Workshop

EVOLUTIONARY AND ECOLOGICAL INDIVIDUALS.

Paris, May 27, 9.30 – 18.00.

Centre de Recherches Interdisciplinaires (CRI) ; Faculté de Médecine, site Cochin Port-Royal
First workshop (on 3) organized in the framework of the STABECO Program – « Stability of ecosystems – from ecology to environmental ethics » - a CNRS – INEE funded project led by Minus Van Baalen (Paris VI, ecology) and Philippe Huneman (IHPST, Philosophy). See:

http://www-ihpst.univ-paris1.fr/p/28,stabilite_des_ecosystemes__de_l_ecologie_a_l_ethique_de_l_environnement.html

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Program

9.30- 12.30

Nicolas Claidiere (Philosophy. Paris)
Transformation and selection in cultural evolution : differences with genetic evolution.

Clement Nizak (Ecology. Grenoble).
Quantitative evolutionary problems in multicellulars: an experimental approach based on the social amoeba Dictyostelium.

Sandrine Adiba (Ecology, Paris 6).
From grazing resistance to pathogenesis

12.30 Lunch.
14- 17h

Ellen Clarke (Philosophy. Bristol.).
Individuality in plants

Manuel Blouin (Ecology. Creteil)
Autocatalysis: a common feature of living systems

Hans Metz (Ecology. Leyden)
Meta-fitness: How can evolutionary arguments on a level above that of the gene make sense?
17-18. General discussion.

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Abstracts.

Hans Metz. *Meta-fitness: How can evolutionary arguments on a level above that of the gene make sense?*

For general ecologies, as opposed to the highly simplified ones considered by population geneticists, the concepts Fitness and Evolutionarily Steady Strategy can be rigorously defined only for clonally reproducing entitites. From this perspective, even the usual biological individuals (bodies) should be seen as no more than uneasy coalitions of genes. From this perspective the phenotype of a gene is the map from all possible genetic backgrounds, together with which which it may find itself in a body, combined with all possible environments in which that body may find itself, to the trait vector measured on the resulting body. On occasion one can for some compound entitity, e.g. classical individuals, families, or local populations comprising a metapopulation, introduce a mock fitness by mentally constructing a parallel world in which mock entities similar to the focal ones do reproduce clonally, and through this route get correct predictions about ESSes for traits of those entities. In my view, the existence of such a correspondence should form the basis for any rigorous concept of evolutionary individuality.

References
Metz, J.A.J. (2008) Fitness. Pp. 1599-1612 in S.E. Jørgensen & B.D. Fath (Eds) *Evolutionary Ecology. Vol. 2 of Encyclopedia of Ecology*. Elsevier, Oxford.
Metz, J.A.J. & M. Gyllenberg (2001) How should we define fitness in structured metapopulation models? Including an application to the calculation of ES dispersal strategies. *Proc Roy Soc* B 268: 499-508.
Parvinen, K. & Metz J.A.J. (2008) On diploid versus clonal ESSes in metapopulations. *Theor Pop Biol* 73: 517-528.

Ellen Clarke. *Individuality in plants.*

I am going to be looking at how organisms are delineated as separate units of selection in the plant kingdom, how this differs from individuation in metazoans, and what we can learn from this about the phenomenon of biological individuality in general. Plants possess many idiosyncratic features, such as cell wall rigidity, somatic embryogenesis and indeterminate development which have deep and interesting consequences for the ways in which hierarchical levels of selection are constrained. Plant individuals do not maintain their stability and autonomy in the same way as most animals.

Clément Nizak. *Quantitative evolutionary problems in multicellulars: an experimental approach based on the social amoeba Dictyostelium.*

Our experimental study is based on *Dictyostelium*, which switches between unicellular and multicellular modes depending on its environment. We have set up an original and quantitative method, based on an in vivo fluorescence microscopy experiment and a cell counter (both constructed in our laboratory), which allows to answer some basic evolutionary

questions raised by the emergence of multicellularity. We do so by measuring, on intact living organisms and as a function of time, the statistical distributions of key parameters: organism size, cell type proportions, clonal composition.

These measurements allow us to tackle several problems raised by the evolutionary transition from unicellularity to multicellularity: How is organism size regulated? What is the variation of size from organism to organism? How are cell type proportions regulated (precision of proportioning, dynamics)? In particular, what is the ratio between soma and germ line proportions?

How does clonal composition in genetically heterogeneous organisms (mosaics, chimeras) influence organism size and cell type proportions? Finally, is genetic heterogeneity overall an advantage or not from an evolutionary standpoint?