

GENERAL PRINCIPLES

In terms of diversity hypotheses, more than one different type of diversity question can be and is asked. In particular there are two very major types of questions we can ask. Questions along the lines of, why the diversity that we have, why there are so many species. Such questions require us to look at balance of speciation and extinction over time. It is very much an evolutionary question as to why so many species have evolved in the first place. And the time scales involved are also evolutionary ones. Very long time scales.

The other major type of diversity hypothesis that can be asked relates to the patterns of diversity that we see. This can be patterns in time, but is typically more to do with patterns in space. And to explain patterns, diversity patterns in space we need to think about adjustment of species to the circumstances in which they find themselves, This includes processes of migration, immigration and emigration, dispersal and so on, and to some extent speciation and extinction but over the sorts of time scales that are relevant, that are most relevant anyway to diversity patterns in space, as to ecological time scales, speciation extinction happens relatively slowly compared with these other processes. So although they will be important, they won't be the primary explanations for these sorts of patterns.

Focusing more on explaining biodiversity patterns in space, we can make another major generalization. We can ask questions about endemism and the patterns of endemism in space and if we are trying to explain these sorts of patterns, then we need to think mainly about biogeographic and evolutionary history. The sorts of barriers to dispersal, levels of isolation and so on that have been in place. But if we are trying to explain patterns of species richness, not taking into account the identity of the species, then we need to look at ecological explanations, so we need to look at the climate, the environment in which the species find themselves. And that tends to give us much better answers to questions about why we find the number of species in particular places that we do.

Summarising the ideas and the findings of many different studies over many decades, Tim Blackburn and Kevin Gaston in their 2000 book put it really quite succinctly. The regions with the highest species richness tend to be very large regions, very productive, that is primary productivity, productive regions, and regions that are quite old in terms of effective time for diversification. So we can see elements of different hypotheses explained in this unit that come together. And this is an important point that the patterns that we see in nature are unlikely to be explained by just one thing alone. They are likely to be a combination of different explanatory variables that are involved.

As Gaston and Blackburn and many others in the past, including Darwin, have pointed out, the least well understood link in the argument here is why there should be more species in productive areas rather than just more individuals of one or two very dominant and productive species. But we do find generally and particularly at larger scales, more than at smaller scales, that the more productive areas have more species, so we don't just find greater dominance.