Causes of mortality among whistling ducks in captivity

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Introduction

This is the fourth of a series of reports that will analyse post-mortem findings of birds dying in the Wildfowl Trust collections since 1959. Detailed records have been kept by J. V. Beer (1959–1969), by N. A. Wood (1970–1973) and by M. J. Brown subsequently.

Within the whistling ducks (or tree ducks) of the genus *Dendrocygna* we have included the following: Spotted Whistling Duck *D. guttata,* Eyton's *D. eytoni*, Wandering *D. arcuata*, Fulvous *D. bicolor*, Cuban *D. arborea*, Javan or Lesser *D. javanica*, White-faced *D. viduata* and Red-billed Whistling Duck *D. autumnalis*. The White-backed Duck *Thalassornis leuconotos*, considered by Johnsgard (1967) to be closely related, will be examined with the stifftails Oxyurini in a later paper.

With the exception of the Magpie Goose *Anseranas*, the whistling ducks show more primitive features than other living waterfowl. These features include a pantropical and sedentary distribution, a single annual body moult, monomorphism and a long-standing pair bond, and the participation of both sexes in nest-building, incubation and defence of nest and young (Kear 1970).

Whistling ducks mature during their first year, and most species inhabit low latitudes where seasonal changes in daylength can be of little consequence in timing the onset of the breeding season. In captivity they may breed from early spring until late autumn (Murton & Kear 1976) but climatic conditions at the Wildfowl Trust collections in England possibly inhibit the smaller, more delicate species from their potential of laying during the greater part of the summer.

Despite great similarities, whistling duck do vary; some have strongly aquatic habits, especially the Fulvous Whistling Duck (Bolen & Rylander 1976). Others, such as the Red-billed, are mainly grazers on land (Rylander & Bolen 1974). Some species nest in trees or tree-holes, while others build nests on the ground, often near water. The Fulvous is geographically one of the most widespread of waterfowl species, while the Cuban is listed as among the world's rarest birds.

History in captivity

The whistling ducks are handsome birds and 'add a welcome dimension to a waterfowl collection' (Bolen 1973). The Cuban Whistling Duck, the largest species, weighing on average 1,150 g, bred at Cologne Zoological Gardens in 1869 and is reported to have been the first to nest in captivity. Almost all species of whistling duck were kept at London Zoo by the end of the nineteenth century but, except for the Fulvous, did not breed there (Sclater 1880). In 1872, the Fulvous nested at London and the Red-billed at Le Havre, France (Delacour 1954), while the first captive breeding of Eyton's Whistling Duck occurred in 1938 at Connecticut, USA (Sibley 1940). Wandering Whistling Duck were bred at Canoga Park, California in 1936 (Sibley 1940) and at Leckford, England in 1939 (Delacour 1954). Javan Whistling Duck (the smallest species, at about 500 g) were bred in California and Connecticut before 1940 (Sibley 1940) and the first Spotted Whistling Duck hatched in captivity as recently as 1959, at Slimbridge (Johnstone 1960). It is probably significant that about half of these first breeding records occurred at low latitudes and, unusually for any waterfowl group, British aviculturalists have not always had the initial success.

Materials

Post-mortem data from 983 whistling duck dying between 1959–1980 have been examined. These consist of 542 adults, 96 juveniles and 378 downies (Table 1). An adult bird is defined as one that has survived to its first January. A juvenile is fully feathered, but dies in its first calendar year (before 1 January). A downy is any young bird that is not fully feathered. The only whistling duck for which many records are available are the Fulvous and the Red-billed species.

Results

Longevity and seasonal mortality

The average age at death of captive adult

whistling ducks was 3·5 years. This figure is based on the 46% of those examined whose age was known, and excludes records from 83 wild-caught birds. Males (108 individuals) died at an average age of 3·9 years and females (141 individuals) at 3·1 years. The oldest recorded birds were a 14-year-old female Spotted Whistling Duck, a 13-year-old male Red-billed Whistling Duck and a wild-caught female Eyton's Whistling Duck that had been in captivity for 13 years (Figure 1). Elsewhere, the longevity record is held by a Red-billed Whistler that lived for over 20 years at London Zoo (Mitchell 1911), while Johnsgard (1968) listed a Wandering Whistling Duck that was 15 years old.

