriptions to Elsevier journals by the end of 2016. Elsevier kept the access open for researchers during ongoing discussions, but shut it down when the negotiations were declared as failed in July 2018 by the DEAL alliance (2).

Similar issues are known for other European countries as well. Swedish research institutions did not renew their contracts with Elsevier, which were running out in June 2018, because of unsuccessful fee negotiations (3).
Apart from Elsevier, Springer is facing a dispute over subscription fees, leading to the cancellation of contracts with more than 250 French institutions (4). In the Netherlands, negotiations have been more successful. They accomplished publish-and-read deals with a number of major publishing houses including Springer Nature, Wiley and Oxford University Press (5).

What all of these debates have in common: Their claims do not only comprise lower pricing but a movement of the entire subscription system towards open-access. The main argument for this idea: What has been financed by public means should be accessible to the public. This demand has reached governmental levels. The European Union postulates open-access as the Scientific standard by 2020. In the course of that movement, several European funding organisations have formed the cOAlition S, whose members oblige their funded researchers to publish only in open-access journals (6).
As a result, the associated researchers are not allowed to publish in prestigious journals, which is still a key factor for scientific careers.

The good reputation of established journals is one of the major arguments raised by opponents of open-access publishing. They see the quality assurance of scientific communication as being endangered.
However, the high quality-standard of prestigious journals is not primarily maintained by publishers, but by use of the peer-review system. This again raises the question as to how publishing houses defend their increasing prices. In times of E-Journals instead of printed media, subscription fees are far higher than running charges would justify– they provide unreasonably high margins, while the budgets of research institutions and libraries continue to shrink.

Since most of the deals with publishing houses failed because of asking prices, the outcomes of ongoing negotiations are eventually a matter of money. But the debates awaken attention to much more fundamental questions about how we want to shape the future of scientific communication. How can we make sure that our science reaches the right audience? How can we enable great scientists working in poor countries to promote their research despite their limited resources? Where do we cut the line between economic and scientific interests? And finally: Whom do we want to own our scientific knowledge?

References:
1) https://www.projekt-deal.de/about-deal/ (accessed 04.11.2018)
2) Else, Holly: Dutch publishing giant cuts off researchers in Germany and Sweden. In: Nature (559), 454-455, 19.07.2018.
[https://www.nature.com/articles/d41586-018-05754-1]
3) Yeager, Ashley: Sweden Cancels Agreement With Elsevier Over Open Access. In: TheScientist, 16.05.2018.
[https://www.the-scientist.com/the-nutshell/sweden-cancels-agreement-with-elsevier-over-open-access-64405]
4) Kwon, Diana: French Universities Cancel Subscriptions to Springer Journals. In: TheScientist, 31.03.2018.
[https://www.the-scientist.com/news-analysis/dutch-universities-journal-publishers-agree-on-open-access-deals-30860]
5) Kwon, Diana: Dutch Universities, Journal Publishers Agree on Open-Access Deals. In: TheScientist, 17.04.2018.
[https://www.the-scientist.com/daily-news/french-universities-cancel-subscriptions-to-springer-journals-29882]
6) https://www.coalition-s.org/ (accessed 04.11.2018)

Inferiority complex, identity crisis, and unemployment: On the risks of being an interdisciplinary researcher

Nina Kranke

Interdisciplinarity is an academic buzzword. An increasing number of interdisciplinary projects and programs reflects the growing recognition of interdisciplinary research by policy makers and funding agencies like the German Research Foundation. Many of us Eyebrow readers and authors are members of at least one interdisciplinary project or institution. We enjoy stimulating discussions with researchers from other disciplines and learn things that we wouldn't have learned otherwise. But what does it mean to be an interdisciplinary researcher? And what risks do we take when we follow an interdisciplinary career path?

There are at least two different types of interdisciplinarity, auto-interdisciplinarity (individual interdisciplinarity) and collaborative interdisciplinarity (team-based science) (1) which are not mutually exclusive but can be combined in the context of interdisciplinary projects. Many researchers are auto-interdisciplinary to some degree. Some philosophers of science, for example, hold academic degrees both in a science and in philosophy. But you don't necessarily need a degree in another discipline to engage in auto-interdisciplinary scholarship. When you read articles or books from various disciplines and utilize concepts, knowledge, theories, or practices from other disciplines, you are doing interdisciplinary work. This kind of work can be very useful and is even required in some cases. In extreme cases auto-interdisciplinary researchers turn into hybrids who don't have a clear-cut disciplinary identity.

Auto-interdisciplinarity has many advantages. A researcher can do the work on their own without the need to schedule meetings or collaborate with other people. In the best case, they broaden their view and are able to integrate multiple perspectives on the phenomenon of interest. However, broadening your knowledge also comes with a cost. The lack of depth of knowledge, particularly in your original discipline, can cause a feeling of inadequacy, an academic inferiority complex. There is also the risk of losing your disciplinary identity and plunging into an academic identity crisis. Moving deeply into another discipline can also alienate you from your peers. At the same time, you are not a full member of any other discipline which can make you feel like you don't really belong anywhere and that no one understands you. Maybe the solution to this problem is to take on a new identity as an interdisciplinary researcher.

Collaborative interdisciplinarity, on the other hand, is a team effort that often addresses complex problems like global climate change, social injustice, or health and disease. Most interdisciplinary projects or collaborations are initiated when the problem in question cannot be solved within the framework of one discipline and expertise from other fields is required. These settings usually allow you to maintain your disciplinary identity, but the differences between the represented disciplines can cause misunderstandings and frustration. As a member of an interdisciplinary group you have to make an effort to convey your knowledge to others and to understand other disciplinary approaches and perspectives. Therefore, it can be extremely helpful if at least some members of the interdisciplinary group are also auto-interdisciplinary researchers.

There are also problems that concern the practical implementation of collaborative interdisciplinarity. People in academia are very busy and scheduling meetings or other group activities can be extremely difficult. Generally speaking, the administration of an interdisciplinary project (e.g. distribution of funds, locating responsibilities) is a challenging task. Another important factor is the motivation to engage in an interdisciplinary project which is strongly linked to disciplinary and institutional incentive structures. Some members of an interdisciplinary group may benefit from the collaboration while others may have little incentive to participate in the project and would much rather dedicate their time to contributing to research within their own discipline. It can also be difficult to find common ground that enables interdisciplinary collaboration and communication or to figure out how data, methods, concepts, or knowledge from different disciplines can be integrated.

There is also a structural problem which concerns both individual and team-based interdisciplinary researchers who are hard to embed in the academic system (2). University structures (e.g. faculties, departments) are based on disciplinary divides. At the University of Münster there is a faculty of medicine, a faculty of biology, and a faculty of history and philosophy, but there is no faculty or department of interdisciplinarity. In disciplinary contexts, interdisciplinary work is usually not rewarded and evaluated in the same way as disciplinary work or inner-disciplinary collaborations (3). The lack of a common framework for evaluating interdisciplinary research is particularly problematic in promotion and tenure processes. Thus, interdisciplinary researchers can have disadvantages on the job market.

