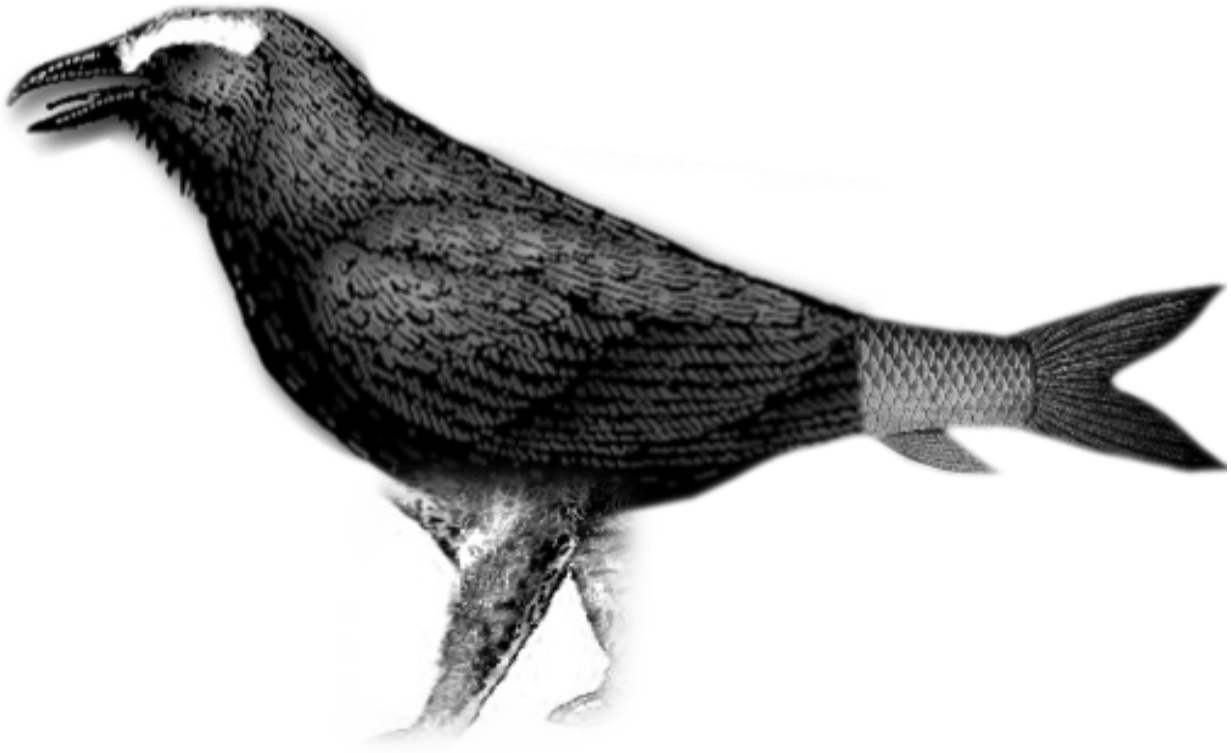
Issue1 February 2018

The Eyebrow



For and by PhD students of the Muenster Graduate School of Evolution

EDITORIAL

Let me present the Eyebrow. You are now holding a copy of its very first issue. It is a magazine written, edited, formatted, and ultimately yielded by PhD students of the Mnster Graduate School of Evolution (MGSE). We do not aim to inform, yet we will. We aim not to elucidate, but we will. We do, however, aim to entertain, by letting thoughts run freely.

The magazine will contain reportages from the different groups associated with the MGSE, news of passed and future events, scientific discourse, and scientific topics brought into a non-scientific setting. The latter is of great importance. The magazine is born from the need of SLIGHT chaos. As we intellectually grow up being proper doctors of science, we explore and are molded within the framework of academia. The academic framework of formulating ideas and presenting results is relatively strict, and with good reason. We need sobriety when dissecting claims about the world we live in. However, scientists are nothing but humans. Certain human characteristics are (or at least should be) scorned within the walls of publishing houses. There are emotional, artistic, and erratic sides within the spectra entailing humanity which includes also the intellects that gaze into abyss of unconquered knowledge. There is a need for a stage where one may bring forth the subjects take on science. We aim to be a window to such a stage – but to deliver them edited in a digestible form.

The process of writing and editing chaos into a digestible format is just as much a personal as it is an intellectual development. Change over time – evolution – is what unites philosophers and biologists alike within the graduate school. As fate would have it, the birth of The Eyebrow overlaps with the birthday of Charles Darwin, February 12th. Also, Valentine takes place in February, which acts as a red thread throughout the issue. As romance to any primal biologist is synonymous with sexual reproduction, the first lab reportage is dedicated to research on courting and sexual conflict. Sexual reproduction and sexual selection is one of multiple processes enabling speciation. Fittingly, the philosophical contribution displays the overlap and need of philosophy when disentangling the biological species concept. Next to the standardized news section, there is an unorthodox take on the Romeo and Juliet story. We wish to display the diversity of the MGSE, both within and between the associated fields of research.

With a guarantee of being educated without effort, exposed to radical thoughts to the point, or silliness at altitudes of flying circuses – I hope you will appreciate the personal perspectives on science of the contributors. We are humbly persistently proud.

April Snøfrid Kleppe, editor in chief

The abyss Le bibliophile, Felix Vallotton, (1911)

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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

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 (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 and want to write, tell or express something, or for any questions you may have, make contact: eyebrow.mgse@gmail.com.

New News

Mercator Fellows EvoPAD
17 June - 15 July 2018: Prof. Dr. Thomas Flatt
Department of Biology Chemin du Mus e 10 CH-1700 Fribourg Switzerland
Website: http://www.unifr.ch/biology/research/flatt/
Research: The Flatt group studies the mechanisms underlying evolutionary changes in life-history traits.

ETT Fellows 2018
Prof. Dr. Michael B. Hennessy, 1/5- 31/7
Department of Psychology, Wright State University, USA
Website: http://psych-scholar.wright.edu/hennessy/
Research: Relation between neuroendocrine activity and behaviour, specifically during development.
Plans for visit: Not settled yet but most likely a workshop. Plausible topic is reproductive division of labour / brood care with a comparison of insects with mammals. This may potentially be carried out together with Christina Grozinger who will arrive in June (see further on).

Prof. Dr. Elisabeth A. Lloyd, 11/5 – 9/6
History & Philosophy of Science Department, Indiana University, Bloomington
Website: http://mypage.iu.edu/~ealloyd/
Research: Philosophy of biology, general philosophy of science, the role of models in science, and gender issues in science.
Plans for visit: Workshop on "Evolution beyond Natural Selection"

Prof. Dr. Christina M. Grozinger, 1/6 - 15/8
Center for Pollinator Research, Penn State College of Agricultural Sciences
Website: https://www.grozingerlab.com/
Research: Regulation and evolution of social behaviour in social insects, focus on honey bees and bumble bees; integrative approach which encompasses genomics, physiology, behaviour, chemical ecology, and ecology
Plans for visit: Potentially a joined workshop with Michael Hennessy (see further up).