Most adult whistling duck die in late winter, indeed, nearly 80% succumb in January, February and March (Figure 2). This is undoubtedly a reflection of their particular susceptibility to cold stress and cold-related conditions (Beer 1964). In part, the high winter mortality may also be a reflection of husbandry methods, since the birds are often housed indoors in cold weather where they may be abnormally crowded.

The winter mortality pattern is very similar to that obtained from those members of the perching duck group which also have a 'primitive' type of breeding season, laying eggs from spring until autumn (Hillgarth & Kear 1981).

At post-mortem examination, a primary cause of death was assigned and it is these

Table 1. Numbers of whistling ducks dying in Wildfowl Trust collections 1959–1980.

	Adults	Juveniles	Downies
Spotted Whistling Duck	33	0	19
Eyton's Whistling Duck	32	8	8
Wandering Whistling Duck	14	0	5
Fulvous Whistling Duck	151	27	163
Cuban Whistling Duck	42	6	30
Javan Whistling Duck	61	18	33
White-faced Whistling Duck	63	1	11
Red-billed Whistling Duck	146	36	109
Totals	542	96	378

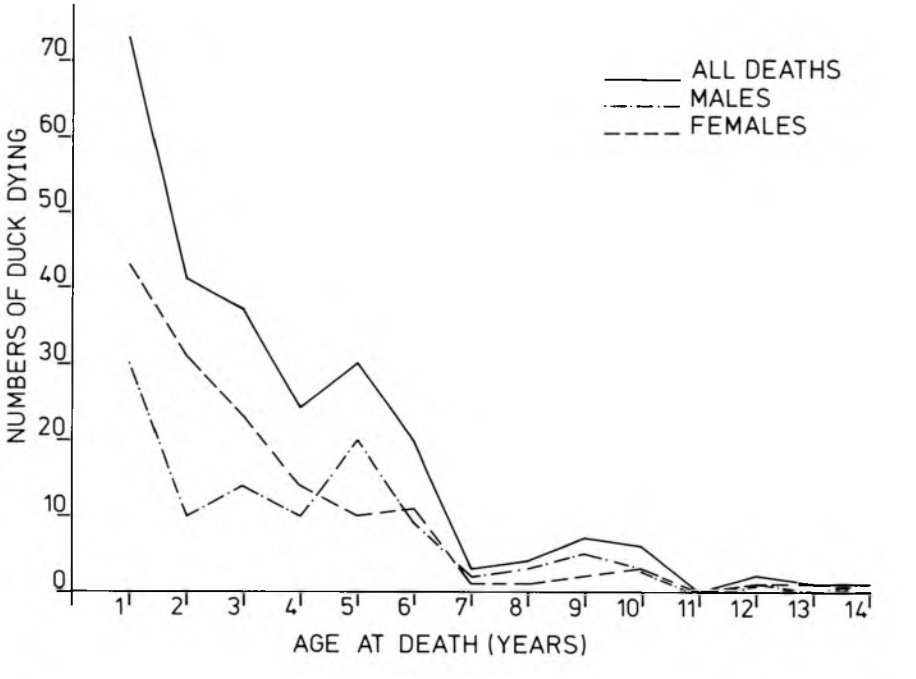

Figure 1. Age at death of 249 captive-bred adult whistling ducks.

