



Development of the preen gland bacteriome in germ-free birds

Preen glands of birds have been found to contain bacteria, which may play important functional roles. Hosts can acquire microbes from the environment (horizontal transmission) and from parental sources (vertical transmission). This vertical transmission could occur both pre-hatching (*in ovo*) and post-hatching (from direct contact with parents). So far, little is known about the development of the preen gland bacteriome over time, and the roles of vertical and horizontal transmission on the assembly of the preen gland bacteriome. Although cross-fostering experiments have shed some light on the roles of horizontal and vertical transmission on preen gland bacteriome development, the use of germ-free birds can enable us to better understand these processes.

We have collected preen gland tissue from germ-free house sparrow (*Passer domesticus*) chicks. Briefly, house sparrow chicks were raised until day 7 or day 14, using 3 different treatments:

1. Germ-free
2. Germ-free + inoculated with parental faecal material
3. Parent raised

By analysing the preen gland bacteriome of these chicks, we aim to better understand the development of the preen gland microbiome over time, and the role of vertical transmission, both pre- and post hatching, in the development of the preen gland microbiome.

Methods:

- Tissue dissection
- DNA extraction
- Data analysis
- Bioinformatics in QIIME2 and R

During this project you will dissect preen gland tissue and extract DNA from preen oil and preen gland tissue. This DNA will then be used for amplicon sequencing. Next, you will analyse the raw bacteriome data in software such as R and QIIME2, and analyse the differences in bacteriome composition between different treatments, ages, and preen gland structures.

Further reading:

Martínez-García, Á., et al., The Microbiome of the Uropygial Secretion in Hoopoes Is Shaped Along the Nesting Phase. *Microbial Ecology*, 2016. 72(1): p. 252-261.

Whittaker, D.J., et al., Social Environment Has a Primary Influence on the Microbial and Odor Profiles of a Chemically Signaling Songbird. *Frontiers in Ecology and Evolution*, 2016. 4(90).

Staff member:	Irene Tieleman	Contact:	b.i.tieleman@rug.nl
Daily supervisor:	Maureen Baars	Contact:	i.m.baars@rug.nl
Expertise group:	Behavioural and Physiological Ecology/GREEN		
Type of project:	<input checked="" type="checkbox"/> Bioinformatics	<input type="checkbox"/> Fieldwork	<input checked="" type="checkbox"/> Laboratory
		<input type="checkbox"/> Theoretical	<input checked="" type="checkbox"/> Data analysis
MSc program:	<input checked="" type="checkbox"/> Biology	<input checked="" type="checkbox"/> Ecology and Evolution	<input type="checkbox"/> Behavioural and Cognitive Neurosciences
	<input type="checkbox"/> Biomedical Sciences	<input type="checkbox"/> Biomolecular Sciences	<input type="checkbox"/> Marine Biology
ECTS:	<input checked="" type="checkbox"/> 30	<input checked="" type="checkbox"/> 40	Language: <input checked="" type="checkbox"/> Dutch <input checked="" type="checkbox"/> English
Start date:	Flexible		
Location:	Linnaeusborg		