Upcoming Courses and Workshops 2018
7th annual Symposium of the Münster Graduate School of Evolution, 21/3 – 22/3
The 7th MGSE Symposium provides the doctoral students with the opportunity to present and discuss their ongoing PhD projects and to learn about studies taking place in other faculties and departments of the graduate school. Posters and presentations are embedded into contributions from Principal Investigators of the MGSE as well as three keynote lectures by internationally outstanding guest speakers:
Prof. Dr. Paula Stockley, Institute of Integrative Biology, University of Liverpool, UK
Prof. Dr. Michael Lynch, Biodesign Center for Mechanisms of Evolution, Arizona State University, US
Prof. Dr. Leo W. Beukeboom, Groningen Institute for Evolutionary Life Sciences, University of Groningen, NL

MSc Advanced Module "Evolutionary Medicine", 16/4 – 11/5
Content: The interdisciplinary MSc Advanced Module (Fortgeschrittenen-Modul) "Evolutionary Medicine" aims to train MSc students in the application of evolutionary principles to the understanding of health and disease. Some of the topics are the evolution of bacteria resistance, evolution of disease-relevant genes, genome-wide association studies or the evolution of transposable elements. Students will be trained in sequencing techniques, genomics, transcriptomics, next generation sequencing or bioinformatics.
Registration: PhD students may also participate if free places are available. This is only foreseeable shortly before the course starts (MSc students have priority).

Workshop on "Evolution beyond Natural Selection", 11/5 - 9/6
The basic idea is to make PhD students familiar with the coming ETT fellow Prof. Lloyds work and foster a lively discussion that may lay the foundation for future cooperation.
Registration: MGSE and EvoPAD PhD students are welcome to register. Deadline for registration is yet to be scheduled.
Contact: Dr. Vanessa Kloke (mgse@uni-muenster.de)
If you like to get involved, please write a short email.
Suggested topics and publications can be downloaded from the Sciebo folder at:
https://uni-muenster.sciebo.de/s/p32u9EN98A5ySzg

1st Münster Evolution Meeting, 4/10 – 6/10
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 intensive networking and discussion.
Abstract submission deadline: 1/5 2018, registration ends 13/9 2018. Registration fee 80 EUR. Follow the MEM website for updated information;
http://www.uni-muenster.de/Evolution/MEM/main.shtml

For further information on listed upcoming courses, modules or workshops, please contact Dr. Vanessa Kloke at mgse@uni-muenster.de or see webpage; http://www.uni-muenster.de/Evolution/mgse/

Old News

Seminar Series

"The Growth of the Evolutionary Thought"
An interdisciplinary lecture series dealing with aspects of Evolution within the disciplines Biology, Medicine, Geosciences, and Philosophy. It provides an in-depth introduction to the history and philosophy of evolutionary science.

MGSE Book Club

The MGSE book club aims to strengthen the understanding of evolution. Anybody who wishes to learn or to offer his/her expertise is very welcome to join. The Book Club is organized by Dr. Francesco Catania and is currently ongoing. The Book Club of SoSe 2017 / WiSe 2017/18 focuses on the book "Evolutionary Genetics – Concepts and Case Studies" by Charles W. Fox and Jason B. Wolf (2006, Oxford University Press).

Former ETT Fellows from 2017

Prof. Dr. Juan Alfonzo, 11/7- 13/9 2017
Dep. of Microbiology, The Ohio State University, USA
Website: http://alfonzolab.blogspot.de/
Research: tRNA editing and tRNA modification in trypanosomes and tRNA import into mitochondria in various systems, with special focus on tRNA transport in human mitochondria.

Prof. Dr. Loriano Ballarin, 16/6 - 13/7 2017
Dep. of Biology, University of Padua, Italy
Research: Investigating the role of haemocytes in immune and stress responses in ascidians, with particular reference to colonial species.

Prof. Dr. Chris Smith, 6/5- 16/6 2017
Department of Biology, Earlham College, USA
Research: Developing the harvester ant genome project as a research tool, and analyzing it to understand the evolution of sociality in Insects. Other central topics in Prof. Smith's research are Division of labor (caste) in ants and Microbial ecology of agroecosystems.

Dr. Mario Rosario Guarracino, 12/3 - 11/5 2017
Inst. for High Performance Computing and Networking (ICAR-CNR), Italy
Research: Machine learning and data mining algorithms, methods and software tools for biological data analysis. Planning and development of high performance computational components for parallel and distributed problem solving environments.

Summer School and Retreats

EvoPAD 1st Summer School, "Evolutionary Processes in adaptation"
The first EvoPad summer school took place from 19 - 22 September 2017 at the Stiftsberg Bildungs- und Freizeitzentrum in Kyllburg in the Eifel region. The aim of the summer school was to bring the PhD students to the same level of knowledge regarding "Evolutionary processes in adaptation". The program included lectures on the basics of evolution, evolutionary genetics, misconceptions about evolution, phenotypic plasticity, epigenetic inheritance, phylogeny, and the role of viruses in evolution. Discussion sessions took place on the extended evolutionary synthesis (EES) but also on how philosophers of science work or how to pursue a career in science. The group was joined by Prof. Dr. Henrik Kaessmann from the University of Heidelberg who gave a talk on "The evolution of mammalian gene expression across multiple dimensions".

MGSE PhD Student Retreat, 16/10 - 18/10 2017
The second MGSE PhD Student Retreat took place at the Evangelische Jugendbildungsstätte in Tecklenburg at the foothills of the Teutoburg Forest. The PhD students presented their research, exchange ideas with their peers and get familiar with other group's work. MGSE PIs Dr. Claudia Fricke, Prof. Dr. Christoph Scherber and postdoc Dr. Caroline Zanchi attended the retreat. Next to providing valuable feedback on the student's projects, the guests gave presentations on their own current work. MGSE Speaker Prof. Dr. Jürgen Gadau attended to inform about recent developments within the graduate school. Additionally, a debate was organised on the topic of EES and "Does evolutionary theory need a rethink".

Courses & Workshops

OMICS workshop, 20/11 - 8/12 2017
Offered for EvoPAD PhD students through the Biology Faculty by the Bornberg-Bauer lab. The workshop was to familiarise the students with basic tools to perform different OMICS analyses, and enabling the students to write their own programs for their analyses. Additionally, an overview was provided over existing programs in the area of differential expression and orthology detection.

Debate training for sensitization for gender related topics – "I see it differently!" , 5/12 2017
Workshop for EvoPAD PhD students. A workshop on how to participate in debates through structured arguments, by means of gender related issues to raise awareness among participants. Workshop was lead by Thore Wojke from Debate Consult.

Statistics Workshop on Linear and Generalized Linear Mixed Models, 26/6- 30/6 2017
Organizers: Dr. Mareike Koppik, supported by Dr. Claudia Fricke, Sergio vila Calero, Kristina Wensing.
Dr. Mareike Koppik from the Institute for Evolution and Biodiversity offered a workshop for MGSE PhD students who are interested in using generalized linear models (GLMs) and R for their statistical analysis.

