Trichomoniasis in wild birds presented to a southwest wildlife hospital (1998-2002).

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Introduction:

Reports of unusually high numbers of wood pigeons dying of oral trichomoniasis in the south of England during 2002 (Duff, 2002), prompted a retrospective review of hospital record cards going back over a five year period. Attention was directed towards a number of **predatory species** (tawny owls (*Strix aluco*), barn owls (*Tyto alba*), buzzards (*Buteo buteo*), sparrow hawks (*Accipiter nisus*) and peregrine falcons(*Falco peregrinus*)) and **prey species** (wood pigeons (*Columba palumbus*) and collared doves (*Streptopelia decaocto*)). The presentation and annual incidence of this parasitic disease in each species is presented and discussed.

Methods:

The hospital record cards for the five-year period (1998-2002) were reviewed manually. Birds were identified as suffering from oral trichomoniasis where large plaques of yellow necrotic debris were identified on the mucosa of the oropharynx. Unfortunately, this was often denoted on the cards by the word “canker” without there being any further details on the extent or nature of the lesions. Where the birds were examined by the author, swabs were taken by rubbing a moistened cotton bud over and into the lesion. A drop of liquid was then squeezed from the swab, onto a microscope slide, and examined immediately with a light microscope, under low and high power, for flagellated motile organisms (typical of the trichomonad parasite).

An attempt was made for certain species to differentiate juvenile from adult birds. This was possible for wood pigeons, collared doves, tawny owls and barn owls. Nestlings and fledglings of these four species are often found by members of the public and presented to rehabilitation centres. The presence of downy feathers will have been used to identify these birds as juveniles.

Results:

Oral trichomoniasis was recorded in five of the seven species studied. There were, however, no reports of the condition in sparrowhawks or peregrine falcons admitted to the hospital during the five-year period 1998-2002. The findings are reported in tables 1-7.

(1) Prey species:

Of the two prey species studied, oral trichomoniasis appeared to occur more commonly in wood pigeons. Of the 1026 wood pigeons seen at the hospital, 79 (0.08%) were identified as suffering from oral trichomoniasis. Of these 79 wood pigeons, 42 were identified as juveniles and 31 as adults; there were 3 birds where the age was not recorded. This compared with 25 (0.04%) of 665 collared doves. Of the 25 collared doves identified as having the condition, 8 were juveniles and 17 adult.

The year 2000 saw a particularly large number of birds, of both species, presenting with the condition. Of the 226 wood pigeons seen at the hospital during 2000, 30 (0.13%) were identified as having oral trichomoniasis. Of the 166 collared doves seen that year, 11 (0.07%) were similarly identified. The numbers of wood pigeons seen in 2002 with trichomoniasis were also high (n=19 (0.08%)) (table 1).

The seasonal occurrence of oral trichomoniasis in wood pigeons and collared doves is presented in figures 1 and 2. There would appear to be a seasonal peak in the autumn for both species. This is particularly marked for wood pigeons with 50 birds presenting with canker during the three-month period (August-October). The pattern for wood pigeons in year 2000 is illustrated in figure 3 and shows a gradual increase in numbers through August and September, peaking with 12 birds in October. The autumn peaks are less obvious for collared doves, which also appear to experience a spring peak (figure 2).

(2) Predatory species.

Oral trichomoniasis was not recorded in any of the peregrine falcons (n = 17), or sparrowhawks (n = 168) presented to the hospital during the five-year period (tables 6 & 7). Two sparrowhawks did have necrotic masses within their cervical oesophagus but these were not identified as canker. Another sparrowhawk presented with oral capillariasis.

Of 374 buzzards seen during the five year period, only 9 (0.02%) were identified as having oral trichomoniasis (table 5). Eight other buzzards had some form of unidentified pathology of the oropharynx: including “lumps” and “plaques”. Of the nine buzzards with canker, three were seen in December, three in November and one each in August, September and October (figure 4).

Of the 338 tawny owls seen, 10 (0.03%) were identified as having canker. By contrast only 1 of 98 (0.01%) barn owls was similarly identified. None of these owls with canker were identified as juveniles.