Nevertheless, conducting interdisciplinary research can be a rewarding experience and is worth taking the risk. And who knows, maybe at some point interdisciplinarity will become fully embedded in the academic mainstream and being an interdisciplinary researcher could set you apart from the competition.

References
(1) https://i2insights.org/2018/02/06/two-types-of-interdisciplinarity/
(2) https://www.nature.com/articles/s41599-017-0039-7
(3) https://doi.org/10.1016/j.respol.2010.11.001
(4) https://doi.org/10.1016/j.respol.2017.03.001

Quiz: Are you an interdisciplinary researcher?

by Nina Kranke

Select one answer per question.

1. What does 'interdisciplinarity' mean?
a) Inter–what?
b) Being undecided on which disciplinary path to follow
c) More work
d) Pretending to be able to solve major problems by gathering people from various disciplines in a room to discuss what exactly the problem is

2. Do you have a clear-cut disciplinary identity?
a) I guess
b) I am still searching
c) Great minds should not be imprisoned by artificial disciplinary boundaries
d) That's what my superior says

3. How often do you attend meetings with researchers from other disciplines?
a) At least once a week
b) Once every 1-2 months
c) Once a year
d) I hate other people

4. Do you enjoy reading books and articles from various disciplines?
a) As long as I don't have to work on my own project, I am happy
b) Reading is overrated
c) Yes, I like short stories, crime novels, biographies, ...
d) None of the above

5. Do your collaborations create an added value?
a) Sure, they add more value to my work
b) WTF?
c) My collaborations only create confusion
d) My collaborations only add stuff to my to-do list

6. Does your project description contain at least three of the following terms: interdisciplinary, integrate, collaborate, team, complex, unite, synthesis, combine, overarching, broad?
a) Probably
b) Certainly!
c) I haven't read my project description
d) I am in between jobs

Scores:
1. a=0, b=1, c=3, d=2
2. a=0, b=1, c=2, d=3
3. a=3, b=2, c=1, d=0
4. a=3, b=0, c=1, d=2
5. a=1, b=0, c=2, d=3
6. a=2, b=3, c=0, d=1

Results:
12 – 18 points:
You are a full-fledged interdisciplinary researcher. You love collaborating with researchers from other disciplines and enjoy working in a team. It is probably easy for you to understand concepts and theories that have originated in another disciplinary context. You like to cut across the boundaries of your own discipline and think outside the box. Maybe you have even taken on the identity of an interdisciplinary researcher. But don't forget to also focus on your disciplinary specialization instead of trying to become an expert in everything.

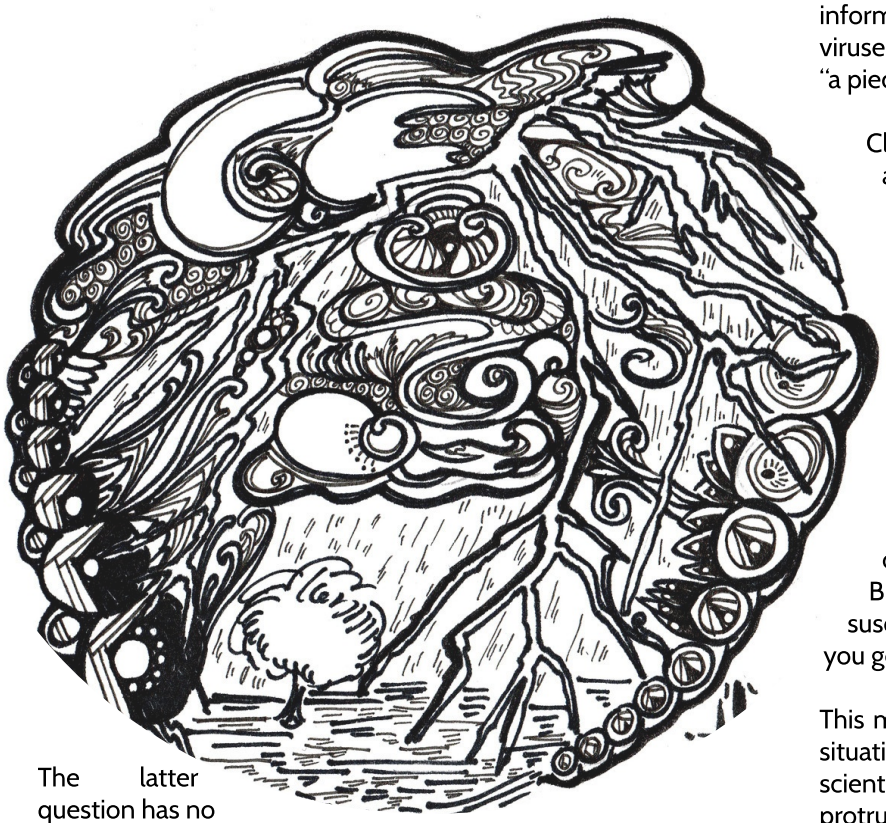
6-12 points:
You are a part-time interdisciplinarian. You enjoy exchange with people from other disciplines but you also spend a lot of time pursuing research questions within your own discipline and value intra-disciplinary collaboration. In cases of conflict between obligations at your department/your lab and interdisciplinary activities, you probably decide against participating in interdisciplinary activities. Yes, interdisciplinary work can be time-consuming and frustrating at times, but it could also broaden your horizon which might even benefit your personal projects.

0-6 points:
You are a lone fighter. You are aware that other scientific disciplines exist, but you prefer to operate in the comfort zone of your home discipline. You probably find team work exhausting and tedious and prefer to deepen your specialized knowledge over acquiring knowledge from other fields. It is true that quality research in any discipline requires expertise and specialization, but your expert knowledge might also be valued in interdisciplinary projects. You don't have to become an individual interdisciplinary researcher to make meaningful contributions to interdisciplinary projects.

Life in a protein coat

Matteo Rizzato
PhD student at the Institute of Cellular Virology, Münster

Since their discovery, viruses have been triggering several challenging questions: where do viruses come from? Did they arise from cells? Were they the first form of "life"?
But one in all, are viruses alive?



The latter question has no absolute answer and is still an intense matter of debate within the scientific community. For us to try to give an answer, we first need a definition of life – and it is here where things become interesting. Scientists have been attempting to give a definition of life for a long time – quite a task! - and it is not surprising that as of now, we do not have the one and final definition. There is likely not just one applicable definition of life.

And yet, if we open the bible of cellular biology – Albert's "Molecular Biology of the Cell" - and look for a definition, a recipe of life, we encounter the so-called seven criteria by which an organism or an entity may be regarded as alive. A living entity must be able to keep its homeostasis, must be structurally organized or compartmentalized, and have a metabolism. Additionally, it must be able to grow and reproduce, adapt to the environment, and respond to external stimuli. By this definition, it is clear that the minimal unit of life is ideally resembled by a cell, may it be a mammalian or bacterial, or a full-grown organism, like me and you.

