

John Chitty BVetMed CertZooMed MRCVS
JC Exotic Pet Consultancy Ltd.
Wombourne, Allington Track
Allington, Salisbury, Wilts SP4 0DD, UK

A vast number of ectoparasites may be found on birds. However clinical disease caused by these parasites is not common and this may explain the lack of coverage of these parasites in the major avian texts and the few descriptions of each parasite species. For this latter reason this paper will not endeavour to name and list each species of avian parasite, nor will it be a guide to speciation of parasites.

It will be a guide to the major groups of parasites, how to differentiate them and what clinical significance, if any, may be attached to them.

A formulary of anti-parasitic agents used on birds and in the environment is provided at the end to prevent duplication of information through the main text.

FLEAS

A wide variety of species of Siphonaptera may be found on many bird species (eg the European Chick Flea, *Ceratophyllus gallinae*) though they are seldom seen. Fleas in general are not host specific and it is likely that these flea species are not specific to an avian host species. Arnall and Keymer (1975) suggest that they may even transfer between avian and mammalian hosts.

The majority of the flea life-cycle is spent off the host around nest sites. A large build-up may occur where many birds nest (eg starlings in roof spaces - Cole, 1997). Large numbers may cause irritation and restlessness and it is possible that significant blood loss could occur in nestlings but there is little documented evidence for this.

One species is worthy of mention, *Echidnophaga gallinacea* the Sticktight Flea. This is common in the Tropics and Sub-Tropics but may be seen on imported birds (mainly poultry/ game but also psittacines, raptors and pigeons). Unlike other flea species which regularly transfer between hosts, this species attaches firmly around the head. In severe cases hyperkeratinisation, irritation and anaemia may occur.

Diagnosis: Adult fleas on birds. More usually finding adult fleas and their eggs, larvae and pupae in nest sites.

Clinical importance: Low!

FLIES

Hippoboscids

aka. Flatflies or louseflies

Related to keds. Many species found on birds including *Pseudolynchia* spp (*Pseudolynchia canariensis* -

Pigeon Louse Fly) and *Ornithomyia* spp. Not host specific. Some species are wingless, others able to fly. Some complete lifecycle on host while others spend time in nests/ crevices and may lay eggs off the host. Blood-sucking.

These may cause pruritus and in severe cases may cause anaemia (especially in young birds). Their main significance is in the spread of blood parasites (eg *Haemoproteus* spp and *Leucocytozoon* spp) and the transfer of mites and lice between individuals.

Diagnosis: easily recognised as large flies flattened dorso-ventrally.

Clinical Importance: Very common – anaemia in chicks is rare, but vector effects are very important.

Myiasis

Invasion of diseased tissue by larvae of Calliphoridae (Blowflies), eg *Calliphora* (Bluebottle) and *Lucilia* (Greenbottle).

This is uncommon in UK birds as most nest and fledge before the main fly season (Malley and Whitbread, 1996). It is therefore only seen in extremely debilitated birds.

Diagnosis: Finding of typical larvae in wounds

Therapy: Cleaning and removal of larvae/ eggs. Treatment of underlying conditions. Application of diluted ivermectin (see below) sprayed on to contaminated tissue and systemic dosing of ivermectin.

Clinical Importance: Unusual even in wild birds. Nonetheless, very serious when it occurs

Mosquitoes (Culicidae)/ Gnats(Simulidae)

Biting insects transmit various diseases:

- Mosquitoes – *Haemoproteus* spp, avipox virus, Avian Malaria (*Plasmodium* spp)
- Gnats – *Leucocytozoon* spp

These will rarely be seen on the birds.

Control: Avoidance of fly breeding areas when siting aviaries. Application of fipronil spray to areas of bare skin (especially the face). Products available in the UK for sandfly control in dogs are not currently recommended for use on birds

Clinical Importance: Blood parasites becoming much more common – therefore fly control vital

“Bugs”

Related to the bedbug, *Cimex lectularius*. Order Hemiptera. Many species found on birds, including *Cimex* spp and *Oeciacus* spp. These are host-specific, eg pigeon has *Cimex columbarius*. Wingless; live and lay eggs in the nest environment. Nymphs and adults are blood-sucking and high levels of infestation may cause anaemia and debility, especially in young birds.