The seasonal occurrence of oral trichomoniasis is presented in figure 4. The condition appears to be seen in buzzards throughout the autumn (August – December) with peaks in November (n=3) and December (n=3). The pattern is, however, less obvious for tawny owls. Three of the four tawny owls seen with the condition in 2001, presented in January, only a few months after the autumn 2000 peak in wood pigeons.

Discussion:

The population of birds examined in this study was that which presented during a five year period to a south west wildlife hospital. This population may therefore be quite different from that reported on elsewhere. Almost all the birds in this study were found alive but unable to fend for themselves.

Oral trichomoniasis was not a particularly common reason for admission for any of the seven avian species looked at in this study. Indeed it was never identified in more than 0.1% of admissions, with the single exception of wood pigeons in 2000 (0.13%). The autumn peak in incidence was particularly marked for wood pigeons, especially in 2000, but was also evident for collared doves. Juvenile birds figured predominantly in this autumn peak but adults were also affected. Town wood pigeons start to nest in February with a peak in April and May. Rural birds start later, peaking from July to September due to different availability of food. It is therefore possible that the hospital is seeing the annual increase in trichomoniasis in rural pigeons; this would be predicted to occur sometime between August and October. Collared doves, by contrast, have a more prolonged breeding season (mainly March – October but some throughout the year (Snow and Perrins, 1998)) and this may explain the additional peak during the early spring. Adult collared doves with canker were identified throughout the year with the exception of the month of January. This contrasted with the incidence in wood pigeons which had no birds affected in March. These differences again probably reflect the breeding cycles of these two species. The incidence in buzzards appears to peak in November and December, shortly after the wood pigeon peak. It is possible that wood pigeons, and especially young wood pigeons, figure more prominently in the buzzard diet at this time of year.

Many of the birds presented with weakness and weight loss. Dyspnoea was another common presentation and was particularly marked in doves and pigeons with caseous lesions obstructing the glottis. An adult male chaffinch (*Fringilla coelebs*), that had been feeding from a bird table frequented by large numbers of pigeons, also presented with severe dyspnoea and caseous lesions of the glottis. Buzzards and tawny owls typically presented in a weakened and emaciated state with extensive lesions extending deep into the tissues of the oropharynx, sometimes involving the sinuses. Intranasal and intrasinal trichomoniasis can result in oedema of the lower eyelid and producing fluttering of the skin over the infraorbital sinuses and dyspnoea (Cooper, 2002). Displacement of the lower eyelid, resulting in partial closure of the eye, was seen in a number of buzzards and tawny owls in this study.

Oral trichomoniasis is caused by the flagellated protozoa *Trichomonas gallinae*. Trichomonads are not particularly host specific and can cause disease in a range of avian species including pigeons, raptors, canaries, finches, budgerigars and owls (Heidenreich, 1997). Almost all wild and domestic Columbiformes are latently infected with Trichomonas gallinae and should be considered carriers of infection (Heidenreich, 1997). Squabs commonly become infected during feeding of the crop milk by their parents (Joseph, 2000).

The organism can attach to apical microfolds and cell borders of the palatal-oesophageal junction within 6-15 hours (Kietzmann, 1993). Initial parasite activity at

this site, possibly mediated by some parasite-secreted factor, initiates squamous cell damage, separation and removal. As squamous cell borders separate, the trichomonads are able to invade the deeper tissues. Kietzman (1993) reported that, following the experimental infection of ring doves (*Streptopelia risoria*) with pathogenic Trichomonas gallinae, accelerated parasite-mediated desquamation and the eruption and expansion of cankers were noted between 19 and 240 hours post-innoculation

"Canker" is a term commonly used to denote oral trichomoniasis in pigeons and doves, whilst the term "frounce" is used to discribe similar lesions amongst raptors. Diphtheritic and necrotic forms are seen. In the former ulceration of the oral cavity, oesophagus, larynx and pharynx are seen; in the latter caseous lesions of the oral cavity and oesophagus as well as beak lesions are seen (Joseph, 2000). Following ulceration of the upper digestive tract, the organism can gain access to the circulatory system and thus spread to the liver, producing vascular congestion and perivascular cuffing within the liver as early as 4 days post-infection (Narcisi et al, 1991).

