Diseases of perching ducks in captivity

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This is the third 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 wood ducks, or perching ducks of the tribe Cairinini, we have included the following genera: the Brazilian Teal *Amazonetta*, Maned Goose *Chenonetta*, Mandarin and Carolina *Aix*, Ringed Teal *Callonetta,* Pygmy Geese *Nettapus,* Comb Duck *Sarkidiornis,* Muscovy and White-winged Wood Duck *Cairina*, Spur-winged Goose *Plectropterus* and Hartlaub's Duck *Pteronetta.*

Perching ducks occur in the equatorial regions or at low temperate latitudes. The Mandarin and Carolina are apparently relics of an early radiation of perching ducks into the north temperate zone, a radiation that has been replaced by the more recent evolution of the *Anas* dabbling duck. All perching duck tend to perch in trees, as the name suggests, but in general the group is extremely heterogenous. They are mainly plant eaters, and food of animal origin does not predominate in the diet of any of them. None are marine. Hartlaub's Duck, Muscovy and White-winged Wood Duck occur exclusively in tropical rain forest. The Maned Goose is a grazer and therefore might be expected to suffer from the usual internal parasities of other grazing waterfowl. Many, indeed the majority, nest in the potentially damp, mouldy atmosphere of holes and have long incubation periods. They exhibit a variety of social patterns, some apparently pair for life and have obvious family ties, while in others the pair bond is fleeting and the male takes no part in the rearing of the young. About half the species are sexually dimorphic, and in the Carolina and Mandarin the brightly coloured males compete vigorously for mates before each breeding season. Some breed when they are a year old, others not until they are two or three. Thus times of stress, when individuals might be expected to succumb to disease, vary greatly from species to species.

The Carolina and the Mandarin have a long history in captivity and are among the most commonly kept ornamental waterfowl. Carolinas were held and bred in captivity in North America as early as the 17th century; they were introduced to Europe at about the same time (Delacour 1959) and were recorded as breeding at London Zoo in the earliest published list of 1831. The Mandarin has been kept in its native China and in Japan for centuries; it first bred in Britain, again at London Zoo, in 1834 (Sclater 1880).

Muscovys were brought to Europe in the 16th century from Columbia and Peru where they had already been domesticated by the American Indians (Delacour 1959). The first wild Muscovy appears to have reached London Zoo in 1851 (Sclater 1880), but it is not a bird that is often seen in waterfowl collections. Its supposed relative, the White-winged Wood Duck bred in captivity only once before the 1970s in Holland in 1936 (Schuyl 1937), but now reproduces successfully at most Wildfowl Trust centres.

Hartlaub's Duck first nested, at Slimbridge, as recently as 1958, and is still not often seen in captivity. The same applies to the Gambian Spur-winged Goose which laid at London Zoo in 1868 but did not breed successfully until 1933 at Whipsnade (Delacour 1959). The Black Spur-winged Goose does not appear to have been captive-bred at all.

Captive Old World Comb Duck bred at Lilford in 1931, and the American Comb Duck in 1939 at Cleres, France. The Australian Maned Geese were first reared in captivity in France in the late 19th century by Courtois and others (Delacour 1959), and now breeds fairly frequently, as does the Brazilian Teal which first nested at London Zoo in 1878.

Ringed Teal probably first bred in Europe in the early 20th century since young birds were sold in Germany in 1911 (Delacour 1959). The Pygmy Geese are uncommon in zoos and collections: the Indian species bred at Bronx Zoo, USA, in 1978 (Bruning 1979), the African Pygmy Goose in early 1975 in Rhodesia.

Materials

Post-mortem data from 1843 perching ducks dying between 1959–1980 have been

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examined. These consist of 724 adults, 202 juveniles and 917 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 autumn or in early winter (before 1 January). A downy is any young bird that is not fully feathered. The only perching duck for which many records are available is the North American Wood Duck or Carolina, but unfortunately White-winged Wood Duck are suffering high mortality in captivity despite excellent breeding results. We are unable to distinguish Indian and African Pygmy Geese: both have been kept by the Wildfowl Trust, but the species is not identified in most post-mortem records.

Results

Longevity

The average age at death of captive perching ducks (considering only the adult class) was 3·5 years. This figure is based on the 46% of those examined whose age was known, and excludes all wild-caught birds. Males died at an average age of 3·5 years and females at a very similar 3·4 years. The oldest recorded birds were a 16-year-old female Comb Duck, two 15-year-old Comb Ducks and a 15-year-old Mandarin. (Figure 1).

Seasonal mortality

In Figure 2 we have examined the mortality of perching ducks month by month. To do this we have divided them into two groups, dependent on their type of breeding pattern as defined by Murton & Kear (1979). The 'primitive' group (mostly of tropical origin) are capable of nesting over a considerable period of the year, usually from March to September, while the temperate group nest in the spring but only until midsummer. In the first group we have included Maned Geese, Spur-winged Geese, Hartlaub's, Comb Ducks, Muscovy and Ringed Teal, in the second, White-winged Wood Duck, Brazilian Teal, Carolinas and Mandarins. There is a significant difference in the mortality patterns between the two groups of males ($\chi^2 = 23$,

