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COMMENT

Threatened species not necessarily rare, rare species not necessarily threatened

In the beautifully-illustrated book of rare and threatened plants of Greece (Phitos *et al.* 1995), the selection of species is based strictly on the four World Conservation Union (IUCN) categories of 'extinct', 'endangered', 'vulnerable' and 'rare' (Lucas & Synge 1978). The Swedish 'red data' book of plants (Aronsson *et al*. 1995) adds 'care-demanding species' to the list. Five percent of the total number of vascular plant species in Greece are included in the Greek book, while 23% of the vascular plant species in Sweden are in the Swedish book. This latter percentage may appear to be sufficiently large, but is it?

A grid with 1-km^2 squares was laid over each of two adjacent inland parishes in southern Sweden, namely Matteröd (M), a woodland area, 55 km^2 in size, comprised of peat bogs and small-scale farming, and Norra Sandby (NS); a 34 km^2 area, where agriculture is more intense. Permanent circular plots, 25 m in radius, were placed at the intersection points of the grid. All the vascular plant species found within each plot were recorded on two occasions: the 56 plots for M were examined in 1964 and 1989, and the 37 plots for NS in 1958 and 1993. In all, 446 species were found, 362 in M and 376 in NS.

For each species, the difference in the number of plots with a positive record between the two occasions was calculated, the two parishes being treated separately. The percentage of species showing a decrease in numbers between the two occasions is 62% in M, and 49% in NS. Only 26% of the M species and 36% of the NS species increased in frequency over time; the others (12% and 15%, respectively) showed no change in their numbers. The Spearman rank correlation test shows that the 292 species common to M and NS changed frequency to approximately the same degree in both parishes (Oredsson 1997; $r_s = 0.48$). This correlation excludes the possibility that random variation in itself accounts for the occasionally conspicuous difference between the two years involved for each area (Fig. 1*a*, *b*).

Six of the 446 species recorded in the present investigation are represented in the Swedish red data book of plants. One of them, *Aphanes inexpectata*, was not found in M, whereas in NS, although in 1958 it was present in six plots, after 35 years it was only recorded in three plots. The same level of loss from plots applies to two 'non-red-listed' species, *Lycopodium annotinum* and *Succisa pratensis*, while in NS *Solidago virgaurea* had decreased from six to two plots and *Odontites rubra* and *Orthilia secunda* from six plots to one plot each.

When first recorded in 1958 (NS) and 1964 (M), none of the five remaining red-listed species were registered in more than one plot in either parish. One of these species, *Dryopteris cristata*, was found in one plot in M in both 1964 and 1989, while in NS it appeared in one plot only in 1993. The four other red-listed species, *Bromus arvensis*, *Digitaria ischaemum*, *Hypochoeris glabra*, and *Pedicularis sylvatica*, had vanished. All in all, 42 species in M and 39 species in NS decreased from one to zero. That is to say, the six red-listed species found in the two parishes do not differ from many other species with respect to change in frequency (A. Oredsson, unpublished data).

The area covered in this study is small, being only 0.18 km^2, which is only a 2.5 millionth part of the area of Sweden. Even so, the following facts taken together led me to suspect that the above findings are applicable to much larger areas than the two parishes investigated: (1) neither of them is exceptional with respect to the composition of the flora (Oredsson 1995); (2) over the last 50 years there seems to have been no extraordinary change in the environment in the region; (3) in the intervening years, the permanent plots were left unattended; and (4) notes taken on the first occasion generally were detailed enough to identify the site of the plot on the second occasion to within a few metres.