The "canker" probably refers to the mass of desquamated cells and necrotic debris that forms within the tissues of the oropharynx. There are quite a number of differential diagnoses for yellow caseous lesions of the oropharynx, including trichomoniasis, capillariasis, candidiasis, pox and abscessation secondary to a penetrating injury (Pokras et al, 1993 & Cooper, 2002). Vitamin A deficiencies may also contribute to stomatitis (Cooper, 2002) and may underly signs of trichomoniasis (Coles, 1997). Signs of trichomoniasis may also be superimposed on an underlying chlamydia infection (deGruchy, 1983). The definitive diagnosis of trichomoniasis is not difficult, however, so long as therapy has not started: a moist swab of the exudate should, if expressed onto a warm microscope slide and examined, reveal motile flagellated organisms with an undulating membrane (Cooper, 2002). This method relies on the motility of the organisms and the swabbing of a representative site. The sample should be examined immediately as the organisms are sensitive to environmental conditions and will soon stop moving. The organisms are usually found at the healthy / unhealthy tissue junction (N.Forbes personal communication), a swab from dead tissue may therefore yield a negative result. Where results are inconclusive, the sample can be incubated in a growth medium until organisms are numerous enough to be easily found in aliquots examined under the microscope (Coles, 1997; Cover et al, 1994).

Amongst raptors, goshawks, sparrowhawks and falcons are thought to be more vulnerable to trichomoniasis (Heidenreich, 1997). Cooper and Petty (1988) suggested that trichomoniasis might be a cause of significant mortality in UK goshawks, after finding trichomonas lesions in the oropharynx of 14 young, from five broods, all of whom died. Elsewhere, trichomoniasis was reported to account for 22% of chick mortality and was identified as the single most important nestling mortality factor for Bonelli's eagle (*Hieraaetus fasciatus*) in Catalonia, Spain (Real et al, 2000). As a condition, it has been reported less frequently in owls than in diurnal raptors and this is generally considered to be due to the fact that columbids do not figure as a major food item for most species of owls (Pokras et al, 1993). A high incidence of trichomoniasis was reported in barn owls in the western United States (Pokras et al, 1993). In England, of 180 barn owls examined post-mortem, over a ten-year period, trichomoniasis was only identified in a single bird (Hardy et al, 1981). Cousquer

(2003) reported that the condition was more common in tawny owls than in barn owls (results reproduced here). This is probably due to the fact that tawny owls consume a wider range of prey than other medium sized owls in the UK (Snow and Perrins, 1998). In addition to small rodents, which form perhaps the bulk of their diet, they will also take birds as big as adult mallards (Snow and Perrins, 1998). Wood pigeons, feral pigeons and collared doves almost certainly figure in their diet and would expose tawny owls to trichomoniasis.

Epizootics of trichomoniasis do occur and, in 1950-51, involved the deaths of many thousands of mourning doves (*Zenaida macroura*) (Stabler and Herman, 1951; Haugen, 1952). Cooper (2002) suggests, however that the disease can not be more than sporadically important due to other limiting factors. It is possible that there have been epizootics of trichomoniasis within the wood pigeon population of the south of England during recent years. Higher numbers of wood pigeons were seen in 2000 and 2002 than in other years. Some of these birds may present to rehabilitation centres. To what extent these birds represent an added risk to predatory species is not entirely clear. It is, however, evident that both tawny owls and buzzards come into contact with and succumb to oral trichomoniasis. The 2000-2001 data presented here suggests that there may have been an increase in tawny owls with trichomoniasis in January 2001, two or three months after the peak incidence of the condition in the wood pigeon population. The November-December peak for buzzards similarly follows the autumn peak for wood pigeons. It is interesting that sparrowhawks do not appear to be seen with oral trichomoniasis, especially as female sparrowhawks regularly take pigeons. It may be that those sparrowhawks succumbing to oral trichomoniasis are not seen at rehabilitation centres, whilst those that fly into windows or are hit by cars are seen preferentially.

Conclusions:

Oral trichomoniasis is occasionally seen in a number of species that regularly present to southwest rehabilitation centres. Amongst wood pigeons and collared doves, the condition presents more commonly in the autumn when many juvenile birds are seen with the condition. Of the birds of prey seen, tawny owls and buzzards appear most commonly affected by the condition. The peak incidence of oral trichomoniasis in tawny owls and buzzards appears to follow two to three months after the autumn peak in wood pigeons. It is therefore likely that these two birds of prey species are affected by epizootics of trichomoniasis in the wood pigeon population.

