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Associate Professor, Associate Professor
Section for Hologenomics

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Short presentation

I am an evolutionary biologist, working at the intersection of evolutionary and clinical microbiology, in the emerging field of Evolutionary Medicine. My research aims to understand the effects of microbial social interactions within, and among microbial species, and between microbes and their hosts. The ultimate goal is the ability to predict and manipulate microbial effects on host fitness. Social Evolution theory provides a framework to understand interactions such as competition, cooperation and cheating. I was introduced to Social Evolution theory through my MSc and PhD work on ant microbes. I have since applied this theoretical framework to understand the dynamics of human associated bacteria. To achieve this I use in vitro and in vivo growth experiments, microscopy, and bioinformatics. I believe this approach is key at a time when the importance of microbes in health and disease is increasingly recognized, and the composition of our microbiomes are changing because of e.g. overuse of antibiotics and diets with high amounts of processed food. I have received my BSc, MSc and PhD degrees in biology from the University of Copenhagen, with research stays and fieldwork in Australia, Thailand, Panama, Brazil and the US. I have done a post doc between the University of Oxford and the Technical University of Denmark, and another between New York University and the Faculty of Health at the University of Copenhagen, prior to receiving a Sapere Aude grant and a Lundbeck Fonden Fellowship to work as an Associate Professor at the Center for Evolutionary Hologenomics.

Employment

Associate Professor

Section for Hologenomics

København K

11 Oct 2019 → nu

Associate Professor

Section for Hologenomics

København K

12 Oct 2019 → nu

PhD student

Ecology and Evolution

København Ø, Denmark

1 Dec 2008 → 31 May 2012

International Researcher

Pedersen Group

København N.

10 Sep 2016 → 7 Jan 2020

Assistant Professor

Microbiology

København Ø

1 Feb 2020 → 4 Nov 2020

Research outputs

Long-term evolution of antibiotic tolerance in *Pseudomonas aeruginosa* lung infections

Ghoul, M., Andersen, Sandra Breum, Marvig, R. L., Johansen, Helle Krogh, Jelsbak, L., Molin, S., Perron, G. & Griffin, A. S., 2023, In: *Evolution Letters*. 7, 6, p. 389–400 12 p.

Menneskets vigtige samspil med dets mikrober

Andersen, Sandra Breum, 2023, In: *Kaskelot*. 245, p. 19-21

Disentangling host–microbiota complexity through hologenomics

Alberdi, Antton, Andersen, Sandra Breum, Limborg, Morten Tønsberg, Dunn, Rob & Gilbert, M Thomas P, 2022, In: *Nature Reviews Genetics*. 23, 5, p. 281-297 17 p.

A metagenomics approach to investigate microbiome sociobiology

Andersen, Sandra Breum & Schluter, J., 2021, In: *Proceedings of the National Academy of Sciences of the United States of America*. 118, 10, 3 p., e2100934118.

Microbial evolutionary medicine: from theory to clinical practice

Andersen, Sandra Breum, Shapiro, B. J., Vandenbroucke-Grauls, C. & de Vos, M. G. J., 2019, In: *Lancet Infectious Diseases*. 19, 8, p. e273-e283 11 p.

Privatisation rescues function following loss of cooperation

Andersen, Sandra Breum, Ghoul, M., Marvig, R. L., Lee, Z., Molin, S., Johansen, Helle Krogh & Griffin, A. S., 2018, In: *eLife*. 7, p. 1-27 27 p., e38594.

Sociomics: Using Omic Approaches to Understand Social Evolution

Ghoul, M., Andersen, Sandra Breum & West, S. A., 1 Jun 2017, In: *Trends in Genetics*. 33, 6, p. 408-419 12 p.

Diversity, prevalence, and longitudinal occurrence of type II toxin-antitoxin systems of *Pseudomonas aeruginosa* infecting cystic fibrosis lungs

Andersen, Sandra Breum, Ghoul, M., Griffin, A. S., Petersen, Bent, Johansen, Helle Krogh & Molin, S., 2017, In: *Frontiers in Microbiology*. 8, 12 p., 1180.

Interaction specificity between leaf-cutting ants and vertically transmitted *Pseudonocardia* bacteria

Andersen, Sandra Breum, Yek, S. H., Nash, David Richard & Boomsma, Jacobus J., 2015, In: *BMC Evolutionary Biology*. 15, 13 p., 27.

