

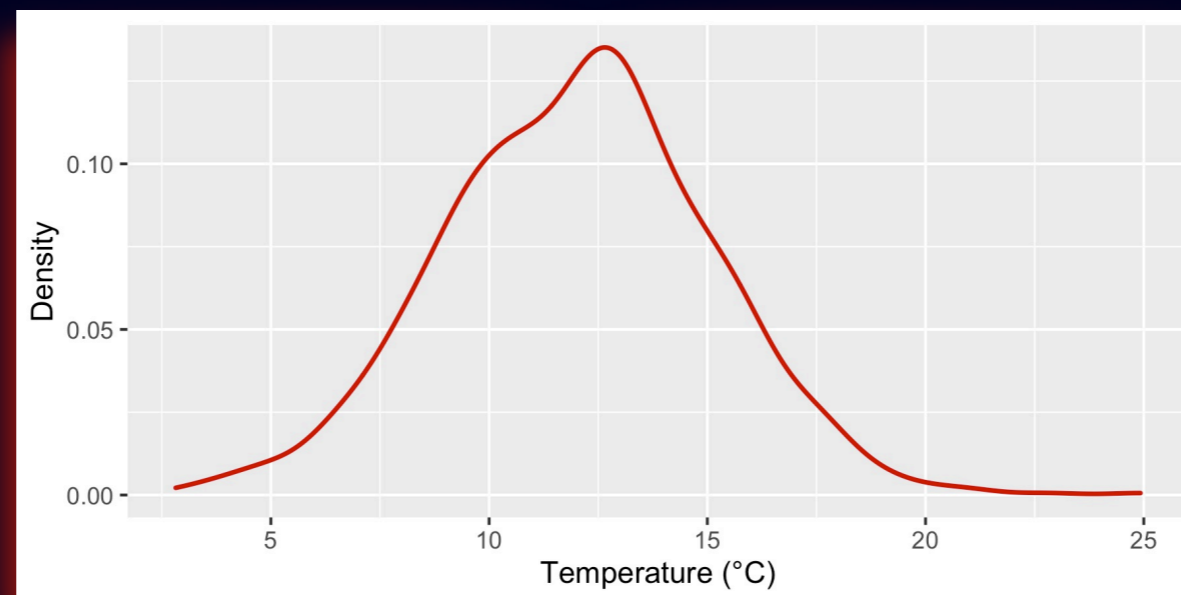
TOPIC 3

STRUCTURING OF BIODIVERSITY



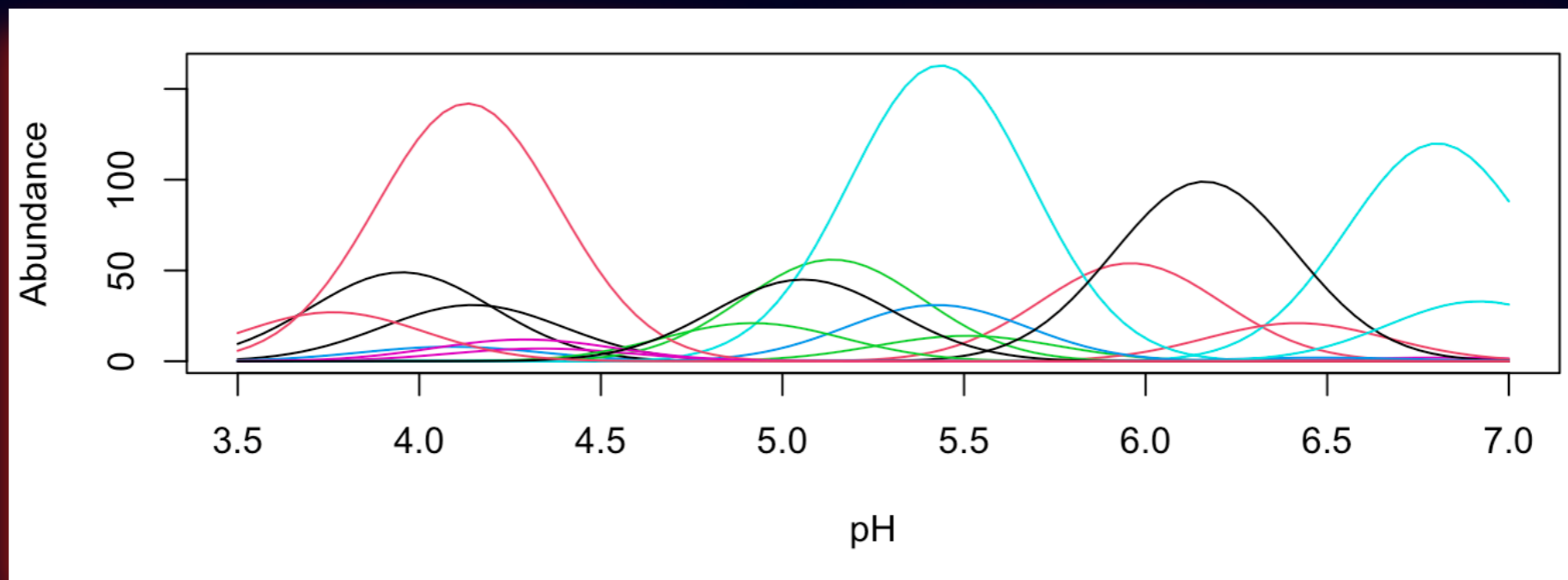
Unimodal species response to gradients

- It is easy to understand how species and/or samples come to be arranged (sorted) along gradients.
- The **unimodal model** sensu Whittaker (1967, 1969):
 - the relationship between the abundance [etc.] of species vs. position along a gradient is a unimodal function,
 - this implies that each species has a unique set of optimal conditions at which the species attains maximal abundance, and
 - the abundance decreases away from that 'sweet spot'.
- But in reality it is more complex as multiple gradients co-exist and communities (i.e. a collection of outcomes according to interacting unimodal species-environment models) are formed in this 'space' of gradients.