Tables 1-7: Annual incidence of Oral Trichomoniasis (Canker) in seven different species. The number of juvenile and adult birds with canker is recorded. This number is also presented as a percentage of the total number of annual admissions. The total number of birds with canker also includes birds whose age was not recorded.

	Total No of Admissions			Total No of birds with Canker					
	Adult	Juvenile	Total	Juvenile		Adult		Total	
				No	%age	No	%age	No	%age
1998	-	-	154	4	0.03	3	0.01	9	0.06
1999	-	-	172	6	0.03	4	0.02	10	0.06
2000	-	-	226	16	0.07	11	0.05	30	0.13
2001	-	-	247	4	0.02	7	0.03	11	0.04
2002	-	-	227	12	0.05	6	0.03	19	0.08

Table 1: Annual incidence of Oral Trichomoniasis in Wood Pigeons (*Columba palumbus*) admitted to a South West Wildlife Hospital.

	Total No of Admissions			Total No of birds with Canker					
	Adult	Juvenile	Total	Juvenile		Adult		Total	
				No	%age	No	%age	No	%age
1998	-	-	137	3	0.02	1	0.01	4	0.03
1999	-	-	121	0	0	2	0.02	2	0.02
2000	-	-	166	3	0.02	8	0.05	11	0.07
2001	-	-	109	2	0.02	2	0.02	4	0.04
2002	-	-	132	0	0	4	0.03	4	0.03

Table 2: Annual incidence of Oral Trichomoniasis in Collared Doves (*Streptopelia decaocto*) admitted to a South West Wildlife Hospital.

	Total No of Admissions			Total No of birds with Canker					
	Adult	Juvenile	Total	Juvenile		Adult		Total	
				No	%age	No	%age	No	%age
1998	37	26	63	0	0	3	0.05	3	0.05
1999	37	22	59	0	0	0	0	0	0
2000	51	25	76	0	0	2	0.03	2	0.03
2001	43	27	70	0	0	4	0.06	4	0.06
2002	52	18	70	0	0	1	0.01	1	0.01

Table 3: Annual incidence of Oral Trichomoniasis in Tawny Owls (*Strix aluco*) admitted to a South West Wildlife Hospital.

	Total No of Admissions			Total No of birds with Canker					
	Adult	Juvenile	Total	Juvenile		Adult		Total	
				No	%age	No	%age	No	%age
1998	23	5	28	0	0	0	0	0	0
1999	16	2	18	0	0	0	0	0	0
2000	17	1	18	0	0	1	0.06	1	0.06
2001	20	1	21	0	0	0	0	0	0
2002	10	3	13	0	0	0	0	0	0

Table 4: Annual incidence of Oral Trichomoniasis in Barn Owls (*Tyto alba*) admitted to a South West Wildlife Hospital.

	Total No of Admissions			Total No of birds with Canker					
	Adult	Juvenile	Total	Juvenile		Adult		Total	
				No	%age	No	%age	No	%age
1998	-	-	62	-	-	-	-	2	0.03
1999	-	-	60	-	-	-	-	0	0
2000	-	-	76	-	-	-	-	2	0.03
2001	-	-	84	-	-	-	-	3	0.04
2002	-	-	92	-	-	-	-	2	0.02

Table 5: Annual incidence of Oral Trichomoniasis in Buzzards (*Buteo buteo*) admitted to a South West Wildlife Hospital.

	Total No of Admissions			Total No of birds with Canker					
	Adult	Juvenile	Total	Juvenile		Adult		Total	
				No	%age	No	%age	No	%age
1998	-	-	39	-	-	-	-	0	0
1999	-	-	37	-	-	-	-	0	0
2000	-	-	36	-	-	-	-	0	0
2001	-	-	21	-	-	-	-	0	0
2002	-	-	35	-	-	-	-	0	0

Table 6: Annual incidence of Oral Trichomoniasis in Sparrowhawks (*Accipiter nisus*) admitted to a South West Wildlife Hospital.

