MITES (ACARI) FOUND IN THE NESTS OF THE DIPPER *CINCLUS CINCLUS AQUATICUS* BECHSTEIN, IN WALES (BRITISH ISLES)

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NIDICOLOUS MITES
DIPPER
WALES

SUMMARY : The mites (Acari) found in seven nests of the Dipper, *Cinclus cinclus aquaticus* Bechstein, in Wales, British Isles, are studied. They belong to 54 species, included in 46 genera, 27 families and 4 orders. This collection includes several stored food pests or species able to invade houses or to produce respiratory allergies in man, e.g. *Tyrophagus putrescentiae* (Schrank), *T. longior* (Gervais), *T. palmarum* Oudemans, *Acarus farris* (Oudemans), *Dermatophagoides farinae* Hughes and *Kleemannia plumigera* (Oudemans). Several fleas, *Dasypsyllus g. gallinae* (Dale), found in one nest, were parasitized by phoretic hypopi of *Acarus avicolus* Fain and Beaucournu. *Tyrophagus nidicola* Dambre-Raes, 1974, is considered here as a synonym of *Tyrophagus palmarum* Oudemans, 1924.

ACARIENS NIDICOLES
CINCLES
PAYS DE GALLES

RÉSUMÉ : La faune acarologique récoltée dans 7 nids de cincles, *Cinclus cinclus aquaticus* Bechstein, au Pays de Galles, Grande-Bretagne, a été étudiée. Les espèces récoltées sont au nombre de 54, elles font partie de 46 genres, 27 familles et 4 ordres d'Acariens. Cette collection comprend plusieurs espèces qui sont habituellement rencontrées dans des matières alimentaires entreposées ou sont capables d'envahir des maisons ou de provoquer des allergies respiratoires chez l'homme ; c'est le cas notamment de *Tyrophagus putrescentiae* (Schrank), *T. longior* (Gervais), *T. palmarum* Oudemans, *Acarus farris* (Oudemans), *Dermatophagoides farinae* Hughes, *Kleemannia plumigera* (Oudemans). L'un des nids contenait des puces, *Dasypsyllus g. gallinae* (Dale), porteuses d'hypopes d'*Acarus avicolus* Fain et Beaucournu. *Tyrophagus nidicola* Dambre-Raes, 1974, décrit de nids de Paridae de Belgique est considéré ici comme un junior-synonyme de *Tyrophagus palmarum*.

INTRODUCTION

The acarofauna of birds' nests is still poorly known. One of the most important contributions in this field is that of NORDBERG (1936). This author, using Tullgren funnels, examined 422 nests of 56 different species of birds in the neighbourhood of Helsingfors, Finland. No nests of the dipper (*Cinclus cinclus*) were represented in this collection. NORDBERG recorded 528 different species of arthropods among which 273 species of mites. The

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Oribatids were represented by 96 species, the Mesostigmata (including the Uropodina) by 43 species, the Prostigmata (including the Hydrachnida) by 65 species, the Astigmata by 68 species, of which 16 free-living species and 52 species parasitic of birds (mainly feather mites) and the tiks, by one species. Some of these species are known as important pests of stored food products (e.g. *Glycyphagus domesticus* (De Geer) and *G. privatus* Oudemans) or harmful for domestic birds (*Dermanysus gallinae* (De Geer)). One might be surprised not to find in this collection representatives of the genera *Tyrophagus* or *Acarus* which are common inhabitants of birds' or rodents' nests.

In Britain, two important papers have been published on the arthropod fauna living in birds' ness. WOODROFFE and SOUTHGATE (1952) studied this fauna by using a technique consisting of sieving the debris of the nests through wire meshes of several sizes and examining the various fractions under the lower power of a binocular microscope. They examined 19 nests from the following house-nesting birds : *Passer domesticus* (L.) (10 nests), *Delichon urbica* (L.) (6 nests), *Sturnus vulgaris* L. (1 nest), *Erithacus rubecula* Hartlaub (1 nest) and *Motacilla alba* Gould (1 nest). They found 13 species of mites and several non identified oribatids. This collection contained several species that are regularly found associated with stored food products such as *Glycyphagus domesticus* and *Tyrolichus casei* Oudemans, or dwelling-houses (*Mealia pteronyssina* (Trouessart)), or parasites of domestic birds (*Dermanyssus gallinae*).

