CV – Roderick DEWAR – August 2007

PERSONAL INFORMATION

Date of Birth: 11 Sept 1960. Married since 1991. 2 children aged 6 and 10.
British national. Email : dewar@bordeaux.inra.fr

ACADEMIC QUALIFICATIONS

1982	B.Sc.	(Hons 1st class) University of Edinburgh	(Mathematical Physics)
1986	Ph.D.	University of Edinburgh	(Mathematical Physics)

CURRENT APPOINTMENT

1997-present Unité EPHYSE (Laboratory of Functional Ecology and Environmental Physics), INRA Bordeaux, France ; Directeur de Recherches grade since 2004.
http://www.international.inra.fr/join_us/working_for_inra/portraits/roderick_dewar

EMPLOYMENT HISTORY

1994-1997	Senior Research Fellow, School of Biological Sciences, UNSW, Sydney
1989-1994	Senior Scientific Officer, Institute of Terrestrial Ecology, Edinburgh
1986-1987	Postdoctoral Research Assistant, Dept. Theoretical Physics, Univ. of Oxford

RESEARCH CAREER SUMMARY (1983 - 2007)

My doctoral (1983-86) and post-doctoral (1986-87) research was in theoretical physics, where I studied the self-similar (fractal) patterns that underlie magnetic phase transitions, percolation across disordered media, the spread of epidemics, and aggregation processes [1-5, see Publications].

In 1989 I underwent my own thematic phase transition to biology. In collaboration with an international network of colleagues, I have developed simple mathematical models to gain insights into the integrative behaviour of plant and ecosystem processes generally, and, more particularly, to predict the responses of forest ecosystems to climate change and management practices.

My biological research to date has involved modelling of individual plant processes (*e.g.* stomatal function [23,43], plant respiration [38], photosynthetic acclimation [31, 33]) as well as their integration at the whole-plant and ecosystem levels (*e.g.* growth allocation [13,14,27], carbon balance [6,7,11,16,22,36,39] and sustainable productivity [25,29,41,42]). My focus on theory, synthesis and simplicity in modelling is a reflection of my background in theoretical physics.

My mechanistic explanation for the conservative behaviours of light-use and carbon-use efficiencies in terms of plant acclimation processes [26,31] provides a physiological basis for the use of these concepts as simple, robust predictors of plant growth and respiration. In a complementary line of work, my synthesis [43] of two previous stomatal models (Tardieu & Davies, Ball & Berry) provides a simple mechanistic picture of the combined effects of soil water stress, above-ground environmental factors, and internal physiological characteristics, on the water-use efficiency of plants.

Most recently, in a return to my physics roots (statistical mechanics) I have also been studying the Maximum Entropy Production (MEP) hypothesis, a potentially quite general organizational principle governing complex, non-equilibrium systems – plants, ecosystems and climate systems being prime examples. My proposed statistical explanation of MEP [44,45,47] has generated considerable interest in using statistical mechanics and MEP to study the behaviour of such systems on different spatial and temporal scales, especially within the environmental sciences (Whitfield, J. Order out of chaos. *Nature* **436**, 905-907 (2005)). My own applications of statistical mechanics in this area range from predicting the evolutionary optimization of biologically important macromolecules [48] to understanding patterns of diversity in ecological communities [50].