stood by the Braun Blanquet (Zurich-Montpellier) school. Most of the papers present a synopsis of higher syntaxa (classes, orders, alliances) in the classification of vegetation in Europe. According to Rodwell *et al.*, who wrote the introduction to this work, the main interest of such contributions lies in the fact that they provide necessary structure for the multitude of more detailed studies that abound in the literature.

In the first paper, Mucina presents a repertoire of classes of vegetation in Europe, indicating the correct names according to the nomenclatural Code for phytosociology (Barkman *et al.* 1986). A list of synonyms and the list of characteristic species is also given. The working committee on the classification of European vegetation has adopted this repertoire as the framework for establishing a system of alliances. One of the first attempts in this regard is presented in the book by Valachovic et al. who make a tentative classification of the orders and alliances of the class *Thlaspieta rotundifolii*.

Another group of papers comes from European countries such as Great Britain, the former Soviet Union, Scandinavia and Greece where there is less research going on in phytosociology, or where different methods have been employed. Diekman, for instance, talks of the problems of classification of alliances in Sweden. Dimopoulos et al. present a study of the vegetation of rock barrens in Greece.

A third group consists of studies from countries with a long history of phytosociologcal research. Here the great quantity of disparate infomation that has accumulated is in need of revsion and harmonisation to bring it up to date with current nomenclature and syntaxonomy. Examples of this were presented by Carni who studied the vegetation of forest edges in Slovenia, by Chytry on the thermophile Oak forests of the Czek Republic, by Punz & Mucina on the vegetation on metaliferous soils of the Eastern Alpes, by Loidi *et al.* on the barrens of northern Spain, and by Grebner on the calcareous turf-meadows of the Northeastern Alpes

Of particular interest to Canadian readers are the classes of vegetation that also pertain to North America. This concerns mostly special vegetation types such as aquatic vegetation (*Lemnetea, Ruppietea, Zosteretea*), bogs (*Oxycocco-Sphagnetea*), coastal vegetation (*Cakiletea, Ammophiletea*), arctic-alpine vegetation (*Loiseleurio-Vaccinietea, Salicetea herbaceae, Juncetea trifidi*), but also synanthropic vegetation (*Epilobietea angustifolii*), and boreal forests (*Vaccinio-Piceetea*). As for the situation in Québec, the numerous studies in phytosociology that have been done here should be synthesized and brought into accordance with the nomenclature of the Code as has been done with the forest vegetation of the Eastern Townships by Ansseau & Grandtner (1986, 1988). The similiarity with problems in Europe is quite obvious in view of the fact that most of the phytosociological work done in Québec has been done using the Braun-Blanquet method. In this sense, this book

could be very useful. The cost of 300 Swedish Crowns is, however, quite prohibative.

Translation, **Stuart Hay,** IRBV, Universtité de Montréal

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Plant Functional Types:
their relevance to ecosystems
properties and global change
(International Geosphere-Biosphere Programme Book Series 1)
by T.M. Smith,
H.H. Shugart & F.I. Woodward
Cambridge University Press
New York, 1997
[US $ 80,00 (hardback)
US $ 44,95 (paperback)]

It is human nature to classify. Linnaeus, for example, provided us with the highly efficient binomial system. Using this universally accepted system of organisation we know that there are approximately 260,000 plant species on Earth. Yet, species are going extinct, mainly due to human-induced habitat destruction, apparently at a higher rate than at any time in the geological record. We are also not sure what affect global climate change will have on future plant distribution patters, and resulting ecosystem properties. Therefore, 260,000 becomes a prohibitive number when it comes to investigating the environmental and biotic effects facing each and every plant. We do not have the time or money to conduct demographic, autecological studies on every plant species. The challenge facing ecologists then is to simplify the problem by effectively grouping plants into broad categories (functional types), which would allow for the development of predictive models. This book is therefore a much needed compilation, with the objective of introducing the concept of functional types and illustrating a number of different approaches.

Plant Functional Types is 369 pages long, includes eighteen chapters and is broken down into five parts: (1) history; (2) theory; (3) local application; (4) global application; and, (5) consequences and limitations. The wide variety of opinions expressed in this book reflects some of the confusion and disagreement surrounding the issue of plant functional types. Some researchers (e.g. Shugart, Ch2; Woodward and Kelly, Ch3; Walker, Ch5; Scholes et al., Ch13) advocate a top-down, environment-driven approach to functional grouping. The sort of information required is the range of plants along environmental gradients. Other researchers (e.g. Gitay and Noble, Ch1; Westoby and Leishman, Ch6; Grime et al. Ch7; Bond, Ch9) pre-

fer a bottom-up, plant-trait driven approach. Some are very sophisticated (e.g. Grime et al.), but can also be time-consuming.

