without further explanation be spared the terms "restriction enzymes" and "microsatellites" (while being informed about them in detail), and require the following explanation of the centrifugation of cells lysed in detergent: "the soapy dead bacteria were put through something like a carnival joy ride, a centrifuge, which spun them around at high speed, so that the heavier things flew to the outside end of the test tube"? Most potential readers that come to my mind, including professional plant evolutionary biologists who would greatly appreciate a compendium of the relevant data from outside their specialty will be put off by this haplessly prettified version of genome evolution.

What the author has to say is important and timely, and there are places in this book where she comes near to making points that may be new and worthwhile to know for evolutionary biologists. However, the author is a molecular, not an evolutionary biologist, and that makes it difficult to separate traditional misunderstandings from trenchant new insights. Take the loss or gain of a capsule by *Neisseria meningitidis* (misspelled in this book) due to the loss or gain of a single C in a string of 7 Cs in the genome: "It is as if you could vary the bottom half of your body to optimize your experiences during a day in a lake-side village". How you would do this is described in some detail, but it would be unfair to reveal it here. Unfortunately, the comparison is dangerously misleading. If you would try to imitate *Neisseria*, you would not optimize anything. You and everybody in the lakeside village with a bottom half that doesn't measure up to the optimal experiences would be executed. Natural selection is not evaded by mechanisms generating potentially adaptive variation; if anything, it acts harder and faster. Lynn Helena Caporale falls into a very common trap by missing the difference between the individual organism and information in the collective genomes of the population. Strangely, she does not do this when she reports facts, but as she generates a veil of ambiguity when she interprets these facts for the reader. "Within 18 hours, a single well-fed *E. coli* could divide to be your size and shake your hand". Cute, but beyond the point. This kind of writing leaves us at times to guess what a paragraph is about. Mitochondria, for instance, are mentioned once on p.83 in passing to help promote the idea of cooperation. Not entirely wrong, aside from the fact that they seem to be temporarily confused with chloroplasts ("the good cousin thrives in the sunlight"). There is no mention of the tug of war between nuclear and mitochondrial genomes, but I am confident that the author could sell us a protection racket as a commendable way to maximize the inclusive fitness of victim and perpetrator.

All of this, undoubtedly, is well meant. However, it does not require all this fluff to get the basic idea across to the interested lay public. If anything, listing all that detail may become confusing. Readers who can follow and use the detailed information certainly would prefer it straight with the appropriate technical terms to connect with the relevant literature. Either kind of reader may well experience the style of this book as patronizing. The author has missed a chance to present some very important but insufficiently appreciated information from molecular biology to evolutionary biologists by trying to assimilate the data herself into a homemade view of evolution and to sell this to the general public.

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Körner C., Spehn E. M. (eds.): Mountain biodiversity. A global assessment. 53 tabs., 114 figs., 366 pp. Parthenon Publishing Group, New York, London, 2002. Softcover EUR 78,89, US$ 79.95. ISBN 1842140914.

Do you often go to your library just to browse through the new books? Some of them usually

have quite appealing titles. Thus, you take one or the other from the shelf to have a glance through the pages. Then you realise that it is one of the numerous proceedings volumes recently published, bringing together authors of different backgrounds and proficiencies with chapters of differing quality on varying topics. How do you react? Frankly speaking, many of us might mutter something along the following lines of, ''Hmm, another proceeding volume; we already have hundreds of them! One does not usually publish one's best data in a proceedings volume, so who is going to read it? On the other hand, there might be some real 'pearls' among the pages''. Hence, according to the attractiveness of the volume (title, author names and maybe the cover), you either put the book back to the shelf or you take it with you on loan.

Mountain Biodiversity is another proceedings volume and one that certainly attracted me. It compiles contributions from the First International Conference on Mountain Biodiversity of the Global Mountain Biodiversity Assessment initiative (GMBA) held in the year 2000 in Switzerland. The 28 chapters report on and review research carried out in about two thirds of the most important mountain systems of the world (Fig. 28.1 on p. 329). The book's title is its program: mountain biodiversity – a global assessment, or, in one of the editors' words, ''this volume deals with the biological richness, its function and change at the cool, high elevation end of the biosphere'' (p. vii). Hence, the reader should not expect a comprehensive compilation of the species richness in the mountain regions of the world. In fact, those interested in the latter would be disappointed by the book (despite its title!). Instead, diverse aspects of mountain biodiversity in a broad sense are treated. This is reflected in the arrangement of the book into five parts: (1) Introduction (one chapter); (2) How Much Mountain Biodiversity Is There and Why? (15 chapters); (3) Climatic Changes and Mountain Biodiversity (six chapters); (4) Mountain Biodiversity, Land Use and Conservation; (5) Synthesis (one chapter).