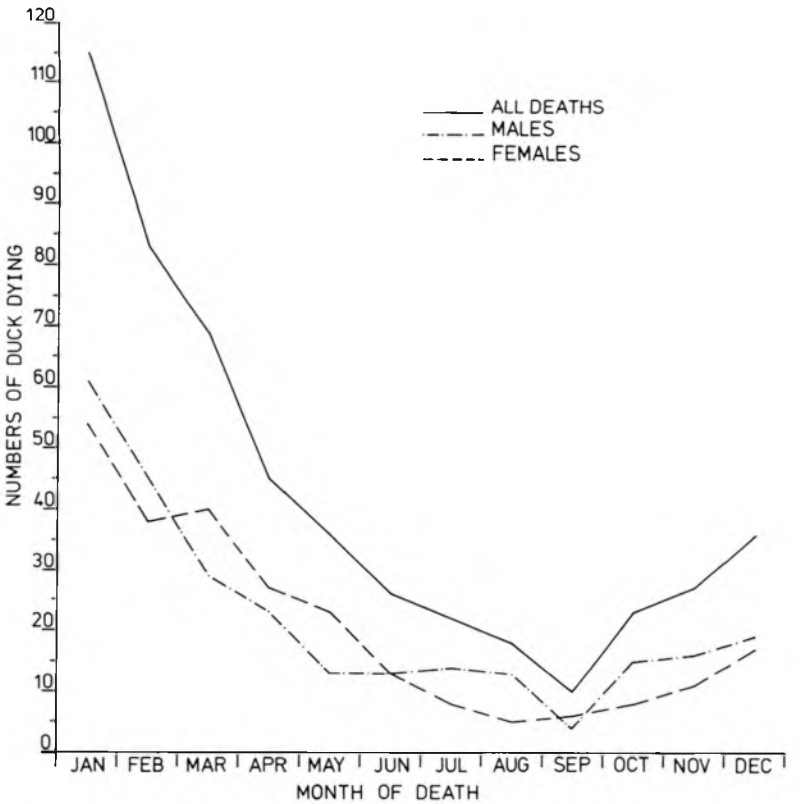

Figure 2. Seasonal mortality of captive adult whistling ducks.

conditions that are discussed below. For information on treatment and prevention of disease the reader is referred to Hillgarth & Kear (1979a), Beer (1959), Beer & Stanley (1965), Arnall & Keymer (1976) and the Game Conservancy (1974).

Tuberculosis

The incidence of avian tuberculosis is high in adults of all species (27%) and it is the commonest cause of death (Table 2). The smaller whistling ducks, which are often kept in aviaries year round, had the highest number dying of tuberculosis, especially Spotted at 70% (23 out of 33), Wandering at 86% (12 out of 14) and the Javan at 32%. It may also be significant that most adults of these three species were wild-caught birds. Four percent of juveniles had tuberculosis (Table 3), and this figure was influenced by the 15% of young Fulvous Whistling Duck that died of the disease (4 out of 27). Of these whose age was known, the average age at death from tuberculosis was 3·6 years (60 individuals), not very different from the overall average. The youngest victims were a male and female 1-year-old and the oldest was a 12-year-old female.

Frost-bite, pneumonia and trauma

Ten percent of adults, 6% of juveniles and 44% of downies (Table 4) died of pneumonia. Two percent of adults suffered frost-bite severe enough to kill them. Thirteen percent of adults died as a result of trauma and 79% of these cases occurred during the coldest months of the year (January, February and March). Some of this was due to predation by rats, some to fighting among themselves, and some because the ducks were housed at one time with flamingos in winter and these larger birds tended to attack them. Trauma was also the single most important cause of death in juveniles (Table 3).

Table 2. Cause of death in 542 adult whistling ducks dying in Wildfowl Trust collections.

	Male	Female	Unsexed	Total	%
Tuberculosis	70	76	2	148	27·3
Trauma	29	40	1	70	12·9
No diagnosis	25	35	9	69	12·7
Pneumonia	29	24	0	53	9·8
Enteritis	25	21	0	46	8·5
Renal disease	17	19	0	36	6·6
Lead poisoning	11	9	1	21	3·9
Cardiac conditions	10	11	0	21	3·9
Aspergillosis	5	12	0	17	3·1
Effects of cold, frostbite, etc.	9	3	0	12	2·2
Amyloid disease	2	8	0	10	1·8
Egg peritonitis	—	5	—	5	0·9*
Impaction and peritonitis	2	5	1	8	1·5
Hepatitis	3	3	0	6	1·1
Anaemia	3	1	0	4	0·7
Other causes	7	8	1	15	3·0
Totals	247	280	15	542	

* Note: 1·8% of females

Table 3. Cause of death in 96 juvenile whistling ducks dying in Wildfowl Trust collections.