Diagnosis: finding adults, nymphs and larvae in the environment. Larger than mites and have six legs in all stages

Clinical importance: Low

Lice

Wingless insects, these are the most common avian ectoparasites. Flattened dorso-ventrally. Only chewing/ biting lice (Mallophaga) occur on birds with vast numbers described. Two orders of lice are found on birds, Amblycera (approx 1300 species described) and Ischnocera (2900 species described on birds from a total of ca 3060 species named in this order).

Lice appear to be host-specific and will cluster in various parts of the body with many species being specific for each niche (eg head and neck, topside/ underside of wings, rump/ tail). This may be reflected in their morphology, eg on pigeons, the slender louse (*Columbicola columbae*) on wings and

the larger body louse (*Menopon latum*). They may be named by host, preferred site or morphology. For a full review, see Smith (2001) or http://darwin.zoology.gla.ac.uk/~vsmith/index_guide.html

They can move directly between hosts or may “hitch lifts” on hippoboscids flies.

Diagnosis: the complete life-cycle occurs on the host. Adult lice are easily seen moving around the plumage or eggs may be seen attached to feathers.

Clinical Importance: Lice are rarely linked to significant pathology. Heavy infestations may cause feather damage and irritation but, more importantly, are a sign of debility/ poor husbandry.

Ticks

Hard ticks (Ixodidae) may feed on birds in the UK. However, soft ticks may be found on newly imported birds.

Large numbers may cause irritation, debility, anaemia and death. Transmit haemoprotozoa (eg *Aegyptionella* spp), arboviruses (eg louping ill - grouse), *Borrelia* spp. (Kurtenbach et al., 1999). These are a major problem in captive birds. The first sign is normally an extremely sick or collapsed bird with extensive haemorrhagic swelling of the face/ head. The tick is normally associated with this swelling. In a recent study (Monks et al., 2006), the major/sole tick associated with lesions was identified as *Ixodes frontalis*. This study failed to show a link with tick-borne pathogens. It is therefore likely that this syndrome may be associated with a tick saliva toxin or a hypersensitivity reaction.

Interestingly, the reaction is only associated with tick attachment around the head. In some cases seen by this author there have also been ticks on the body that have not had an associated reaction. However, it is also possible that these other ticks may have been of another species

Chastel et al. (1991) showed reactions were more common in unusual hosts or with multiple engorged adult female ticks. This may suggest a novel infection or, more likely, a host-parasite intolerance. *Ixodes frontalis* is most commonly associated with Turdidae.

Birds showing tick reactions should be treated as an emergency. Fluids, broad-spectrum antibiotics and short-acting corticosteroids (eg dexamethasone; Dexadreson, Intervet) should be administered as quickly as possible. Monks et al. (2006) describes a therapeutic success rate of 75%. In this author's experience, provided birds are presented quickly enough survival rates can be much higher.

Diagnosis: easily seen on birds.

Therapy: environmental control with “Indorex” spray (Virbac; see below) very effective (Forbes, personal communication). This should be combined with regular fipronil applications and avoid bringing ticks into the aviary areas (Chitty, 2000).

Ticks already on the bird should be manually removed and the bird dosed with ivermectin.

Clinical Importance: High! See above

Mites

For a full review see Philips (1997)

***Dermanyssus* - aka. Red Mite/ Roost Mite**

Free-living mite living in housing; breeds off the host and only feeds (blood) at night.

Primarily a parasite of poultry (*D. gallinae*) but will feed on any bird. Can cause intense irritation and restlessness as well as anaemia/ debility if numbers large enough. May be fatal to young birds.

Diagnosis: mites active at night. May get on humans as well as birds. Examine birds/ perches/ etc at night. A white sheet placed in aviary/ over cage at night may attract mites which can then be seen in the morning (Keymer, 1982).

