



IUSSI North-west European section

International Union for the Study of Social Insects
Autumn Newsletter 2016

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Euro-IUSSI 2016

The organising team of the summer's meeting thanks all the participants – it was a pleasure to host you in Helsinki and it was the exciting science and friendly people that made the meeting a success! We look forward to seeing you at future IUSSI events!

Announcements

The winter meeting of the North-West European Section of IUSSI

Date: 19th December

Location: Natural History Museum, London

Program: registration starts at 9am, first talk at 10am. We will have a full day of talks, with a poster session over tea/coffee in the afternoon. After the talks informal discussions continue in the pub.

Plenary speaker: Kate Parr, University of Liverpool has promised to deliver this year's plenary talk – see <http://funkyant.weebly.com/> and <https://www.liverpool.ac.uk/environmental-sciences/staff/catherine-parr/research/> for more on Kate's exciting research!

Presentations: Especially students are encouraged to present their work, but all submissions are of course welcome! If you want to give a talk or a poster, please send an abstract (max. 200 words) to heikki.helantera@helsinki.fi with the words "IUSSI-NW abstract" in the title line, and indicate whether you are applying for a talk or a poster. Deadline 11th Nov. There will be a prize for the best student talk and poster.

Registration: register by e-mail to heikki.helantera@helsinki.fi with the words "IUSSI-NW registration" in the title line. If you submit an abstract for a talk or poster there is no need for a separate registration e-mail. Registration fee (paid on the day at the venue, in cash) 10£ student members / 20£ regular members / 30£ non-members. Includes coffee/tea. Deadline 1st Dec.

Lab News

TEAM::ANTZZ (Helsinki)

The fifth year of TEAM::ANTZZ as part of the Centre of Excellence in Biological Interactions has been a busy and successful one. The group also had the honour to organize the EURO IUSSI 2016 conference in Helsinki, which we greatly enjoyed under Lotta Sundström's firm command.

During the field season several exchange students visited Helsinki. Joshua Clarke from Queen's University Belfast investigated fluctuating asymmetry in *Formica* ants under the supervision of Heikki Helanterä. Marianne Teichmann from the University of Göttingen, and Gyan Harwood from Arizona State University worked on transgenerational immune priming in honey bees under supervision of Daliel Freitak. In August Dr Rose Thorogood, from the University of Cambridge, joined us for an indeterminate time, to learn more about kin selection and social behaviour, and transfer these insights to vertebrate studies. We were very delighted to have the help of three field and lab assistants this year: Matti Leponiemi, Maarit Nurminen and Eeva Vakkari, as well as our irreplaceable lab technician Heini Ali-Kovero.

The year 2016 has also seen several thesis defenses: Martina Ozan defended her PhD thesis on kin conflicts in *Formica fusca*, with Serge Aron as her opponent, and has now moved on to other tasks. Petri Rautiala at the Univ. of Jyväskylä, whom Heikki Helanterä co-supervised, defended his thesis on theory of social evolution and haplodiploidy with Stuart West as his opponent. Jana Wolf will defend her thesis on queen size morphs in *Myrmica ruginodis* in October, with David Nash as her opponent, and Dimitri Stucki is working hard to finish his thesis on immune defences and trade-offs in *Formica exsecta* in early 2017.

Claire Morandin finished her first year as a postdoc working on methylation and network properties of caste differentiation, and is now on maternity leave. Jonna Kulmuni is halfway through her HFSP long term fellowship, and has now moved back to Helsinki. Jack Beresford will also move to Helsinki and start a PhD under the supervision of Jonna Kulmuni and Lotta Sundström.

Heli Salmela returned from her maternity leave, during which she somehow managed to produce five publications on proteins in the honey bee and *Drosophila*. Heli Salmela and Daliel Freitak have also filed international patent application for honey bee vaccination. In TEAM::BEEZ Daliel Freitak and her PhD students Siiri Fuchs (co-supervised with Lotta Sundström) and Franziska Dickel, and MSc students Salla Lohi and Marianne Teichmann have now shifted almost entirely to work on honey bees.

Helena Johansson continues working on population genetics and soil microbiota, whereas Stafva Lindström and Kishor Dhaygude continue on their respective PhD projects, jointly supervised by Lotta Sundström and Helena Johansson. This team also supervises an MSc student, Laura Soininen. Nick Bos decided to take a career turn and try his wings in the industry. His student Ella Laakkonen just finished her MSc thesis on aging and immunity in ants, and PhD student Unni Pulliainen, jointly supervised with Lotta Sundström, is now on maternity leave.