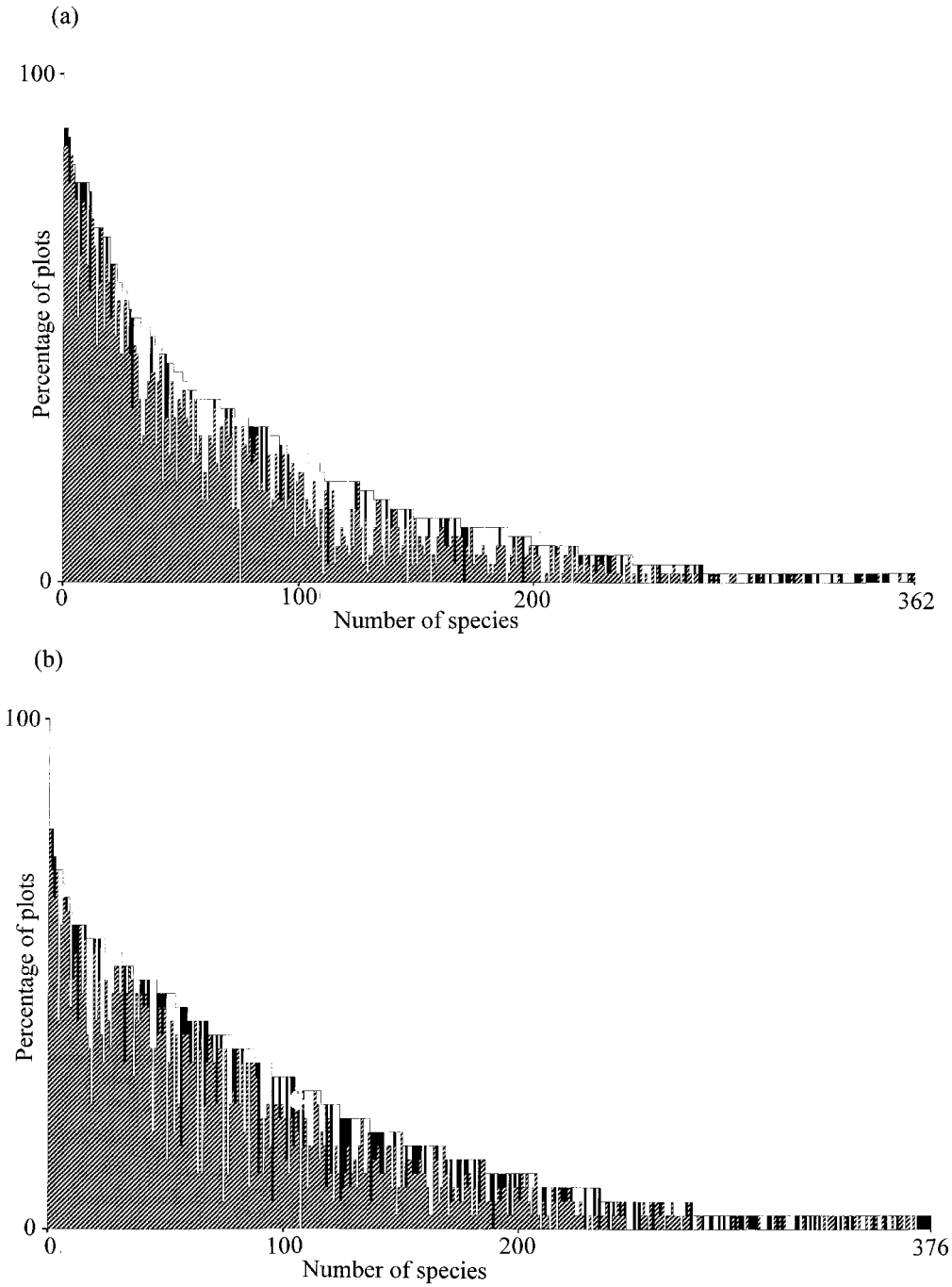

Figure 1 Vascular plant species found in permanent plots in two adjacent parishes in southern Sweden each investigated on two separate occasions, the interval between recording being (*a*) 25 years in Matteröd and (*b*) 35 years in Norra Sandby. The *x*-axis shows one bar for each species, the species ordered according to highest frequency (year 1 if decreasing, year 2 if increasing). The *y*-axis gives the percentage of plots with findings in relation to the total number of plots in the respective parishes. Hatched: positive records in both years; white: recorded in year 1 only; black: recorded in year 2 only.

In southern Sweden, almost every single flowering plant species is affected by changes in the environment. At present, two principal forces seem to be at work, namely the level of industrial growth in northern Europe within the last 150 years, entailing the deposition of nitrogen compounds through acid rain (Oredsson 1990), and the rapid depopulation of the countryside since World War II, which has led to larger-scale farming operations, where marginal habitats are

neglected and become overgrown (Oredsson 1990). The capacity of certain species to utilize nitrogen surplus, and their ability to survive in habitats which are becoming overgrown, will probably determine which species will remain.

We have to attempt to predict the outcome of the battle, and immediately let the supposed losers enter a 'New Ark' as red-listed species. If not, the number of species will diminish uncontrollably, unless industrialized man puts an end to smoke and exhaust fumes, and returns to ancient farming methods. As the worst outcome of human activities, Nevling (1996) foresees the desolation of Earth before the year 3000. Half of the vascular plant species examined in this study have decreased in frequency in recent decades. So far, only 1% of them appear in the Swedish red data book.

Noah's mission was to save all species on Earth. Conservation biologists are today's Noahs and should perhaps stop concentrating on rare species only.

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ALF OREDSSON
Department of Systematic Botany, University of Lund
Östra Vallgatan 18-20, S-223 61 Lund, Sweden
Tel: +46 46 2228978
Fax: +46 46 2224234
email: Alf.Oredsson@sysbot.lu.se