Meet the EvoPAD

Ozan Altan Altinok

Department of Philosophy, University of Münster.

The new folks in town, the EvoPAD, would like to say hello! EvoPAD (Evolutionary Processes in Adaptation and Disease) is a Research Training Group funded by the German Research Foundation (DFG). All members of EvoPad are associated members of the MGSE. The research group consists of 12 core projects spanning the domains of biology, medicine, and philosophy. With a total of 12 Principal Investigators (PIs), 5 associated researchers, 12 PhD students and 3 associated PhD students, EvoPAD is a unique and diverse group of researchers. The diversity of the EvoPad provides a promising environment to study different aspects of evolution.

How can such diversity work harmoniously under the same roof? The common theme uniting the projects is – the often neglected – evolutionary processes underlying health and disease. After all, nothing in biology makes sense except in the light of evolution. Additionally, with respect to the health sciences – philosophy and ethics are commonly overlooked. EvoPAD seeks to put things right. The purpose of the EvoPAD group goes both ways. Firstly, to provide a better understanding of evolution through the individual interdisciplinary research projects. Secondly, to apply the theory of evolution as another pillar in projects ranging from ethics to medicine to philosophy of science around the concepts of adaptation and disease.

The ethical, philosophical, evolutionary aspect of each and every project are being discussed during the development of the projects. With the ambition to foster a community there are, next to workshops, monthly symposia that are open to everyone.

So, why not come and meet us? We are at Hüfferstrasse 1a, and are easily reachable from the website of EvoPAD https://www.uni-muenster.de/EvoPAD/about-us/index.html

Hidden sexuality

by D.D.

Thomas Junker gave the last lecture of the MGSE seminar series "The Growth of Evolutionary Thought" January 29 to a full lecture hall. His talk was on the "Hidden nature of human sexuality", based upon his bestselling book on the same topic, "Die verborgene Natur der Liebe – Sex und Leidenschaft und wie wir die Richtigen finden". We managed to pose some follow-up questions regarding the topics covered in his talk.

Q: In your talk you raised the point about beauty. That humans appreciate a beautiful partner as a sign of fitness. Do you think this aesthetic sense extends beyond human beauty. Could we imagine an asexual species which has evolved no concept of aesthetics/beauty? E.g. fungi.

A: It is well known that aesthetic evaluations are not only used to assess potential sex partners but many aspects of the environment. Examples would be food (e.g. the ripeness of a fruit) or characteristics of a habitat that indicate advantages or disadvantages. I.e. aesthetics is not restricted to humans or sexually reproducing species, but it requires a nervous system to have a concept of beauty.

Q: You emphasize that human behaviour is grounded in human biology (genetics). People are often reluctant to claim a deterministic role of genes. Do you find much hostility to these views, either among scientists or the general public?

A: As a matter of fact many people are offended by the idea that human behaviour is in many ways determined by our genes (and not by free will or by the environment). I wonder why it should be preferable to be determined by environmental factors like general culture, education, religion, or the media. This might be one of the reasons for the reluctance to accept the role of genetic factors in human behaviour: Being determined by one's own genes challenges the power of social agents and can create potentially dangerous conflicts.

Q: Conflicting fitness between sexes can lead to sexual conflict, potentially generating an arms race. For example, mate guarding decreases the chances of males to increase their own fitness by mating only with one female instead of with many females as possible, while females would have an advantage over males if they choose "the right" male in order to have her offspring. Do you consider that pair bonding could be a product of sexual conflict?

A: Monogamy certainly has many disadvantages for men and women. You named two of them. The question however is, if monogamy has more advantages than disadvantages and how it performs compared to other mating strategies like solitary life, polygamy, or promiscuity under the given circumstances. The balance furthermore depends on the qualities and situation of the individual. I.e. for individuals who do not have the necessary attractiveness or resources a solitary life might be the adequate strategy.

Q: Romantic relationships in humans are intimately linked with society at large. For example, marriages are largely social, legal, and religious commitments. Speculating freely, with respect to sexual norms differing between nations, would you deem human sexuality adapted to the social cultural norms and that human sexual behaviour is fluid/plastic, OR would you speculate that people have same sexual behaviour regardless of what they may report?

A: The interesting thing is that although human cultures and societies vary quite substantially in their legal, economic etc. conditions, the relevant mating strategies are restricted to a rather small number. There are always individuals who prefer unusual arrangements of love and sex - at least for a while -, but the vast majority sooner or later returns to monogamy or mild polygamy even if other possibilities are permitted. This observation is corroborated by the fact that anatomy to a large extent is destiny and human (sexual) anatomy fits much better to pair bonding than to promiscuous multimale-multifemale systems.

Photo: Beatrice Hermann

In focus: Department of Behavioural Biology, WWU

Principal investigators:
Prof Dr Sylvia Kaiser, Prof Dr Helene Richter, Prof Dr Norbert Sachser

MGSE Ph.D. students:
Niklas Kastner, Susanne Sangenstedt, Alexandra Mutwill, Janina Feige, Binia Stieger

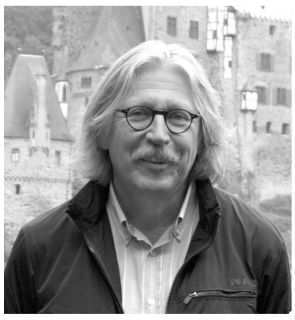
Model organism:
mice (Mus musculus), guinea pigs (Cavua aperea f.porcellus), wild cavies (Cavia aperea)

Research field:
Animal behaviour, stress, hormones, animal welfare, domestication, gene x environment interactions, cognition and emotion, individuality, reproducibility of animal experiments, 3R-concept/refinement

Research methods:
touchscreen based cognitive testing, software based behavioural observation, various behavioural paradigms, hormonal analysis of blood/saliva/faeces

Interview with MGSE PI: Prof Dr Norbert Sachser

Q: Which of your research findings was the most surprising for you?



A: When I began my studies in animal behaviour it was generally believed that behaviour is primarily controlled by instinct. The most surprising finding was that this is not even true for rodents. Rather their behavioural phenotype is shaped adaptively by social experiences throughout the lifetime, that is, from the prenatal phase through adolescence and beyond.

Q: Is there an unresolved research question out there you would like to have the answer to?
A: I would like to better understand how cultural and biological factors interact to shape individual emotion, cognition and behaviour.

Q: If you had the chance to choose, which model organism would you like to study?
A: We studied a broad range of species from humans and orang-utans to rhinos and elephants to different species of rodents and lapwings. We studied domestic and wild animals, model and non-model species. We even discovered a new species: the Münster yellow toothed cavy. There are not many wishes left - maybe the study of toddlers.

Q: What is the biggest challenge as a professor?
A: One of the biggest challenges is to find the right balance between research, teaching, and science management.

