tion to apply here"; and a rehash of information presented in the other papers, e.g. on climatic and other physical characteristics of the environment and on man's physiological adaptation to altitude. These factors make the paper difficult to read and are likely to result in its being ignored and/or to reflect negatively upon social scientists. If interest can be sustained, however, the reader will learn that native people suffer severe cultural and physical harm as they experience the effects of competition from those at lower elevations.

Technically, the book has been inexpensively produced by photo-offset from a size-reduced typed manuscript with difficult-to-read, uneven line lengths. Use of a word-processor would have obviated this problem. There are very few typos or other annoying errors except for the use of "rather unique," about which I have a pet peeve.

Although the book focuses on alpine geoecology, many of the ideas are equally relevant for arctic environments, since both are areas of environmental stress and their human occupation tends to be marginal. Hence those interested in these environments will find a number of worthwhile items. Despite the shortcomings, the material should prove worthwhile to laypersons, politicians, and academicians interested in this important part of our planet. Its contents complement existing books and articles by providing comprehensive overviews together with some new material in a readily accessible volume.

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RECENT TREE-LIMIT DYNAMICS OF SCOTS PINE *(Pinus sylvestris L.)* IN THE SOUTHERN SWEDISH SCANDES. By LEIF KULLMAN. Umeå, Sweden: University of Umeå Department of Ecological Botany, 1981. Wahlenbergia, Scripta Botanica Umensia, Vol. 8. 67 p., 37 figs., 24 tab. Sv.Kr.45.00.

Since the beginning of this century, many Scandinavian and Finnish naturalists have been interested in evaluating the influence of climate on biota. This preoccupation has not been confined to purely academic purposes, but often has arisen from a need to understand properly the historical and present state of the northern environment, in order that socioeconomic activities may fit in more harmoniously. In many northern European studies, one can find reports of this unceasing battle against Nature, in terms of dramatic events experienced by local populations. Northern lands are very susceptible to climatic change and to short-term climatic variability, and in that connection Kullman's study is most welcome.

In this booklet, Kullman has evaluated recent displacements of the Scots pine *(Pinus sylvestris L.)* tree-limit in the southern Swedish Scandes, located in west-central Sweden. The objective of his study was to measure the changing position of the pine tree-limit during the 1915-1975 period (within the now well-established short interval of worldwide climatic warming) and to correlate it with climate. Although it would have been worthwhile to include the entire span of the warming episode, Kullman restricted his analysis to a 60-year period, probably the most important segment, because he had access to a set of data collected at the beginning of the century. Kullman revisited mountain sites where early ecologists had recorded the altitude of the uppermost birches *(Betula pubescens* Ehrh. s.l.) and had noted where the pines formed the tree-limit in 1915.

Kullman has defined the pine tree-limit as the altitude above sea level of the uppermost pine of at least 2 m in height. The exact position of the pine tree-limit is relative to the location of pines at least 85 years old. Kullman writes that if the tree-limit is occupied by a pine more than 85 years old, then no change in the position of the tree-limit occurred between 1915 and 1975. This inference is based on tree-growth data indicating that a pine takes about 25 years to reach a height of 2 m.

The main conclusions of Kullman's study are that: (1) the pine tree-limit rose by a mean value of 30 m at 53% of the sites (mainly SSE to SW sites), particularly during the periods 1936-1940 and 1946-1950; (2) the condition of the uppermost marginal forests and tree-limits has improved because of a rise in natural reproduction; and (3) continental sites were especially suited for pine seedling establishment, because maximum snow depths rarely exceed a few decimetres. Data on tree-limit and terrain conditions are numerous but treated independently; multivariate analysis would have been useful to evaluate the magnitude of impact of specific ecological factors. Information on present-day climate is rather scarce, and statistical treatment of climatic parameters of the 1915-1975 period is missing. The age structure diagrams of the uppermost pines (Figs. 4 and 5) show no connection with the temperature trend for the period June-September 1901-1975. Some improvements and discussion would have been desirable in this section. In general, the study is well documented, and one must realize that Kullman is a field ecologist giving pertinent and factual notes on the ecology of Scots pine. The booklet is well edited, and the presentation is sober, without flaws. All 32 photographs are grouped at the end of the booklet, and are useful to the reader not familiar with the Scandes region. Although some photographs are redundant, four photos of the same Scots pine taken during a nine-year interval illustrate minor changes in growth related to winter conditions. Only minor errors were noticed in the text (e.g. Fig. 5, p. 30: read TL-15 instead of TL-75; Table 19, p. 32: read years instead of år). References to northern European studies are numerous and helpful for North Americans interested in the topic. Aside from some minor problems, this study is useful, and I recommend it to field ecologists, Quaternarists, and climatologists working in northern environments, where climatic instability is quite important in the dynamics of plant and animal populations.

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