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DISPERSAL BEHAVIOUR OF THE EDIBLE DORMOUSE (*MYOXUS GLIS* L.) IN A FRAGMENTED LANDSCAPE IN CENTRAL GERMANY

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ABSTRACT – This study contributes new evidence on the dispersal behaviour of the Edible Dormouse (*Myoxus glis* L.) in a fragmented landscape in central Germany. Extensive investigations using the live-trap method show that the Edible Dormouse is able to cross treeless landscapes of at least 46 m. It is also shown that these movements are part of its normal behaviour. In the present study two dispersal periods per year were shown: (1) during spring some adult males moved, (2) during autumn several juvenile Dormice changed to other areas.

Key words: Edible Dormouse, Population-density, Dispersal-behaviour.

RIASSUNTO – *Comportamento dispersivo del Ghiro* (Myoxus glis) *in un ambiente frammentato della Germania centrale* – Questa ricerca fornisce nuovi dati sul comportamento dispersivo del ghiro *(Myoxus glis)* in un ambiente frammentato della Germania centrale. Estese indagini mediante trappole per cattura di animali vivi hanno mostrato che il ghiro e capace di attraversare aree prive di alberi di almeno 46 m. E stato anche dimostrato che questi spostamenti sono parte del suo normale comportamento. Nel presente studio sono stati mostrati due importanti periodi di dispersione per anno: 1) durante la primavera si spostano alcuni maschi adulti; 2) durante l'autunno diversi giovani ghiri si spostano in altre aree.

Parole chiave: Ghiro, Densita di popolazione, Comportamento dispersivo.

INTRODUCTION

The biology and ecology of the Edible Dormouse (*Myoxus glis* L.) have already been studied several times (e.g. Vietinghoff-Riesch, 1960; Eiberle, 1977; Fischer, 1983/1984; Gorner & Henkel, 1988; Bieber, 1991). However, these studies did not answer questions on the dispersal of Dormice. Recently published radio-tagging-studies by Müller (1989) and Hönel (1991) offered new results on the dispersal behaviour of the Edible Dormouse. Both authors stated that the animals avoid crossing streets and open ground. Hönel (1991) observed that the animals cross gaps only if there is a chance to cross by moving from branch to branch. Similar studies on the Common Dormouse (*Muscardinus avellanarius* L.) in England revealed comparable results, i.e. they do not like to change habitats by moving on the ground (Bright & Morris, 1989).

These observations could lead way to the assumption that the Edible Dormouse is unable to disperse in treeless landscapes and that agricultural land is like an invincible barrier (Honel, 1991).

The study presented here intends to elucidate the dispersal-behaviour of the Edible Dormouse in Germany using the method of live-trapping.

METHODS

1. STUDY AREA

The study area is situated in central Germany close to Marburg (50° 48' N, 8° 48' E) in Hessen. It is a part of a landscape at 300-320 m above sea-level climatically determined by an annual mean temperature of about 8,5°C and circa 600 mm precipitation per year.

The landscape is a bright open valley of basalt and sandstone. The whole area consists of fertile soil and is used as agricultural land. The hills are covered with large beech forests, while the slopes and the valley are fields and meadows.

The study-area is subdivided into three different traping-areas (Fig. 1).

Area one (1ha/"Forest area") is a part of a large beech forest (*Fagus sylvatica;* 110-124 years old) with some specimens of *Quercus petraea.* A partial undergrowth is present in the form of *Sambucus racemosa* and *Sambucus nigra.* The edge of the forest is well defined and includes some specimens of *Carpinus betulus*, *Salix* sp. and *Prunus spinosa*

Area two (1ha/"Shrub area") is a part of a bushy woodland (35-40 years old) with a total size of 2.2 ha and is characterized by its high diversity of the vegetation. The species of the well developed understorey are *Prunus spinosa, Carpinus betulus*, *Crataegus monogyna*, *C. oxyacantha, Rosa* spp., *Sambucus nigra, Rubus idaeus*, *R. fruticosus* and *Lonicera xylosteum.* The trees are represented by *Fagus sylvatica*, *Pinus sylvestris*, *Piceu ubies, Quercus petraea. Q.robur*, *Tilia cordata, Salix sp., Juglans regia*, *Robinia pseudoacacia, Prunus doiiiestica, Malus doniestica, Pyrus communis* and *Prunus avium.*

The third area (0,5 ha/"Hedge area") is an isolated hedge (35-40 years old) with a total size of 0,5 ha. The growth of the hedge is similar to the "Shrub area" but with lower diversity. The main plants are *Prunus doniestica, P. spinosa*, *Malus domestica* and *Corylus avellana.* Unlike to the "Forest area", both the "Shrub area" and the "Hedge area" are almost impassible to humans.

