Disclosure of interest The author declares that she has no competing interest.

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Session III. Social insects and other

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Supergene, sex and sociality

Laurent Keller
Faculté de biologie et médecine, Département d'écologie et évolution, Groupe Keller, Lausanne University, CH-1015, Lausanne, Switzerland
E-mail address: laurent.keller@unil.ch

Intraspecific variability in social organization is common, yet the underlying causes are rarely known. I will show that the existence of two divergent forms of social organization in six ant species is under the control of a pair of heteromorphic chromosomes that have many of the key properties of sex chromosomes. In particular, this social chromosome contains a large (13 megabases) region in which recombination is completely suppressed via three large inversions (Fig. 1). These findings highlight how genomic rearrangements can maintain divergent adaptive social phenotypes involving many genes acting together by locally limiting recombination.

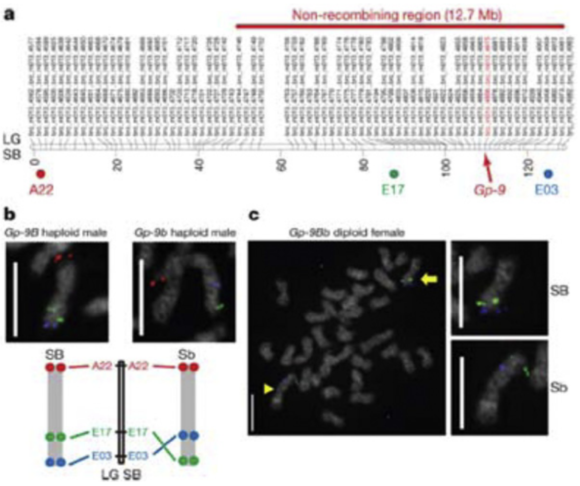

Fig. 1 Fine scale mapping and BAC-FISH analysis of social chromosome.

Disclosure of interest The author declares that he has no competing interest.

Further reading

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Termites: Soil engineers for ecological engineering

Pascal Jouquet[1,*], Ajay Harit[2], Sougueh Cheik[1,3], Saran Traoré[4], Nicolas Bottinelli[1,3]
[1] *UMR iEES-Paris, Centre IRD, Bondy, France*
[2] *School of Environmental Sciences, Mahatma Gandhi University, Kottayam, Kerala, India*
[3] *Soils and Fertilizers Research Institute, Dong Ngac, Tu Liem, Hanoi, Vietnam*
[4] *UFR-ST, Université Nazi Boni (UNB), Bobo, Burkina Faso*
* *Corresponding author.*
E-mail address: pascal.jouquet@ird.fr (P. Jouquet)

This communication assesses advances in our knowledge of the beneficial influences of termites on ecosystem functioning and services. Termites are amongst the main macroinvertebrate decomposers in arid and semi-arid environments and exert additional impacts through the creation of biostructures (mounds, galleries, sheetings, etc.) with different soil physical and chemical properties. Unfortunately, the positive 'or bright' role of termites is often overshadowed by their dark side, i.e. their status as pests threatening agriculture in the tropics (635 vs. 164 articles referenced in WoS with termites and either pest or ecosystem engineer as keywords. Source: WoS, April 2019). Termite impacts on soil properties and water dynamics can be differentiated at four different scales: (i) at the landscape scale, where termites act as heterogeneity drivers; (ii) at the soil profile scale, where termites act as soil bioturbators; (iii) at the aggregate scale, where they act as aggregate reorganizers; (iv) and last, at the clay mineral scale, where they can act as weathering agents [1].

In this communication, two examples of ecosystem services provided by termites are given.

The first describes the positive impact of termites on water infiltration and nutrient guidance at small scale through the production of foraging galleries in soil [2] and how this activity can be used to improve agro-ecosystem functioning in arid and semi-arid environments [3].

The second example deals with the construction of mounds and sheeting by termites in "natural" environments [4] and how these "patches of biodiversity and fertility" can be used in the lower Mekong Basin to reduce food insecurity and to provide a better access to health [5] (Fig. 1).

Finally, the perception of termite mounds in Southern Indian rural environments (Fig. 2) is discussed and used as example of the cultural services that can be provided by termites in some circumstances. The story of Valmiki, the author of the Ramayana, is explained and used as a parable for highlighting the interconnection between the "bright" and "dark" sides of termites, and more generally that to get the bright we also need the dark.

Fig. 1 Termite mounds are conspicuous features of paddy fields in Laos and Cambodia. Their soil is used as amendment because it is enriched in organic matter and clay while its animal and plant diversity are used by the population as source of food or medicine (Miyagawa et al., 2011) (Photo: P. Jouquet, Cambodia, 2008).

Fig. 2 Termite mound made by *Odontotermes obesus* in Southern India (Photo: P. Jouquet, 2016). The offerings and the statuette show that termite mounds are used as a means to express one's devotion to Shiva.

Disclosure of interest The authors declare that they have no competing interest.

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Using contact networks and next-generation sequencing for wildlife epidemiology

Vincent Doublet[*,1,2], Toby Doyle[2], Isobel Refoy[2], Sophie Hedges[2], Claire Carvell[3], Mark J.F. Brown[4], Lena Wilfert[2,5]
[1] *Institute of Evolutionary Biology, University of Edinburgh, UK*
[2] *College of Life and Environmental Sciences, University of Exeter, Penryn Campus, UK*
[3] *NERC Centre for Ecology & Hydrology, Wallingford, UK*
[4] *Royal Holloway University of London, School of Biological Sciences, UK*
[5] *Institute of Evolutionary Ecology and Conservation Genomics, University of Ulm, Germany*
[*] *Corresponding author.*
E-mail address: vincent.bs.doublet@gmail.com
(V. Doublet)

Horizontal transmission of infectious diseases is strongly determined by the contact network between hosts [1]. Environmental and ecological variables that define the probability of contacts between individuals, such as food resource quality and quantity, have been largely neglected in models studying the dynamics and epidemiology of wildlife diseases.

In this work, we used pollinators and their pathogens to study the role of contact networks in a natural multi-host pathogen community. In agricultural landscapes, wild flowers are the most important food resources of insect pollinators such as bees and flies. To boost yields of agricultural crops and ensure pollinator conservation, the UK Environmental Stewardship scheme prompted farmers to grow pollinator-friendly wild flower margins along their fields (Fig. 1). Wild flower margins (Fig. 1) have proven to be efficient to increase both density and diversity of bees in agricultural areas, and to increase pollination success of surrounding crops.

As the rate of disease transmission should increase with host density, we hypothesize that the success of wild flower margins may generate hubs for pathogen exchange within the bee community. Several recent studies have illustrated the frequent transmission of infectious diseases between managed and wild bees, potentially via the shared use of flowers [2]. However, the environmental and ecological drivers of disease dynamics between pollinators remain uncharacterised [3]. To understand the role of flower density and diversity for bee disease transmission, we reconstructed high-resolution plant–insect visitor networks from flower visitation data collected in ten farms in Southern England (five farms participating in the scheme vs. five control farms), as well as a record of bee pollen collection to describe the resource bees were exploiting (pollen vs. nectar).

When analysing the plant–pollinator networks, we found that flower density and diversity strongly define pollinator density and foraging behaviour, and influence the structure of indi-