On the other hand, our molecular understanding of viruses has grown exponentially in the past hundred years. Given that it was in 1895 that scientists first postulated the existence of a non-filterable entity that causes diseases, but saw viruses only in the early 1940's with the advent of electron microscopy, humanity has done quite a leap. Eventually, researchers have been able to pinpoint and define the core components of viruses (thank you, science!): nucleic acids containing the viral "identity" and proteins forming a coat to protect and deliver such information – plus a lipid envelope, for certain types viruses. Or, as Sir Peter Medawar would say, viruses are "a piece of bad news wrapped in a protein coat".

Clearly, viruses do not fit all the requirements of the above mentioned biological definition of life: they have not their own metabolism and they rely upon their host for replication and adaptation to the environment. Therefore, if you were to ask a virologist whether viruses are alive or not, you would probably end up with a convinced "No, they are not" as an answer. We are taught in schools and universities that viruses are "obligate intracellular parasites", perfect Darwinian machines with the sole aim of entering a cell to hijack its metabolism and self-replicate. The textbook idea of a virus is the one of an inert, passively floating particle subject to Brownian motion that once in a while meets a susceptible and permissive cell for infection and there you go, you have infection.

This may hold somewhat true for most viruses, in most situations. And yet, what if I told you that out there scientists found viruses capable of developing protrusions – i.e. protein filaments - to adapt to harsh environments, and that they can do so without cells?
If you were to read this before 2005, you would call me an over enthusiastic sci-fi reader with a fervid imagination. However, Monika Häring and colleagues from the Institute Pasteur in Paris shared such a finding in a brief communication published in Nature (1). They found a virus, ATV - short for Acidianus two-tailed virus - that infects a hyperthermophilic archeon living in acidic hot springs. High temperature and low pH, quite a harsh environment, as you may imagine. This lemon-shaped virus has been isolated and seen developing filamentous proteic tails in complete absence of its cellular host, provided the high temperature and low pH. When kept at low temperature, however, the virus was not forming these protrusions. This finding was a real breakthrough for the virological community. It was the first instance where scientists saw a virus adapting and responding to the environment without the presence of a host. Adaptation to the environment and responding to external stimuli, two of the seven criteria to define life, were not met by viruses until this finding. This example clearly alters the view of viruses and whether or not they are living entities.

It is also well established that for any living being on our planet, there is at least one virus ready to infect it. After all, viruses are the most abundant entities on earth, beating even bacteria by a factor ten. Humans, plants and animals have their viruses, even archaea and bacteria are no exception to this rule: bacteriophages, viruses that infect bacteria, have been among the first viruses to be characterized, and have even been adopted as a therapeutic strategy to fight severe bacterial diseases. We could therefore say that if you are alive, you can be infected, to expand the definition of life. You probably guessed at this point where this is going.

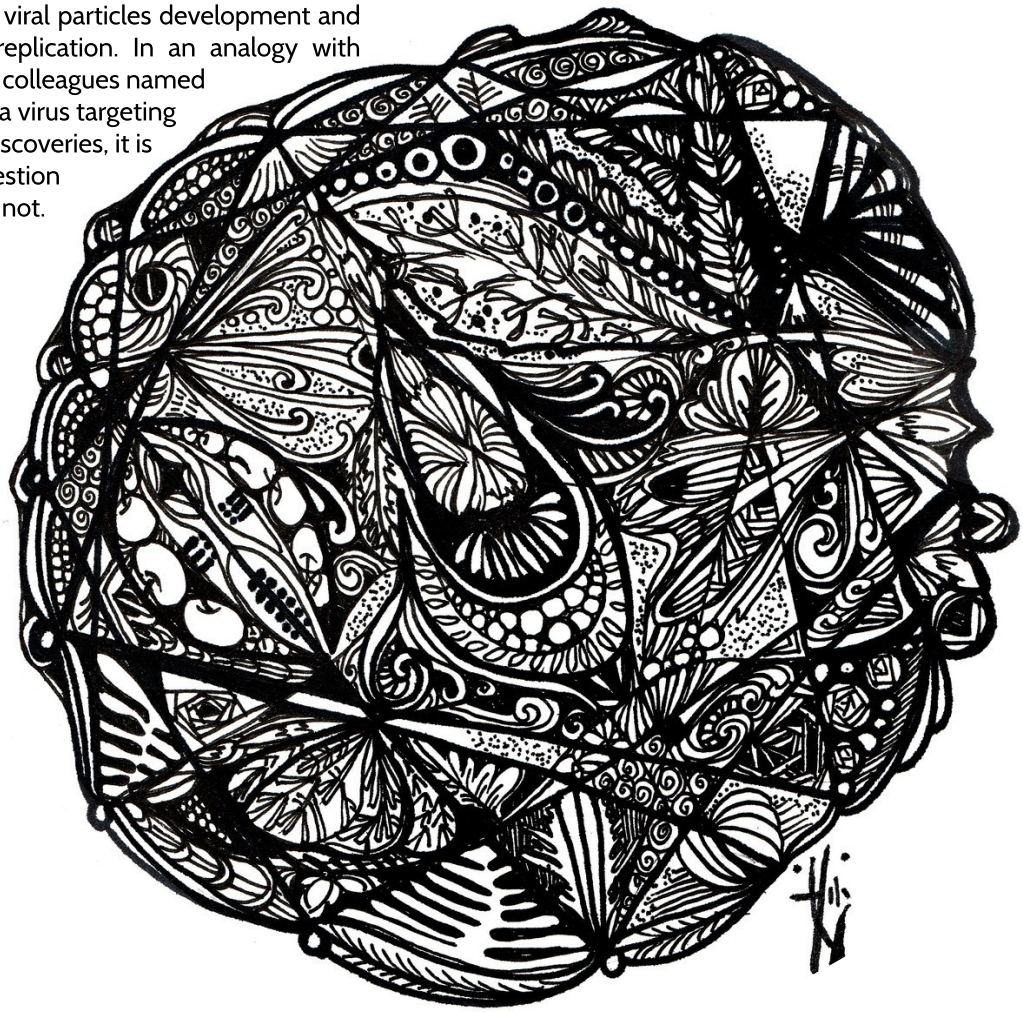
Can viruses be infected by other viruses? Quite surprisingly, the answer is yes. Back in 2004, Claverie and Raoult made a groundbreaking discovery, by describing the first giant virus, APMV, the largest virus known to mankind and prototype of the Mimivirus superfamily (2). These viruses are so large that they were mistaken for bacteria at first. Following up this discovery, Raoult and his team made another astonishing finding. They observed that a strain of APMV was infected with a much smaller virus, and this infection occurred within APMV viral factories inside the amoebae that this virus infects. This small "satellite" virus has been named Sputnik, after the first satellite mankind sent to space. Sputnik infects and makes Mimiviruses "sick", resulting in aberrant APMV viral particles development and therefore hindering their replication. In an analogy with bacteriophages, Raoult and colleagues named Sputnik the first virophage, a virus targeting another virus. After these discoveries, it is not trivial to answer the question whether viruses are alive or not.