WOODROFFE (1953, 1954), using the sieving method of the previous authors, examined the nests of five species of birds (i.e. *Passer domesticus* (L.), *Delichon urbica* (L.) *Hirundo rustica* L., *Columba* sp. and *Corvus monedula* (L.)). He found 21 species of mites, of which several are known to infest stored food products (i.e. *Tyrophagus longior* (Gervais) (= *Tyroglyphus tenuiclavus* Zachvatkin), *Acarus siro* L. (= *Tyrophagus farinae* Latr.), *Glycyphagus domesticus, Thyreophagus entomophagus* (Laboulbène) or house dust (*Dermatophagoides* sp. = *Mealia* sp.).

RAES (1969), in Gent, Belgium, examined 101 nests of birds, of which 46 were of *Parus major* L., 23 of *P. caeruleus* L. and 32 of *Passer montanus* (L.). She found 43 species of mites (of which 38 were specifically named) belonging to 32 genera. Most of these species were oribatids (26 species). Some well know pests of stored food or parasitic species on domestic birds were present in this collection (e.g. *Acarus siro, Glycyphagus domesticus, Dermanyssus gallinae, D. hirundinis* (Hermann), *Ornithonyssus bursa* (Berlese), *Ixodes* sp.).

BAKER, DELFINADO and ABBATIELLO (1976), using the Berlese extraction method, investigated nests, of mostly unidentified birds, in New York, U.S.A. They found 21 species of mites among which several are commonly recorded from stored food products (e.g. *Tyrophagus longior, Acarus siro* and *Aeroglyphus robustus* (Banks)) or are associated with house dust allergy (*Dermatophagoides evansi* Fain and *Sturnophagoides bakeri* Fain), or with diseases in domestic fowl (*Dermanyssus gallinae*). Until recently no information was available concerning the mite fauna living in the nests of Dippers (*Cinclus* spp.). SPITZNAGEL (1985a), in a list of more than 600 publications dealing with various aspects of Dippers (biology, behaviour, faunistic, morphology, systematics etc...) did not mention any paper concerning the mites living in the nests of these birds. However, during the same year (1985b) this author recorded infestation of Dippers (*Cinclus cinclus aquaticus*) in Germany by a parasitic mite, *Ornithonyssus sylviarum* (Canestrini and Fanzago). The mites were observed on the birds from November to February. SCHMID (1985), also in Germany, observed the same mite species parasitizing 13 out of 45 nestlings of the dipper bred in nesting boxes made of eternit.

MATERIAL EXAMINED

Origin of the nests.

We have examined 7 nests of *Cinclus cinclus aquaticus*, all collected in Wales in May and June 1985, along the rivers Tywi, Teifi, Wye etc...

The mites were extracted from nests by the use of Berlese funnels and sent to one of us (M.G.) by Dr Stephanie J. TYLER, Conservation Officer for the Royal Society for the Protection of Birds (Wales).

The nests n° 1-6, were collected under the river bank in very wet areas. The seventh sample (nest 12) is the combined extractions from several nests all collected from drier sites under bridges.

Composition and structure of dipper nests in Wales.

Dr Stéphanie J. TYLER kindly provided us with the following information about the composition of the dippers' nests in this region of Wales : " Main structure and dome are made of mosses, chiefly *Eurhynchium praelongum* and other *Eurhynchium* species, e.g.*E. riparoides, Brachythecium rivulare, B. rutabulum, Thamnium alopecurum, Omalia trichomanoides, Hypnum cupressiforme, Thuidium tamariscinum, Rhytidiadelphus squarrosus* and *Fontinalis*. Some nests apparently contain mainly two or three species. The mosses used are usually either woodland/bankside species or as in the case of *Fontinalis* and *E. riparoides*, gathered from rocks in the river. I guess birds use mosses that are abundant in the locality, rather than selecting certain species — hence the listed species are all widespread and common. The inside of the nest is made of grasses, with dry leaves lining the cup. Leaves selected are often beech, but oak and ivy are also frequently used. Grasses used depend on the locality, e.g. *Molinia* in moorland nests ".