	Male	Female	Unsexed	Total	%
Trauma	10	14	1	25	26
Enteritis	4	6	1	11	11
Cyathostoma	1	6	0	7	7
Pneumonia	0	6	0	6	6
Aspergillosis	4	2	0	6	6
Cardiac conditions	3	2	0	5	5
No diagnosis	2	3	0	5	5
Tuberculosis	2	2	0	4	4
Impactions and peritonitis	1	3	0	4	4
Lead poisoning	0	4	0	4	4
Other bacterial infections	0	3	0	3	3
Renal disease	1	2	0	3	3
Stress—newly arrived	1	1	1	3	3
Amyloid disease	1	2	0	3	3
Acuaria	1	1	0	2	2
Air sacculitis	1	1	0	2	2
Anaemia	0	1	1	2	2
Dislocated leg	0	1	0	1	1
Totals	32	60	4	96	

Table 4. Causes of death in 378 downy whistling ducks dying in Wildfowl Trust collections.

	Male	Female	Unsexed	Total	%
Pneumonia	73	84	8	165	43·7
Infected yolk	43	36	6	85	22·5
Renal disease	23	30	2	55	14·6
Enteritis	9	11	0	20	5·3
Impactions	8	7	1	16	4·3
Trauma	7	6	0	13	3·4
Aspergillosis	3	2	0	5	1·3
No diagnosis	3	0	2	5	1·3
Other causes of death	8	5	1	14	3·7
Totals	177	181	20	378	

Enteritis and renal failure

Enteritis and kidney conditions also were more common in cold weather. Nine percent of adults, 11% of juveniles and 5% of downies were affected by enteritis, while 7% of adults, 3% of juveniles and 15% of downies died following renal problems. Fulvous adults (13%) and Red-billed juveniles (14%) were particularly prone to enteritis. Fulvous (10%) and Cuban adults (14%), and Fulvous (12%), Cuban (10%) and Red-billed downies (23%) were especially susceptible to renal failure.

Lead poisoning

Four percent of adult and juvenile whistling duck had died of lead poisoning because they had picked up and eaten lead pellets in the soil. Among adults, Fulvous and Red-billed were the species mainly affected, though two Cubans and one White-faced also had been poisoned. There were five cases among Fulvous adults (3%) and one in Fulvous juveniles. Sixteen years earlier, Beer and Stanley (1965) also had obtained a figure of 4% mortality due to lead poisoning among whistling duck dying at Slimbridge.

Cardiac conditions

Four percent of adults and 5% of juveniles died of cardiac conditions (including atherosclerosis or hardening of the arteries), which appear to be a general problem on a small scale in all species. Humphreys & Beer (1971) had earlier found traces of atherosclerosis in the following species of whistling duck at Slimbridge: Eyton's, Fulvous, White-faced, Javan, Red-billed and Cuban.

Aspergillosis

The incidence of aspergillosis was very low for captive waterfowl; only 3% of adults, 6% of juveniles and 1% of downies were affected. Eyton's (9%) adults seem slightly more prone than other species. There was likewise only one death involving *Candida*.

Parasites

Mortality due to parasite infestation also was unusual. In adults, a single case of amidostomiasis occurred in a female Javan Whistling Duck and one of cyathostomiasis in a female Red-billed Whistler. Among juveniles, cyathostomiasis was slightly more common (7%), with six cases in the Red-billed and one in an Eyton's Whistling Duck; two downy Fulvous Whistling Duck also had this disease. *Acuaria* caused the death of two juvenile Fulvous Whistling Duck.