Since a clear-cut definition of life is also quite challenging to establish, we can say there is a growing body of evidence that viruses are more "alive" than "dead". Viruses shape the life of every living being on our planet, and they drive their evolution. Viruses, by infecting living organisms, reshape their behavior and have implications on individuals as well as the environment. The definition of life, in its strict terms, may not enable us to include viruses in the category of living beings. We must nonetheless acknowledge that viruses push the boundaries and challenge the definition of life, which is good per se. Studying the life in protein coats will eventually enable us to refine our understanding of life and maybe, find a better and broader definition of it.

References:

1: Häring, M., Vestergaard, G., Rachel, R., Chen, L., Garrett, R. A., & Prangishvili, D. (2005). Independent virus development outside a host. Nature, 436, 1101.

2: Raoult, D., Audic, S., Robert, C., Abergel, C., Renesto, P., Ogata, H., ... Claverie, J.-M. (2004). The 1.2-Megabase Genome Sequence of Mimivirus. Science, 306(5700), 1344 LP-1350.

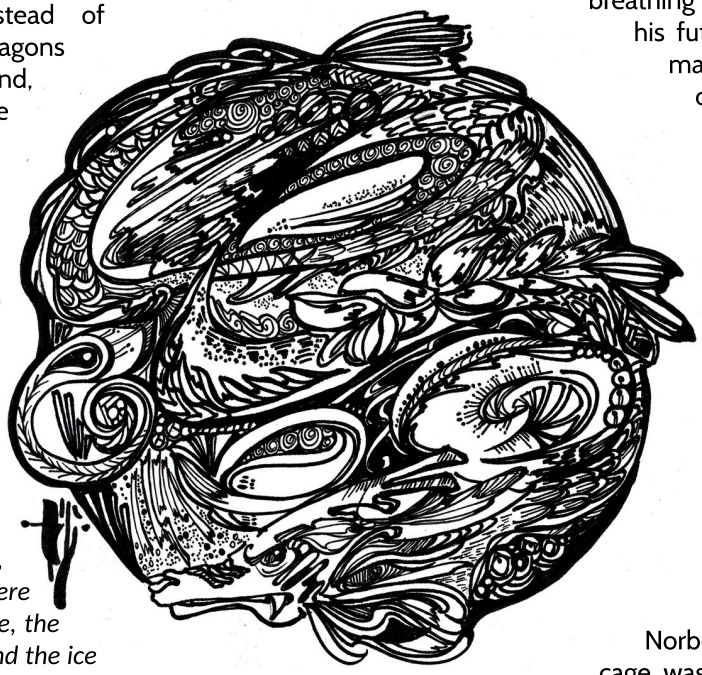


Winter is coming

Nadja Haarmann

Game of Thrones is a franchise you either love or hate. Or, maybe, you have never seen it before. It plays in Westeros, a mediaeval-fantasy world. Most characters die and only few will survive to the end. One woman owns three dragons. Let's imagine we travel through time in Westeros...

In the land of Westeros, winter had come and snow and ice had buried the world. Because of the long cold, animals grew taller again, and their fur became thicker and warmer, and their claws and teeth became sharper and longer. Humans were no longer the fiercest predators during this era. Survival, not gold or power, was the primary goal. In the end the humans left Westeros and travelled south.
Centuries passed and mankind evolved. The old stories of Westeros were told from generation to generation. Every time they changed a bit. In the end these stories became fairytales instead of history. No one believed in dragons anymore! Industry, economy and, of course, science evolved like they did in our world. Now, see, what is on the news today:



Dragons are real!
Researchers from the Münster Graduate School of Evolution (MGSE) were on a field trip in the region of Westeros. The region is known for its arctic storms and huge animals such as mammoths, sabre-toothed tigers, and dire wolves. Biologists, archaeologists, geologists, and philosophers were investigating the wildlife on the ice, the fairytales of "Game of Thrones" and the ice itself. Therefore, they drilled a deep hole into the permafrost to take samples. What they found after the DNA analysis, mass spectrometry, and other methods was incredible: a completely new species. Some regions of the DNA seem to be related to birds and crocodiles.

After drilling and digging the researchers found scales, bones, and more frozen tissue. The bones belong to a whole skeleton. The new species is named Rex draconis. *It is the first scientific proof of the existence of dragons.*

Back in the lab and in warmer regions, the researchers continue to investigate the new species. Behavioural biologists and philosophers discuss the old stories and which of the old books contain some truth. Were dragons only predators or could they also be tamed? Molecular biologists still try to isolate the complete genome. The first papers are already in print in academic journals. The question arises that if dragons are real, then what else is real and what belongs merely to the realm of fantasy?

Some weeks later...

"We want to bring dragons into the world again!" states Prof. Dr. Horrible. Since the remains of *Rex draconis* were frozen solid, biologists were able to isolate and then replicate the whole DNA via PCR. Now it is just a matter of time for the first test-tube dragon to be born. Prof. Dr. Horrible's statement leads to a large ethical discussion. Should extinct animals be revived using science? How will it affect the ecosystem if predators such as dragons fly through the sky again? A lot of questions remain unanswered and details about this species remain elusive.

Prof. Dr. Horrible is unstoppable. Still, it takes several months until the first test-tube dragon is born. His colour is a bright red and he is called Norbert. It becomes quiet clear that dragons are carnivores who have a weakness for gold and glitter. Norbert has wings with which he will be able to fly one day. If he is capable of breathing fire will be an investigation for his future. His claws and teeth are made to tear flesh apart and to crack bones.

After a few months Norbert has grown enormously. He is as big as a house and dangerous. It became quite evident that dragons are not easily tamed or controlled. Prof. Dr. Horrible suffers from multiple burns and wears a bald head now. By the way, yes, dragons do breathe fire. Hurray!

Norbert escaped! Neither chain nor cage was strong enough to hold him back. People from Greenworld fundamentalists celebrate his escape: "A wild creature must be free. The conditions were not bearable for such a wonderful living thing!" Obviously, these people did not take into account what a wild dragon would do, once freed. Norbert ate a dozen cows, 47 sheep, six horses and just three humans. Prof. Dr. Horrible has been put into jail because he is responsible. Well, and because no police officer or soldier was able to put Norbert into jail. Someone has to be punished. Of course...

Norbert travels north to where his ancestors were found. He is screaming for his family. He is so lonely being the first and the last dragon of this world. In his raging pain he burns the ice that covers Westeros. Mammoths and sabre-tooth tigers vanish from the surface of this earth immediately. The permafrost is destroyed. Ice and snow are gone, but so is the world of his ancestors. Norbert is devastated. Suffering from this great grief, Norbert hides beneath a lonely mountain and falls into a deep (and probably everlasting) sleep. Winter is over.

The Science of Santa

Jasmin Kurafeiski

Winter season is Christmas season. And unsurprisingly, a lot of science has been conducted on Santa Claus. Santa related research interests span from philosophy, to sociology, and even physics. So in the spirit of winter and Christmas let us check out some papers on Santa Claus.

