

A tropical mite, *Ornithonyssus bursa* (Berlese, 1888) (Macronyssidae, Gamasida) in Danish swallow (*Hirundo rustica*) nests; with a review of mites and ticks from Danish birds

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A tropical haematophagous mite, *Ornithonyssus bursa* (Berlese 1888) new to Denmark, is numerous in colonies of swallows (*Hirundo rustica*). Mites are most abundant in second clutches of swallows and in large colonies where they are easily transmitted by birds from one nest to another. Presence of numerous mites seems to markedly decrease the survival of swallow nestlings. A description of the mite is given. A review of bird mites and ticks from Denmark reveals 25 species found on 14 wild and 8 domesticated species of birds.

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Introduction

During a study of nestling mortality in swallows (*Hirundo rustica*) one of the authors (APM) found that a high mortality rate was especially common in large colonies and that nests with dead nestlings contained large numbers of mites; the mites were presumed to cause the nestling mortality. The number of mites in a nest was estimated by placing a hand in the nest for 10 seconds immediately after fledging and estimating the number of mites attracted to the hand. Numbers were estimated to 0, 10, 100 or 1000 mites. Breeding success of swallows was found to be low when many mites were present in the nest (Table 1).

Two dead nestlings were placed in alcohol and the number of mites falling out of the plumage was counted. The two nestlings, which were found at Kraghede (57°12'N, 10°00' E), in the Vendsyssel, part af

No. of mites in the nest	Total no. of eggs	Total no. of fledglings	Breeding success (%)
0	473	410	87
10	108	101	94
100	82	69	84
1000	25	5	20

Table 1. Nestling mortality in swallows in relation to the rate of mite infection (no. of mites found on a hand placed 10 seconds in a nest following fledging of swallows). Data from 1982 and 1984. ($\text{Chi}^2 = 90.2$, $\text{df} = 3$, $p < 0.001$).

Tabel 1. Ungedødelighed hos landsvale i relation til mængden af mider i reden (antal mider fundet på en hånd placeret 10 sekunder i reden efter ungerne udflyvning).