Heikki is now starting the second year of investigating evolutionary transitions and superorganismality funded by the Kone Foundation. Perttu Seppä continues his efforts educating students to the secrets of population genetics and studying conservation genetics of *Myrmica* and *Formica* ants. Their PhD student Sanja Hakala spent the summer at the field collecting data, and material for the lab analyses, accompanied by MSc student Mats Ittonen.

Lotta Sundström herself has been very busy with supervising, being a co-director of the CoE, director of the doctoral programme in Wildlife biology, and the vice dean of the Faculty of Biological and Environmental Sciences. Despite these duties, she still continues to work as a field assistant during the summer months, i.e. boat driver and ant colony sampler, in Tvärminne.

Brown lab (Royal Holloway)

This year the Brown lab has seen many new faces. Judy Bagi (Research technician) and Emily Bailes (Post-doc) joined us in the spring to work on a BBSRC funded project on the spread of diseases among bees sharing floral resources. They've settled in well, and we can't remember what the lab was like without Judy keeping us all organised! We have also been joined by two visiting students over the summer: Alejandro Trillo Iglesias (PhD student) from Montse Vilà's lab in Spain, and Kaitlin Deutsch (MSc student) from Owen Lewis's group at the University of Oxford, who have been working on the parasite spillover from commercial bumblebees in strawberry farms and viruses shared between honeybees and hoverflies respectively. Next month we will also be joined by a Masters project student for a yet to be decided project.

However, we also had the inevitable sadness of seeing people leave. Fabio Manfredini has now finished his Marie-Curie fellowship and moved across the corridor to work with Elli Leadbeater (which relieved the sadness to some degree!) and Zoe Munday has just left us following the successful completion of her Masters project on necrophoretic behaviour in bumblebees and whether infection with the parasite *Nosema bombi* alters this behaviour.

Meanwhile Mark has been jetting around the world, speaking at the Penn State Pollinator conference, visiting China to collaborate with Jilian Li of the Institute for Apicultural Research (founded by Chairman Mao, no less!), and, of course, enjoying the excellent European IUSSI meeting in Helsinki, and the fantastic trip to Tvarminne afterwards, where he saw *Lasius fuliginosus* for the first time (bucket list!).

Callum Martin had a successful field season this year, and is completing analyses of the data he has collected on the importance of commercial bumblebees in strawberry pollination, work he presented at IUSSI Helsinki. Arran Folly is now finishing his first year of his PhD with us and has had promising preliminary results for his lab experiments investigating the impact of phytochemicals on bee health, work which was also presented at Helsinki in August. Hauke Koch – who is part of a joint project based at Kew with Phil Stevenson – has been working hard in the field and lab investigating the impacts of phytochemicals on bee health. Our other PhD students, Dylan Hodgkiss and Sarah Walkington have also had busy summers working on hoverfly pest control and pollination and the bumblebee microbiome.

We look back on a fantastic conference in Helsinki – thanks so much to all the organisers – and forward to seeing many of you in London for this year's winter meeting!

Insect Cognition Lab, Royal Holloway

We have had an exhausting spring and summer field season here at Royal Holloway! PI **Elli Leadbeater** and postdoc **Fabio Manfredini** have been setting up our new honeybee facilities, which include an outdoor and an indoor apiary, with the help of our beekeeper **Keith McMahon**. Fabio has additionally been running experiments on waggle dance communication from dawn to dusk in the later part of the summer. PhD student **Liz Samuelson** has also been hard at it, running a wild bumblebee experiment that took place from 8pm to 5am almost every single night throughout the spring (!), followed by summer honeybee work. It's been an exciting time and we hope that Fabio and Liz get to have a rest in the upcoming winter months, when they'll be getting their data analysed.

We are pleased to welcome two new starters this September. PhD student **Harry Siviter** joins us from the world of reptile and primate cognition, and will be working on the effects of anthropogenic stressors on bee cognitive traits, co-supervised by Mark Brown. MRes student **Tash Waite**'s research experience also comes from the vertebrate world, and she will be using

bumblebees to investigate mechanistic explanations for complex cognitive traits. Finally, we're sad to say goodbye to our summer Nuffield students and interns **Agata Soltysinka**, **Alexis Gkantiragas** and **Zara Manwaring**, all of whom have made our lab a lively place to be over the summer, and we're pleased to hang on to **Adam Woolcott**, who hasn't managed to get away.