2. LIVE-TRAP METHOD

The Dormice were caught in wooden live-traps (30 cm length; 6,5 cm breadth, 8 cm high). The traps were made to order (a variation of the traps described by Müller-Stieß, pers. comm.) by the firm of Franz Keim (Fallenfabrik Franz Keim, Alte Landstraße 1-5, D - 94127 Neuburg/Inn, Germany).

The trap-density was 100 traps/ha. Fifty traps were installed in trees and bushes 1-2 in above the ground and 50 on the ground. Trap-distribution was irregular and not ordered in a grid-pattern.

One capture-period lasted three nights. Altogether there were 23 capture-periods with a total of 7500 trap-nights.

Each area was investigated twice a month (Area "Forest" and "Hedge" together/week II and IV alternately to the "Shrub area"/week I and III of each month).

The investigation period lasted from May - October 1992, but in the hedge area trapping lasted from August - October 1992.

All Dormice caught were registered (weight, age, sex, trap-no.) and tattooed

(tattoo-pliers/5 mm; Firma Hauptner, Schwanthalerstraße 51, D-80336 München, Germany) before being released at the capture point.

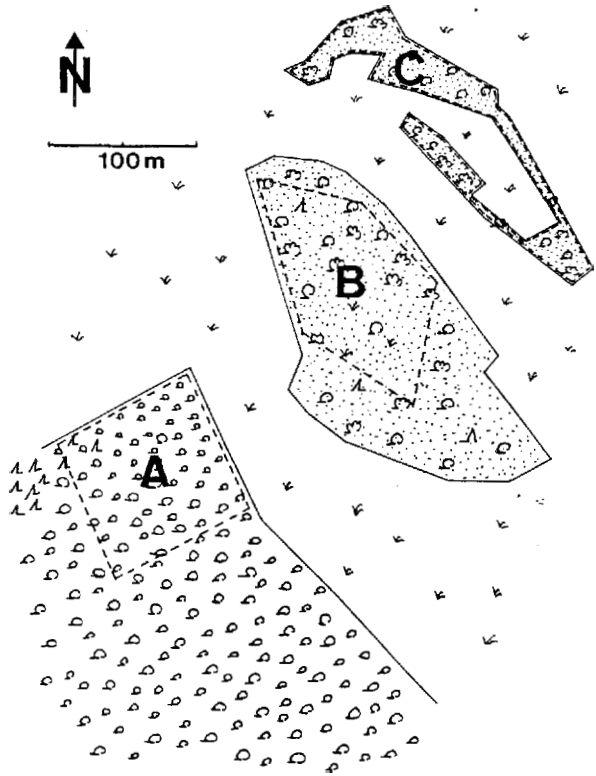

Fig. 1 – Overall view of the three different traping-areas. Traping areas are enclosed by dotted lines. A="Forest arca": B="Shrub area": C="Hedge area".

RESULTS

1. POPULATION-DENSITY

Altogether 196 (100%) Dormice were caught in the three traping-areas, some by chance in nestboxes. The animals were active during a six month period, May-October.

There was no mortality in the traps.

Evaluation of the trap results shows that the largest population lived in the "Forest area" (max. 57 ind./ha) and the smallest population in the "Hedge area" (max. 12 ind./ha). The "Shrub area" had an intermediate density maximum of 21 individuals/ha. The population-density was calculated using the MNA-method (Minimum Number of Animals known to be alive). Figure 2 shows the density fluctuation during 1992 in the three trap areas. The figures for the areas "Forest" and "Shrub" (Fig. 2, A and B) show two peaks. The first peak appeared in July ("Shrub area": 19 ind./ha; "Forest area": 22 ind./ha) and the second peak, well

defined in the "Forest area", was observed in September ("Shrub area": 21 ind./ha; "Forest area": 57 ind./ha). Between these two peaks the population density decreased in the "Shrub area" to 12 ind./ha and in the "Forest area" to 13 ind./ha. The "Hedge area" (Fig. 2, C) cannot be considered in this context because the trapping period in this area only lasted from August until October.