Q: What advice would you give students for a successful Ph.D.?
A: Listen carefully to others and use their experiences, but finally do what you think is right!

Q: What made you choose such a romantic research field?
A: I did not choose – I was imprinted!

Q: Does studying social and sexual behaviour enhance standard romance in daily life?
A: From my point of view: definitely yes! But I am not sure whether others would agree.

Q: What is the most fascinating thing about guinea pigs?
A: Their sophisticated system of social support and help - they even helped me to receive a professorship.

Q: Are guinea pigs your favourite animals?
A: I prefer dolphins, elephants, dogs, and cats.

Q: What scientific tips can you give to a successful celebration of Valentine's Day?
A: As a behavioural biologist I recommend: Go to the zoo and – depending on your and your partner's personalities – get inspiration by the peacocks, the love birds, the birds of paradise or the bonobos.

Of rumba and romance in guinea pigs

Alexandra Mutwill,
Susanne Sangenstedt
Institute of Neuro and Behavioural Biology,
,WWU

When human males try to attract a mate, they apply bold, funny, and sometimes weird strategies. A classic, which can be more or less successful depending on the chosen mating partner and his/her sobriety, is dancing. Just like male guinea pigs, they start moving their hips from side to side, humming a song that does not quite match the music, circle around their mate of choice and then call it rumba[1]. Some female guinea pigs have a reaction familiar to humans: annoyance. Angry looks and protesting squeaks can be ignored as long as you are humming loud enough and dont stop the dancing.

Guinea pigs learned the rumba from their wild ancestors, the wild cavies, originating from South America. Like their domesticated counterpart, female wild cavies are often quite unimpressed by the male dance performance. For them, there is only one rule when it comes to mate choice: the bigger, the better!1 Despite this, heavier wild cavies do not, necessarily, have more copulations than lighter ones.[2] So instead of gaining weight, a dancing lesson for rumba may be still enough.

On the dance-floor of love, an important decision is selecting the correct partner for your attention. In order to solve this problem especially young individuals often apply a strategy known as trial and error. As humans risk thumb cramps from swiping potential mates in hope of a date, you might think male guinea pigs get dizzy from swinging their hips to every accessible female. Far from it! Young and fresh, this seems to pay off: no matter if blond or brunette, old or young, the amount of experience seems to count. But then, grown up a bit, after hundreds of dates and dances, both humans and guinea pigs might fall for someone special. Humans switch from swiping to typing, concentrating on their beloved and distractions become scarce. Its the time of selfies, tweets and posts: showing the love is the main thing! In guinea pigs similarly, once a female gets attached to a male, this bonding is clear to everyone: the partners show at least twice as much contact and courtship behaviour towards each other and are often seen together.[4] To make it even more clear, males spread their specific scent onto the preferred female, so no one is confused.[3] This way exclusiveness is (mostly) ensured, the couple is respected[3] and both partners can look cheerfully towards the future. Yet, there might be challenging situations ahead. Having a partner seems favourable then. If male guinea pigs for instance are put in unknown surroundings, only the presence of his beloved female will reduce his stress hormone levels.[5] No other lady, neither familiar nor unfamiliar, is able to do so.[5] Also vice versa, the bonding male can provide the best social support for his beloved female in the same situation.[4] Its not surprising that this kind of bonding has persistence: it can remain for years![3]

A romantic Valentines story, but what about humans? Interestingly, men indeed showed a reduced endocrine stress response in a public-speaking task, when their female partner was present. However, the other way round, they were not able to provide this social support. Women even showed a tendency toward increased stress hormone levels when their male partner was around. As human males are unsuccessful at calming down their female partners with rumba, maybe it is better to give them chocolate. You should give it a try!

1. Rood, J. P. Ecological and Behavioural Comparisons of Three Genera of Argentine Cavies. Anim. Behav. Monogr. 5, 1–IN4 (1972).
2. Adrian, O. & Sachser, N. Diversity of social and mating systems in cavies: a review. J. Mammal. 92, 39–53 (2011).
3. Sachser, N. Sozialphysiologische Untersuchungen an Hausmeerschweinchen. (Paul Parey, 1994).
4. Kaiser, S., Kirtzeck, M., Hornschuh, G. & Sachser, N. Sex-specific difference in social support - A study in female guinea pigs. Physiol. Behav. 79, 297–303 (2003).
5. Sachser, N., Dürschlag, M. & Hirzel, D. SOCIAL RELATIONSHIPS AND THE MANAGEMENT OF STRESS. Psychoneuroendocrinology 23, 891–904 (1998).
6. Kirschbaum, C., Klauer, T., Filipp, S.-H. & Hellhammer, D. H. Sex-specific effects of social support on cortisol and subjective responses to acute psychological stress. Psychosom. 57, 23–31 (1995).

the conflict behind sex

Sergio vila-Calero
Evolution and Sexual Conflict Group, Institute for Evolution and Biodiversity, University of Muenster.

Sex is usually interpreted as a cooperative act between two individuals that, in a very romantic human view, come together to express their love or share a moment of passion. Biologically, sex is seen as one of the most important strategies that allow our genes to be passed into the next generation by mixing the genetic material from two different individuals. Thus, this can also be understood as a cooperation that would, for example, increase the chances of survival of our offspring due to their "enhanced" genetic variability – who doesn't want a better future for their kids, right? However, there is more behind sex than these romantic or altruistic ideas. In fact, sexual reproduction can have as much of selfishness as altruism when we see it as the means to perpetuate our own genes through subsequent generations.

In biology we use the term "Sexual Conflict" to describe the difference of interests that may arise between males and females in a species. In this context, "difference of interests" doesn't mean who gets to keep the house and who keeps the pets during a divorce. For us biologists, sexual conflict happens when one of the two sexes, let's say males, try to mate with as many females as possible and prevent those females from mating with other males. This can have several negative implications for females, for instance that the male they mated with was not the healthiest one and her offspring will inherit his poor health. Therefore, females come up with their own strategies to counteract this and find the fittest male or males that, for example, should give her kids better changes of survival or provide her with a nice "present" before she endures the difficult times nurturing her babies. At this point I must be clear that by no means I am implying that all males are "ladies men" and that all females are materialistic or interested only in those Chris Hemsworth's eyes[1]. In fact, I am not even referring to us humans! All those human-like behaviours I mentioned before were "invented" by many species of animals probably earlier than even humans existed on earth.

Sexual conflict is one of the most interesting topics of research for many Evolutionary Biologists and Ecologists around the world. In Germany, Dr. Claudia Fricke[2] and her research group at the Institute for Evolution and Biodiversity from the University of Muenster focus in studying evolution and sexual conflict by using a well-known organism in the scientific community, the fruit fly Drosophila melanogaster. Why flies? Well, fruit flies have been helping us to understand life for over a century[3], mainly because they are very small, which is convenient to keep thousands of them indoors. They are simpler than other organisms in their internal organization, regarding tissues, organs, genes, and so on (note that this is not the same as saying that flies are primitive, which is a misleading and usually incorrect concept used to refer to animals that are smaller or "less intelligent" than humans). They reproduce fast, so we can have many generations of flies in a short period of time.