Centre for Social Evolution (CSE), Copenhagen

2016 has seen the continuation of the major transitions initiated last year – the funding for the CSE from the Danish Natural Science Foundation came to an end last year. The Centre has now been embedded as a Departmental research unit with diversified funding. The biggest practical change for many of us is having to get along without **Koos Boomsma**, who is currently enjoying a 6-month sabbatical in Oxford. He has made a couple of flying visits and will be back in December.

The genomics group, led by **Guojie Zhang** and Koos, has been very active this year. The big paper on attine ant genomes, coordinated by **Sanne Nygaard** finally appeared in *Nature Communications*, just after Sanne's postdoc came to an end and she left for a job at Herlev Hospital. **Morten Schiøtt** was appointed as a permanent Research Associate in January, and we welcomed back **Rasmus Stenbak Larsen**, who after a brief stint at the Zoological Museum, is now working as an Academic Technician as part of Guojie Zhang's 5-year grant from the Lundbeck Foundation – a research project to identify genes and regulatory network associated with caste differentiation in attine ants, together with PhD student **Bitao Qiu**, who is also dissecting the brains of ants in different castes, hoping to identify genes associated with behavioural division of labour. **Lukas Schrader** joined the group as a postdoc in October last year, and has been working on comparative and population genomics in *Acromyrmex* inquiline social parasites – funded by Koos' ERC grant, as well as helping set up GAGA (The Global Ant Genomics Alliance: see <http://antgenomics.dk>).

Michael Poulsen's group continues to grow, supported by a 5-year grant from the Villum Foundation. **Victoria Challinor** joined for a postdoc in January 2016, investigating the role the chemical environment of the fungus-growing termite gut plays in sanitation of incoming forage material and suppression of disease in the colony. This complements the approaches taken by PhD student **Haofu Hu**, who is using computational genomic tools to examine the termite gut microbiome and its role. Also focusing on better understanding the presence of antibiotic-producing bacteria in termite guts, MSc student **Anna Vejlin** joined the group to initiate antimicrobial screens of a collection of gut bacteria isolates against fungi and bacteria of termite colony origin and facultative human pathogens. Over the last year, three Erasmus students worked on their MSc projects in Michael's group: **Alexandra Pyatnitskaya** from Paris AgroTech did her project on antimicrobial peptides in fungus-growing termites, **Jayalal Jayanthan** from Skövde University came to work on gut bacteria in termite royal pairs, and **Callum Richards** from Imperial College showed really nicely how cockroach gut communities can be forced to change over even a short amount of time when the diet changes substantially.

As for the supercolonial ants, **Ea Hørsving** completed her MSc on *Myrmica rubra* in February, but **Jes Søb Pedersen** continues to work with this species and with *Monomorium pharaonis*, now also in collaboration with Guojie's group. As part of this, **Manuel Nagel** joined us on a postdoc with Guojie to examine brain development and spatial gene expression in the pharaoh's ant, and we also welcomed back **Luigi Pontieri** as a postdoc to work on the effect of environmental stimuli on behaviour and gene expression pattern in *Monomorium pharaonis* worker's brain.

American student **Veronica Sinotte** has joined CSE on a Fulbright Fellowship, and will do her MSc work on the neuroethology of disease defence in *Acromyrmex* colonies. This will be part of **Line Ugelvig**'s programme on the genetic and social factors regulating the ant social disease defences, funded by the Danish Research Council and her L'Oréal for Women in Science Award.

Postdoc **Jon Shik** has continued working on diet and nutrition in the fungus-growing ants, and his MSc student **Winnie Rytter** successfully defended her thesis on the foraging ecology of fungus growing ants in mid-September. Two of **David Nash's** MSc students also successfully defended their theses this year. **Mette Frimodt Hansen** completed her project on microgynes of *Myrmica rubra* in February, and **Marie Hauge** her project on spatial and temporal genetic variation in *Maculinea alcon* in Denmark at the end of September. **Anne Andersen** spent three months in Naomi Pierce's lab in Harvard, developing RAD-tags for the examination of the population genetics of lycaenid butterflies, and is now back in Copenhagen, continuing her work on the conservation genetics of *Maculinea arion* across the Palæarctic. New MSc student **Majken Grundsø Hansen** will work closely with Anne and David to attempt to identify suitable sites for supplementation or reintroduction of *Maculinea* butterflies in Denmark.