Other diseases

Among downies, infected yolk or omphalitis was a serious problem (Table 4), killing almost a quarter of those that were examined (23%). Impactions killed 4% of downies and juveniles, and 2% of adults. Egg peritonitis was surprisingly low, affecting only 2% of adult females. Finally, amyloid disease caused the deaths of 3% of juveniles and 2% of adults.

No diagnosis

The cause of death of several corpses could not be determined. This was true of 13% of adults, 5% of juveniles and 1% of downies. Among both adults and juveniles, the Fulvous and Red-billed species were the most difficult to diagnose (Fulvous: adults 25%, juveniles 24%; Red-billed: adults 35%, juveniles 44%). These species often have been kept fully-winged, and so bodies are not always recovered in a good enough state of preservation to determine the cause of death. Our figures also may tend to confirm that 'stress', which is not easy to diagnose, is an important factor in whistling duck mortality.

Discussion

As with all the captive waterfowl groups so far examined, the disease most commonly found is avian TB (Schaefer *et al.* 1973). Whistling ducks show a very similar level of tuberculosis to shelducks and sheldgeese (Hillgarth & Kear 1979b) but are less susceptible than seaducks and perching ducks (Hillgarth & Kear 1979a, 1981). It seems significant that the whistling duck species most frequently kept in aviaries are the ones showing the highest levels of TB infection. As a husbandry point, it is probable that renewing the soil and nesting material, cleaning water margins and cutting back the vegetation so that sunlight

can penetrate, will reduce the incidence of TB in aviary birds.

The very low level of parasite infestation is noteworthy and so is the equally low level of aspergillosis. Endoparasites of Red-billed Whistling Duck have been studied in the wild by George and Bolen (1975) who found that helminths were significantly more common in juveniles than in adults, but no correlation could be found between the parasite load and the physical condition of the duck host. In general, loads were light and appeared to reflect food habits. Similarly, Lavery (1970) found that Wandering Whistling Duck populations in Queensland were unaffected by the level of internal parasites, although the birds were prone to carry quite large numbers of intestinal helminths.

Aspergillosis was found to be almost as uncommon as among the perching ducks (Hillgarth & Kear 1981) where we suggested that the group might have evolved some immunity along with their hole-nesting habits. It is possible that the same immunity has developed in the whistling ducks, many of which nest in enclosed spaces (Bolen 1973) where the possibility of mould infections might be expected to be high. Mortality from aspergillosis in birds normally increases in stressful situations, which makes the captive whistling ducks lack of susceptibility somewhat paradoxical.

Captive whistling ducks, at the moment, seldom reach their potential lifespan, and it is difficult to avoid the conclusion that they are ill-adapted to English latitudes. Their sensitivity to cold can be linked to much of their mortality. The extremely high incidence of trauma suggests that predators can attack a resting bird before it takes evasive action, although housing in predator-proof and weather-proof aviaries is not necessarily going to reduce the numbers of deaths unless the birds are given plenty of space, not mixed with other species, and the aviaries can be kept TB-free. Beer (1964) suggested that in cold weather they should be given priority care, under cover or with screening from the wind, and with plenty of clean straw to stand on. Fortunately, straw will not present the usual mould hazard that it does to most other waterfowl. Pneumonia kills many whistling ducklings (Table 4), again reflecting their tropical origins, as we thought to be the case with young perching ducks (Hillgarth & Kear 1981). Cain (1973) established that Red-billed Whistling Duck could not tolerate a temperature of −20°C in a cage for longer than three days; after that their legs froze and death followed within 24 hours. He implied that temperature limited the northward distribution of this species on the American continent. It is likely that similar physiological restraints operate on all members of the group.

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Summary

The results of post-mortem data on 983 whistling ducks *Dendrocygna* dying in Wildfowl Trust collections between 1959 and 1980 have been analysed. The main causes of mortality were tuberculosis, trauma and conditions related to cold sensitivity. There was a very low level of parasite infestation and of aspergillosis.

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