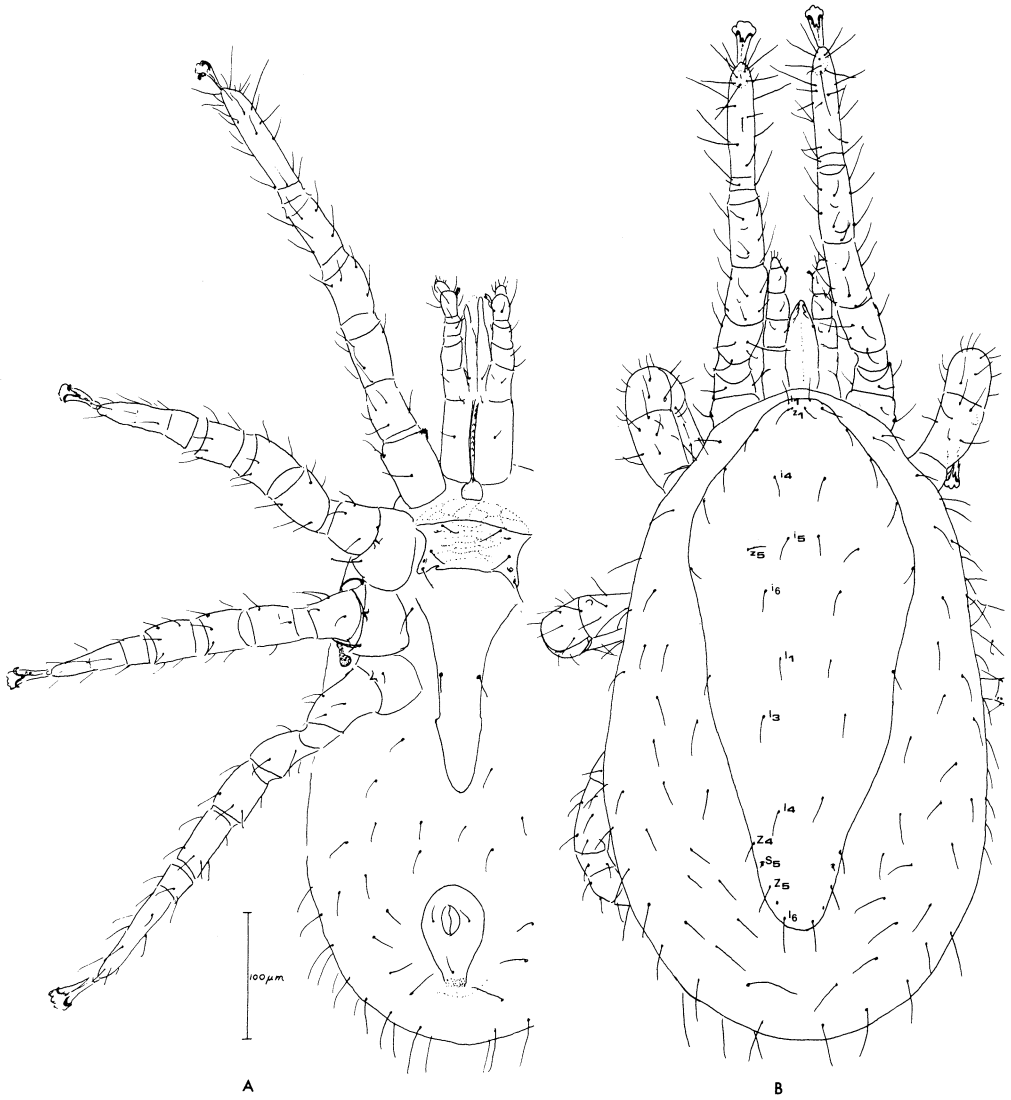


Fig. 1. *Ornithonyssus bursa*, female, ventral (A) and dorsal side (B).

Fig. 1. *Ornithonyssus bursa*, hun, under- (A) og overside (B).

northern Jutland, harboured more than 2000 mites (at least 1000 mites per nestling). An inspection of the plumage revealed many more mites on the birds. The mites belong to the species *Ornithonyssus bursa* (Berlese, 1888), especially known from tropical bird species as the tropical fowl mite but recorded a few times earlier from Europe (Micherdzinski, 1980). The mites from Kraghede contained all blood-sucking stages of the mite.

Description

Species of *Ornithonyssus* are characterized by a wedge-shaped genital plate and a dorsal plate that becomes more narrow distally and is provided with special setae. *O. bursa* belongs to the species of the genus lacking seta i_3 on the anterior part of the dorsal plate, a character seen in all developmental stages. *O. bursa* can be discriminated from the species of *Ornithonyssus* by the following characters:

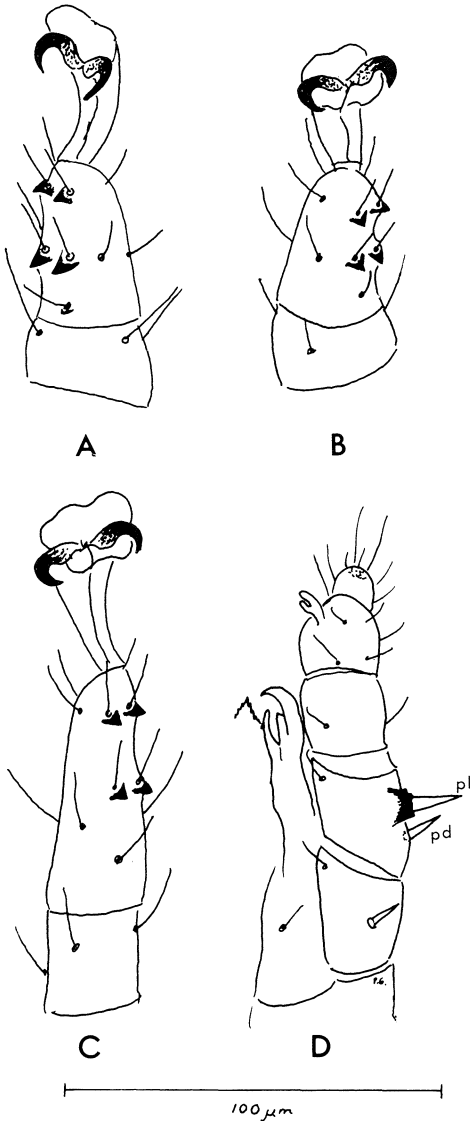


Fig. 2. *Ornithonyssus bursa*, male, tars II (A), III (B), IV (C), and palp (D).

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Female: (Fig. 1 A and B) the dorsal plate has relatively short setae and is rounded posteriorly. Four pairs of setae are found at the posterior part of the plate: Z₄, S₅, Z₅, and I₆. Of these, Z₄ are markedly shorter than I₆, and S₅ are microsetae. In the closely related species *O. bacoti*, the tropical rat mite, Z₄, Z₅ and I₆ are of similar length and longer than in *O. bursa*.