LIST OF THE MITES FOUND

ORDER MESOSTIGMATA

FAMILY PARASITIDAE

This family includes essentially predatory mites feeding on various microarthropods, and their eggs and on nematodes.

Parasitus fimetorum (Berlese, 1904).

This is one of the most widespread European species of *Parasitus*. It is distributed throughout the British Isles. It is generally found in rotting vegetation, compost, manure and dung and also in small mammals' nests and occasionally in birds' nests but not recorded, so far, from dippers' nests (HYATT, 1980).

We found several specimens (females an nymphs) from the nests n° 2 and 12.

Parasitus hyalinus (Willmann, 1949).

This species had been recorded only once from the British Isles, from the nest of *Riparia riparia*, from manure, mushroom compost and grassland (HYATT, 1980).

In the nest n° 6 we found 2 females. This is the first published record from Wales.

Holoparasitus lawrencei Hyatt, 1987.

This species had been described from several parts of the British Isles includind Wales. It was found in litter, moss, leaf-litter, humus, tree holes and in the nest of *Turdus merula* (HYATT, 1987).

We found a male and a female in the nest n° 12.

Porrhostaspis lunulata Müller, 1859.

A widespread European species, distributed throughout the British Isles and living in mosses, leafmould, compost etc...

Two female specimens were found in nest n° 12.

Vulgarogamasus kraepelini (Berlese, 1905).

This species occurs in mosses, deciduous litter, rotten wood, grassland fungi, in nests of mammals etc... It has been recorded from different countries in Europe and throughout the British Isles, including Wales (HYATT, 1980).

Our specimens (2 females) were found in nest n° 4.

Paragamasus robustus (Oudemans, 1902).

This species has been recorded from the western countries of Europe and is widely represented in the British Isles in Sphagnum, moss, humus, leaf mould etc...

Nests n° 4 and 12 each contained one female.

Paragamasus ? lapponicus Trägårdh, 1910.

One female belonging to the *runciger* group of *Paragamasus* was found in nest n° 12.

Family Veigaiidae

Veigaia transisalae (Oudemans, 1902).

This species is widespread in Europe, includind the British Isles. It is predacious in habit as are other species of the genus.

We found two females in nest n° 4.

Family Digamasellidae

Dendrolaelaps sp.

One female specimen in poor condition found in nest n° 3.

Family Eviphididae

These mites are free-living and occur in the soil and in litter. They are associated with other arthropods. The majority of species are nematophagous. (Evans and Till, 1979).

Eviphis ostrinus (C. L. Koch, 1836).

We found 4 females from nest n° 4 and one female from nest n° 12.

Alliphis ? necrophilus Christie, 1983.

This species, described from England, is very close to *A. halleri* (Canestrini).

We found ten females and two males in the nests n° 2, 3, 4, 5 and 12.

Family Ascidae

The mites of this family are free living and feed on fungi and pollen or prey on other invertebrates. They occur in soil or humus or in nests or shelters of birds, mammals or arthropods (Evans and Till, 1979).

Zerconopsis remiger (Kramer, 1876).

Four females were found in nest n° 2.

Gamasellodes ? vulgatior Athias-Henriot, 1961.

Two females from nests n° 4 and 6.

Proctolaelaps pygmaeus (Müller, 1859).

We found 15 females and 2 males from the nests n° 1, 2, 3, and 12.

Iphidozercon gibbus (Berlese, 1903).

Only from nest n° 2 (3 females and 1 nymph.)

Arctoseius cetratus (Sellnick, 1940).

We found three females in nest n° 4.

Family Ameroseiidae

Kleemannia plumigera Oudemans, 1930.

The species is mycophagous and may occur in large numbers in new houses where they feed on moulds which grow on vegetable material used as a insulating material (Rack, 1971). This species has also been recovered from litter of broiler houses, in sifting from oats and on baled hay (Hughes, 1976).

We found several females in nest n° 1.