	Total No of Admissions			Total No of birds with Canker					
	Adult	Juvenile	Total	Juvenile		Adult		Total	
				No	%age	No	%age	No	%age
1998	-	-	4	-	-	-	-	0	0
1999	-	-	4	-	-	-	-	0	0
2000	-	-	4	-	-	-	-	0	0
2001	-	-	5	-	-	-	-	0	0
2002	-	-	0	-	-	-	-	0	0

Table 7: Annual incidence of Oral Trichomoniasis in Peregrines (*Falco peregrinus*) admitted to a South West Wildlife Hospital.

References:

Coles, B.H. (1997) Avian Medicine and Surgery. Blackwell Science Ltd, Oxford, England.

Cooper, J.E. and Petty, S.J. (1988) Trichomoniasis in free-living goshawks (*Accipiter gentilis gentilis*) from Great Britain. *J Wildl Dis*. **24** (1) : 80-87.

Cooper, J.E. (2002) Birds of Prey: Health and Disease. Blackwell Science, Oxford, UK.

Cousquer, G. (2003) Trichomoniasis in Tawny Owls (Strix aluco) from the South West of England. 'In Press' In: *News from Europe, Supplement to the Journal of Wildlife Disease*,

Cover, A.J., Harmon, W.M. and Thomas, M.W. (1994) A new method for the diagnosis of Trichomonas gallinae infection by culture. *J Wildl Dis*. **30** (3) : 457-459.

Erwin, K.G., Kloss, C., Lyles, J., Felderhoff, J., Fedynich, A.M., Henke, S.E. and Roberson, J.A. (2000) Survival of Trichomonas gallinae in white-winged dove carcases. *J Wildl Dis* **36** (3) : 551-554.

DeGruchy, P.H. (1983) Chlamydiosis in collared doves. *Veterinary Record* 113 (14) 327.

Duff, J.P. (2002) Wildlife diseases in the UK (2002). *Annual report to DEFRA and the OIE*. Ed: J.P. Duff. page 12.

Hardy, A.R., Hirons, G.J.M. and Stanley, P.I. (1981) The relationship of body weight, fat deposit and moult to the reproductive cycles in wild tawny owls and barn owls. In: *Recent advances in the study of raptor disease*. Eds J.E. Cooper and A.G. Greenwood. Chiron Publications, Keighley, West Yorkshire, England.

Haugen, A.O. (1952) Trichomoniasis in Alabama mourning doves. *Journal of Wildlife Management*, **16** : 164-169.

Heidenreich, M. (1997) Birds of Prey: Medicine and Management. Blackwell, Wissenschafts-Verlag, Oxford, UK.

Joseph, V.J. (2000) Vomiting and Regurgitation. In: *Manual of Avian Medicine*. Eds:G.H. Olsen and S.E. Orosz. Mosby, St Louis, Missouri, USA. pages 70-84.

Kietzmann, G.E. Jr. (1993) Relationships of Trichomonas gallinae to the palatio-esophageal junction of ring doves (*Streptopelia risoria*) as revealed by scanning electron microscopy. J Parasitol. **79** (3) : 408-415.

Narcisi, E.M., Sevoian, M. and Honigberg, B.M. (1991) Pathologic changes in pigeons infected with a virulent Trichomonas gallinae strain (Eiberg). *Avian Dis*. **35** (1) : 55-61.

Pokras, M.A., Wheeldon, E.B. and Sedgwick, C.J. (1993) Trichomoniasis in owls: Report on a number of clinical cases and a survey of the literature. In *Raptor Biomedicine*. Eds P.T. Redig, J.E. Cooper, J.D. Remple and D. Bruce Hunter. University of Minnesota Press, Mineapolis, USA. pages 88-91.

Real, J., Manosa, S. and Munoz, E. (2000) Trichomoniasis in a Bonelli's eagle population in Spain. *J Wildl Dis* **36** (1) : 64-70.

Snow, D.W. & Perrins, C.M. (1998) Birds of the Western Palaearctic. Oxford University Press, Oxford, UK.

Stabler, R.M. & Herman, C.M. (1951) Upper digestive tract trichomoniasis in Mourning doves and other birds. *Transactions of the North American Wildlife Conference*, **16** : 145-162.

Stabler, R.M. (1954) Trichomonas gallinae: a review. *Experimental Parasitology* **3**: 368-402.