Long-term social dynamics drive loss of function in pathogenic bacteria

Andersen, Sandra Breum, Marvig, R. L., Molin, S., Johansen, Helle Krogh & Griffin, A. S., 2015, In: *Proceedings of the National Academy of Sciences of the United States of America*. 112, 34, p. 10756-10761 6 p.

Specificity and stability of the *Acromyrmex*–*Pseudonocardia* symbiosis

Andersen, Sandra Breum, Hansen, Lars Hestbjerg, Sapountzis, P., Sørensen, Søren Johannes & Boomsma, Jacobus J., 2013, In: *Molecular Ecology*. 22, 16, p. 4307-4321 15 p.

Disease dynamics in a specialized parasite of ant societies

Andersen, Sandra Breum, Ferrari, M., Evans, H. C., Elliot, S. L., Boomsma, Jacobus J. & Hughes, D. P., 2012, In: *PLOS ONE*. 7, 5, 8 p.

Dynamic *Wolbachia* prevalence in *Acromyrmex* leaf-cutting ants: potential for a nutritional symbiosis

Andersen, Sandra Breum, Boye, M., Nash, David Richard & Boomsma, Jacobus J., 2012, In: *Journal of Evolutionary Biology*. 25, 7, p. 1340-1350 11 p.

Host specificity of parasite manipulation: zombie ant death location in Thailand vs. Brazil

Andersen, Sandra Breum & Hughes, D. A., 2012, In: Communicative & Integrative Biology. 5, 2, p. 163-165 3 p.

Behavioral mechanisms and morphological symptoms of zombie ants dying from fungal infection

Hughes, D. P., Andersen, Sandra Breum, Hywel-Jones, N. L., Himaman, W., Billen, J. & Boomsma, Jacobus J., 2011, In: B M C Ecology. 11, 13, p. 13 10 p.

Dynamics of ant-microbial interactions: coevolution along the parasitism-mutualism continuum

Andersen, Sandra Breum, 2011, Faculty of Science, University of Copenhagen. 150 p.

Acute tissue death (white syndrome) affects the microenvironment of tabular *Acropora* corals

Andersen, Sandra Breum, Vestergaard, M., Ainsworth, T. D., Hoegh-Guldberg, O. & Kühl, Michael, 2010, In: Aquatic Biology. 10, 1, p. 99-104

The life of a dead ant - expression of an adaptive extended phenotype

Andersen, Sandra Breum, Gerritsma, S., Yusah, K. M., Mayntz, D., Hywel-Jones, N. L., Billen, J., Boomsma, Jacobus J. & Hughes, D. P., 2010.

Zombiemyrer på vej til kirkegården

Andersen, Sandra Breum & Hughes, D. P., 2010, In: Aktuell Naturvidenskab. 4, 2010, p. 26-29

The life of a dead ant -the expression of an adaptive extended phenotype

Andersen, Sandra Breum, Gerritsma, S., Yusah, K. M., Mayntz, D., Hywel-Jones, N. L., Billen, J., Boomsma, Jacobus J. & Hughes, D. P., 2009, In: American Naturalist. 174, 3, p. 424-433 10 p.

Activities

Vin & Videnskab - Hologenomics: Det nye sort i DNA-forskning

Andersen, Sandra Breum (Invited speaker)
10 Nov 2021

Club EvMed: Harnessing the social lives of microbes to improve human health

Andersen, Sandra Breum (Invited speaker)
25 Mar 2021

Gordon Research Seminar Animal-Microbe Symbioses

Andersen, Sandra Breum (Organizer)
15 Jun 2019 → 16 Jun 2019

Microbial Darwinian Medicine

Andersen, Sandra Breum (Organizer)
14 Aug 2017 → 17 Aug 2017

Evolution og symbiose

Andersen, Sandra Breum (Lecturer)
21 Sep 2009

Press/Media

24 Spørgsmål til professoren

Sandra Breum Andersen
03/10/2022

1 Media contribution

Feature in Evolutionary Medicine article

Sandra Breum Andersen

14/05/2022

1 item of Media coverage

Interview i Kulturen på P1

Sandra Breum Andersen

31/03/2022

1 item of Media coverage

Myrer på dødeligt tropisk svampetrip: En svamp har i millioner af år sikret sin overlevelse ved at bringe myrer fra koncepterne.

Sandra Breum Andersen

16/08/2009

1 Media contribution

Podcast Videnskab.dk

Sandra Breum Andersen

30/10/2020

1 item of Media coverage