In 1983 A. Chris Downs of the University of Houston decided to violate privacy of correspondence laws to read children's letters to Santa to see if there are differences between boys and girls [1]. The children were told by their female teachers to write letters to Santa, the letters were copied and the originals handed to the parents. Only letters from children who stated to believe in Santa were used for the analysis. Generally the number of requested toys varied greatly, girls requested more toys than boys. However, the majority of requested toys was gender neutral. In cases of non-neutral toys "gender-appropriate" ones were the preferred choice.

The second paper I want to address deviates a bit from the previous one. It deals with Christmas trees instead of Santa (the Santa corresponding one is behind a paywall, but the abstract indicates similar findings). The paper "Height of Christmas Tree Drawings as a Function of Time" [2] analyses drawings of Christmas trees made by students in 6th grade by measuring the height of the tree. Based on previous studies it was assumed the size of a holiday related drawing only changes with the approaching holiday if the drawn object is humanized and not an inanimate object. Here drawings of Christmas trees are analysed based on the hypothesis of Christmas trees being more relatable than Easter eggs. The author concludes that his results support his hypothesis, as the drawing size increases towards Christmas and decreases afterwards.

The existence of Santa is a matter of belief, as he is a magical being - all arguments disproving his existence can be circumvented by treating him as a being outside of our physical boundaries. His presumably physics breaking abilities might even sound a little godlike. Justin L. Barrett tackles this idea in "Why Santa Claus is not a God" [3]. Despite arguing against the deity Santa, the author still remarks how Santa is a successful approximation of a god concept, more godlike than Mickey Mouse! Yep, that's really in the abstract! Anyway, the author moves on to explain some general profile for potential god figures. A god figure has to be counterintuitive, but just minimally. Like "an invisible buffalo" being a better god concept than "an invisible buffalo that is immortal, made of steel, experiences time backwards, fails to exist on Saturdays, gains nourishment from ideas, and gives birth to kittens". Because that is just too much. The other godly traits are being an intentional agent with strategic information, performing detectable actions, and motivates practices. By combining these traits the author's perfect candidate would be an invisible, talking, mind-reading potato that does noticeable stuff, and influences people to perform rituals that do not include sacrificing all female followers once they reach puberty.... But wait, wasn't this supposed to be about Santa?! Here, Santa is analyzed according to movie portrayals and songs. In short: The only fulfilled traits are being an intentional agent and acting in the real world. Santa is not counterintuitive as he is portrayed to be an ordinary person using magic. The information available to Santa is also of little strategic value, as he only knows about deeds of the past or if you are asleep.

But Santa has been scrutinized in other ways as well. For many, the existence of Santa is a numbers game. How many households does he have to visit? How heavy would the sleigh be? How fast does he have to travel? Or how many calories does he consume due to all the cookies and milk he is given by North American families [4]. Considering 3 cookies and 8-ounces of milk, each household ticks in with 275 calories. In context of number of households the total calories amount to 9.9 billion calories just from the USA. But certainly, breaking the laws of physic to deliver all those presents is really exhausting and needs a lot of energy. Well, not according to the authors. They claim ascending a 4m chimney would require 1.5 calories, or rather 54.2 million calories for all US chimneys. They shortly muse about Santa having an immensely high metabolism, or malabsorption due to gastric surgery. However, they quickly dismiss those possibilities and conclude that it's a Christmas miracle!

Christmas is a wonderful time for many people, including scientists. It sparks imagination and curiosity. This is not limited to how people perceive Christmas, but also includes the unexplainable tasks and feats of Santa. But in the end Christmas is simply magical!

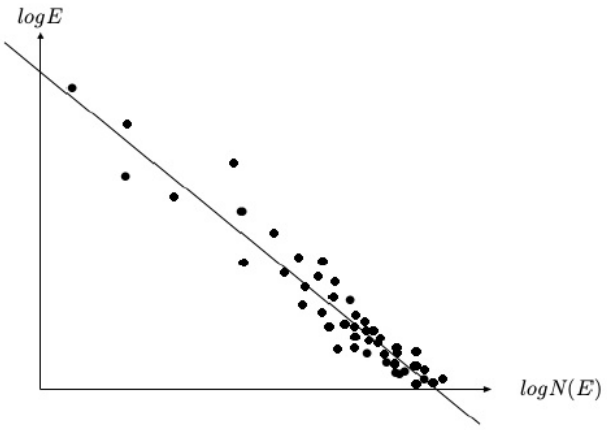
References

(1)"Letters to Santa Claus: Elementary School-Age Children's Sex-Typed Toy Preferences in a Natural Setting"
https://link.springer.com/content/pdf/10.1007%2FBF00289620.pdf
(2)"Height of Christmas Tree Drawings as a Function of Time"
http://www.scq.ubc.ca/wp-content/uploads/2013/12/heightofxmastrees.pdf
(3) "Why Santa Claus is not a God" http://booksandjournals.brillonline.com/content/journals/10.1163/156770908x289251#
(4) "How many calories did Santa Claus consume on Christmas Eve?"
https://link.springer.com/content/pdf/10.1007%2Fs00508-017-1306-8.pdf

About self-organization and complexity

Notes from the Kalju physics lab

You sit on a sandy beach and build a sand castle, or just a sand pile. While building it, you notice how sand grains are steadily falling down. Suddenly you might get a bigger avalanche, but most of the avalanches are not real avalanches, but just a few sand grains that slide along the pile. This seemingly random behaviour of falling sand nevertheless follows a mathematical pattern called Zipf's law (or its sibling laws, there is a plethora of variants on the Zipf theme), which basically says that there are few big avalanches and many small ones. The cool thing is that this somewhat trivial observation is «qualitatively quantifiable», and the same pattern is applicable to a number of phenomena, from the behaviour of lightnings in a thunderstorm, to the distribution of earthquakes, the patterns of traffic jams and stock market dynamics. They are all instances of self-organization. Even the words in a text follow a Zipf distribution: in any written text there are many more instances of and, if and which, than instances of pusillanimous, implacable or supercilious. Here is an example of a Zipf distribution, where the energy axis for example represents the energy released in a earthquake:



$N(E) \sim$ Number of events with energy E, $N(E) = kE^s$ (k and s are coefficients)

So how does self-organization come about? Return to the sand pile, and think about what happens when you build it up, i.e. what forces are at stake. The basic unit of the sand pile is the sand grain, and each individual sand grain is governed by one sole force, namely gravity. Now, when several sand grains are put together and pile up, they constitute each other's support, but from time to time one or more sand grains slip down, creating avalanches of different sizes. By piling up (and gliding) the grains interact with each other: the sand pile is more than just a number of sand grains subdued to gravity, it has become a system with a system dynamics. Self-organization can thus be described as some entities coming together to constitute a system with an emergent system dynamics.

In physics we count four fundamental forces, the long ranging gravity and electromagnetism, and the short ranging nuclear forces called the strong and weak forces.