How are those traits useful to study evolution or ecology? If you remember from school or any documentary, evolution is the process by which organism have come to be the way we see them now, the way we humans see ourselves now. It's the never-ending process by which organisms have changed over generations through their own genetic information and the influence that environment has on them. Ecology, however, explains the interaction of species with their environments, which includes other organisms and the habitat they live in. Therefore, by having a fast-reproducing, small and simple organism like fruit flies, we can have many generations in short time (useful for e.g. evolutionary studies), keep them in not necessarily big facilities (cheap in space and resources) and study their anatomy, physiology, behaviour, genetics and more (it's easier to study e.g. a fly brain than a mouse brain).

Now let's go back to the important business, the sexual conflict. As simple as they are, fruit flies present conflict in their lives too. Males want to mate with as many females as they can, because smaller in this case also means they don't have too much time to do it[4]. So once they mated with one female, they look for another one and start courting her (yes, male fruit flies also court their potential partners). It looks that these males are there only for the sex, right? However, females don't stay passive and are very choosy with who to mate with, and not only that, but they also give those lustful males a taste of their own medicine. A female stores the sperm of males for some time and if there is any chance another male convinced her to mate, it's more likely that she will allow the sperm of the last one to fertilize her eggs. But that's not all, males have come with another strategy to "fight" those astute females and be sure they will use their sperm to fertilize their eggs. In their seminal fluid, together with sperm males carry some molecules that can influence the behaviour and physiology of the female they mated with. Once females received this crafty cocktail from males, they tend to reject other males that approach with the intention to mate.

We see sexual conflict everywhere in nature, from invertebrates that, like some spiders, give fancy gifts to their potential mates who will decide if they are allowed to mate or if, in turn, the giver will be today's meal, to a vertebrate species that traditionally gives the potential mate a shiny rock to keep sexual competitors away, as long as, of course, the receiver of the gift agrees that it is the right time to embark in such an important commitment. This and a long list of examples are proof

that all organisms, included humans, share similar genes, physiologies, behaviours, and even conflicts which define who we are and how we came to populate this world.

1 I made you think about Hemsworth, right? Google him ;)
2 https://www.uni-muenster.de/Evolution/evolseco/
3 Stephenson R. & Metcalfe NH. (2013) Drosophila melanogaster: a fly through its history and current use. J R Coll Physicians Edinb. 43(1):70-5.
4 Fruit flies can live up to around 50 days under optimal temperature conditions in nature.

Romeo & Juliet

Nadja Haarmann
Research Group Hospital and Environmental Hygiene, Institute of Hygiene, University Hospital Münster

Es waren zwei Koenigskinder
Die hatten einander so lieb,
Sie konnten zusammen nicht kommen,
Das Wasser war viel zu tief.
There were two royal children
Who loved each other so much,
But never they could be together,
The water was much too deep…

The poem is a very famous German ballad by an unknown author. Briefly, he dies for her, she dies for him. No happy ending, just like in the Phantom of the Opera or Romeo and Juliet. To die for love, to be intoxicated with love, to give ones life to save one another, to travel the world and the seven seas; these are themes often described by the world's most famous writers.

Now, what is the parallel to biology? Well, I want to tell you about the close relationship between enterohemorrhagic Escherichia coli O104:H4 (EHEC) and human kidney cells (Juliet from now on). In 2011 EHEC caused the largest outbreak of bloody diarrhea and haemolytic uremic syndrome in the world and in the end, there were 54 fatalities and nearly 4000 people affected[1]. EHEC, or Romeo as he henceforth will be known, is –as I already mentioned– really close to Juliet, literally. Romeo did everything for love, nearly died for it, but let's start in the beginning: "Travel the world and the seven seas". Romeo's origin is unknown. It has been suggested that he came from Egypt[2]. Romeo's closest relative was isolated in Africa and is called enteroaggregative Escherichia coli (EAEC) 55989[3].

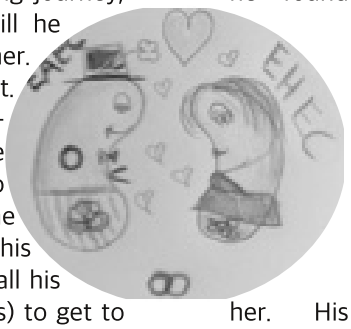
It is safe to assume that he travelled the Mediterranean Sea and across the Alps to find Juliet in Germany. Perhaps hitching a lift on salad sprouts. Since sprouts are eaten, Romeo went through oesophagus and landed in hell (stomach). There, he was cooked in acid for all his sins for 2 hours before managing to escape. Fortunately, he survived, at least some parts lived long enough to reach the holy land, in other words Eden or the paradise or, in our terms, the human gut.

He escaped the spheres of hell (stomach) and collected himself again. It sounds easy but of course it was not. After escaping the stomach, he found himself surrounded by beautiful mountains (epithelia cells).

He even met the locals -mainly a family called Capulet. They could not understand each other, and they weren't friendly. The locals defended their territory against Romeo. He started to search for a safe spot to build a home (biofilm) leaning onto the mountains (Epithelia cells of the gut). He used his own hands (aggregative adherence fimbriae) to build the walls and roof. He cultivated grains (mucus) in the fields using a home-made plough (Pic, serine protease) for food. Romeo still feared the others and he was so alone. When he built his house, he also added a small window with his pickaxe (SigA, Serin protease) to get a look at the other side of the mountains. There he saw a deep and roaring river (blood stream). He followed the wild stream with his eyes, when he suddenly saw her.

She was shaped like small red beans: Pretty, gorgeous, and so wonderful. He could not speak a word. Nothing had ever made him feel this way. Since spoken words were much too minor for the depth of his emotions, he started to send her letters - filled with all his love (Shiga toxin) – and sealed them with a kiss. Romeo did not notice that he had inflamed (inflammation) her with his letters because Juliet (Kidney cells) was instantly and completely intoxicated (with Shiga toxin) by his loving words. Juliet could not feel the inflammation due to her intoxication. Overwhelmed, she started to cry, with tears shimmering like pearls (Interleukin-8).

After all this time, the long journey, he found his love at least. And still he could not reach her. Desperation filled his heart. And then– suddenly– Juliet changed. She became pale, started to tremble and collapsed. She died! Caught in his unbearable pain, he used all his weapons (virulence factors) to get to her. His world (epithelia cells) turned dead and grey (inflammation of the gut). The locals (Juliet's family) heard him scream and called the police (Antibiotics). But he would not be caught! Never! He'd rather die! As if the police knew his silent wish, they shot him down. When the bullet penetrated his heart, he remembered Juliet for one more time and while he died he sent all his love to Juliet (Shiga toxin, SOS response). What he did not know was that Juliet was still alive. She had merely fainted. When she saw Romeo being shot by the police she decided that her existence was not precious anymore (only to her human, but well shit happens). She embraced his love (Shiga toxin) for one more time. Then she died with a smile on her face. At least she had been loved in her life.



