

## **Distribution of the European hedgehog (*Erinaceus europaeus* L.) in Sweden and Finland**

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Information on the distribution and changes in abundance of the hedgehog in Sweden was collected by means of questionnaires. The investigation showed that man has influenced the distribution of the hedgehog in Sweden (as in Finland and Norway) due to intentional introduction. In Finland and Sweden, its range has expanded during the twentieth century. However, this has occurred much faster in Finland than in Sweden. At present, the hedgehog is found in most parts of southern and central Sweden, and in Norrland, along the coast up to the Finnish border. A “minimum time-span” was calculated to predict the areas in which the hedgehog is expected to be found in self-maintained populations. This time-span was calculated to 155 days and covers the time needed for reproduction, storage of energy and growth of the young. It corresponds rather well with the northern distribution limit of the hedgehog. It was found that no large-scale general changes in abundance occurred between 1975 and 1979.

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### **1. Introduction**

It is widely believed in Sweden that the hedgehog population has decreased dramatically during recent decades. The hedgehog is reported to be near extinction in some areas and road mortality is often put forward as a major reason for this decline. However, recent investigations in southern Sweden indicate that the influence of road mortality has been exaggerated (Göransson et al. 1978).

The information on hedgehog distribution given in field guides and textbooks is based mainly on tradition and not on systematically collected information. The aim of this study is to provide more scientifically based information on recent distribution of the hedgehog in Sweden, and to analyse possible trends during the period 1975–1979. Comparable information is available from Finland (Kristoffersson et al. 1966, 1977) and this report includes a comparison between Sweden and Finland.

### **2. Methods**

Information was collected by means of questionnaires

which were sent to local societies associated with the Swedish Society for the Conservation of Nature and to all members of the Swedish Youth Federation for Environmental Studies and Conservation. I asked for information about the presence/absence of hedgehogs during the years 1975–1979, changes in abundance during this period, and any introduction of hedgehogs by man into the actual locality.

The hedgehog is a well-known animal in Sweden and is confined mainly to human settlements. I, therefore, consider the replies received as being reliable. Out of 17,000 questionnaires sent out about 900 were returned.

### **3. Results**

#### **3.1. Previous information on the distribution**

Linné stated in his *Fauna Svecica* (1761) that the hedgehog was a rare animal in central Sweden (Svealand) but he gave no real information about the situation further to the north: in Norrlandia vix occurit. Nineteenth century handbooks (Nilsson 1847, Lilljeborg 1874) state that the hedgehog is not uncommon in southern and central Sweden (Fig. 1); only one observation from Norrland is mentioned. In the beginning of the twentieth century, hedgehogs were found