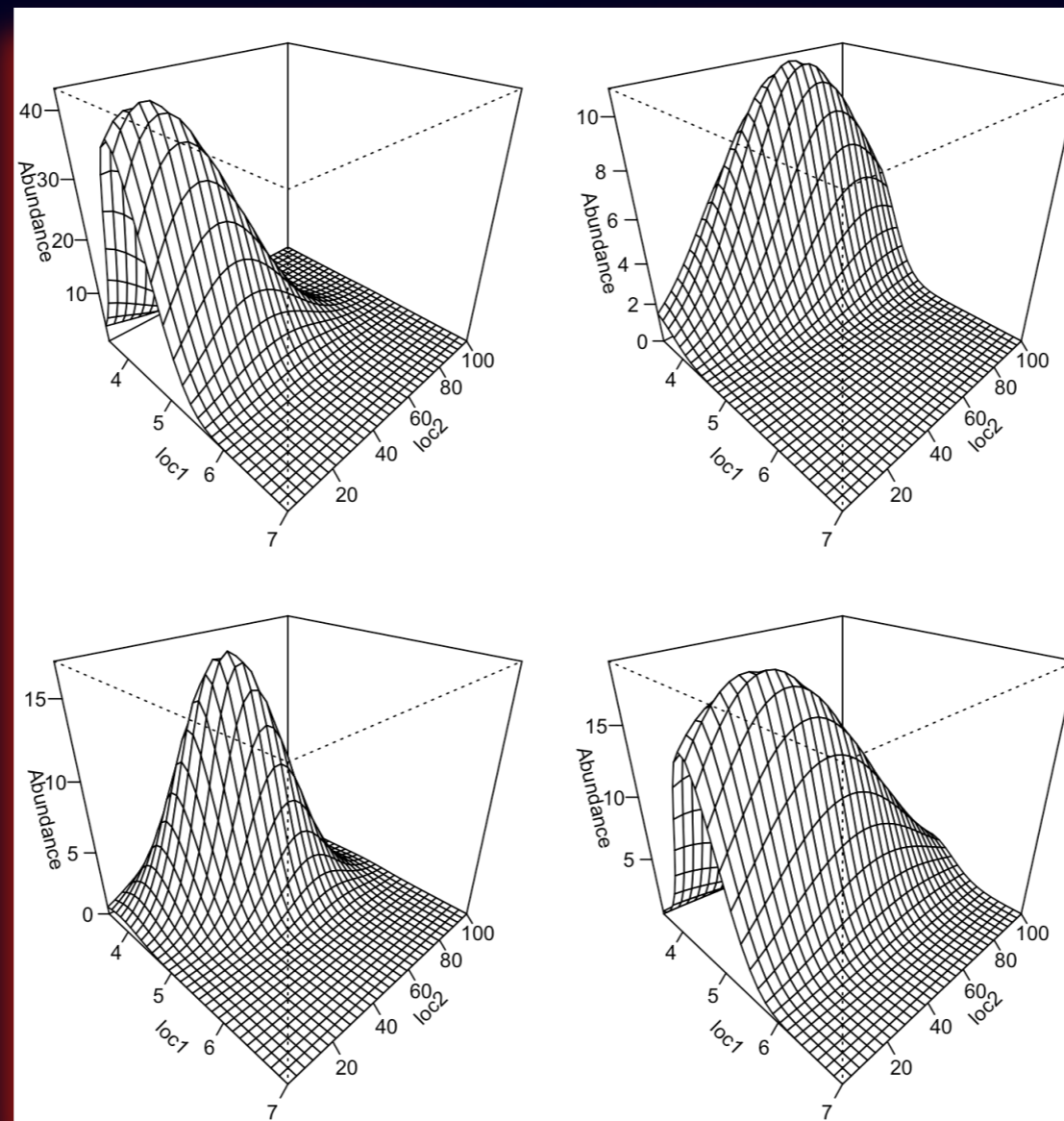
Coenoclines

- A coenocline is a visual representation of all species response functions combined along a single gradient.
- Given the large number of species and the high noise in most studies, coenoclines are usually only displayed in highly simplified form. Nevertheless, they are useful heuristic concepts.



Coenoplanes

- Coenoplanes are coenoclines extended to two dimensions (2 environmental gradients).



{coenocliner}

- Please study the functionality of the package {coenocliner} and make sure to know how to simulate your own sets of species distributions:
 - <https://fromthebottomoftheheap.net/2014/07/31/simulating-species-abundance-data-with-the-coenocliner-package/>
 - Simpson, G. L. (2016). coenocliner: a coenocline simulation package for R.

Coenospaces

- Coenospaces (>2 gradients) are even more difficult to display. However, an ordination biplot (discussed later) is an abstracted depiction of coenospace.
- We use ordinations to analyse such landscapes.