According to our picture, these forces basically govern the world. We also operate with the concept of a free particle: an elementary particle that happily moves around in the world, sort of integral and alone; but we all know that no man is an island, and neither are particles, sand grains, or anything else in the world. Everything is part of one or many systems, and all these systems are governed by their system dynamics. The world is obsessively self-organizing! The physicists will of course insist that even the system dynamics is subjected to the fundamental physical principles like the principle of least action and the conservation of energy. Thus the grain of sand will only fall down as long as the lowest energy level is underneath it, and there is nothing to hold it back. Likewise, grains of sand will not start building up unless energy is supplied (like your spade or a very strong wind). So now we have it all in box: new forces emerge as new systems build up, and both forces and system are constrained by the basic physical principles.

The importance of being mathematical

This does however not mean that everything can be brought back to particle physics, because the fundamental

equations of physics tell us nothing about the systems that appear at a higher energy- or size-scale! In other words: the amazing physical equations, like the Dirac equation which implicitly predicts anti-matter, have nothing to say about the step above the elementary particle stage. We can describe the electron, but nothing in our equations predicts that the electron will take part in the system we call an atom! Atoms are simply too big for a particle physicist. Yet the study of self-organization and chaos theory emerges from physics. This game of modeling nature mathematically is age-old, and can be brought back at least to Pythagoras (about 2500 years ago) and probably longer. It is based on the intuition that nature's nature is mathematical, i.e. the belief that the building blocks of the world is not solely energy, but also information. Because mathematics is really about information, and a mathematical calculation is nothing but a reformulation of the information content of a mathematical expression. Take the number 4. If I write 2+2=4, and only keep the 4, I have distilled the content of 2+2 to a mere 4, but thrown away the information about its origin. My 4 could have come from 2x2 as well as from 10-6, 3+1, etcetera. Sometimes it is important to keep track of the road to the end-point, sometimes not.

Whenever we manage to describe a natural phenomenon mathematically, it means that we have caught its «information content». But to write down an equation that describes some structure is not the same as having a model, as the great Leibniz pointed out. His reasoning is that any set of points can be connected by a line, which in

its turn can be described by an equation. But this does not correspond to a model unless the equation has some predictive power (i.e. it can be falsified/verified). And in physics we look for models, and physical models are mathematical.

Complexity and scale

We can classify systems in terms of growing disorder, from ideal (deterministic) systems, to completely chaotic systems. The scale goes from total predictability of behaviour, to none. The most interesting region is really on the border to chaos, on which a system can display complexity, and among complex systems, the most interesting are the ones displaying stable complexity. Complex systems however share the feature with chaotic system that earlier states of the systems are so to say erased, i.e. the system's behaviour is irreversible. This implies that the theory cannot explain the emergence of complexity, least all the stable complexity we observe in the world, the most striking example being life, emerging from interactions between carbon, oxygen, hydrogen and nitrogen.

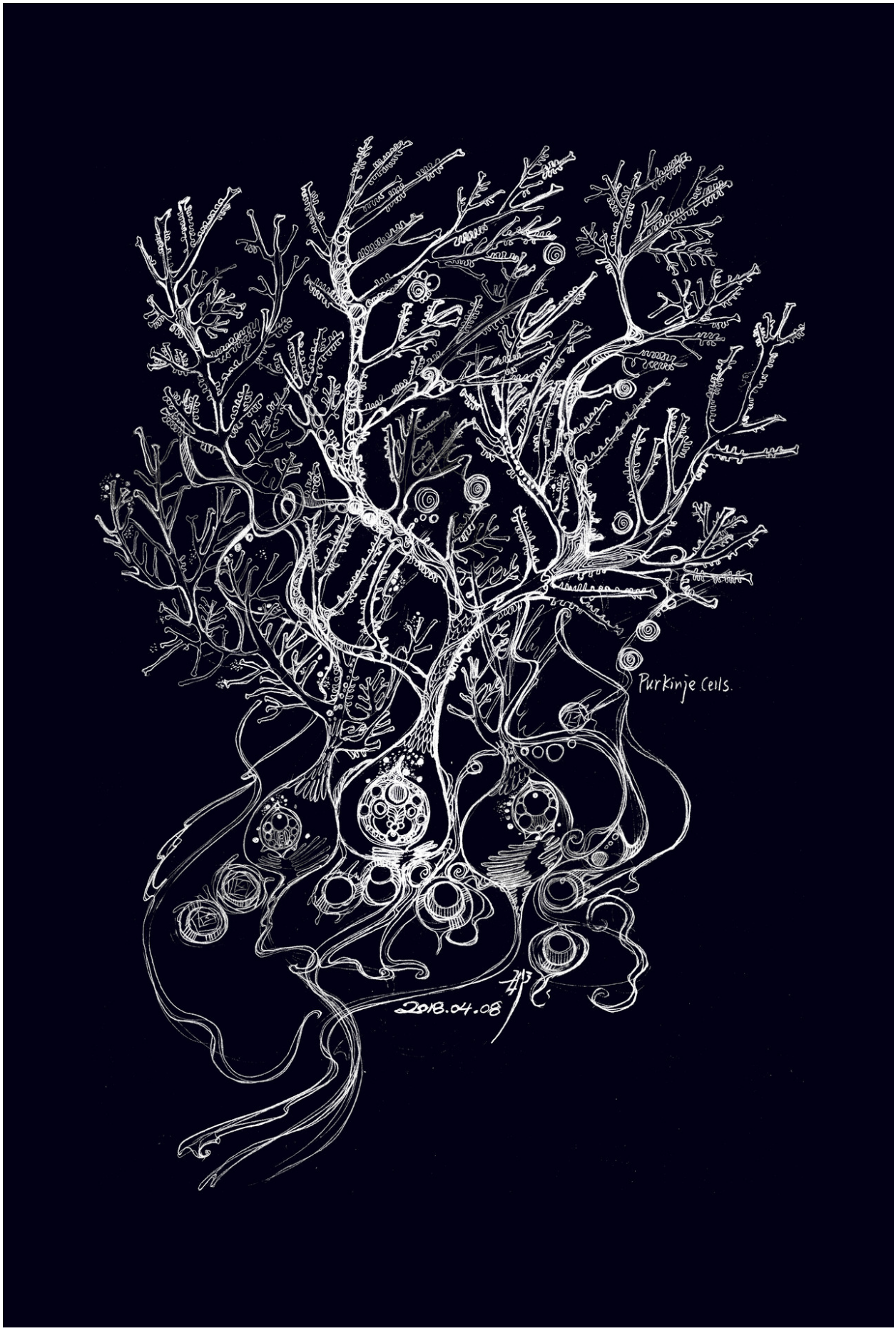
Most phenomena moreover occur at a certain scale. The human scale for example, is around 1,50 – 2,00 meters, while the diameter of an atom is around 10^-10 meters. Most stars are of about the same size as our sun, and most galaxies have about the same amount of stars as the Milky Way. But there are systems that lack a specific scale, like for example clouds. Such a system is critical, which means that everything that happens to any part of the system influences the entire system. This makes sense when you consider that when we think that an ordinary falling stone has no impact on the Earth, it is because it's so much smaller than our planet, while if there is no scale at all, there is no concept of small or big – and all influences are equally important for the entire system.