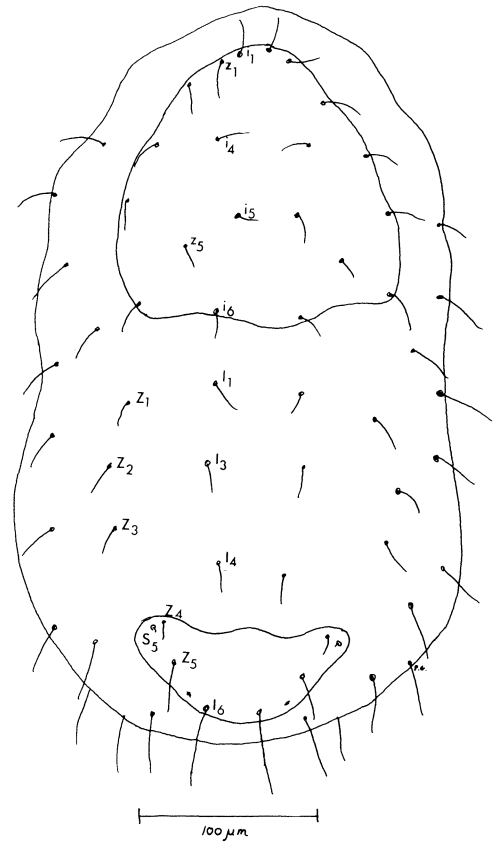


Fig. 3. *Ornithonyssus bursa*, protonymph.

Fig. 3. *Ornithonyssus bursa*, protonymfe.

Male: (Fig. 2) *O. bursa* is sexually dimorphic, the male having apophyses with tarsal setae on legs II, III, and IV, (Fig. 2, A-C). Setae pl and pd on the palps (Fig. 2, D) are large and spine-shaped. Setae pl are on an excrescence.

Protonymph: (Fig. 3) This stage can be separated from the protonymphs of other species by the relatively large pygidial plate and by setae Z₄ being markedly smaller than setae I₆.

Biology

Ornithonyssus bursa is a haematophagous mite found on a number of bird species (e.g. domestic fowl, pigeon (*Columba livia*), swallow, sand martin (*Riparia riparia*), house sparrow (*Passer domesticus*), and quite rarely on mammals (Micherdzinski, 1980).

The life-cycle includes a larva and two

nymphal stages, proto- and deutonymphs. The larvae and deutonymphs do not feed, and the duration of these stages is very short. Sucking of blood lasts only a couple of minutes. The generation time is normally 5-7 days, making a drastic increase in population size possible within a few weeks (Sikes & Chamberlain, 1959). Under these circumstances, second broods of swallows should more frequently be infected with mites than first broods because of population growth. Only 24% (N = 93) of first broods contained any mites, whereas 47% (N = 51) of second broods did so. The difference is highly significant ($\text{Chi}^2 = 7.21$, $\text{df} = 1$, $P < 0.01$).

The behaviour of *O. bursa* has been studied on starlings (*Sturnus vulgaris*) in New Zealand (Powlesland 1978, Petersen 1979). The mites overwinter on starlings, whereas those left in the nest die during the winter. Nestboxes are infected in spring from adults (25% have mites in their plumage). The mites suck blood from nestlings, changing their behaviour during nestling growth: when nestlings are small and the plumage is undeveloped, mites suck blood from the very thin skin on the feet and spend most of the time in the nest material. However, after a few days the birds begin to use their feet for movements, causing the skin to harden. As the plumage develops, mites are found there in great numbers, especially on the wings and the head. Many are probably transported away from nests as nestlings fledge. After a few days, those mites left behind in the nest material aggregate near the entrance hole where they may infect birds visiting the box. One nestbox in New Zealand held as many as 71,000 mites.

In Denmark the mites were similarly found partly in the nest material, partly on the birds. Large numbers of mites could be found on the nest rim in empty nests, and dead nestlings had large numbers dorsally especially on their heads.

Distribution

In Europe *O. bursa* is known from Czechoslovakia and Poland. It has furthermore been found in North and South America, Cuba, Japan, China, Thailand, Borneo, Australia, New Guinea, New Zealand and Hawaii (Micherdzinski, 1980).

Bird mites from Denmark

A total of 13 species of mites and ticks have been found on 14 species of wild birds, and 16 species on 8 species of domesticated birds (Table 2). Mites from wild birds principally belong to the ticks *Ixodidae* (Nos. 3-9 in Table 2). Larvae of *Neotrombicula autumnalis* have been found on different bird species in Northern Jutland. Mites from domesticated birds belong to the groups Actinedida (Nos. 12-14) and Acaridida (Nos. 15 - 25). Two species from the genus *Argas* have been found on pigeons (Nos. 1-2), and one haematophagous mite from Gamasida has been found on domestic fowl (No. 10).

