**RISE – Rotifers In SpacE – new eukaryotic extremophile model organisms to study the impact of radiation and micro-gravity on biological processes?**

Boris Hespeels\*, Lucie Bruneau\*, Richard Coos\*\*, Cécile Bopp\*\*, Véronique Baumlé\*, Bjorn Baselet\*\*\*, Margot Cardinal\*\*, Marjan Moreels\*\*\*, Anne-Catherine Heuskin\*\*, Sarah Baatout\*\*\*, Stephane Lucas\*\*, Karine Van Doninck\*

\* URBE, Laboratory of Evolutionary Genetics and Ecology, University of Namur, Namur, Belgium Namur

\*\* Research Centre for the Physics of Matter and Radiation (PMR), University of Namur, Namur, Belgium

\*\*\* Radiobiology Unit, Molecular and Cellular Biology Expert Group, Institute for Environment, Health and Safety, SCK-CEN, Mol, Belgium

Contact : boris.hespeels@unamur.be

**Abstract**

Bdelloid rotifers are one of the smallest animals on earth. Living all over the world, mostly in semi-terrestrial environments, they appear to be extremely stress tolerant. Their desiccation tolerance at any stage of their life cycle is known to confer tolerance to a variety of stresses including high doses of radiation and freezing. Like bacteria *Deinococcus radiodurans*, bdelloid rotifers appear to survive such extreme conditions because of efficient antioxidants and DNA repair mechanisms. However, such molecular mechanisms remain largely unexplored. In addition, they constitute a major scandal in evolutionary biology due to the putative absence of sexual reproduction for at least 60 million years.

Experiments on the rotifer bdelloid *A.vaga*, with its unique characteristics and a draft genome available, may contribute significantly to our understanding of living in extreme environments. Here we will results from project RISE (Rotifer In SpacE), that was designed with the intention to use bdelloids as a new model organism for space research. This research project was selected by ESA (European Space Agency) and addresses the following questions: 1) How microgravity and space flight are affecting biological processes of *A. vaga*? 2) What are the limits of bdelloids extreme resistance to radiation? 3) What are the molecular mechanisms involved in protection and repair of damage induced by different radiation sources? 4) Are microgravity and space flight affecting protection and repair mechanisms of *A. vaga*?