Panos Sapountzis has finalized our big comparative study on the gut bacterial communities of 17 fungus-growing ant species of attine ants that started in 2012, and is now in revision for Molecular Ecology. He plans to continue this work with the genome sequencing of some of these bacterial endosymbionts and functional genomic experiments to verify some of the hypotheses that were supported by the comparative study. **Jack Howe**, having completed his MSc, is now one year into his PhD that is exploring the potential and realised conflicts over reproduction within the colonies of leaf-cutter ants at a number of levels. Firstly, between the two symbiotic partners— the ants and their fungus— then, among the workers themselves— who occasionally lay reproductive eggs— and finally searching for conflict among genes within individuals of the colony. **Joanito Liberti** is now in the last year of his PhD, working on the protein-level evolution of reproductive tract secretions and how these mediate post copulatory sexual selection in fungus-growing ants and honey bees. To help achieve this, he spent the first three months of 2016 at the University of Western Australia working with Boris Baer's group at the Centre for Integrative Bee Research.

As far as fieldwork was concerned, May saw CSE's annual residency in Gamboa, Panama, and another very productive field season with work on attine ants from tiny *Cyphomyrmex* right up to unmissable *Atta* – this year with a record number of sloth sightings! Large contingents from Copenhagen and Boris Baer's Perth group were joined this year by members of Christian Rabeling's group (Rochester, USA) and two microbiologists from Matt Hutching's group in Norwich. Michael's group also had a very successful field season in South Africa, meeting up with Duur Aanen's group from Wageningen for four weeks of sampling for fungal community analysis, population genetics on fungus-growing termites and their cultivar fungus, and chemical profiling of termite guts and gardens. This will provide material for the last years of **Rafael da Costa's** PhD on plant decomposition in fungus-growing termites and **Saria Otani's** PhDs on the lack of specialized diseases in fungus-growing termites, as well as for Victoria, Anna and Haufu's projects.

The Norwich collaboration is part of **Tabitha Innocent's** work on the cuticular microbiomes of Panamanian attine ants and their interactions with the gut microbiomes across the different fungus growing ant lineages. Marie Curie postdoc **Mariya Zhukova** is also contributing to this work with Panos and Tabitha, focusing on electron microscopy of gut symbionts in the larval and pupal stages.

Henrik de Fine Licht is now firmly established at the Frederiksberg campus and the work on host-specific insect-pathogenic fungi is rapidly progressing. Especially after **Myrsini Eirini Natsopoulou** started as a postdoc with Henrik in March 2016, after successfully finishing her PhD studies in Halle, Germany, with Robert Paxton. Myrsini has quickly acquainted herself with the new study system of Entomophtoralean fungi and flies. Together with MSc student **Andreas Naundrup Hansen** she is making good progress on trying to elucidate immune responses and epigenetic changes in response to fungal infections.

University of East Anglia (Andrew Bourke's group)

Over the past year, our focus has been on getting our research done in the face of the many distractions that life, universities and embarrassing referendum results place in one's way... Two ongoing projects aim to profile the genes involved in worker reproduction and caste differentiation

in the bumble bee *Bombus terrestris*. Respectively these are a NERC-funded project with **David Prince** and **Tim Huggins** and a BBSRC-funded project with **David Collins** and **Marjorie Labédan**. **Anders Wirén** is providing bioinformatic support for both projects. Meanwhile, **Pierre Blacher** has been investigating longevity and ageing in workers in *B. terrestris*, supported by a fellowship from the Fyssen Foundation, and **Liam Crowther** will shortly enter the fourth year of his NERC-funded PhD, which is on the ecology and genetics of the rapidly-expanding UK population of the Tree Bumble Bee, *B. hypnorum* (collaboratively with CASE partner Claire Carvell at the Centre for Ecology and Hydrology, Wallingford).

David Collins, Marjorie, Pierre and Liam all presented their work at conferences over the summer (at the European IUSSI Meeting in Helsinki and the International Conference on Pollinator Biology, Health and Policy at Penn State University, USA). Regretfully, we will shortly be saying farewell to Pierre and Marjorie, as, following the end of his fellowship, Pierre will be moving on to a postdoctoral position in Michel Chapuisat's group at the University of Lausanne; we wish them every success. However, we're pleased that we'll soon be welcoming **Ryan Brock**, who will join us in January from his MRes with Seirian Sumner at the University of Bristol to start a PhD on social behaviour in *B. hypnorum*. We also look forward to the arrival of **Lynn Dicks** from the University of Cambridge, who will shortly be starting a new position at UEA as a NERC Independent Research Fellow, setting up her own research group focusing on the interface of pollinator conservation and policy.