"For never was a story of more woe / Than this of Juliet and her Romeo."

1 Robert Koch institute, 2011
2 Karch et. al., The enemy within us: lessons from the 2011 European Escherichia coli O104:H4 outbreak., EMBO Mol. Med, 2012
3 Mellmann et.al. Prospective Genomic Characterization of the German Enterohemorrhagic Escherichia coli O104:H4 Outbreak by Rapid Next Generation Sequencing Technology, PLOS one, 2011

The Biological Species Problem – A Return to Essentialism?

Francois Pellet
Department of Philosophy, University of Münster

What is a biological species?[1] If we are to introduce how philosophy can be of any help to evolutionary biology, then we can argue that the contribution of philosophy to evolutionary biology can be best understood through the analysis of a single case study.

I would like to show that the ongoing debate about what a biological species is (is very likely) the best illustration for analyzing the relationship between philosophy and evolutionary biology.

The debate about biological species is a metaphysical debate about the ontological status or the nature of biological species. Historically speaking, most of the definitions of biological species argued for by philosophers are situated within a naturalistic stance; meaning that definitions of biological species have been - and are still -- strongly influenced by discoveries made in the natural sciences. Indeed, if there exists a scientific field relying the most on the notion of a biological species, then it is obviously evolutionary biology.

My purpose is not to review all of the different naturalistic theories of biological species that have been proposed (cf. Ereshefsky, 2017 for a sample of those theories). My aim is more modest: I shall contradict different arguments which have been put forward against a so-called essentialist definition of biological species i.e. aiming at defining biological species by sorting out their single or unique essence (typically through giving their necessary and sufficient conditions). Thus I wish to show you that an essentialist definition of biological species is, thus, still tenable.

The Argument of Vagueness

It is argued in our post-Darwinian era that a biological species cannot be defined by sorting out its specific essence, for a biological species is an evolving species; David Hull (1965; 1978) has argued, along a Lockean line, that biological speciation is a gradual process, and as such, there is no way to draw a precise boundary between one biological species and another.

Nonetheless, we may still ask: to what extent can we accept (drastic) trait variations among individuals and still talk about individuals falling under one and the same biological species, and when does (biological) speciation really occur? E.g., in the course of biological speciation, when can a variety (or realizer) of a biological species called "Darwin's finches" still be said to be a variety of the same species or, to the contrary, a variety of another biological species (on Darwin's finches, cf. Sachse, 2011)? The Modern Synthesis (Dobzhansky, 1937; Fisher, 1930; Mayr & Provine, 1980) brings the answer that, due to environmental differences in the Galapagos, different advantageous genetic mutations are fixed in a variety of Darwin's finches so that one variety, at some point, cannot interbreed with other varieties. Thus, from a precise moment, this variety belongs, to another biological species than Darwin's finches.
However arbitrary the non-interbreeding condition seems to be - for the mere possibility to produce such offspring by interbreeding is not excluded: e.g. Minotaur is the offspring of a (fictional) female human being called "Pasiphaë" and a snow-white bull -, this condition for delineating which varieties can belong to one and the same biological species (absolutely extensionally defined) can also be seen precisely as an essential requirement for x and y to belong to one and the same biological species. As such, a biological species (even understood as an evolving biological species) can be plausibly defined with an essence. A definition of a biological species as an evolving biological species cannot replace an essentialist (under a plausible reading) approach to biological species.

The Argument from Impossible Realization

Another empirical argument has been put forward, according to which presupposed essences make it unlikely to ever find specific biological species (or realizers) falling under the essentialist definition in question. I.e. no specific biological species defined by the natural sciences could ever satisfy or realize this too demanding definition of a biological species, mostly due to (diachronic) variation in traits within the realizers of one and the same biological species (Sober, 1980; cf. also Walsh, 2006). In a nutshell, an essentialist definition of biological species seems to be decoupled from biological practice.

However, in order to find out plausible realizers of a biological species, it is not necessary to define a biological species as an evolving biological species. It is sufficient to show that every (even teeny tiny) trait variation (or realizer of an evolving biological species) can be plausibly defined along an essentialist line: there are no variations among one and the same biological species, for these variations are themselves, other biological species.

A consequence of this is that we should acknowledge the existence of many more (highly specific) biological species than the ones whose existence is taken for granted today in everyday discourse and in the sciences. Thus, the worry to find out realizers of such fine-grained individuated biological species remains. However, we could argue that there is a historical trend (especially in evolutionary medicine), which is such that more and more specific biological species are discovered through time.

The Argument from Biological Species Extinction

Another powerful empirical argument is that the view of biological species as having an essence presupposes a

picture of biological species as time-less (or eternal), and this picture is untenable in light of the history of biological species extinction/birth (i.e. speciation) (Richards, 2017).
However, this presupposition is false: one can perfectly well sustain an essentialist view (under a plausible reading) of biological species in addition to account for biological species' extinction/birth. In other words, one may in favor of seeing biological species as plausibly having an essence and against seeing them as time-less: e.g. the biological species Tyrannosaurus rex can very well be perceived as a specific biological species, plausibly having an essence whose type was instantiated at time t-1, but is no longer instantiated at time t0 i.e. that no token at time t0 instantiates it. And if it happens that a token of the type is present at time t+1, then we shall not say that the type Tyrannosaurus rex was present between the time interval t0 and t+1 (when there is no instance of it), but that the type just comes into existence (once again) at the same time t+1, when there is (at least) one token of it. We reject here the widespread Platonist view of types as eternal beings (wrongly associated with the view of abstract objects (e.g. numbers) as eternal), which underlies the rejection of the view of biological species as being essentially definable.

Globally speaking, our replies to the above three arguments show that these arguments do not give us credentials for abandoning an essentialist view of biological species, but that a weak enough plausible conception of essence (on the basis of which we can propose a definition of biological species) is still tenable.

Footnotes
1 Note, at the outset, that some (cf. Ereshefsky, 2017) reserve the term "species" tout court to refer to what is for others, strictly speaking, biological species, where for the latter ones "species" refers to (natural) kind (cf. Bird & Tobin, 2017; Koslicki, 2008). I situate myself in this latter tradition. That is why, I am talking, in this paper, about, more precisely, biological species.
2 Metaphysics - A branch of philosophy investigating the nature of the general categories of being (e.g. biological species, etc.).
3 Naturalism - A specific philosophical methodology, according to which philosophy ought to adopt the same methodology used by the current scientific practice.
4 Essentialism - The thesis that there are real, objective, unique and discoverable (or knowable) essences (belonging) to beings i.e. conditions which make a being what it is.
This historical line of thought, actually, goes back to (at least) the famous sorites paradoxes (as an entry, cf. Hyde, 2011).