Therapy: see Formulary. Environmental control essential but it should be realised that this is extremely difficult to achieve – destruction of the environment, followed by on-bird therapy and moving to a new, clean environment is the only recommended method. Any new bird entering a flock

should be treated for ectoparasites – especially for poultry

Clinical Importance: High!

Ornithonyssus - aka Northern Fowl Mite

A poultry parasite (*O. sylviarum*) but also found on many other species. Similar to *Dermanyssus* but completes life-cycle on the host and feeds (blood) through the day as well. It is therefore associated with more irritation than red mite. Control is easier as the mite is an obligate parasite.

Diagnosis: Large mites may be found feeding on birds typically around the vent. Mites/ eggs may be found on faecal examinations following ingestion during preening.

Clinical importance: Much less common than *Dermanyssus* in the UK, but growing importance

Harvest Mite - *Neotrombicula autumnalis*

Parasitic larval stage. Very unusual on birds. May provoke an intense reaction, including vesicle formation.

Diagnosis: mites easily identified on birds.

Clinical Importance: Low

Feather Mites

These live between the barbs on the ventral surface of feathers. The entire life-cycle is spent on the bird. As with lice, species appear host-specific and also prefer certain niches on the bird, eg. on the budgerigar, *Protolichus lunula* is found on wing and tail feather while *Dubininia melopsittaci* is found on smaller body feathers. Over 1400 species have been described. Most are not directly damaging to feathers (though *Falculifer rostratus* may damage feathers on the wings of pigeons) and light burdens generally cause no problems. It is proposed that mite burdens are kept low by the beating of the wings and that large numbers build-up when birds are too debilitated to flap wings (Atyeo and Gaud, 1979). In these situations mites may move off the feathers and onto the skin causing considerable irritation. This can result in loss of productivity in poultry.

Diagnosis: adult mites are easily seen as dark dots on feathers. They may be gathered on acetate strips. Discarded sheds of nymphs may be found in the plumulaceous barbs.

Therapy: see Formulary

Clinical Importance: Low, but large numbers indicate debility

Quill Mites

Most species live and reproduce in quills where they feed on available secretions and detritus. The exception are Syringophilid mites which penetrate the quill and suck tissue fluid. In large numbers these may cause feathers to break easily and may predispose to follicle and pulp infections.

Diagnosis: appearance of damaged quills (opaque instead of transparent). Opening the quill and examining contents microscopically will reveal mites and eggs.

Clinical Importance: Low

Quill Wall Mites

Laminosioptidae and Fainocoptinae. These parasitise the developing primaries of a wide variety of species. They feed on the outer unkeratinised layers of the feather germ triggering hyperkeratosis of the sheath.

Diagnosis: Appearance of feathers. Scrapings of hyperkeratotic areas reveal mites.

Clinical Importance: Low

Skin Mites

Many species of mite may colonise avian skin. They may be considered in four groups:-

- **Epidermoptid Mites:** eg. *Psittophagoides* (psittacine birds), *Passeroptes* (columbid and passerine birds) which live on the skin surface; *Michrlichus avus* (canary), *Proyialges* (passerines), *Myialges* (many) burrow into the cornified layers. These latter mites possess clawlike processes on the anterior legs enabling burrowing. These also enable the mite to cling onto hippoboscids and move between hosts. These may produce pruritus, crater lesions, scurf, and hyperkeratosis (aka. depluming itch; feather rot). Burrows may be seen as long winding lesions in the skin. *Microlichus* spp (canaries) live in feather bulbs producing congestion and swelling.
Diagnosis: typical signs, skin scrape, biopsy.
Clinical Importance: Reasonably common – especially in poultry
- **Cnemidocoptid mites:** these invade follicles and the stratum corneum of the face and cere (*C. pilae* (psittacine birds, esp budgerigars)) or feet and legs (*C. pilae*, *C. jamaicensis* (passerine birds); *C. mutans* (poultry)).
The mites burrowing activity stimulates hyperplasia and hyperkeratosis. There may also be a heterophilic inflammation (Pass, 1989).
Neocnemidocoptes gallinae may produce lesions similar to “depluming itch” in poultry.
Diagnosis: (very) typical signs, skin scrapes.
Clinical Importance: very common in small psittacids, passerines and poultry
- **Harpyrhynchid mites:** Several species of *Harpyrhynchus* occur on psittacine birds. *H. serini* is found on canaries and *H. columbae* on pigeons. These attach to feather bases. In severe cases hyperkeratotic epidermal cysts may be produced. These appear pea-sized and white/yellow.
Diagnosis: signs, mites may be found inside cysts, eggs may be found on the calamus.
Clinical Importance: Low
- **Cheyletellid mites:** Rare but may produce lesions and a “mange” by burrowing in the stratum corneum. *Ornithocheyletia* spp are found on psittacines. Cheyletellid mite burrows in pigeons have been found to become colonised by a mould (*Micromonospora*) and the mite then feeds on the keratin breakdown products from the mould.
Diagnosis: skin scrape.
Clinical Importance: Low

