Kevin Painter
Heriot-Watt University
e-mail: painter@ma.hw.ac.uk
Richard L. Mort
MRC Human Genetics Unit, Institute of Genetics and Molecular Medicine, Edinburgh
Ian J. Jackson
MRC Human Genetics Unit, Institute of Genetics and Molecular Medicine, Edinburgh

An integrated experimental/theoretical approach to explore cell migration during embryonic development

Cell migration is critical to multiple developmental processes, from early embryonic reorganisation to the intricate wiring of the nervous system. Neural crest cells (NCCs) form a highly motile population characterised by an epithelial to mesenchymal transformation that allows their migration to various remote target tissues, where they differentiate into multiple cell types. Failure to migrate, proliferate or differentiate leads to a plethora of birth defects. Melanoblasts, a subtype of NCC and the embryonic precursors of melanocytes, serve as a model system for cell migration during development and in pathologies such as cancer cell metastasis. Melanoblasts migrate out of the neural crest into the developing skin before localising into the developing embryonic hair follicles. A variety of factors may contribute to their colonisation of the embryonic skin, including tissue growth, melanoblast motility, melanoblast proliferation and extracellular signaling factors. In this talk I will discuss our integrated experimental/theoretical approach to understanding melanoblast invasion, in which data obtained in an ex vivo system for live imaging of melanoblast migration in embryonic skin is incorporated into mathematical models which, in turn, are used to test distinct hypotheses for colonisation and formulate experimentally testable predictions.