Family Zerconidae

These mites lives in woodland humus and litter and in grassland. They are probably all oligophagous predators (Evans and Till, 1979).

Zercon zelawaiensis Sellnick, 1944.

We found one female in nest n° 12. This species had already been recorded from the British Isles in

Calluna heat in Devon and from the Burren Co Clare, Ireland (EVANS, 1953).

Zercon triangularis C. L. Koch.

We found one female in nest n° 12.

FAMILY LAELAPIDAE

SUBFAMILY LAELAPINAE

This subfamily includes numerous species either free-living or associated with insects, (e.g. *Hypoaspis*), birds or mammals (e.g. *Androlaelaps*).

Androlaelaps casalis (Berlese, 1887).

This cosmopolitan and common species occupies a wide range of habitats. It has been found on the bodies and in the nests of numerous species of mammals and birds, but it does not appear to harm these hosts. *A. casalis* is a general feeder and a predator of acarid mites (HUGHES, 1976).

This species has been collected (about 20 females specimens) from all our nests.

Hypoaspis sp.

A total of 12 females and three males were collected from nests n° 3, 4 and 6.

FAMILY UROPODIDAE

Nenteria ? oudemansi Hirschmann, 1969.

Two females collected from nest n° 12.

ORDER PROSTIGMATA

FAMILY TARSONEMIDAE

Tarsonemus sp.

Female specimens from nests n° 6 and 12.

FAMILY BDELLIDAE

Bdella muscorum Ewing, 1909.

We found one male from nest n° 12.

FAMILY PYGMEPHORIDAE

Pediculaster calcaratus (Mahunka, 1965)

This species has been described from the soil of pasture at Ajka, Hungary. It was known only from its typical locality.

We found a single specimen from the nest n° 12.

FAMILY TYDEIDAE

Tydeus sp.

One nymph from nest n° 12.

Lorrya catenulata (Sig Thor, 1931)

Six females from the nest n° 12.

Coccotydeus ? globifer Sig Thor, 1931.

This species has been described from moss at Frognersaeteren, Svalbard, near Olso, Norway. It is the type of the genus *Coccotydeus* Thor, 1931. BAKER (1965) examining the type of *Tydaeolus atomus* (Berlese, 1908) (= type species of genus *Tydaeolus* Berlese, 1910) noted that it beared only one pair of club-like sensillae, as in *Coccotydeus*, and not two pairs as described by BERLESE. Consequently he synonymized *Coccotydeus* with *Tydaeolus*. BAKER also noted that the type of *T. atomus* is in very poor condition and that the chaetotaxy (except the sensillae) and the dorsal striations were not observable. We think therefore that the synonymy of these genera, based only on the similarity in the sensillae, is difficult to accept. Moreover, the exact status of *Coccotydeus* is still uncertain by lack of an accurate description of the type species (*C.*

globifer). We propose therefore to retain provisionally the genus *Coccotydeus*, until new specimens of the typical species (*C. globifer*) and from the typical locality become available and could be restudied. In the nest n° 6 we found 10 females that we tentatively identify as *Coccotydeus globifer*. Our specimens are 160 to 190 μm long (idiosoma) and 75-85 μm wide. The body is divided in two regions by a transverse suture (sejugal furrow). The sensillae are club-shaped with a very thin and long stalk and a strongly inflated extremity 7 to 8 μm wide and 12 μm long. The setae *vi* (paramedian pair) are situated very slightly behind the line joining the sensillae (= *sc i*) ; the setae *ve* are short and situated in front of the sensillae ; the setae *sc e* are lateral and situated slightly behind the *vi*. (This setal nomenclature is that of FAIN, 1973). The striations of the median area of the dorsum are longitudinal on the propodosoma and transverse on the hysterosoma. Dorsal setae thin with indistinct barbs. There are 6 pairs of genital setae (of which 3 pairs are paramedian), 2 pairs of pregenital setae and one pair of anal setae. Leg setae (solenidia and famulus not included) : tarsi 12-8-7-7 ; tibiae 4-2-2-2 ; genua 4-4-1-1 ; femora 6-3-3-2 ; trochanters 1-1-1-0 ; coxae 2-1-3-2.

