

# “Through the looking glass”

A One-Day Symposium on Asymmetry, Handedness, and Mirror Images in Nature



Organised by the Netherlands Centre for Biodiversity (NCB, i.o.)  
in honour of KNAW Visiting Professor Rich Palmer (University of Alberta, Canada)

Venue: Auditorium, Naturalis  
(Darwinweg 2, Leiden)

9.00-9.20	<i>Registration</i>
9.20-9.30	Welcome
9.30-10.15	Keynote Lecture Rich Palmer (Univ. Alberta, Canada): “Learning, Developmental Plasticity and the Evolution of Morphological Asymmetry”
10.15-10.40	<i>Coffee break</i>
10.40-11.10	Barbara Gravendeel (NCB-NHN, Leiden): “Helical Handedness of Orchids”
11.10-11.40	Menno Schilthuizen (NCB-Naturalis, Leiden): “A Negative Spiral: Sex and Body Shape in Tropical Treesnails”
11.40-12.10	Edmund Gittenberger (NCB-Naturalis, Leiden): “A Very Unlikely Event”
12.10-12.40	Tom van Dooren (NCB-Naturalis/NHN, Leiden): “Handedness and Asymmetry in Scale-Eating Cichlids”
12.40-13.45	<i>Lunch</i>
13.45-14.15	Guy Vingerhoets (Univ. Gent): “Neural Correlates of Human Tool Use: Cerebral Organization and Lateralization of a Particular Skill”
14.15-14.45	Jeroen Bakkers (Hubrecht Lab, Utrecht): “Laterality of the Heart: What Is Left?”
14.45-15.15	Stefan van Dongen (Univ. Antwerp): “All You Wanted to Know about Asymmetry But Were Afraid to Ask: Some Case Studies in Humans”
15.15-15.45	Frietson Galis (NCB-Naturalis, Leiden): “Developmental Errors in Symmetry and Asymmetry Formation in Mammals”
15.45-17.00	<i>Drinks</i>

**ABSTRACT of the Keynote Lecture by Rich Palmer:**

Evolution by natural selection requires three steps. New variants of organisms: must arise, must have an impact on fitness (survival or fecundity), and must (ultimately) be heritable. The first step - how new variants arise - remains controversial. Traditionally, new phenotypes are attributed to novel genotypes (mutants or recombinants). But developmental plasticity may be a more important source of new variants than generally recognized.

The absence of heritable variation for direction of asymmetry in species that show a random mixture of asymmetric forms (i.e., equal numbers of right- and left-handed forms), identifies a unique phenotype - "direction of asymmetry" - for which there is no genotype. A wide-ranging survey of asymmetry variation within and among species of animals and plants offers some of the strongest evidence to date for a 'phenotype-precedes-genotype' mode of evolution. In addition, the tendency of many animals to learn (e.g., handed behavior) may facilitate both the origin and the amplification of right-left morphological differences via developmental plasticity. Such an interplay between learning and developmental plasticity might greatly enhance the rate of morphological evolution.

Entrance is free. However, you are kindly requested to register by sending an e-mail to Mrs. Liselot Paauw-Wielkens ([paauw@naturalis.nl](mailto:paauw@naturalis.nl))