

optimistic with regard to the first barrier, because the time and cost required to produce a phylogeny are rapidly diminishing, and taxonomically broad, well-sampled trees are becoming increasingly refined [8–10]. Indeed, commissioning trees specifically to inform conservation decisions is an increasingly viable option. Ready-to-use software is also becoming available [11,12], although more could be done to make mapping of ED as straightforward as mapping of species diversity. The final potential barrier is thornier; considering evolutionary relationships in conservation decisions will make a real difference to the goal of preserving the Tree of Life, but clear goals and clear communication are essential. We hope that the concerns of Winter *et al.* act as a necessary tonic in this regard.

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# Conquering current obstacles for avoiding the misuse of evolutionary diversity in nature conservation: a reply to Rosauer and Mooers

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We thank Dan Rosauer and Arne Mooers [1] for their valuable contribution to the discussion that we wanted to raise with our recent Opinion in *TREE* about the relevance of evolutionary diversity (ED) in present-day conservation plans [2]. Conservation biology has always been haunted by the need to set priorities among alternative strategies and we agree with Rosauer and Mooers that we live, more than ever, in times of triage [3]. That is why we also think that nature conservation needs to be made on a well-justified basis. With our article, we wanted to stress that, although ED is certainly not *a priori* useless for conservation, several obstacles still need to be overcome before it becomes an effective argument. In this respect, we suggest that projecting ED as a surrogate for functional diversity or evolutionary potential represents often-used, but weakly evidenced arguments, and that the conservation of ED should not be based on such arguments unless they are better justified.

Rosauer and Mooers further argue that such correlational justifications are even neglecting ED as a fundamental measure of biodiversity on its own [1]. The echidna example of Rosauer and Mooers [1] addresses the rarity aspect (we used the example of *Welwitschia* explicitly in that sense), which leads back to the importance of considering ED as a value *per se*. In contrast to Rosauer and Mooers's interpretation, we did not want to dismiss this facet of biodiversity. Besides, living in times of triage does not necessarily mean that our efforts should be purely anthropocentric and advantage driven, focusing only on the protection of 'useful' biodiversity [3]. In fact, we believe the hazardous argument that ED is a surrogate for functional diversity or evolutionary potential can even be used to promote conservation based on the ability to maintain current or future ecosystem services. Instead of pleading for using these utilitarian arguments, we hope that our concerns will increase discussion, raise awareness, and encourage the integration of ED in common conservation targets based on stronger and less utilitarian justifications. This, however, will still be achieved only after the

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design of suitable guidelines and well-defined conservation goals.

A second point that Rosauer and Mooers [1] raise is related to the diversity of metrics. Their main argument is to prioritize those regions, species, and so on that ultimately 'enhance the persistence of the diversity of the Tree of Life' [1]. However, here we are again: do we really know what to protect to ensure the persistence of the tree of life, which is, as far as we understand it, something different from conserving the highest amount of ED? In other words, in this era of triage, if one must cut or protect some of the branches of the tree of life, which ones should be considered: long or short branches? To our knowledge, simply calculating ED, whatever the metrics used, cannot solve this. Protecting the tree of life is also a dilemma because it is an additional facet of biodiversity that we call to be conserved on top of already existing conservation schemes. Rather than using ED as a new silver bullet, we think that the 'agony of choice' in conservation is a matter

of concern needing not only more research and clear communication between and among conservationists and stakeholders, but also the development of public awareness and involvement.

We are grateful to Rosauer and Mooers for this discussion and hope that it will continue to motivate similar discussions and promote research projects on ED in ecology and conservation science.

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