Coccotydeus ? tenuiclaviger Sig Thor, 1931.

This species was described from the same habitat as *T. globifer*.

In the nest n° 6 we found 20 females which resemble the description of *C. tenuiclaviger* except that the setae *vi* are slightly behind the line of the sensillae. Our specimens are 135 to 170 μm long (idiosoma) and 70 to 90 μm wide. The sensillae are in the shape of an elongate club, the apical half has a maximum width of 5 μ and the inflated part is 16-18 μm long. Dorsal striations as in *C. ? globifer* but dorsal setae thicker and distinctly barbed, the opisthonotal setae about twice as long as the podonotal setae. There are 5 pairs of genital setae (of which 2 pairs paramedian). Leg setae as in *C. globifer*. MURPHY (1954) recorded the presence of *C. tenuiclaviger* from natural heathland in Yorkshire and WOOD (1965) described two new species of *Tydaeolus* (= *Coccotydeus*) from Britain. Dr. R. MEHL, Institute of Public Health, Oslo, kindly sent us two Berlese samples that he collected from mosses in Frognesaeteren, near Oslo, but unfortunately they did not contain specimen of the genus *Coccotydeus*.

FAMILY CUNAXIDAE

Cunaxa sp. near *capreolus* (Berlese, 1890)

We found one specimen in nest n° 1.

FAMILY STIGMAEIDAE

Eustigmaeus sp.

One male specimen from nest n° 1.

ORDER ASTIGMATA

FAMILY ACARIDAE

Tyrophagus putrescentiae (Schrank, 1781)

This species is represented by several specimens (females and males) found in the nest n° 1.

Tyrophagus longior (Gervais, 1844).

We found two males, one female and one nymph in the nest n° 2.

Tyrophagus palmarum Oudemans, 1924 (= *Tyrophagus nidicola* Dambre-Raes, 1974 ***Syn. nov.***).

Numerous specimens of that species have been found in all the nests that we have examined. *T. nidicola* was described from nests of *Parus major* and *P. caeruleus* in Belgium. We have examined paratypes of this species and cannot find any significant difference between them and *T. palmarum* so that *T. nidicola* is here regarded as a junior

synonym of *T. palmarum*. In the original figures and description of *T. nidicola*, setae *ve* are depicted as microsetae whilst in the paratypes they are relatively long as it the rule in the genus *Tyrophagus*.

Acarus nidicolous Griffiths, 1970.

This species has been described from nests of rodents, mole, hegehog, the hooded crow etc... from Great Britain. It is known from adults and immatures including hypopi. FAIN and BEAUCOURNU (1972) recorded the presence of phoretic hypopi of this species in France from seven species of fleas from insectivores (mole and hedgehog) and on a flea from *Mustela nivalis*.

Adults and immatures (including a few hypopi) of *A. nidicolous* were present in nests n° 3, 4, 5 and 12.

Acarus farris (Oudemans, 1905).

We assign to this species six males, eight females and several nymphs found in the nest n° 12. In this nest we also found numerous hypopi which are morphologically closer to *Acarus avicolus* Fain and Beaucournu (1972) than to those of *A. farris*. In our specimens the scapular setae are distinctly shorter than in the hypopi of *A. farris* depicted by GRIFFITHS (1970) or collected by one of us (M. G.) in English cheeses also infested by adults of this species. *A. farris* is very frequent in cheddar stores in England (WILKIN, 1979).

Acarus avicolus Fain and Beaucournu, 1972.

This species has been described from hypopi collected from three different species of flea off four species of birds in France. These hypopi are morphologically intermediate between those of *A. nidicolous* and those of *A. farris*. In the nest n° 3 we found eight fleas, *Dasypsyllus g. gallinae* (Dale) of which three bore a total of eight hypopi of *A. avicolus*. Most of the hypopi found in the nest n° 12 are of the " avicolus " type. It is not possible, by lack of material, to decide if *A. avicolus* is a simple variation of *A. farris* or a good species. We hope to be able to collect more material and to solve this problem.

