SCIENTIFIC MEETING

SAVING SPECIES ON THE EDGE: FROM THEORY TO PRACTICE

Tuesday 13 March 2007
The Meeting Rooms, The Zoological Society of London, Regent's Park, London NW1 4RY

Chair: Professor Andy J. Purvis
Department of Biological Sciences, Imperial College London

Putting evolution into conservation: prioritizing species on the EDGE of existence

Dr Nick Isaac, Research Fellow, Institute of Zoology, ZSL, London

Many factors are used to select priority species for conservation, particularly threat and endemism. Phylogenetic information is rarely incorporated into priority-setting exercises in spite of the value associated with evolutionary heritage. Conserving species with few close relatives is important because they represent a disproportionate amount of biodiversity. Evolutionary Distinctiveness (ED) is a simple way of apportioning conservation value to species according to their phylogenetic position. Information about threat status can be combined with ED to generate a list of species that are both Evolutionarily Distinct and Globally Endangered (EDGE species). EDGE scores are robust to taxonomic 'splitting' because any increase in threat status is offset by a reduction in ED. The EDGE approach is applied to a near-complete species-level phylogeny of the Mammalia to generate a global priority list incorporating both phylogenetic diversity and extinction risk. The highest-ranking species represent a high proportion of total mammalian diversity and include many species not usually recognised as conservation priorities.

These lonely animals: attributes of evolutionary distinctiveness

Dr Arne Mooers[1,2] & Dave Redding[1], [1]SFU Canada and [2]Institute for Advanced Study in Berlin

Evolutionary distinctiveness (ED) as measured in the EDGE framework is an exciting species-specific measure of the relative evolutionary value of species. But what is it? First, at least in primates, the most evolutionary distinctive species also do seem to be morphologically odd, suggesting ED measures something tangible. Second, although the traditional way of viewing evolutionary variation in conservation has focussed on sets of species with a view to maximizing complementarity, ED seems to do well in this regard too. Given how unwieldy such set-measures seem to be, this is an unexpected plus for ED. Indeed, ED is very reminiscent of a particular complementarity measure called the Shapley value. This observation allows us to formulate a second measure, still unnamed, that is also species-specific, explicitly complementary, and which incorporates both how isolated a species is on the tree of life and how endangered its relatives are. At least at a course scale,

ED is also well-correlated with this new measure, and exceptions are instructive. Finally, species-specific measures like ED are an important first step in combining disparate measures of species value and risk in a common framework for conservation. Such an approach should be of practical use both in endangered species legislation and to conservation agencies like zoos and botanical gardens.

Further Reading:

Avise, J.C. (2005). Phylogenetic units and currencies above and below the species level. In *Phylogeny and conservation*: 77-100. Purvis, A., Gittleman, J.L. & Brooks, T. (Eds). Cambridge, UK: Cambridge University Press.

Haake, C.-J., Kashiwada, A., & Su, F.E. (2005). The shapley value of phylogenetic trees. *IMW Working Paper no 363*. ArXiv (q-bio.QM/0506034)

Isaac, N.J.B., Turvey, S.T., Collen, B., Waterman, C. & Baillie, J.E.M. (2007). Mammals on the EDGE: conservation priorities based on threat and phylogeny. In Press, *PLoS One*.

Redding, D.W. & Mooers, A.O. (2006). Incorporating evolutionary measures into conservation prioritisation. *Conservation Biology* **20:**1670-1678. www.sfu.ca/~amooers/papers/Redding&Mooers_ConsBiol06.pdf

Steel, M., Mimoto, A. & Mooers, A.O. Quantifying a taxon's expected contribution to future phylogenetic diversity. www.sfu.ca/~amooers/papers/Steel_etal_AmerNatman.pdf

EDGE in practice: conserving evolutionary history

Dr Jonathan Baillie, Research Fellow, Institute of Zoology, ZSL, London

The EDGE approach has been developed to highlight and aid in the conservation of the world's most Evolutionary Distinct and Globally Endangered (EDGE) species. The list of the top 100 EDGE mammals includes species such as the Yangtze River dolphin, long-beaked echidna, pygmy hippopotamus, golden-rumped elephant-shrew, bumblebee bat and long-eared jerboa. Although these species have few close relatives and are highly threatened, little is being done to conserve them. In fact, 70% of the top 100 EDGE mammals are receiving little or no conservation attention. The EDGE programme has been developed to ensure these remarkable species do not fall through the conservation net unnoticed. Here we outline progress since the launch of the EDGE programme in January 2007, and introduce the ambitious plans for the future, truly demonstrating the transition from theory to practice. The programme focuses on EDGE species that are receiving little or no conservation attention. Over the next 5 years we aim to ensure conservation measures are place for each of the top 100 EDGE mammals. We are starting by focusing on 10 poorly-known EDGE species and supporting 10 EDGE research fellows (in-country students or researchers) in the field. Expeditions will be undertaken to conduct initial surveys to define the status of the 10 Focal Species and to help clearly define the dominant threat processes. The 10 EDGE Fellows will be trained to monitor and manage rare and threatened species. With the assistance of ZSL and partner organisations, they will also produce detailed conservation action plans. The EDGE programme currently focuses on mammals, but will shortly be expanding to include amphibians, followed by birds and other groups in the future.