University of Leeds: The Duncan Lab.

It is hard to believe that it has been a year since I left New Zealand to join the University of Leeds. A lot has happened in the past year and some highlights include welcoming my first PhD student Jens Van Eeckhoven to my Lab. Jens has been working hard over the spring/summer trying to get red mason bee females to nest and lay eggs in the laboratory. This summer I established a small apiary at the University of Leeds and have survived my first beekeeping season in the Northern hemisphere – and I am already looking forward to the next season!

This summer has flown by; I attended two fantastic conferences and have just returned from a workshop in Kazakhstan. The IUSSI-euro meeting in Helsinki was an absolute standout for this summer, a great opportunity to meet people, discuss ideas and on top of all that fantastic presentations. Following the conference I went on the post-conference ant tour to Tvarmarine marine station we had fantastic weather, everyone was great company (although I wasn't brave enough to use the sauna!) and I learnt so much about ants – thanks to Lotta and the other organisers it was a great trip.

This summer I was happy to host my PhD student Mackenzie Lovegrove, who is based in NZ, for a short visit to my lab and am hoping she will return next summer for an extended visit. We also managed to finally get our paper about reproductive constraint in the honeybee published (Duncan et al., (2016) Notch signalling mediates reproductive constraint in the honeybee *Nature Communications*). But now the days are drawing in and semester has started, it is time to welcome six new undergraduate / masters students to my laboratory all working on various aspects of insect reproduction. I can't wait to see what adventures the next year will bring.



Jens, myself and Mackenzie having a pint after a hard days work.



Post conference tour to Tvärminne research station, beautiful weather, great company and fantastic ants!

University of Exeter in Penryn, Cornwall

This year, **Lena Wilfert**'s lab has grown, with several new workers starting. Consequently, this summer was very busy with the start of the Agri-Bee-Health project, a large BBSRC funded collaborative work with Mark Brown's group (Royal Holloway) and Michelle Fountain (East Malling Research) to investigate the impact of agri-environment schemes, promoting wild flowers crop margins, on emerging infectious diseases dynamics in pollinators. While the whole world was chasing Pokémon, new lab member's **Toby Doyle** (technician) and **Vincent Doublet** (postdoc) were surveying pollinators across the South England country side and collecting loads of bees from farmland (#CatchThemAll). With the help of the undergraduate student **Isobel Refoy**, masters student **Charlotte Stewart** and Royal Holloway postdoc **Emily Bailes**, thousands of samples were brought back to Cornwall, ready for RNA extraction and virus sequencing, pollen identification and bee genotyping. New MRes student, **Sophie Hedges** will join the team to conduct population genetics from these samples. You can follow the project on twitter (@AgriBeeHealth) and the new lab website: <http://wilfertlabgroup.wixsite.com/wilfertlab>. **Robyn Manley**, a third year PhD student funded by NERC, has been studying how the presence of *Varroa destructor* affects the dynamics of multi-host pathogens of honeybees and wild bumblebees, following on from our recent paper on the global spread of DWV (Wilfert, L., G. Long, H. C. Leggett, P. Schmid-Hempel, R. Butlin, S. J. M. Martin and M. Boots (2016). "Deformed wing virus is a recent global epidemic in honeybees driven by Varroa mites." *Science* **351**(6273): 594-

597). This project is further funded by the C. B. Dennis Trust and The Genetics Society. **David Pascall**, a BBSRC-funded PhD student, is working viral discovery and viral evolution in bumblebees. He also studies the interaction between viruses and neonicotinoid pesticides on bumblebees through field and lab experiments.