FAMILY PYROGLYPHIDAE

Dermatophagoides farinae (Hughes, 1961).

We found one tritonymph in the nest n° 3

FAMILY HISTIOSTOMATIDAE

Histiostoma feroniarum (Dufour, 1839).

Numerous specimens of all stages (including hypopi) in the nests 1, 2, 3, 5, 6 and 12.

ORDER ORIBATIDA
(= CRYPTOSTIGMATA)

The oribatid mites are generally living in humus, moss, Sphagnum, dead wood, litter of forest, on leaves, on lichens, under stones, under bark of trees etc... The species found in nests were probably introduced with the material (mostly moss) used to build the nest.

FAMILY CAMISIIDAE

Platynothrus peltifer (C. L. Koch, 1839).

One nymph from nest n° 12. This species is known from moss and Sphagnum.

FAMILY EREMAEIDAE

Eremaeus oblongus (C. L. Koch, 1836).

One adult was found in nest n° 12.

Family Oppiidae

Dissorhina ornata (Oudemans, 1900).

We found six adults in nests n° 1, 4 and 12. This species is very common in Britain (Evans).

Lauroppia neerlandica (Oudemans, 1900).

We collected twelve adults from nests n° 4, 5 and 6.

Medioppia subpectinata (Oudemans, 1900).

We found one adult in nest n° 1

Moritziella unicarinata (Paoli, 1908).

Two adults were found in nest n° 4.

Oppiella nova (Oudemans, 1902).

We found ten adults in nests n° 1 and 5.

Quadroppia quadricarinata (Michaël, 1885).

Two adults were found in nest n° 12.

Ramusella clavipectinata (Michaël, 1885).

We found six adults in nests n° 4 and 5.

Family Banksinomidae

Banksinoma lanceolata (Michaël, 1885).

We found 12 adults in nests n° 4, 5 and 6.

Family Oribatulidae

Zygoribatula exilis (Nicolet, 1855)

Ten adults were found in nest n° 12.

Family Scheloribatidae

Liebstadia similis (Michaël, 1888).

A few adult specimens were found in nest n° 1.

Family Chamobatidae

Chamobates borealis (Trägårdh, 1902).

One adult was found in nest n° 12.

Family Mycobatidae

Minunthozetes semirufus (C. L. Koch, 1841).

Two adults found in nests n° 1 and 4.

Family Achipteriidae

Pseudachipteria magna (Sellnick, 1928).

One adult was found in nest n° 12.

Conclusions

The study of seven dipper nests in Wales has revealed the presence of an important acarofauna. A total of 54 species were identified in these nests. They belong to 46 genera, 27 families and four orders of mites. This collection includes several food pests (*Tyrophagus putrescentiae, T. longior, T. palmarum, Acarus farris*) and one species, *Kleemannia plumigera*, able to invade new houses in large numbers. Another species, *Dermatophagoides farinae*, an important producer of house-dust allergy, was represented by a single specimen and it is therefore not possible to exclude the possibility of contamination.

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LIST OF THE MITE SPECIES FOUND IN THE NESTS OF *CINCLUS CINCLUS AQUATICUS* IN WALES

	Nest 1	Nest 2	Nest 3	Nest 4	Nest 5	Nest 6	Nest 12
MESOSTIGMATA							
PARASITIDAE							
Parasitus fimetorum	–	+	–	–	–	–	+
Parasitus hyalinus	–	–	–	–	–	+	–
Holoparasitus lawrencei	–	–	–	–	–	–	+
Porrhostaspis lunulata	–	–	–	–	–	–	+
Vulgarogamasus kraepelini	–	–	–	+	–	–	–
Paragamasus robustus	–	–	–	+	–	–	+
Paragamasus ? lapponicus	–	–	–	–	–	–	+
VEIGAIIDAE							
Veigaia transisalae	–	–	–	+	–	–	–
DIGAMASELLIDAE							
Dendrolaelaps sp.	–	–	+	–	–	–	–
EVIPHIDIDAE							
Eviphis ostrinus	–	–	–	+	–	–	+
Alliphis ? necrophilus	–	+	+	+	+	–	+
ASCIDAE							
Zerconopsis remiger	–	+	–	–	–	–	–
Gamasellodes ? vulgatior	–	–	–	+	–	+	–
Proctolaelaps pygmaeus	+	+	+	–	–	–	+
Iphidozercon gibbus	–	+	–	–	–	–	–
Arctoseius cetratus	–	–	–	+	–	–	–
AMEROSEIIDAE							
Kleemaninia plumigera	+	–	–	–	–	–	–
ZERCONIDAE							
Zercon zelawaiensis	–	–	–	–	–	–	+
Zercon triangularis	–	–	–	–	–	–	+
LAELAPIDAE							
Androlaelaps casalis	+	+	+	+	+	+	+
Hypoaspis sp.	–	–	+	+	–	+	–