The volume starts with a drumbeat, i.e. the introductory, review-like chapter by Christian Körner, who is the renowned author of *the* current book on alpine plant life (Körner 1999). Körner treats the richness of high elevation biota in general and describes its causes and function. In so doing, the co-editor mainly refers to the 'insurance hypothesis', stating that functional redundancy might preserve ecosystem functioning and stability. Körner clearly states that this is more of a plausible line of reasoning than a proven fact. Socio-economic relationships are referred to as well. Körner stresses how lowland societies depend on upland societies (and vice versa), e.g. with respect to water and energy supply, prevention of flooding and erosion or traffic routes. Finally, the current knowledge of the effects of atmospheric change on mountain biodiversity is briefly summarised. As usual, Körner's text is stimulating and thought-provoking. My take-home message from this first chapter was that we do not know an awful lot about the function of biodiversity in mountain regions and that it is too early for general conclusions. However, there were also some details with which I didn't quite agree. For instance, on page 9, it is stated that polyploidy and a high degree of self-incompatibility would create high genetic variation in alpine biota. For references, the reader is either referred to Körner's own textbook (Körner 1999) or to the second chapter of *Mountain Biodiversity* on genetic diversity of alpine plants (see below). However, both subjects are not really treated in Chapter 2, and Körner (1999) contradictorily mentions that the level of polyploidy in alpine and in lowland plants is equal. Mulling it over, I could not come up with any published data that would generally support the above statement on self-incompatibility and polyploidy. Hence, this could be a good focus for future research, and I conclude that this is what Christian Körner and Eva Spehn wanted to get across with the edition of this volume: go out to the field and do the studies (cf. p. 330)!

Chapter 2 (by Irène Till-Bottraud and Myriam Gaudeul) deals with the genetic

diversity of alpine plants. First, the authors explain the difference between neutral genetic diversity measured by molecular markers such as isozymes or RAPDs and the evolutionary and selectively active genetic diversity as identified by quantitative traits. Most studies on genetic diversity in mountain plants so far only measure neutral molecular markers, because quantitative genetics is rather time-consuming. I appreciated this clear statement. However, the authors somehow forgot to stress that it is only neutral variation that can be used to investigate many of the key biological processes such as gene flow or mating patterns. What follows is a short introduction to population genetics and a review of the few studies available on genetic variation in alpine plants. In summary, genetic variation in alpine plants seems to be similar to that of lowland plants, and species-specific life history traits clearly influence the genetic variation in alpine plants just as they do in lowland species. Nevertheless, more specific studies are needed to disentangle the various effects of biotic and abiotic factors. I agreed with most of the authors' conclusions, but I was surprised to see that some recent key references from North America and Europe (e.g. on *Campanula rotundifolia* or *Eritrichium nanum*) were missing (although literature up to the year 2002 was included) and that other references included in the chapter clearly did not refer to alpine populations (e.g. in the case of *Gentianella germanica* or *Pinus sylvestris*). Additionally, I do not agree with several details, and in particular, with the authors rather negative view on phylogeography (p. 29). In contrast to what the authors state, most phylogeographic studies use molecular data to provide independent tests of biogeographical hypotheses, which are based on geology, geomorphology, paleo-environmental and -climatic evidence or on areas of high species richness or endemism. The great virtue of phylogeography is that it has brought back to broader recognition the simple fact that present-day patterns are the result of historic processes in space *and* time.