An example of a system in a critical state, is a system undergoing a phase transition, like from water to ice. Then every part (every water molecule) undergoes the same transition, and islands of the new phase emerges everywhere in the old phase, and we get the same pattern independently of what scale we investigate – we have a fractal structure. Everywhere around us we can observe that the border between two different phases tend to be fractal: coast lines are fractal – they are the border between solid state (land) and liquid state (water).

Likewise the bifurcated branch pattern of a tree constitutes the border between solid stats (tree) and gas (air), and finally our fractal clouds are the borders between gas and vapour -

There are however structures that lack characteristic scale without having emerged from a phase transition, and those are precisely the self-organized structures. They can be described as open systems far from equilibrium, to which energy and information is steadily transported. This is a nutshell description of life! You and I breathe and eat, we are very organized systems far from equilibrium, morphic islands in the ocean of the Second Law of Thermodynamics that preaches that everything steadily goes towards growing disorder! The thing is, the entire system (Life + Earth) does indeed obey the unpleasant Second Law. Life on Earth consumes the incoming sunlight, which is highly structured, and sends back the garbage out into the Universe, in the form of (disordered) infrared light. We actually don't consume the Sun's energy, but rather its order, i.e. information. No information exists without energy (and vice versa), and the information from the Sun is carried by photons, light particles emitted by the Sun. Life might be far from equilibrium (the favourite state of stones), in a state of stable complexity which is a sort of frail equilibrium. It's like balancing on an edge, with the risk of suddenly falling down: an event which is called punctuated equilibrium. This is what some biologists believe caused the famous Cretaceous extinction event, where such a great number of plant and animal species disappeared.

What conclusions do we draw in our remote physics lab? I think we recommend to relate biological phenomena to the fundamental physical principles, like the above mentioned conservation of energy and so on. There may also be new principles to be formulated at the bigger-size-scale of biology, this is something that should be investigated! The physicists and mathematicians have already come up with the maths of fractals and Zipf distributions and alike. Now we are impatiently waiting for new schemes and maybe even principles, emerging from biology, some of which are to be published in the next issue of The Eyebrow!



by Miao Sun

THE CRYPTOCHROME THRILLER

By Dr. Bianca Brüggen

Melody: Michael Jackson – Thriller

Verse It´s close to midnight, and the migratory season´s ´bout to start,
the birds are restless, and they feel they need to go, time to depart,
they spread their wings, and look around to get orientation,
they´ll find their ways, with sun, stars and use the inclination – of field lines.

Refrain It is he Cry4 in their eye,
it´s non-circadian and it is showing them the way,
it is the Cry4, in the sky
they may see kind of images of where they want to fly.

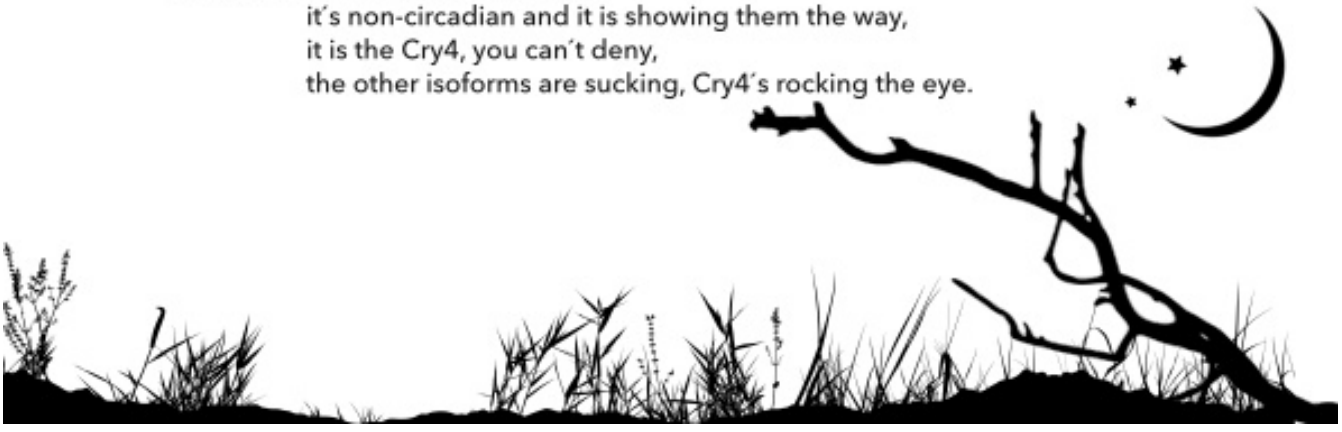
Verse Singlets and triplets, they are formed due to the electronic spin,
the H and N cores, provide interactions hyperfine they´ve been,
from tryptophan, the electrons will from radical pairs,
enabling, the birds so high precision that it scares – so unawares.

Refrain It is he Cry4 in their eye,
it´s non-circadian and it is showing them the way,
it is the Cry4, what they see,
nobody´s ever knowing but they get where they want to be.

Bridge Double cones, ganglion cells, we don't know where to locate,
upper beak, cluster N, pole cells or do they all feign,
still so much questions remain.

Verse And when they get there, they sit on the same tree as the year before,
even the young birds, they´ll remember the same route for evermore,
and if you move, them east or west they´ll keep the same direction,
to make them lose it, you can cut trigeminal nerve and do dissection – or brain injection.

Refrain (2x) It is he Cry4 in their eye,
it´s non-circadian and it is showing them the way,
it is the Cry4, you can´t deny,
the other isoforms are sucking, Cry4´s rocking the eye.