The Robinson Lab (University of York)

The ant research group in York has said goodbye to **Sam Ellis** who has taken up a post-doc at Exeter University, sticking with social networks, but now studying orcas. **Duncan Procter** completed his PhD on landscape genetics of polydomous *Formica lugubris* populations, and now has a post-doc at Bristol modelling environmental effects on human behaviour. PhD student **Phillip Buckham-Bonnett** has produced the Non-native Species Rapid Risk Assessment for the impact of *Lasius neglectus* in the UK and is continuing with fieldwork and surveying for this species. The ant group again hosted **Courtney Rockenbach** from Simon Garnier's group over the summer working on trail traffic in polydomous systems, and also **Liz Franklin**, University of Bournemouth working on exploration behaviour in *Lasius niger*. **Elva Robinson** is very pleased to have finally finished the process of editing her book 'Wood Ant Ecology and Conservation' and is looking forward to welcoming two new PhD student into the laboratory this Autumn. **Eleanor Drinkwater** will start a project on collective personalities in *Myrmica rubra*, and **Dominic Burns** will take up a NERC-National Trust funded project to continue the laboratory's work on wood ant polydomous foraging networks.

Sumner lab

The big news from the Sumner lab is that we are relocating! Seirian is joining the staff of the Centre for Biodiversity and Environment Research at University College London, where the lab will now be based. Post-Doc Daisy Taylor is continuing her work on a NERC-funded grant to identify the molecular basis of caste differentiation and sociality in five species of neotropical Polistine wasps. After a successful fieldtrip last summer, she's off to Frasers Hill in Malaysia in January for three months to collect hover wasps for RNA sequencing and proteomics – were still looking for field assistants, so please spread the word (<http://www.sumnerlab.co.uk/field-assistant-position-malaysia-jan-march-2017-apply-now/>).

PhD students Robin Southon and Sam Duckerin are both mostly busy working on data analysis but recently enjoyed the attending the CEE Autumn Symposium at the Natural History Museum to meet some of the new London crowd. Adam Devenish is currently planning the final field season of his PhD in South Africa. He is hoping to determine the effects of seed traits on dispersal success in invaded ant communities. Patrick Kennedy has just finished 3 months of fieldwork in Panama for his second PhD field season. During his final year he will be working through masses of RFID data and behavioural observations to hopefully better understand social drifting in *Polistes canadensis*. Sandra Moreno is now entering the second year of her PhD after completing her first field season. During the summer she was out in Dorset collecting samples of *Ammophila pubescens* (a progressive provisioner) and *Ammophila sabulosa* (a mass provisioner) during different behavioural stages in order to study differences in gene expression. Sam Morris is currently out in Brazil working with the local dinosaur ants for his Masters by Research project.

Congratulations to Dr. Emily Bell for completing her PhD on phenotypic plasticity and the evolution of castes in *Polistes* wasps back in January. She is now continuing at Bristol as a new Senior Teaching Associate. Ryan Brock is in the final throes of his Masters by Research with us on wasp bioinformatics: we wish Ryan all the best with his PhD work, with Andrew Bourke at University of East Anglia. Finally, we look forward to welcoming Alessandro Cini at UCL later in the year, who is joining us on a Marie Curie postdoctoral fellowship to study genomics of *Polistes* social parasites.

Conference Report

Shulin He, Institute of Biology, Free University Berlin

As one of the lucky winners of a Student Travel Grant to attend the 6th European Congress of the IUSSI, held this year in Helsinki from the 8th-11th August, I would like to thank the North-west European section for giving me a great opportunity to share my research with the wider social insect scientific community. It was a large meeting that was very well organized by our hosts, the University of Helsinki, with over 300 hundred scientists and students in attendance.

The time of the meeting was perfect for visiting Helsinki. It is a beautiful city with nice weather and the people are friendly. During the reception in the natural history museum on the first day, and the Rector's Reception on the second day, I enjoyed the atmosphere, of course including the snacks and beverages. The most valuable thing during the receptions was that I got the chance to meet lots of interesting colleagues and friends whom I got to know better during the course of the conference.

My field is about social immunity and its evolution. Therefore I spent most of my time listening to great talks and reading posters about immunity and eusociality. These presentations ranged from behavior, physiology to molecular biology, from which I learned a lot and got much wider knowledge than I expected. At the same time, I also made my first presentation in symposium 10- Social Insect Immunity- with the title "Defend and disinfect: a dual role for soldiers in a complex insect society". Though I was nervous about my language before my presentation, I made it, which meant a lot to me. Unexpectedly, my talk got more attention than I expected and I received many valuable comments and interesting ideas from communication with others.

Overall, I am very glad that I attended this conference, and I would like to express the gratitude to the North-west European section of the IUSSI for awarding me the travel grant. Without it I would not have been able to learn and get to know the social insect community in Europe, in addition to presenting my PhD research for the first time. The trip to EURO IUSSI 2016 was a valuable experience for me, and I look forward to going to more IUSSI conferences in the coming years!