The next eleven Chapters (3 through 13) deal with the diversity of vascular plants at various spatial scales in mountain forests, at timberline or in the alpine belt of the Andes, Rocky Mountains, European mountains, several mountain systems of Central Asia and Siberia, Madagascar and Australia using diverse techniques from plot sampling to remote sensing. These chapters mainly represent case studies, but most authors evaluate their data with a will to come up with general conclusions. One recurring theme is the different size of plant species pools on siliceous and calcareous bedrock. Many of the chapter authors also stress the importance of human impact on mountain biodiversity. For instance, it is interesting, but somehow also frightening, to learn that a historical timberline depression due to human management is not at all a feature found only in European mountains, but that it has also occurred, e.g., in the Andes (Chapter 5 by Michael Kessler) or in Madagascar (Chapter 13 by Urs Bloesch et al.). While many of the studies had to deal with rather incomplete data sets for obvious reasons (e.g. Chapter 10 by Bernhard Dickoré and Georg Miehe), it is nevertheless surprising that even in the floristically well investigated European mountains the application of modern statistical analyses (e.g. Chapter 8 by Thomas Wohlgemuth) could result in new views on well-known biogeographic relationships. For instance, in Chapter 7, Risto Virtanen et al. describe the well established negative correlation between vascular plant diversity in mountain regions with increasing latitude. However, they found opposite trends in mountain bryophytes and macrolichens. In fact, the latter trends were even stronger than the former. As an explanation, the authors refer to insufficient census effort, but, disappointingly, did not speculate about an underlying biological pattern. While reading through these chapters, I was somehow disappointed by several 'just-so' statements on the evolution of plant species diversity. Is it correct that alpine species generally have small, fragmented (isolated?) populations subject to local differentiation and

speciation (p.67)? Chapter 2 of the volume on the genetic variation in alpine plants contradicts this statement.

The next chapters report on two of the very few animal studies included in the book. In Chapter 14, Rüdiger Kaufmann and Corinna Raffl give a detailed description of the local succession of invertebrate communities on a glacier foreland in the European Alps. They compare this invertebrate diversity with the successional changes of plant diversity at different functional and taxonomic levels. Finally, Cynthia Beall (Chapter 16) gives a somewhat exotic, but interesting overview on studies of haemoglobin concentration and reproduction in human populations at high altitudes, reminding us of the fact that about 400 million people live at altitudes above 1500 m.

Chapters 17 through 22 deal with climate change and mountain biodiversity and Chapters 23 and 24 with land use changes in Ethiopia and Venezuela. Again, the diversity of subjects and organisms treated is substantial, from small-scale elevational shifts of species in the alpine-nival belt of the European Alps, and mammals and birds in Australia's Snowy Mountains, to medicinal plants in India. Nevertheless, it was this part of the book about which I had an ambiguous feeling. I really enjoyed some of the chapters, but found others limited in their conceptual framework, content and scope, as well as with respect to the methods and statistics used. I also question the value of extremely detailed, but essentially non-replicated (not to say pseudo-replicated) approaches.

In the next three Chapters (25 through 27), Lawrence Hamilton, Douglas Williamson and Manab Chakroborty discuss, in a general way, the importance of protected areas and the application of different conservation strategies for the preservation of mountain biodiversity. However, many of the basic ideas, concepts or findings are not specific to mountain areas and had not been evaluated or adjusted to specific situations at high elevations. Is this surprising? Probably not. The ways in which human society can react and operate are quite limited, irrespective of whether this refers to lowlands or uplands. In the end, it is politics anyway. Chakrobortry therefore identifies the unwillingness of key agencies responsible for land use, agriculture, forestry, mining, transportation or energy supply to address the politically difficult trade-off, which will result if current rates of biodiversity loss are to be reduced, as one of the major obstacles to the protection to mountain biodiversity (p. 320). I found it intriguing that forestry was hardly mentioned as a potentially sustainable form of long-term human land use in mountain regions.

The book concludes with a synthesis by the two editors and a co-author (Chapter 28 by Eva Spehn et al.). The authors first give a short general overview on different topics treated in the proceedings volume such as the function of biodiversity or genetic variation, then proceed with region-specific short summaries of biodiversity, and, finally, discuss aspects of global change and conservation. Their concluding remarks could be abstracted as: a better knowledge of the global biodiversity in mountain regions and of its function is needed.

To sum up, I found the book well edited by Christian Körner and Eva Spehn (maybe with the exception of some figures and several table and figure legends). Having read the book from cover to cover and coming back to the question of whether one should put this proceedings volume back to the shelf in the library or whether it is worth it to carry it along to one's own office, I would suggest that all researchers interested in mountain biodiversity, be it genetics, evolution, species and habitat richness or their functions and especially those interested in alpine plants should of course have a closer look at the volume to see if they might find something of interest to them. I certainly did.

Reference

Körner C (1999) Alpine plant life. Springer, Berlin.

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