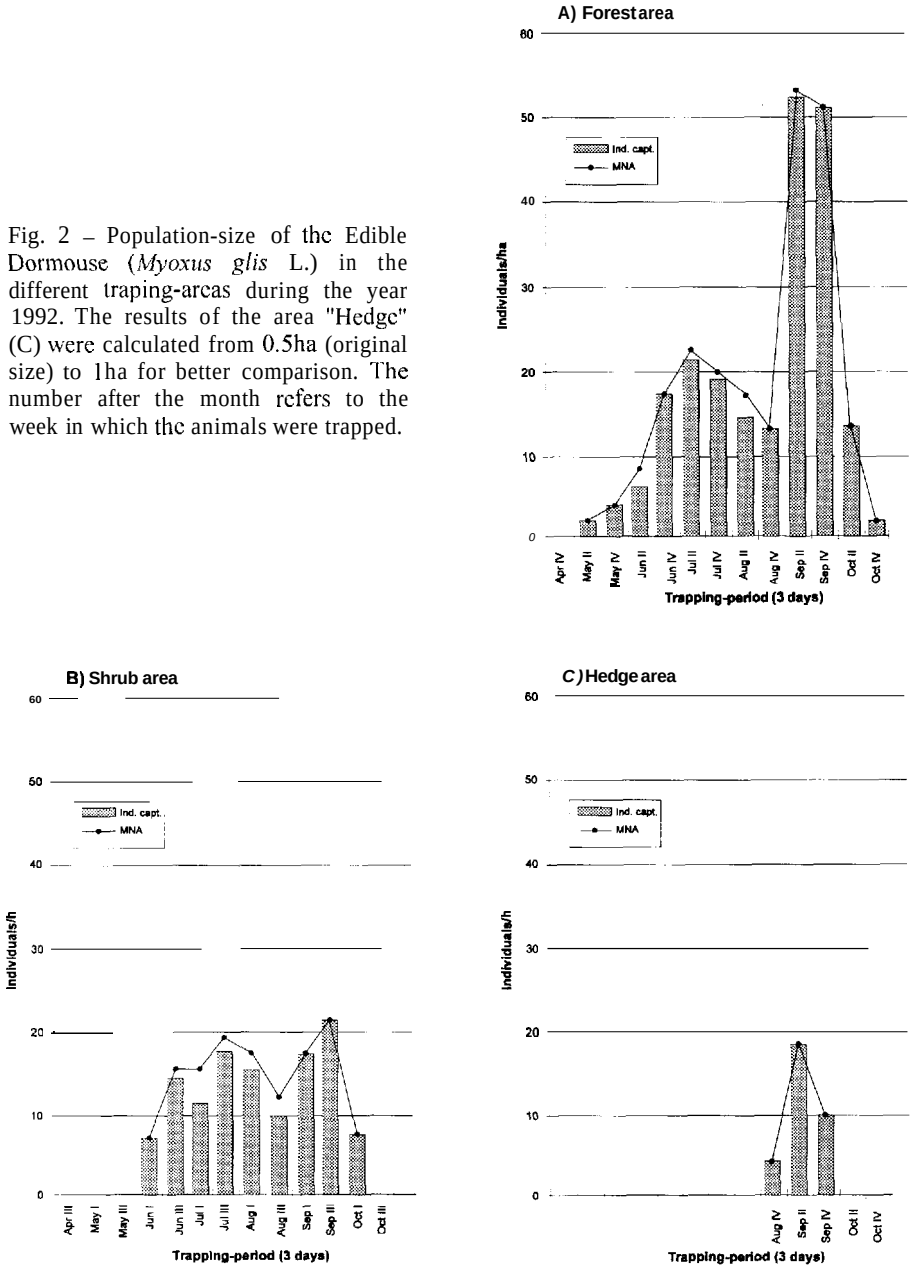

Fig. 2 – Population-size of the Edible Dormouse (*Myoxus glis* L.) in the different traping-areas during the year 1992. The results of the area "Hedge" (C) were calculated from 0.5ha (original size) to 1ha for better comparison. The number after the month refers to the week in which the animals were trapped.

2. DISPERSAL-BEHAVIOUR

Figure 3 shows the movements between the three traping areas. The capture points of the animals before and after the dispersal are marked by solid dots.

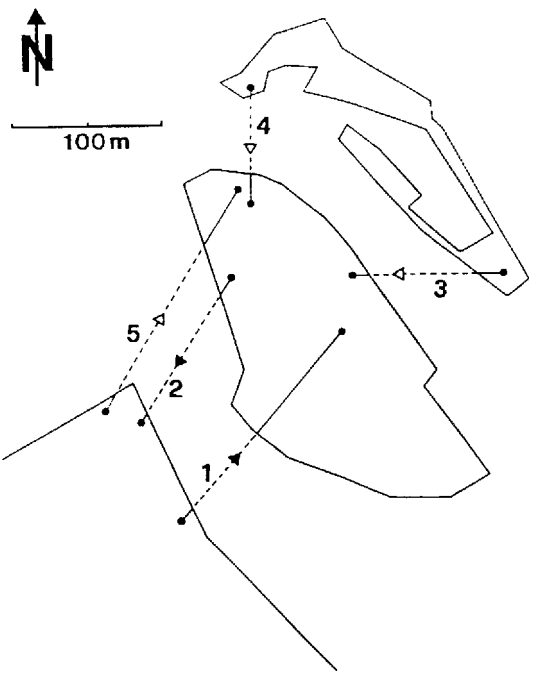

Fig. *3* – Overall view of the animal movements between the three traping-areas. Interrupted strokes describe movements over agricultural land (treeless). Arrows show the direction (black = adult Dormice; white =juvenile Dormice).

