Success in nature and sport: exploring the biological basis of excellence in physical activities

All physical activities rely on a complex assortment of anatomical, physiological, motor and behavioural traits. Discovering the determinants of individual success in physical activities has become central to the study of adaptation because it allows one to understand the coevolution of organismal form and function in natural populations. In a similar way, determining the combination of traits most responsible for success in human functional tasks is of enormous interest to the sports industry for discovering and developing athletes and the health sciences for facilitating improved pathways of recovery following injury. But despite the parallels in research programs between the natural and health sciences, each discipline has operated in relative isolation. In this seminar, I will explore the parallel lines of research that explore the determinants of success in physical activities in two very different but complimentary study systems: (i) natural populations of the small carnivorous marsupial, the northern quoll (*Dasyurus hallucatus*) from tropical Australia, and (ii) semi-professional soccer players. The northern quoll is the world’s largest semelparous mammal, which means mating is highly synchronous, males live for only one year, and all males undergo die-offs soon after reproduction. Given the importance of procuring mates in such a short period (approx. 2 weeks), the ability for males to win fights and cover long distances to find reproductively mature females is presumably of critical importance. Female quolls live for two to three years and their die-off occurs after the young are weaned - which is around four months after the mating season. Soccer is also ideal for a integrative studies of success because we can readily identify, isolate and quantify many of the possible underlying determinants of success among large numbers of individual players. Soccer is the world’s most popular team sport and is played by an estimated 240 million registered competitors and watched by more than a billion people worldwide. Using these two very different study systems, I will discuss the implications of my work for understanding the evolution and ecology of physical performance in nature.