Recommendations of the meeting of the European Platform for Biodiversity Research Strategy

held under the Spanish Presidency of the EU
Palma de Mallorca, Spain,, 13-15th of April, 2010

concerning

EVOLUTION AND BIODIVERSITY:

THE EVOLUTIONARY BASIS OF BIODIVERSITY AND ITS POTENTIAL FOR ADAPTATION TO GLOBAL CHANGE

Evolution creates and sustains biodiversity[1]. Genetic diversity is fundamental to evolutionary processes and is a central element of our natural capital. Its conservation and sustainable use should be better incorporated into policy and management. Within this context, the participants of the meeting place high priority on research to:

Evaluate the evolutionary basis of biodiversity

1. develop fundamental, mechanistic models of speciation to understand the evolutionary basis of biodiversity.

2. understand the rates and types of evolutionary responses, including rapid evolutionary change, to different levels of disturbance using studies in natural laboratories; for example; biological invasions, conservation areas, peripheral/marginal populations, evolutionary hot spots.

3. improve understanding of population dynamics and functional genetic variation in refugia and along environmental gradients, to maintain viable populations and thereby provide a more secure scientific basis for favourable conservation status.

4. understand how phenotypic plasticity and genetic polymorphism contribute to maintaining ecological function.

Assess the evolutionary responses to anthropogenic pressures

5. understand evolutionary responses to sea and land use change, habitat loss, fragmentation and population reconnection, in all biogeographic regions.

6. increase understanding of the mechanisms by which evolutionary responses to global change occur, through studies at individual organism level (e.g. epigenetics, phenotypic plasticity)

7. allow evolutionary processes to be properly taken into account in natural resource management, conservation and restoration, for example, develop criteria for establishing conservation priorities for species and habitats, taking into account threat, status, genetic diversity and evolutionary potential.

[1] Evolution is influenced and driven by many things, including selection, genetic drift, genetic variation, gene flow, population size, stochasticity and phenotypic plasticity

8. understand consequences of evolutionary responses to anthropogenic pressures for ecosystem functioning, resilience and capacity to adapt and provide services.

Understand evolution in complex systems and co-evolutionary networks

9. better understand, in complex multi-species networks, the feedback that operates between evolutionary dynamics, assembly processes, key species, changes in relationships among species, and the stability or vulnerability of these networks.

10. understand how the structure and function of complex multi-species networks depend on spatial and temporal scales and how they respond to changes in connectivity and fragmentation, including the evolutionary and co-evolutionary responses of their component organisms.

11. understand co-evolutionary dynamics of humans and other components of the global network of ecosystems, for example pathogens and emerging diseases.

Research in support of the Science Policy Interface, Communication and Public Awareness

12. facilitate understanding of the historical and ongoing evolutionary basis of biodiversity, and appropriate implementation of research results by policy makers and managers.

To develop the necessary high quality and policy relevant research on evolution and biodiversity, particular attention should be paid to:

- Making use of biological collections as a tool to study evolution.
- Making use of past and present species distribution data as tool to improve the modelling of future species distributions.
- Encouraging investment in the future by supporting long term studies and development of long term visions for the conservation of biodiversity and the study of anthropogenic evolution.
- Making use of appropriate molecular and quantitative genetic tools to efficiently measure genetic diversity and adaptation of populations, applying these tools across the diversity of life cycles.
- Promoting university education on evolutionary biology and biodiversity
- Promoting interdisciplinary cooperation for the study of complex systems (e.g. physical sciences and neural sciences)

Complementary information can be found in the DIVERSITAS Science Plan BioGENESIS[2]

[2] http://www.diversitas-international.org/?page=core_biogen