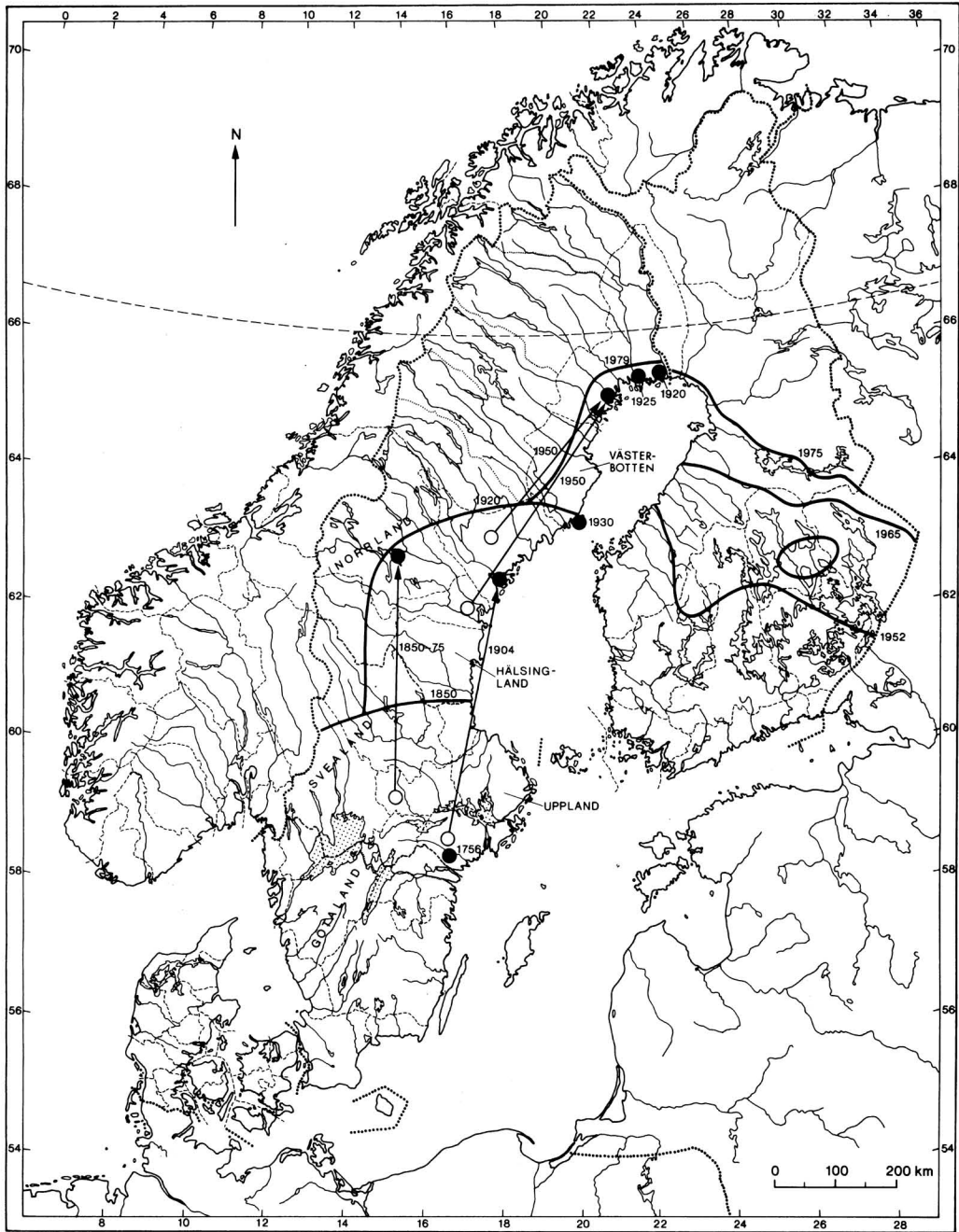


Fig. 1. Approximate distribution limits of the hedgehog in Sweden during three periods: 1850 (Linné 1761, Nilsson 1847, Lilljeborg 1874), 1920 (Ekman 1922), 1979 (this investigation). The arrows indicate reports of transported and introduced animals. The year of introduction is shown (if known).