Parasites and Feather Plucking

Many cases of feather plucking in parrots are blamed on ectoparasites. The truth is that ectoparasites are an extremely rare cause of feather plucking: most plucking pet parrots are kept singly and housed indoors – thus they have little opportunity to become infected!

However, ectoparasites may be suspected if

- The case is in an outdoor bird
- More than one bird is affected
- Or the bird has only just been obtained from a dealer or pet shop, or has been taken to a show/ gathering of birds of same or similar species
- The bird has suggestive lesions – eg feather damage (not chewed!), lesions in the calamus or skin
- The bird appears to be genuinely pruritic

Given the large range of possible parasites, it is wisest to take appropriate samples and look for these parasites rather than simply treat with avermectins

FORMULARY

Drug	Trade Names	Active Against	Dosage	Notes
“On Bird”				
High cis permethrin	Harker’s Louse Powder (Harkers)	Feather/ quill mites, lice, fleas, hippoboscid flies	Powder applied through plumage. Repeated every 2-3 weeks	Licensed for pigeons
Piperonyl butoxide/ pyrethrin	Ridmite Powder (Johnson)	As above	Apply through plumage. Repeat every 10-21 days	
Piperonal/ Cedarwood Oil/ Tea Tree Oil	Blast-Off Powder (Birdcare Co)	As above	Apply through plumage. Repeat fortnightly	Advised to use concurrently with Zodiac + environmental spray to kill repelled mites
Fipronil	Frontline (Merial)	Feather/ quill mites, lice, fleas, <i>Dermanyssus/ Ornithonyssus</i> , ticks, hippoboscid flies. Prophylaxis against biting flies	Apply spray to cotton wool and then apply to back of head, under wings + base of tail. Repeat every 2-4 weeks For biting fly prophylaxis apply to bare areas of skin weekly or (for falconry birds) whenever flown in risk areas	Do not soak birds (risk of hypothermia) Use spray, not spot-on
Ivermectin	Topical drops available (eg Ivermectin Drops (0.1%) (Pharmaq) ** 0.02% spray Xeno200 (Genitrix)	Burrowing mites (<i>Cnemidocoptes</i> spp, “depluming itch”), <i>Dermanyssus/ Ornithonyssus</i> , myiasis	Apply as directed In larger birds use injectable preparations at 200µg/kg i/m or orally	Care- toxicity associated with injection in passerines
Environment				
Malathion	Duramitex (Harkers)	<i>Dermanyssus</i>		Dilute 0.93%. Paint/ spray on perches
Permethrin/ pyriproxyfen	Indorex (Virbac)	<i>Dermanyssus</i> , ticks, fleas		Spray as necessary. Excellent in outdoor areas
Methoprene/ Permethrin	Zodiac + (Birdcare Co)	Fleas, bugs, mites		See above re “Blast-Off” powder

** As these drops are now readily available from pet shops and suppliers in the UK, always check as to whether or not the keeper has been using them before being disappointed when diagnostic tests reveal no parasites!

It is also important to note that some produce different ivermectin preparations for different size birds (eg Beaphar) so it is important to check which preparations have been used

REFERENCES

- www.missouri.edu/~vmicrorc/Byhost/Poultry.htm : a very useful web resource with separate sections on parasites of raptors, cage birds and ratites
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