university of groningen / faculty of science and engineering

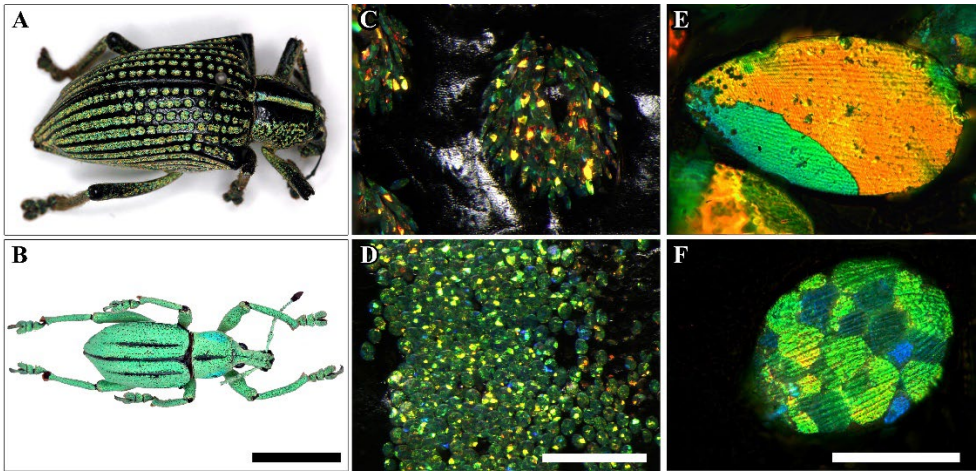
GELIFES Groningen Institute for Evolutionary Life Sciences

MSc Research Project

The biology of colour

How do organisms obtain their colour, and how do these colours evolve in the eyes of mates or predators? In our group we are interested in the proximate and ultimate aspects of colours in animals and plants. We use a suite of approaches, including microscopy and spectroscopy, to study the mechanistic basis of colour, and link it to the (visual) ecology of the animals that see these colours.

For the next semester we have several options for colourful projects. Especially in insects there are many groups that have evolved striking body and/or wing coloration. For example, how do different groups of beetles (e.g. jewel beetles, Buprestidae; diamond beetles, Entiminae; snout beetles, Curculionidae) obtain their colours, and why are taxa in some groups very colourful, whereas others have dull colours? Similar questions can be addressed in butterflies (e.g. *Morpho*, *Papilio*, *Graphium* spp), bees (e.g. orchid bees, Euglossinae) and wasps (e.g. cuckoo wasps, Chrysididae).



Beetles and their scale arrangement on the elytra. **A** *Entimus imperialis* (Entiminae). **B** *Eupholus cuvieri* (Curculionidae). **C**,**D** Scale arrangement in *E. imperialis* and *E. cuvieri*. **E** A single scale of *E. imperialis*, with a few colored domains. **F** A single scale of *E. cuvieri* with many domains. Bars: (A,B) 1 cm, (C,D) 200 µm, (E,F) 50 µm.

See also: A blog post about the colours of duck feathers: https://royalsociety.org/blog/2017/08/how-are-duck-feathers-so-brightly-coloured/
A news item on poppy flower colours: https://www.rug.nl/sciencelinx/nieuws/2019/02/how-poppy-flowers-get-those-vibrant-colours-that-entice-insects and see the projects on the staff page of Casper van der Kooi.

Methods: Photography, microscopy, anatomy, spectroscopy. Depending on the interest of the student, the project can include evolutionary and optical models.

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Daily supervisor: Casper van der Kooi & Doekele Stavenga **Contact:** D.G.Stavenga@rug.nl
Expertise group: GREEN/Neurobiology

Type of project: ☐ Bioinformatics ☐ Fieldwork ☒ Laboratory ☐ Theoretical ☒ Data analysis
MSc program: ☒ Biology ☒ Ecology and Evolution ☒ Behavioural and Cognitive Neurosciences
☐ Biomedical Sciences ☐ Biomolecular Sciences ☐ Marine Biology
ECTS: ☒ 30 ☒ 40 **Language:** ☒ Dutch ☒ English

Start date: Flexible - at least until September 2023, maybe longer **Location:** Linnaeusborg