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Disentangling the environment and representing vegetation science

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Editors' Award 2005

Each year, the Chief Editors of *J. Veg. Sci.* choose a paper to exemplify one type of paper they are keen to publish, and to give credit to the authors. For 2005, it is Désilets & Houle (2005).

The existence of the species-area curve is probably the oldest observation in community ecology, often dated back to Humboldt & Bonpland (1807). In the past ca. 200 years it has been observed so often that it has been called ecology's only law. Yet we still do not know which of the main causes, sampling or environmental heterogeneity, is the more important, and we know little of how the species-area relation varies among ecological situations. Désilets & Houle sampled 70 plots, each with nested subplots, across gradients of the supply and heterogeneity of five resource/environmental factors. The factors were inter-correlated, so their relative importance was determined by path analysis. The authors concluded that the over-riding factor near the river was disturbance – flooding filtered the pool of species to those able to tolerate it – but resource availability was high there, enabling the tolerant species to dominate the community.

The great problem in field ecology is that every environmental factor is correlated with others, but Désilets & Houle showed how they can be disentangled.

The scope of the journal

Some readers have asked whether *J. Veg. Sci.* is still open to all approaches in vegetation science. Of course, so long as good quality manuscripts are submitted. The scope of *J. Veg. Sci.*, stated on the inside front cover and www.opuluspress.se, is: "all aspects of vegetation science, with particular emphasis on papers that develop new concepts or methods, test theory, identify general patterns, or that are otherwise likely to interest a broad readership."

The latter phrase is the crunch when we are evaluating a manuscripts: will it interest a broad readership? The 'scope' continues:

"Papers may focus on any aspect of vegetation science including *theory*, *methodology*, *spatial patterns* (including plant geography and landscape ecology), *temporal changes* (including palaeoecology and demography), *processes* (including ecophysiology), and *description of ecological communities* (by phytosociological or other methods), provided the focus is on increasing our understanding of plant communities."

Those categories were all represented in 2005.

Theory

Perhaps the most basic theory in vegetation science is the climatic climax of Clements (1916), that vegetation progresses to a state that is determined by the climate. Bond (2005) calls this the 'Green-world' theory, and questions it. He suggests that large areas of the world are Brown (i.e. controlled by herbivory) or Black (i.e. controlled by fire).

Methodology

When one of us (JBW) was a Ph.D. student a couple of years ago he read in an M.Sc. thesis: "The roots were divided into two categories, white roots and non-white roots. It has been possible to make this distinction by taking into account the colour of the roots". Well, yes. But that's all one could do. Now Moore & Field (2005) have shown that it is possible to identify roots to species level by using DNA sequences. This promises to be a very valuable method.

A very different problem has been how to measure functional diversity, fulfilling the validity criteria of Mason et al. (2003), but across several characters simultaneously. Botta-Dukát (2005) produced the first solution for this problem, an important one today when there is so much discussion of functional diversity.

Spatial patterns

Often, small-scale spatial patterns are just described, and a possible cause speculated. Druckenbrod (2005) went a step further by using a process-based model to predict the pattern of individual trees, and showed that the actual pattern was very similar to that predicted by the model.

Temporal changes

After decades when space-for-time-substitution dominated studies of 'temporal' changes, interspersed by polemics from Egler (e.g. 1977), many long-term records of actual vegetation change are emerging. In the study of Mark & Wilson (2005) the records were made over 50 years by one observer. Alan Mark set up a low-alpine plot in when he was an M.Sc. student, and, now retired, is still following it. Unlike many studies, the vegetation was not recovering from a disturbance when recording started, nor was there any major disturbance during the 50 years. The study of Clarke et al. (2005) also has a long record, made by one person, but in very different semi-arid vegetation.

We would welcome more manuscripts in palaeo-ecology, and have recently appointed a specialist in this field, Stephen Jackson, as an Associate Editor.

Processes

It has been hypothesized that the ability to respond plastically to changes in resource levels is a key component of the invasion ability of exotic species: a hot topic. Hatswell & Panetta (2005) determined plasticity experimentally and compared it with invasion ability. They found no correlation. Bellingham et al. (2005) examined the other side of the coin: the effect of invaders on the rest of the community. Liancourt et al. (2005) represents physiology *sensu lato*, but we welcome hard-core ecophysiology, as with demography, when it increases our understanding not just of one species but of the whole community.

Description

We were privileged to publish the circumpolar vegetation map by Walker et al. (2005). To be frank, the attraction for many readers will be the area: places around the Arctic Circle that they will never visit themselves, but would love to read about. The survey was based mainly on studies using the Braun-Blanquet method, for uniformity. There is often a problem in presenting such broad phytosociological surveys because of the length of the text. *Phytocoenologia* is also a journal of IAVS, and has accepted longer papers. However, the approach of Walker et al. was to present a 16-page paper (we are happy to allow 16 pages for a really important contribution), and place all the details in two electronic archives. Duarte et al. (2005) used an electronic appendix in the same way. Their study was of one Cape Verde island: a very limited area but one we felt would be of interest to a broad readership, and the study was careful in its methods, for example placing the plots by restricted randomization.

However, the main activity in phytosociology has been the development of methods. Those outside the field often assume that phytosociological methods remain in the 1930s. On the contrary, phytosociologists now use fixed-area samples, and use methods such as cluster analysis as the basis for their groupings. Stratified random or other types of formalised placement of relevés are common. *J. Veg. Sci.* was pleased to be at the forefront of developments in 2005. Podani (2005) examines which of the multivariate methods that are normally used with data collected on ordinal cover-abundance scales (e.g. the Braun-Blanquet +1-5 scale) are valid for such data, and concludes that basically none are. He advocates and invents valid methods, and names a computer program that includes them. Podani's paper is a major contribution to phytosociology, and we hope it will be widely read and put into practice.

Phytosociological studies often deliberately bias the sampling to ensure rare habitats are included, but this thwarts attempts such as that of Walker et al. (2005) to synthesise disparate phytosociological data sets. Knollová et al. (2005) recommend methods for overcoming this problem. When community types / associations have already been defined, there is frequently a need to assign a newly-sampled plot to one of them. For the British National Vegetation Classification, programs Tablefit and Match are used; they are based on quite intuitive, if simple, methods. Černá & Chytrý (2005) explored the use of artificial neural networks for the purpose, and found them very satisfactory, even when few diagnostic species were present.

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