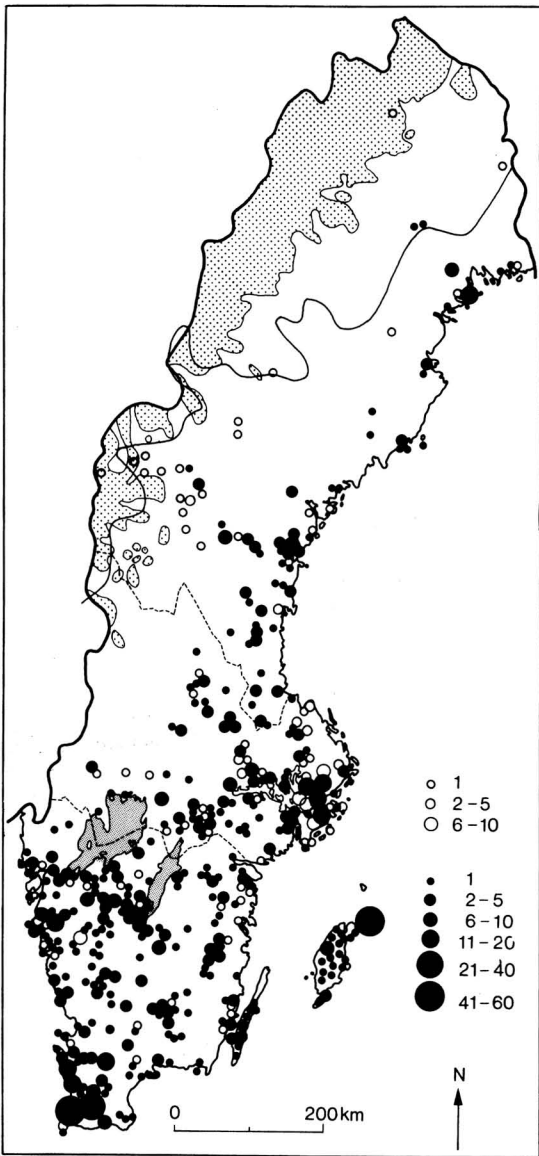


Fig. 2. The distribution of the hedgehog according to the 1979 enquiry. Open circles denote the number of negative answers (absence) and dots the number of positive answers (presence). The broken lines show the borders of the main regions of Sweden and the shadowed area shows the mountain and mountain-birch forest zones (Lindquist 1966). The predicted northern distribution limit is shown with the 150-day isocline (solid line).

along the coast in Norrland up to the province of Västerbotten (Fig. 1, Ekman 1922). Ekman mentioned that man had introduced hedgehogs into several places in Norrland. He also

questioned the spontaneous occurrence of hedgehogs as far north as the province of Upland (Fig. 1). The presence of hedgehogs in Hälsingland is said to originate from animals introduced in the late nineteenth century (Brehm & Ekman 1938, Notini & Haglund 1957).

### 3.2. Present distribution

The distribution of hedgehogs as indicated by the reports received is presented in Fig. 2. Hedgehogs are found in the south of Sweden (Götaland) and most parts of the central region (Svealand). In Norrland, they are found mainly along the coast up to the Finnish border.

The proportion of answers reporting the presence of hedgehogs was taken as an index of the numerical status of the hedgehog in different regions. This figure was higher for Götaland than for Svealand (Tab. 1) whereas the difference between Svealand and Norrland was not statistically significant. From the island of Gotland in the Baltic all answers but one reported the presence of hedgehogs.

The reports on changes in abundance during the last five years are unclear (Tab. 1). In each region, the answers are about equally distributed between the different categories. The proportion of answers reporting an increase was about the same in Götaland (24 %) and Svealand (28 %), but considerably lower in Norrland (14 %). The proportion indicating a decrease is lower in Götaland (22 %) than in the rest of the country (34 % — 29 %). The reports from the island of Gotland indicated a decrease in 53 % and an increase in only 4 % of the answers. In all regions, the proportion indicating no change constitutes a considerable part of the answers, which makes it difficult to interpret the results. The picture becomes clearer if one only looks at the relation between the “decrease” figures and the “increase plus no change” figures. In Götaland 70 % of the answers showed “increase plus no change” whereas only 30 % of the answers indicated “decrease”. In Svealand and Norrland the reports showed about 55 % “increase plus no change” and about 45 % “decrease”.

### 4. Discussion

It is only possible to obtain an approximate picture of the range expansion in Sweden because of the lack of previous investigations on the occurrence of the hedgehog. However, the data

Table 1. Distribution and estimated abundance of the hedgehog in the four main regions of Sweden. Numbers and percentages of replies.