The cave

Written by Daniel Dowling,
Ebb-lab, IEB, WWU

With the feast of St Valentine still heavy in the air biologists turn to that perennial of discussion: the biological species concept. The biological species concepts—which defines species as reproductively isolated populations—has a certain charm and works well when used to discuss large sexually reproducing organisms. Yet it holds little water with respect to asexual organisms (which make up the bulk of biodiversity) and is difficult to apply to the myriad of extinct creatures whose reproductive biology is unknown to us. Prehistoric DNA, both gleaned from fossils and buried in modern genomes can elucidate past sexual encounters between disparate species.

Modern human populations share a recent common African ancestor and our genomes remain remarkably similar to one another. Yet our genomes are peppered with the small inheritances of other archaic species—both beneficial and harmful.

Anatomically modern (AM) humans (Homo sapiens) originated in Africa several hundred thousand years ago. The exact time and location are uncertain with most fossil evidence suggesting an east African origin roughly 200,000. However, recently described 300,000-year-old fossils from Morocco suggest that they have a more complex, more ancient, and more pan-African history.

Waves of migration out of Africa led to the gradual populating of the other continents. The Middle-East was settled roughly 100,000 years ago, Europe and Australia about 40,000, and finally the New World roughly 12,000 years ago. Venturing forth AM humans found that these new continents were already inhabited by previous migrants—archaic human species which had left Africa millennia before. Perhaps the most well-know archaic human species (or subspecies, perhaps) is the Neanderthal (Homo neanderthalensis). Neanderthals are thought sturdier, stockier, and more adapted to the frozen environments of Ice-age Europe than AM humans. Other archaic human species include Homo erectus from Asia and the diminutive Homo floresiensis that shared the island of Flores (in modern-day Indonesia) with dwarf elephants and giant predatory lizards.

Neanderthals are thought to be the closest relatives of AM humans and diverged approximately 600,000 years ago. Several researchers suggest that Neanderthals should be considered a subspecies of modern humans, rather than a distinct species for themselves. Neanderthals became extinct about 40,000 years ago, coinciding with the arrival of AM humans in Europe. The exact cause of their extinction is contested with being out-competed by invasive AM humans a recurring suggestion.

Genetic evidence, however, suggests that at least some of the Neanderthal genome escaped extinction and lives on in present day humans. Recent ancientDNA (aDNA) studies of Neanderthal fossils have yielded several Neanderthal genomes. Comparisons between these ancient genomes and modern-day genomes reveal that the genomes of present-day non-African populations contain a small proportion—between two and six per cent—of Neanderthal DNA.
This contribution to the modern genome implies a series of interbreeding events between Neanderthals and AM humans. This has been estimated at about 60,000 years ago. Such interbreeding led the introgression of genetic material from one population to the other. As Neanderthals had evolved in their environment for longer than the recently arrived AM humans this introgression allowed for the spread of advantageous genetic variation into the AM human population. Such adaptive traits include skin pigmentation, for tolerating lack of sunlight at high latitudes, and genes involved in the immune system. However, several deleterious traits have also been associated with Neanderthal ancestry including heart disease and propensity for allergies.

aDNA studies have brought up further surprises. When scientists sequenced the genomes of human bones from the Denisovan cave in Southern Siberia they discovered not one, but two species of archaic human. This included the already well-know Neanderthals but also a new population distinct from both Neanderthals and modern humans. This new population, which is known only by some fragments of bone (some teeth and a finger) and currently lacks a Linnaean binomial, is referred to as the Denisovans after the cave were it was discovered.

And, just with the Neanderthals, there is evidence that Denisovan and modern humans interbred. Today, populations in Asia and Melanesia have approximately 4% Denisovan DNA in addition to Neanderthal DNA. This is especially pronounced in the islands of Melanesia where Denisovan DNA is as high as 6%. Also like the Neanderthals, the Denisovans bestowed some beneficial traits upon their descendants. On the Tibetan Plateau almost the entire population has an unusual of the EPAS1 gene—which infers a tolerance for low oxygen environments. The variant is almost unknown outside of Tibet but is strikingly similar to the same gene in the Denisovan genomes.

Comparisons between Neanderthal and Denisovan show, too, further interbreeding events. This sharing of genes blurs the boundaries between these ancient species. Whether this means that Neanderthal, Denisovan, and AM human were merely in the process of speciation or if they are, in fact, variants of a single species is unresolved. But, consider, that more likely than not, you have some Neanderthal ancestry.

When philosophy and evolutionary biology meet

Written by Francesco Catania,
IEB, WWU

In Chinese philosophy, Yin and Yang describe "how seemingly opposite or contrary forces may give rise to each other" (Wikipedia). Yin-Yang changes are cyclical; think of night and day, for example. Also, when there is more Yin there is less Yang, and vice versa. Finally, just as there is Yang within Yin there is Yin within Yang. In other words, nothing is fully Yin or fully Yang. But what has this to do with evolutionary biology?

Let's imagine that genes emerge and evolve through Yin-Yang-like dynamics. Like a Yin-Yang cycle, genes could originate from DNA sequences that were not genes in the past, and could become non-genes in the future. There is more. Protein-coding genes consist of segments that help make proteins (exons) and noncoding segments (introns). Exons and introns could also originate from one another. These sequence conversion events would be achieved over a long time, of course. Let's say a period that lasts more than your grandpa's age.

In the Catania lab, we are busy exploring whether these hypothetical dynamics are as plausible and widespread as they seem to be. We study how these dynamics shape and are shaped by intracellular processes, the extent to which they are influenced by changes in the extracellular environment, and how they contribute to adaptations to environmental changes.

As cool as these ideas are, be warned: the coolest piece of information is yet to come. Because evolution is an ongoing process, the dual nature of genes and intragenic sequences may be captured. Today. Right now. The wealth of DNA and RNA sequence data available through open-access databases makes it possible to test this hypothesis. Two widespread molecular processes known as "alternative splicing" and "alternative polyadenylation" closely resemble the cyclical process we hypothesize.

What are the consequences of ignoring genes and coding sequences' dual nature? The answer to this question is complex, neither black nor white. Unsurprising. Remember, nothing is fully Yin or fully Yang.

The PI corner

In every issue we have a column for where a principal investigator (PI) may write whatever is on her or his mind. As with the PhD students, the topic may vary from science to non-science. If you are a PI or postdoc, and you want to write, feel free to make contact by email: eyebrow.mgse@gmail.com

SCRABBLE

A selection of curious science

by Jasmin Kurafeiski

5. “Which Feels Heavier—A Pound of Lead or a Pound of Feathers?” A Potential Perceptual Basis of a Cognitive Riddle”
You probably have heard the age old joke question “What is heavier, 1 lbs of lead or 1 lbs of feathers?”. Instinctively people might say lead is heavier, but obviously they weight the same, right? Well, of course they do! However in 2007 scientists tested this question and found that people perceive a box containing 1 lbs of lead as heavier than a box containing 1 lbs of feathers.