Paper and Ink

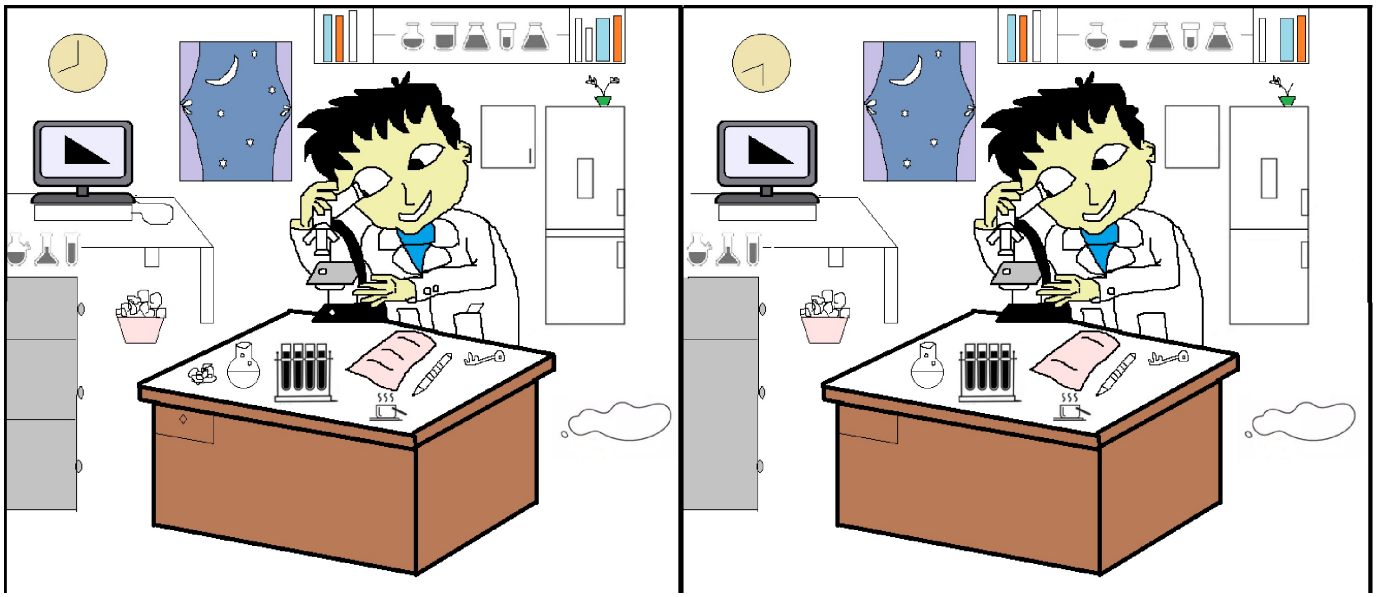
Book reviewed: Lab Girl by Hope Jahren
The anonymous reader.

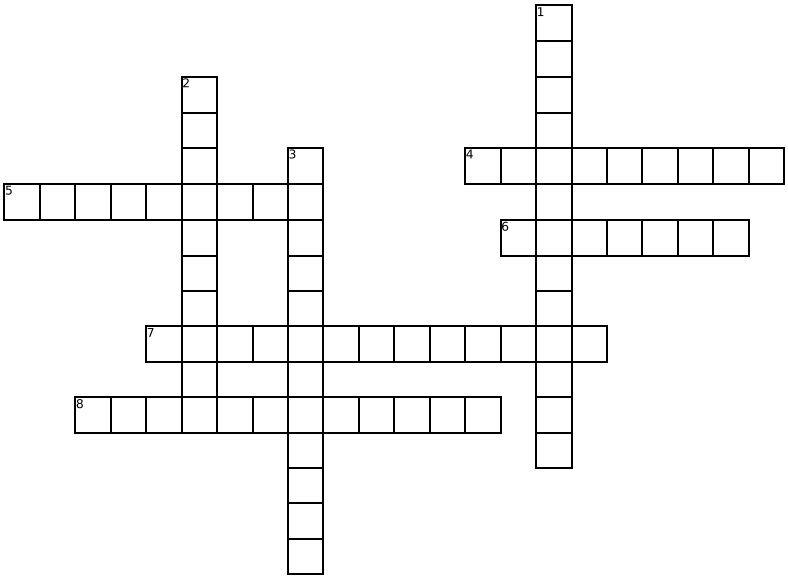
I want to share a book with you that I really enjoyed reading (well, truthfully it took a few pages before I too appreciated Hope Jahren's style, but then I really enjoyed it). The author Hope Jahren is a biogeochemist who uses stable isotope analysis to study the chemical composition of plants, both past and present, to understand their interactions with the environment. I discovered the book by accident, but it has created enough buzz to become a New York Times notable book and a winner of the National Book Critics Circle Award and a Prize for Excellence in Science Books. In times when science and scientific facts are cast aside, this is what we need.

So what did I enjoy about the book? It was the passion and the resilience she portrayed and lived. Plus the tale of the amazing friendship with her long-lasting co-worker, that was weaved throughout the story. Her autobiography is interlaced with chapters entirely dedicated to interesting facts about trees, highlighting Hope Jahren's fascination with these long-lived organisms. Hope Jahren starts with her childhood and how following her dad to work instilled in her a curiosity about the world and a desire to understand its workings. The book is about her early struggles to find her space in the scientific community and secure her survival in this community. It is also a very honest account of how this struggle for funding got exacerbated as she simultaneously discovered she suffered from mental health issues. She persevered and to a great deal this was due to the support she received from her outstanding friendship with her co-worker Bill Hagopian. I greatly enjoyed this book, as it is such an honest account of friendship and her dedication and love for science, plus I learned a great deal about trees. Hope Jahren ends with the idea that at least once in our life we should plant a tree and nurse it through the tough first years for it to grow into a long-lived adulthood.

I can only heartily recommend this book and hope that you also enjoy reading it as much as I did. However, if you do not feel like reading more about science whatsoever after a long day of doing science, then turn to Sue Kidd Monk and her book 'The invention of Wings' for another captivating read.

Scrabble





Across

4.Hydrogen's elder brother
5.2*22 2x =
6.Direct descent from an ancestor
7.I decay logistically
8.Famous British broadcaster and naturalist

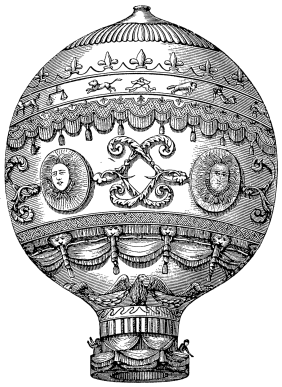
Down

1.My nickname is clumping
2.I have a backbone: don't mess with me
3.One who identifies good and bad vibrations

Happy holidays from the Eyebrow crew!

K	M	K	N	D	G	T	N	R	S	E	N	M	J	J
S	K	U	I	A	U	J	E	V	Z	Y	O	I	W	X
E	A	A	A	V	M	I	W	E	B	L	I	S	J	X
L	E	N	V	B	N	W	E	L	K	L	T	T	S	C
G	C	I	T	D	S	R	O	L	V	O	A	L	A	Z
J	L	A	E	A	F	T	T	N	B	H	N	E	X	M
B	K	E	J	I	C	V	H	D	S	Y	R	T	I	H
W	R	R	T	A	A	L	L	C	A	A	E	O	E	V
M	Y	N	P	C	D	R	A	N	A	F	B	E	N	Q
N	A	E	D	I	T	E	L	U	Y	N	I	V	V	H
Y	S	H	D	F	Y	T	O	T	S	V	H	P	L	Z
V	Z	N	M	P	B	F	Q	Q	V	W	I	I	V	S
G	L	A	C	I	A	T	I	O	N	Y	Y	N	E	B
R	S	S	H	U	C	L	Q	S	T	L	Z	V	I	W
H	A	B	V	M	R	S	E	V	T	N	X	G	S	B

Special announcement



We would like to dedicate this page to wholeheartedly thank Vanessa Kloke for her work within the MGSE. Her encouragement and aid has been invaluable in establishing the Eyebrow and getting it on its feet. We wish her a joyous maternal leave and wish her a happy return for later on.

Meanwhile in her absence, we are in no doubt that the MGSE will be in any trouble, as the tasks of the graduate school will be managed safely in the hands of Kristina Wensing. We would like to welcome Kristina in her job and we look forward working closely with her in the future.