Discussion

Although 189 bird species breed in Denmark (Dybbro, 1976), mites have until now only been recorded from 14 of these. Knowledge of mite bird hosts from Denmark is therefore highly scanty.

Birds migrating long distances and imported cage birds (e.g., parrots) may transport mites and, potentially also diseases, over huge distances. These mites can reinfect resident bird species, among others those frequently visiting poultry farms.

In poultry farms, birds heavily infected with *O. bursa* become scabby, anemic, droopy and progressively emaciated (Furman, 1963). Sulkin & Izumi (1947) isolated the western equine virus from the tropical fowl mites collected from house sparrows.

Boyd (1951) found that 300 starlings imported to USA from Europe were infected (3.8%) with *Ornithonyssus sylviarum*, also a pest species causing damage in poultry farms.

Powlesland (1978) found that *O. bursa* could survive only 4-6 weeks on a blood meal. However, in laboratory studies (21 °C) Mac Fayden extraction of mites from three nests of swallows ultimo November 1984 revealed many thousands of *O. bursa*, all adults in excellent condition, moving around with a speed of about 9 cm per minute. This is about 10-12 weeks after the nestlings fledged. Danish swallows winter in South Africa (Asbirk, 1971), and birds probably become infected in the winter quarter, where swallows from most of the western and central Palaearctic winter.

O. bursa can spread in a swallow or starling colony because of extrapair copulations, occasional visitors, and intraspecific nest parasitism. These activities occur frequently in large colonies suggesting that the infection rate probably increases markedly with increased colony size. Mite infections may affect the reproductive strategy of the swallows (reduced clutch size due to probable nestling mortality (Moss & Camin, 1970)), the nestling production (Table 1) and mate choice (Hamilton & Zuk, 1982).

It is well known that *O. bursa* is able to attack man (Lodha, 1969). Apart from *O. bursa*, both *Dermatophagoides gallinae* and *Ixodes plumbeus*, known in Denmark, may reduce the reproductive success of their host.

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Dr. Niels Haarløv, The Royal Veterinary and Agricultural University, Copenhagen, is thanked greatly for contributions to the list of mite species found on domesticated birds in Denmark.

Sammendrag

En undersøgelse af dødeligheden blandt danske landsvaleunger (*Hirundo rustica*) 1982-84 har vist, at denne falder sammen med forekomsten af store mængder af blod-sugende mider (tabel 1). To døde svalunger lagt i sprit indeholdt mere end 1000 mider pr. fugl. Kontrolundersøgelse af fjerdragten afslørede endnu et betydeligt antal mider pr. fugl.

Miderne tilhører den i Europa kun få gange tidligere observerede »tropiske fuglemide« *Ornithonyssus bursa*, der er kendt fra tropiske egne på alle kontinenter. Den forekommer både på domesticerede og vilde fugle. Miden er beskrevet (fig. 1 - 3 og tabel 1).

Blodsugningen hos *Ornithonyssus bursa* varer kun et par minutter. Udviklingen fra generation til generation varer 5-7 dage, hvilket muliggør en nærmest eksplosiv udvikling i bestanden på få uger. I overensstemmelse hermed blev det fundet, at 47% af rederne i andet kuld indeholdt mider, medens kun 24% af rederne i første kuld var inficeret. Dette mønster var særlig tydeligt i større kolonier, hvor fuglene tit besøger hinandens reder.

Ornithonyssus bursa's adfærd er studeret på stær (*Sturnus vulgaris*) på New Zealand af Powlesland (1978) og Petersen (1979).

Medens stæreungerne er små, skjuler miderne sig i redematerialet mellem blodmåltiderne, men efterhånden som fjerdragten udvikles, forbliver flere og flere mider på fuglene. De flyvefærdige unger bringer selvsagt mange mider med sig væk fra reden, og tilbageblevne mider vil evt. kunne overføres på tilfældige fugle, der besøger redekassen. Mider, der ikke findes på fugle, dør i løbet af vinteren, idet de kun kan klare sig 4-6 uger uden blod. Danske undersøgelser har dog vist, at miderne er i fortrinlig kondition ultimo november 1984, 10-12 uger efter at rederne er forladt, og miderne er formentlig i stand til at bevæge sig over betydelige afstande til fods.

Ca. 25% af stærene i New Zealand bærer miderne på sig om vinteren, og rederne inficeres således med mider fra fuglene om foråret. Adfærden på landsvaler forventes ikke at afvige fra ovenstående, dog må det undersøges, om miderne her i landet dør i løbet af vinteren.

I en enkelt stærekasse i New Zealand blev der fundet 71.000 mider.

Artiklen afsluttes med oversigt over mider fundet på forskellige fugle i Danmark.

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