4. “Does garlic protect against vampires? An experimental study”
Have you ever wondered if the methods to protect yourself against fictional monsters like garlic against vampires actually work? You might say “But vampires don't exist!”. A team of Norwegian scientists were not deterred by this minor inconvenience and used leeches instead. The leeches actually preferred hands smeared with garlic, leading the scientists to the conclusion that garlic possibly attracts vampires.

3. “The impact of artificial fragrances on the assessment of mate quality cues in body odor”
In honor of valentines day, how about a little romance? So you are a guy and want to impress the ladies with your masculinity? Well, according to science it is simple: Wear deodorant! So maybe those Axe commercials were right all along!

2. “Lubrication of chocolate during oral processing”
Other than romance, what else is important about Valentines day? Chocolate! Imagine how it melts in your mouth... but did you ever wonder why it melts the way it does? Scientists have mixed molten chocolate with saliva, or water, or had people chew the chocolate and spit it out. Adding a liquid, like saliva or water, to molten chocolate dissolves sugar and decreases its viscosity. They found saliva to be more lubricating than water, as well as proper mixing to be important proper chocolate melting.

1. ”The unsuccessful self-treatment of a case of 'writer's block'”

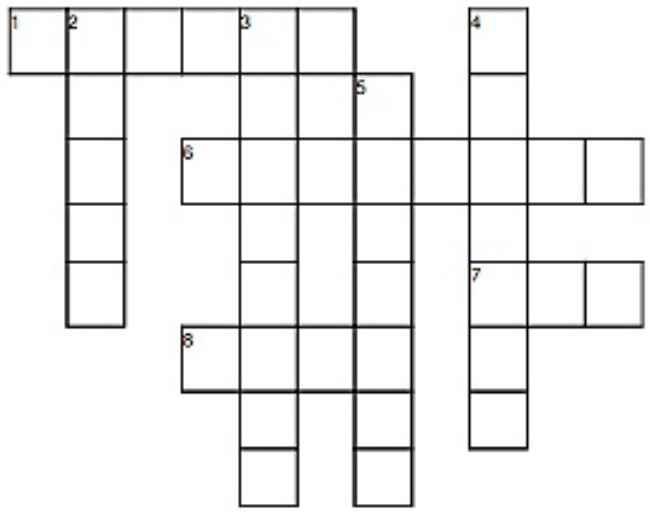
PhD is a journey which is taken by a brave few,
If you haven't started yet then below is your cue.

The Ten Commandments

by Shrey Gandhi

i
Thou shall select a topic where thy interest lies,
No matter what you do it eventually dies.
ii
Thou shall carefully select a guide,
'cause when Hulk gets angry you can only hide.
iii
Thou shall not waste time as it always flies,
Remeber that the lows are followed by the highs.
iv
Thou shall not love or date,
Cause all else can wait.
v
Thou shall marry thy thesis,
Cause work never ends or ceases.
vi
Thou shall never worry what thy results are,
Find the hidden sense, no matter how bizarre.
vii
Thou shall never waste time,
For there is no bigger crime.
viii
Thou shall never do plagiarism,
It will be treated on par with terrorism.
ix
Thou shall always have a backup plan ready,
For life in science is rarely steady.
x
If your heart is full and you have nerves of steel,
one simply cannot doubt nor argue this job is ideal!

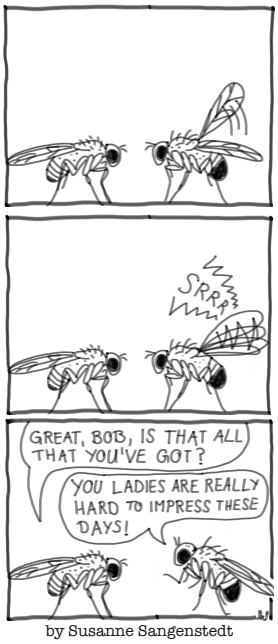
The Eyebrow Crowssword Puzzle



Across:
1. Not chimpanzee, but the other cousin
6. Richard __(Author of “The dialectical biologist”)
7. A stretch of DNA, abundant in transposable elements.
8. A family of viruses whos discover revolutionized virology

Down:
2. “All constituents considered collectively" used in several branches of biology
3. A pre-mendelian concept of inheritance
4. 1997, Biopunk Science Fiction movie, starring Uma Thurman
5. Pri...soup (context of beginning of life)

by Ozan Altan Altinok



by Susanne Sangenstedt

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

Recent graduate students of the MGSE

Dr. Kristina Wensing

Title of PhD thesis:
Sex-specific contributions of sexual selection and sexual conflict to male-female coevolution in Drosophila melanogaster
Supervisor: Dr. Claudia Fricke
Publications:

·Wensing, K. U., Koppik, M. & Fricke, C. Precopulatory but not postcopulatory male reproductive traits diverge in response to mating system manipulation in Drosophila melanogaster. Ecol. Evol. (2017). DOI:10.1002/ece3.3542

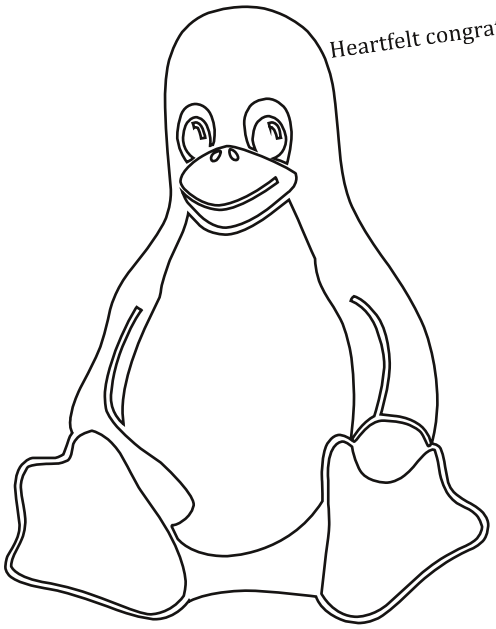
·Ruhmann, H., Wensing, K. U., Neuhalfen, N., Specker, J.-H. & Fricke, C. Early reproductive success in Drosophila males is dependent on maturity of the accessory gland. Behav. Ecol. (2016). DOI:10.1093/beheco/arw123

Dr. Tobias Zimmermann

Title of PhD thesis:
Shaping of behavioral phenotypes by social experiences during adolescence: neuroendocrine mechanisms and adaptive significance
Supervisor: Prof. Dr. Norbert Sachser
Publications:

· Zimmermann, T. D., Kaiser, S., Hennessy, M. B. & Sachser, N. Adaptive shaping of the behavioural and neuroendocrine phenotype during adolescence. Proc. R. Soc. B Biol. Sci. (2017). DOI: 10.1098/rspb.2016.2784

· Zimmermann, T. D., Kaiser, S. & Sachser, N. The adaptiveness of a queuing strategy shaped by social experiences during adolescence. Physiol. Behav. (2017). DOI: 10.1016/j.physbeh.2017.08.025



Congratulations to the recent doctors Kristina and Tobias! If you yourself, or your favourite PhD student of the MGSE, are about to graduate or have recently graduated - feel free to notify us to announce their success.