LIST OF THE MITE SPECIES FOUND IN THE NESTS OF *CINCLUS CINCLUS AQUATICUS* IN WALES (CONTINUED)

	Nest 1	Nest 2	Nest 3	Nest 4	Nest 5	Nest 6	Nest 12
UROPODIDAE							
Nenteria ? oudemansi	–	–	–	–	–	–	+
PROSTIGMATA							
PYGMEPHORIDAE							
Pediculaster calcaratus	–	–	–	–	–	–	+
TARSONEMIDAE							
Tarsonemus sp.	–	–	–	–	–	+	+
BDELLIDAE							
Bdella muscorum	–	–	–	–	–	–	+
TYDEDAE							
Lorryia catenulata	–	–	–	–	–	–	+
Tydeus sp.	–	–	–	–	–	–	+
Coccotydeus ? globifer	–	–	–	–	–	+	–
Coccotydeus ? tenuiclaviger	–	–	–	–	–	+	–
CUNAXIDAE							
Cunaxa sp. nr. *capreolus*	+	–	–	–	–	–	–
STIGMAEIDAE							
Eustigmaeus sp.	+	–	–	–	–	–	–
ASTIGMATA							
ACARIDAE							
Tyrophagus putrescentiae	+	–	–	–	–	–	–
Tyrophagus longior	–	+	–	–	–	–	–
Tyrophagus palmarum	+	+	+	+	+	+	+
Acarus nidicolous	–	–	+	+	+	–	+
Acarus farris	–	–	–	–	–	–	+
Acarus avicolus	–	–	+	–	–	–	+
HISTIOSTOMATIDAE							
Histiostoma feroniarum	+	+	+	–	+	+	+
PYROGLYPHYDAE							
Dermatophagoides farinae	–	–	+	–	–	–	–
ORIBATIDA							
CAMISIIDAE							
Platynothrus peltifer	–	–	–	–	–	–	+
EREMAEIDAE							
Eremaeus oblongus	–	–	–	–	–	–	+

LIST OF THE MITE SPECIES FOUND IN THE NESTS OF *CINCLUS CINCLUS AQUATICUS* IN WALES (CONTINUED)

	Nest 1	Nest 2	Nest 3	Nest 4	Nest 5	Nest 6	Nest 12
ORIBATIDA (continued)							
OPPIIDAE							
Dissorhina ornata	+	–	–	+	–	–	+
Lauroppia neerlandica	–	–	–	+	+	+	–
Medioppia subpectinata	+	–	–	–	–	–	–
Moritziella unicarinata	–	–	–	+	–	–	–
Oppiella nova	+	–	–	–	+	–	–
Quadroppia quadricarinata	–	–	–	–	–	–	+
Ramusella clavipectinata	–	–	–	+	+	–	–
BANKSINOMIDAE							
Banksinoma lanceolata	–	–	–	+	+	+	–
ORIBATULIDAE							
Zygoribatula exillis	–	–	–	–	–	–	+
SCHELORIBATIDAE							
Liebstadia similis	+	–	–	–	–	–	–
CHAMOBATIDAE							
Chamobates borealis	–	–	–	–	–	–	+
MYCOBATIDAE							
Minunthozetes semirufus	+	–	–	+	–	–	–
ACHIPTERIIDAE							
Pseudachipteria magna	–	–	–	–	–	–	+

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