The primary objective, or basic utility, of developing functional groups is prediction. Can we predict and model the outcome of an environmental event (e.g. drought) on a plant community using functional types? This book gives us several good examples which indicate that this is possible in some environments at both the small scale (e.g. Grime et al., Scholes et al.) and the large scale (e.g. Cramer, Leemans)

A general consensus among the contributors was that the final functional grouping must depend on the question. For example, Bond (Ch9), working in the Cape fynbos, noted that despite fynbos having the highest diversity per unit area in the world (Table 9.1), the species could be grouped within the same functional type. In other words, there is a lot of redundancy. A severe loss in biodiversity might therefore have little effect on the representation of functional types in the landscape, and possibly little effect on ecosystem function. Mooney (Ch17) discusses the possible implications of loss of biodiversity to ecosystem function. A similar example is shown by Lauenroth *et al.* (Ch12). In this case, although two graminoids in semi-arid environments could be grouped into the same functional type, their differences are large enough to cause ecosystem function to differ significantly depending on relative dominance. Smith (Ch16) presents models which simulate similar limitations of aggregating species into functional categories.

Overall, this is an important book for all plant ecologists, whether student, researcher, professor or land manager. It is difficult for such a wide ranging collection of papers from researchers around the world to maintain a balanced and thorough coverage. Some vegetation types (e.g. semi-arid grasslands) were much better represented than others (e.g. wetlands). However, I recommend it for the simple reason that it pulls together much of the current thinking on plant functional types (a somewhat neglected field in the recent past). Even though I disagreed with some of the methods and ideas presented, this book presents the breadth of the field and the associated problems. The disparate views highlight future work needed. In particular, it will be necessary to compare the spectrum of functional types in local floras in various parts of the world. I would also like to see a universal framework from which we can develop functional types, along the lines of Linnaeus' binomial system. The reward is potentially enormous. As Walker (Ch5) states "a complete, global analysis of plant functional types would be analogous to the periodic classification of the elements".

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Indicator Plant Species in Canadian Forests
Plantes indicatrices des forêts canadiennes
by G.S. Ringius and R.A. Sims
Natural Resources Canada,
Canadian Forest Service
(Cdn $ 19,95; hardback $ 39,95)

This book, simultaneously published in English and in French, was produced under supervision of the steering committee of the Ecological Land Classification of the Canadian Forest Service. Funding for this effort was provided by the federal Green Plan (le Plan vert fédéral). It is great to see a tangible product of this plan available to the public, as its funds were mainly allocated to the projects of federal government scientists. The English version of this book is distributed by UBC Press, whereas the French version is distributed by Les Presses de l'Université Laval.

The concept of indicator plants is not new, but the authors begin their introduction with the statement that "Forest resource managers in Canada are just beginning to recognize the value of many forest floor and understory plant species for assessing forest site quality". The rationale for using indicator plant species is that direct analyses of site quality are time consuming and expensive (ex. soil analyses, soil moisture measurements), whereas recording the presence of indicator plant species is relatively easy. Furthermore, an indicator plant species integrates the various factors conducive of site productivity over at least an entire growing season. In this respect the information it yields may often be superior to that of one-time samples, particularly in the case of soil nitrogen and soil moisture. Nevertheless, one hopes that the indicator value of each indicator species has been tested through some of these direct ecological factor measurements, however imperfect some may be. Anecdotal evidence will not suffice if forest management activities, aimed at some future economic gain, are to be directed in part by the use of indicator plant species. Fortunately, the book is based on recent research that has correlated field measured ecological variables to plant species occurrence and abundance.

The English and French versions of this book are small in format (18 cm x 15 cm, 217 pages), which makes them easy to carry around in the field. Each species included in the book is described over two facing pages. The text is divided into several sections, covering the ecology of the species (Indicator Value/Significance to Forest Management; Distribution and Habitat), its botanical description and notes on known cultural or wildlife uses (including edibility or toxicity). The text is clear and informative, and free of superfluous jargon (a glossary defines some basic terms). The line drawing illustrations are excellent, and convey more information than the colour pho-