

BOOK REVIEW

The Vegetation of the Subantarctic Islands Marion and Prince Edward by N. J. M. Gremmen. Geobotany Series, Vol. 3. Dr W. Junk Publishers, The Hague, 1982. 149 pp. Dfl 110 (about £23.50).

During the past ten to fifteen years there has been an increasing awareness of the importance of the biota of the Antarctic and sub-Antarctic biomes, their biology, trophic interrelationships and survival strategies. On the island of South Georgia and on Marion Island, terrestrial biological investigations are now concerned mainly with ecosystem processes and research is organized as a series of integrated projects. However, until the publication of Dr Gremmen's book, no in-depth treatment of the plant communities of any sub-Antarctic island had been published.

Gremmen's monograph is the result of two 8-month visits to Marion Island and a 1-week visit to Prince Edward Island. These islands form a sub-Antarctic archipelago of recent volcanic origin, situated in the south Indian Ocean. The book is the published version of a doctoral thesis submitted to the University of Nijmegen. The aim of the study was to apply the methods of the Braun-Blanquet phytosociological approach to provide a detailed assessment and ecological account of the islands' plant communities and to arrange these into a hierarchical classification which will serve as a basis for further scientific research on the islands. It is a major contribution to the Marion Island Bioenergetics and Mineral Cycling Programme.

The book provides valuable background information on the environment, human influence and phytogeography of the islands (33 pages). There is a brief chapter on methodology (5 pages) followed by the plant community descriptions (73 pages) and there is a disappointingly short (4 pages) chapter on the ecology of community distributions and concluding remarks, but an overall discussion is lacking. There are 257 references cited, 63 figures, of which 32 are black and white photographs, 32 tables and a further six as appendices. However, it would have been useful to include a summary of past botanical research leading up to the present study. The first detailed ecological account of the vegetation of these islands was provided by B. J. Huntley over a decade ago. While this must have served as a valuable foundation on which to develop his intensive phytosociological study, Gremmen rarely makes any mention of or cross-reference to Huntley's work.

A total of 510 quadrats (relevés) was analysed in a wide range of vegetation types, mainly within a few kilometres of the research station. The selection of quadrat sizes ranging from 10 to 0.1 m², depending on the structure and floristic complexity of the community and determined by the controversial minimum area concept, may be questionable. The phytosociological tables are classified according to the traditional and somewhat unwieldy syntaxonomic hierarchical system, the first serious attempt to do so comprehensively and in detail for any southern polar region. The fundamental vegetation unit is the association. Each is defined by its characteristic species combination, including one or more character and differential species, as well as companions with high frequency of occurrence and each of which is clearly different structurally and/or ecologically from related vegetation units. Where such units are floristically, structurally and ecologically similar but distinguished by different character-species, they are ranked as subassociations. The naming and typification of the associations and subassociations follows the international code of phytosociological nomenclature and all the communities identified are described for the first time. The results of this study revealed, somewhat unexpectedly, that the Braun-Blanquet method of classification may be successfully applied to a floristically

impoverished vegetation in which many species have a wide ecological amplitude. However, this vegetation possesses sufficient variation to allow the detection of a large number of communities clearly differentiated floristically, the distribution of which can generally be related to environmental factors.

The vegetation units are grouped into community-complexes, each comprising a number of floristically related communities and differentiated from other complexes by one or more character-taxa which are used to derive the name of the complex. Each complex is ecologically significant and comprises communities of related environmental features. Forty-one plant communities ranked as associations or subassociations are distinguished and described in detail. These are grouped into six complexes:

1. The *Crassula moschata* complex restricted to coastal areas strongly affected by salt-spray.
2. The *Callitriche antarctica*–*Poa cookii* complex occurring in coastal areas strongly influenced by trampling and manuring by marine animals.
3. The *Acaena magellanica*–*Brachythecium* complex of springs, flushes, drainage lines and stream margins.
4. The *Juncus scheuchzerioides*–*Blepharidophyllum densifolium* complex, with a predominance of bryophytes, forming mires with deep peat accumulation in poorly-drained lowland areas.
5. The *Blechnum penna-marina* complex occurring on well-drained, relatively sheltered slopes with a thin layer of peat overlying deposits of clay.
6. The *Andreaea*–*Racomitrium crispulum* complex comprising open fjældmark communities on dry, exposed, mineral substrata and often dominated by hard cushions of *Azorella selago* and cryptogams.

Each complex description is followed by a section the synchorology of these or closely related communities elsewhere in the sub-Antarctic and southern cool temperate biomes. A striking feature of the Marion and Prince Edward Islands plant communities, according to the species lists and accounts, is the relative insignificance of lichens. Although 50 taxa are recorded from the islands, only seven are referred to, besides a general category of 'crustose lichens'. Presumably there are several bryophyte- and lichen-dominated communities in which vascular plants are scarce or absent and comprising one or more cryptogamic complexes, as on other sub-Antarctic islands, but which have not been investigated in this study.

The principal factor determining the composition and distribution of plant communities on the islands is the water regime in the soil, notably the amount of water available and the degree of lateral water movement which has a marked effect on nutrient availability to the plants. A large number of the associations and subassociations are distributed along the wet–dry gradient and often along corresponding organic–mineral soil and sheltered–exposed gradients, although these trends are not treated objectively.

The account is clearly written and well documented, although there are numerous spelling and grammatical errors which should have been detected by the editor. While amply illustrated, the black-and-white photographs unfortunately have rather too much contrast and sometimes lack sharpness. The community structure diagrams add little to the vegetation descriptions and diagrams illustrating the distribution of community types along environmental gradients, supplemented with edaphic or other data would have been of greater value. The title is perhaps slightly misleading as the book is almost entirely concerned with a description of the plant communities and their classification, while pattern, succession, zonation, ecological

gradients and other aspects of vegetation dynamics have not been investigated quantitatively and are seldom mentioned. The author states that tabulation of the data was largely achieved manually but that specific computer programs were also used to classify and ordinate the data. If objective procedures were employed to arrange the relevé data into the various association and subassociation divisions with the vegetation complexes this is not discussed and no statistically ordinated data are presented.

Despite its various shortcomings, this is an extremely comprehensive and authoritative account of the plant communities of a little-known, but biologically important, part of the world. It will prove invaluable to all research investigations of the biota and environment of Marion and Prince Edward Islands and also to related research on other sub-Antarctic islands. Hopefully it will set a precedent for similar phytosociological investigations elsewhere in the biome.

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REFERENCE

- HUNTLEY, B. J. 1971. Vegetation. (In ZINDEREN BAKKER, E. M. VAN, WINTERBOTTOM, J. M. and DYER, R. A. eds. *Marion and Prince Edward Islands*. Cape Town, A. A. Balkema, 98-160.)