	Götaland		Gotland		Svealand		Norrland	
	Repl.	%	Repl.	%	Repl.	%	Repl.	%
Distribution								
presence	399	91	147	99	150	75	75	73
absence	39	9	1	1	50	25	28	27
total	438	100	148	100	200	100	103	100
Abundance								
increase	95	24	6	4	36	28	15	14
decrease	87	22	77	53	44	34	30	29
no change	110	28	50	34	15	12	22	21
no opinion	104	26	13	9	34	26	38	36
total	396	100	146	100	129	100	105	100

obtained strongly indicate that the hedgehog has expanded its range during this century. This is obviously primarily a result of intentional introduction (Fig. 1). The range expansion has occurred mainly along the coast up to the Finnish border. Kristoffersson et al. (1966) showed that the hedgehog has been introduced many times into Finland, and this might have led to new local populations. Hedgehogs were even imported from Estonia and Russia in the beginning of the century. In Norway, the occurrence of hedgehogs has varied greatly over the years (Föyn & Huus 1947), but no detailed investigation has been performed. As in both Finland and Sweden, the occurrence of hedgehogs in certain places must have been a result of intentional introduction (Föyn & Huus 1947). Thus, in Finland, Norway and Sweden it is quite evident that man has influenced the occurrence of hedgehogs. In Finland, investigations by the Riistantutkimuslaitos (Kristoffersson et al. 1966, 1977) show that the hedgehog expanded its range from 1952 to 1975 (Fig. 1). Furthermore, a considerable increase in the occurrence of hedgehogs was reported. The observed range expansion in Finland has obviously occurred much faster than in Sweden. One can only speculate about the reason for this. One reason could be the fact that the hedgehog has been introduced many times into Finland. Today, hedgehogs are found all over Finland except in the northern and north-eastern parts above the Gulf of Bothnia (Kristoffersson et al. 1977). Roughly the same distribution pattern is seen in Sweden.

The north-western part of Sweden adjacent to Norway consists mainly of mountain and mountain-birch forest regions, which are unsuitable habitats for hedgehogs. The western limit of the hedgehog distribution cannot be stated with any certainty as there are too few answers

from the region between the coast in Norrland, where the hedgehog is found, and the mountain-birch forest zone.

It is reasonable to assume that the hedgehog, which hibernates in winter, needs a certain minimum length of time during the year to reproduce, to store energy for hibernation and for the young to grow enough to survive the first winter. I have calculated a "minimum time-span" to predict in which areas the hedgehog is expected to be able to establish a self-maintained population. The mating period is calculated to 30 days (Deanesly 1934), the gestation period to 32 days, and the weaning period to 38 days (Ranson 1941). The weaning weight is reported to be between 125 g and 345 g (Morris 1967). To survive the winter, the autumn body weight of a juvenile hedgehog must be about 700 g (Jungbluth 1978). Using a growth curve for juvenile hedgehogs with 250 g as the starting weight, I have estimated that it takes about 55 days to achieve a weight of 700 g (Kristiansson unpubl.). Addition of these minimum periods gives a "minimum time-span" of 155 days for the production of young. Furthermore, it is necessary for the adult, as well as the young, to have been able to store enough energy during this minimum time to cover their needs during the c. 200 day hibernation period. The length of the vegetation period, calculated as the number of days with a temperature of 3°C or higher (Ångström 1953), can be used as a measurement of invertebrate production (the main food of the hedgehog). The hedgehog is expected to be found south of the 150-day isocline and below the mountain-birch forest zone (Fig. 2). In fact, this seems to correspond rather well with the northern distribution limit of the hedgehog. However, answers reporting the absence of hedgehogs from the vicinity of the isocline are few and further reports

are needed. Of course, other constraints can affect hedgehog distribution: e.g., the availability of favourable winter nests, local climatic conditions and regularity in the arrival of spring and autumn.

The number of reports obtained from different provinces was too small to be used for a detailed analysis of changes in hedgehog numbers. The reports indicated that no general large-scale change in abundance occurred during the 5-year period until 1979. However, some changes might

have occurred locally. The status of the hedgehog is probably better in Götaland than in the rest of the country.

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