SECTION 11 THEORETICAL BIOLOGY

Section leader J.A.J. Metz

GENERAL INTRODUCTION

The section designs unifying frameworks as well as conceptual and mathematical tools, for studying evolutionary and ecological problems, both on an a priori basis and in close co-operation with experimental groups. The theoretical research ranges from the analysis of key biological concepts and the exploration of the consequences of established biological theories to the construction of models for specific biological systems, the latter often with a view to develop data-analytical techniques.

Project 1 ***Ecological Dynamics***
This project considers the dynamics of single species as well as processes involving the interaction between several species on ecological time scales. In one direction novel mathematical tools are developed for the translation from complex individual level causes to population dynamical consequences. In the other direction data analytical tools for dealing with observed ecological time series are developed, which increasingly account for the underlying individual level processes. The project includes various sub-projects.

Project 2 ***ESS theory***
In this project the step in the opposite direction, from population dynamics to properties of individuals, is made through the ESS route. In addition statistical methods are developed for analysing data on individuals in a manner useful for evolutionary theorising. The project includes various sub-projects.

Project 3 ***Adaptive Dynamics***
This project considers evolutionary time-scales and the species level as well as between-species interaction. Our aim here is the construction of an overarching theory of phenotypic evolution, as a direct dynamical extension of the evolutionary statics of ESS theory. This theory also deals with co-evolution and with the treelike structure of character evolution through adaptive speciation. The project includes various sub-projects.

Project 3 ***Methodological Foundations of Phylogenetics***
This project aims to contribute to the development of conceptual and methodological issues in the theory of Phylogenetic Systematics. The project includes various sub-projects.

Project 4 ***Bio-informatics and Self-Organising Systems***
This project aims to contribute to the field of Bio-informatics by data-mining and the simulation of complex systems, and to the theory of self-organising complex systems. The project includes various sub-projects.

PERSONNEL

Prof. Dr. J.A.J. (Hans) Metz	Professor UL
Prof. Dr. D.J. (Diedel) Kornet	Endowed Professor LUF
Dr. F.H.D. (Eke) van Batenburg	Associate Professor UL
Dr. P. (Patsy) Haccou	Associate Professor UL
Dr. M. (Rino) Zandee	Associate Professor UL
Drs. E. (Evert) Meelis	Assistant Professor UL
Dr. A.P. (Sacha) Gultyaev	Scientific Programmer UL
Dr. F. (Frietson) Galis	Postdoc UL
Dr T. (Tom) van Dooren	Postdoc EU
J.B. (Joost) Beltman	Grad. Student ALW
M. (Michel) Durinx	Grad. Student ALW
M. (Marjolein) Dutmer	Grad. Student UL
T.A.C. (Thomas) Reydon	Grad. Student UL
Y. (Yuri) Robbers	Grad. Student UL
C. (Claus) Rueffler	Grad. Student ALW

ALW	Netherlands Foundation for Life Sciences
EU	European Union
UL	Leiden University

COLLABORATIONS

National:
- Leiden, LIC, Leiden University, Prof. Dr. J.P. Abrahams
- Utrecht, Mathematisch Instituut, Prof. Dr. O. Diekmann
- Utrecht, Veeartsenijkunde, Prof. Dr. J.A.P. Heesterbeek
- Wageningen Universiteit, Dr. L. Hemerik
- RHHB, UL, Dr. P. Hovenkamp
- Amsterdam, VU, Prof. Dr. S.A.L.M. Kooijman, Dr. B. Kooi, Dr. T. Troost
- Lelystad, CDI-DLO, Dr. M.C.M. de Jong
- Leiden, Fac. Wijsbegeerte UL, Dr. J.W. McAllister
- Leiden, LIC UL, Prof. Dr. C. Pley, Dr. B. Kraal
- Amsterdam, vg. Zuivere en Toegepaste Oecologie UvA, Prof. Dr. M.W. Sabelis
- Utrecht, Biostatistiek, Dr. M. Schipper
- Leiden, LUMC, Dr. W. Spaan, Dr. E. Snijder
- Leiden, RHHB, UL, Dr. P.C. van Welzen

International:
- Toronto, Canada, Dept. Zoology Univ. Toronto, Prof. Dr. D.R. Brooks
- Sheffield, University of Sheffield, UK, Prof. Dr. C. Cannings
- ADN-IIASA, Laxenburg, Austria, Dr. U. Dieckmann
- University of British Columbia, Vancouver, Canada, Dr. M. Doebeli
- Laboratoire d'Ecologie, Ecole Normale Supérieure, Paris, France, Dr. R. Ferrière, Dr. C. Cadet, Dr. M van Baalen,
- University of Southern Denmark, Odense, Denmark, Dr. K. Gerdes
- Zoological Museum, Lausanne, Dr. O Glaizot
- Cornell University, Ithaca, NY, USA, Prof. H.W. Greene
- Math. Inst., Univ. of Turku, Turku, Finland, Prof. Dr. M. Gyllenberg, Dr SAH Geritz, Dr. É. Kisdi, Dr. K. Parvinen,
- Univ. of Helsinki, Helsinki, Finland, Prof. Dr. I. Hanski
- M. Tuda Kyushu Univ., Fukuoka, Japan, Prof. Dr. Y. Iwasa, H. Yokomizo, E. Shudo
- University of Tenessee, Knoxville, USA, Drs. F.J.A. Jacobs
- Chalmers University, Göthenbörg, Sweden, Prof. Dr. P. Jagers, C. Serra
- University of Connecticut, Storrs, USA, Dr. E.L. Jockusch
- Charles University, Prague, Czech Republic, Dr. Martin Kundrát
- Stockholm University, Sweden, Prof. O. Leimar
- Eötvös University, Budapest, Hungary, Dr. G. Meszéna
- Bayer Crop Science NV, Gent, Belgium, Dr. F. Meulewaeter
- Institut für Mathematik, Vienna, Austria, Prof. Dr. K. Sigmund
- University of California at Santa Cruz, USA, Prof. Dr. B. Sinervo
- Universität Köln, Cologne, Duitsland, Prof. Dr. D. Tautz
- Universidad Católica del Norte Coquimbo, Chile, Dr. M. Thiel

- Ecole Normale Superieure Paris, France, Dr. T. Tully
- Stekhlov Institute of Mathematical Sciences, Moscow, Russia, Prof Dr. V. Vatutin
- Yale University, New Haven, USA, Prof. Dr. G.P. Wagner

GRANTS

- EU: Postdoc (T. van Dooren) as part of a programme together with IIASA, Turku, Bergen and Paris for research on "Modern Life-History Theory and Its Application to the Management of Natural Resources") from September 2000 for three years. Euro 36,300 plus Euro 5,000/year.
- NWO-ALW: AIO (J. Beltman) "Sexual imprinting, song learning and gene-culture coevolution: modeling the evolution of brood parasitism in birds", August 2000 for four years + Euro 1,362 reiskosten + Euro 226 materiaalkosten
- NWO-ALW: AIO (M. Durinx) "Developing a bifurcation theory for Evolutionary Stable Strategies", from 1 September 2000 for four years. + Eur 709 reiskosten.
- NWO-ALW: AIO (C. Rueffler) "Putting life history theory in a realistic ecological context" from 1 September 2000 for four years + Eur 709 reiskosten.

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DISSERTATIONS

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