A total of 5 Edible Dormice (2.5%) moved from one trapping-area to another, with each of these animals crossing a minimum of 46 m of treeless agricultural land. Table 1 shows more details about these animals.

It is possible to split the data in two groups. Group one is represented by two adult males (arrows 1 and 2 in Fig. 3) which moved from one area into another during the late spring. In this case the adult males moved during the mating season, which could be determined from the birthdays of litters (5.-11.08.92) in nestboxes.

The second group consists of juveniles (arrows 3, 4 and 5 in Fig. 3), which moved during autumn.

It is notable that all three juvenile Dormice moved into the "Shrub area" (animal *3* and 4 from the "Hedge area" and animal 5 from the "Forest area").

Comparison between the weights before and after dispersal suggests that only juveniles are obviously heavier after the event (animal 3 added 56 g = 2 g/d; animal 4 added 54 g = 1,94 g/d and animal 5 added 13 g = 1.*0S* g/d). The weights of adult males did not show a consistent picture in this regard (animal 1 lost 4 g = -0.66 g/d; animal 2 added 6 g = 1.2 g/d)

DISCUSSION

1. POPULATION-DENSITY

The population-density results clearly show that the largest population lived in the beech forest. Especially during autumn the population in the "Forest area" increased markedly (Fig. 2). This was due to the high reproduction and consequently high numbers of young Edible Dormice. The high reproduction rate could be explained by good seed crops on the oaks and beeches during 1992.

Tab. 1 – Details of the Dormice which moved between the study areas. Animal No. same as in Fig. 3.

ANIMAL NO.	LAST CAPTURE BEFORE MOVE DATE / WEIGHT	FIRST CAPTURE AFTER MOVE DATE / WEIGHT	AGE	SEX
1	12.06.92/ 102 g	IX.06.92/ 98 g	adult	male
2	18.06.92 / 120g	23.06.92/ 126 g	adult	male
3	09.09.92 / 49 g	07.10.92 / 105 g	juvenile	female
4	08.09.92 / 50 g	06.10.92 / 104 g	juvenile	female
5	24.09.92/ 65 g	Oh.10.92 / 7X g	juvenile	male

2. DISPERSAL-BEHAVIOUR

Contrary to Honel (1991) this study shows that moving over open areas seems more than an occasionally event in the normal behaviour of the Edible Dormouse.

Hönel (1991) explained in her radio-tagging study that this species avoided crossing open ground and that streets and free surfaces have isolating effects of isolation. Müller (1989) deduced from his radio-tagging study that structures like fields and meadows function like a barrier for the animal. He pointed out that moving over open areas (20-40 m) was a really seldom event.

One possible explanation for these differing results could be caused by the different study-methods. The present study used live-traps, allowing the observation of the whole population **in a** defined area. With radio-tagging, a moving animal would only be observed by chance. Hönel (1991) tagged 42 animals in three years and Muller (1989) observed only 5 animals during one year.

A second reason for the different results could be the investigation period and the choice of study-animals. Honel (1991) tagged only animals with a weight over 100 g and the study-period for each animal rarely lasted more than 6 weeks (mainly during summer), again restricting the probability of observing dispersal movements. However, even with a small number of movements, results of the present study showed clearly that the Dormouse-populations in the isolated areas "Shrub" and "Hedge" were not genetically isolated.

Comparisons between the peaks of the population density (Fig. 2) and the dispersal events (Table 1) demonstrate that the animals moved during a time of high population density. In the first period, adult males dispersed to new areas. Perhaps rivalry between the males in one population grows during the mating season and some animals were forced to leave the area of stronger males or

perhaps they dispersed to find more females.

Juvenile Dormice were found moving between areas about two months after their birth and all moved into the "Shrub area". These facts pose new questions: Do young Dormice search for an optimal hibernation place? Do they follow their mother and hibernate together with her or do they wander and hibernate alone?

Further investigations using different methods are needed to answer these questions.

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