ved brugen af kunstige materialer er en øget risiko for redeprædation, idet disse materialer ofte stritter iøjnefaldende frem fra redeunderlaget.

Summary: Man-made materials in nests of Blackbirds

Plastic, string, etc. are often used as nest material by Blackbirds *Turdus merula*. To investigate the quantitative aspects of this behaviour, I examined 222 Blackbird nests in February 1999 near the city of Århus, eastern Jutland. Man-made materials occurred in 77% of all nests. The frequency of occurrence varied significantly from 83% and 82% in two urban areas (N = 151) to 65% in a scrub area (N = 71). Careful disassembly of 153 nests with man-made material yielded 1058 pieces (Table 1; mean 7, range 1-38). Transparant plastic was the commonest man-made material in the nests.

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Prevalence of *Borrelia burgdorferi* sensu lato in ectoparasites in nesting boxes in Denmark

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Introduction

The list of known carriers and possible vectors of Lyme Borreliosis in Western Europe includes *Ixodes ricinus, I. trianguliceps, I. hexagonus, I. acuminatus, I. uriae, Dermacentor reticulatus* and *Haemaphysalis punctata* (Hillyard 1996). *I. ricinus* is considered the most important vector in relation to the epidemiology in Europe. The other European *Ixodes* ticks, being nidicolous species (Hillyard 1996), are primarily suspected of influencing the epizootiology by serving as vectors within the nest areas of rodents and birds. Tick species from other genera than *Ixodes* are generally considered as carriers rather than vectors because they have a limited potential for transmitting *Borrelia burgdorferi* sensu lato transstadially, i.e. from larva to nymph and from nymph to adult tick (Mulkowe et al. 1992, Lane et al. 1994, Tälleklint 1996). There is also some evidence that several other arthropods might serve as carriers of *B. burgdorferi* sensu lato (Magnarelli & Anderson 1988, Zeman, 1998), and therefore potentially could contribute to its transmission.

More than 20 tick species have been accounted for in Denmark (Doss et al. 1978), many being parasites on birds. The human pathogenic *Borrelia burgdorferi* sensu lato genospecies (*Borrelia burgdorferi* sensu stricto, *B. afzelii* and *B. garinii*) have been found in ticks collected from birds (Jensen et al. in press, P. M. Jensen, unpubl. data), and the importance of birds in the transmission *B. burgdorferi* is now recognized as being of equal or perhaps greater importance than the tick-mammal interface. Like rodent nest (Maupin et al. 1994), birds nest may be suspected of providing an environment which amplifies the transmission, and the practice of placing nest boxes in inhabited areas might increase Lyme Borreliosis risk locally.

The purpose of this study was to examine the transmission potential of ectoparasites in nest box material and to determine whether ectoparasites in the nest environment possibly could enhance the transmission of *B. burgdorferi* sensu lato under Danish conditions.

Materials and methods

In May and July 1995 nest material from a total of 49 nesting boxes were collected. Previous visual observations were used to identify the bird species which had occupied the nest boxes. Nest material was removed from each box, placed in plastic bags and transported to the laboratory, where the material was examined using a stereo-microscope. Bloodsucking ectoparasites, i.e. fleas and ticks, were crushed on a slide. The hemolymph of the ectoparasites was then analysed for *B. burgdorferi* sensu lato presence by immunofluorescent antibodies (IFA) (Landbo & Flöng 1992). In addition, approximately 50 1-3 week old birds occupying nest boxes were inspected for the presence of ticks in June 1995.

Results and discussion

Ticks were only recovered from one bird nest, previously occupied by Pied Flycatcher *Ficedula hypoleuca* (Table

Table. 1. The number of ectoparasites and the occurrence of *Borrelia burgdorferi* sensu lato determined by IFA. *Antallet af ektoparasitter of forekomsten af* Borrelia burgdorferi *sensu lato bestemt ved IFA.*

Bird species occupying the nest *Fugleart*	Nests *Reder*	No. positive/examined Ticks *Flåter*	 Fleas *Lopper*
Pied Flycatcher *Ficedula hypoleuca*	14	0 / 2	0 / 83
Marsh tit *Parus palustris*	5	0 / 0	0 / 30
Blue tit *Parus cearuleus*	12	0 / 0	0 / 78
Great tit *Parus major*	18	0 / 0	0 / 109
Total	49	0 / 2	0 / 319

1). No ticks or fleas were found to be infected with *B. burgdorferi* sensu lato. For more than half the nests it was known that the nest had served for nesting less than a month before the sampling date. It therefore seems unlikely that birds (or bats) get infected with *B. burgdorferi* sensu lato by ectoparasites in bird nests. No ticks were found on 1-3 week old birds in nesting boxes. The use of nesting boxes therefore appears to have no enhancing effect on the transmission of *B. burgdorferi* sensu lato. Rather it can be hypothesised that human-made nesting boxes, which are commonly used in residential areas, secures a nest environment which does not allow for ectoparasites to pass on *B. burgdorferi* sensu lato to visiting or nesting birds.

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Resumé: Er ektoparasitter med *Borrelia burgdorferi* sensu lato i danske fuglekasser et problem?
Lyme Borreliose er en sygdom, mennesker kan pådrage sig som følge af flåtbid. Det er særligt flåter inden for slægten *Ixodes*, der bærer det biologiske agens for sygdommen: *Borrelia burgdorferi* sensu lato; men også andre ektoparasitter kan muligvis medvirke til at sprede bakterien. Via smittespredningen med ektoparasitter kan det forventes, at reder hos gnavere og fugle potentielt set er habitater, hvor smittespredningen er særlig intensiv. Dette kunne medføre, at opsætning af fuglekasser lokalt kunne forøge risikoen for, at mennesker pådrager sig Lyme Borreliose. Det gennemførte studium, hvor 321 ektoparasitter fra 49 fuglereder blev undersøgt for infektion med *B. burgdorferi* sensu lato, og ca 50 fugleunger blev undersøgt for flåter, understøtter ikke en sådan hypotese. Det synes mere nærliggende, at fuglekasser tilbyder et miljø, hvor fugle ikke eksponeres for smitte med *B. burgdorferi* sensu lato.

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