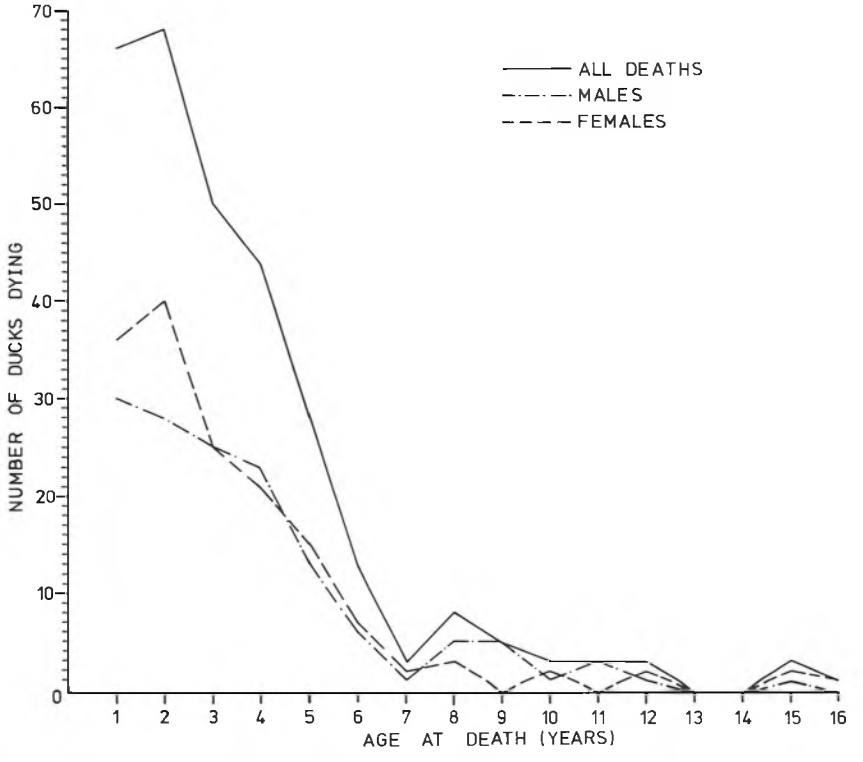

Figure 1. Age of perching ducks at death.

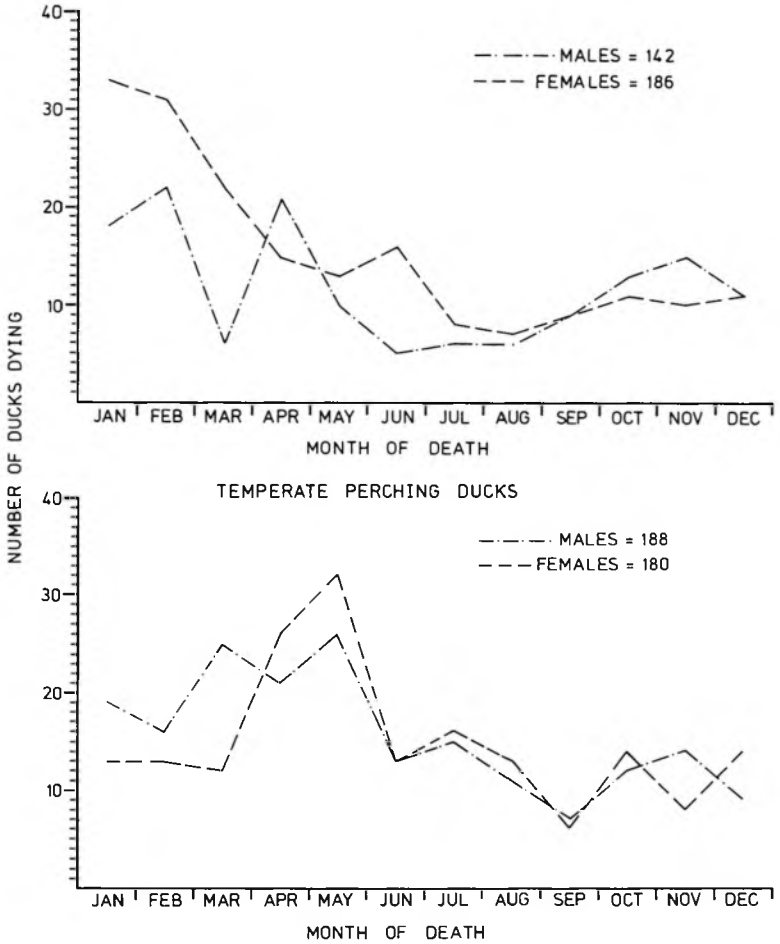

Figure 2. Deaths per month of 'primitive' perching ducks.

$0{\cdot}02 < p > 0{\cdot}01$), but a highly significant difference if the deaths of females are compared ($\chi^2 = 49{\cdot}4$, $p = > 0{\cdot}001$). Of those birds with a 'primitive' type breeding pattern, females die principally in January, February and March which are the cold months at Slimbridge. The temperate perching duck females, which are presumably better adapted to cool temperatures, die mainly during the egg-laying season of April and May.

Cause of death

At post-mortem examination a primary cause of death was assigned and it is these conditions that are discussed below. For information on treatment and prevention of diseases the reader is referred to Hillgarth & Kear (1979a), Beer & Stanley 1975, Arnall & Keymer (1976) and the Game Conservancy (1974). Trauma is excluded; very few cases have been recorded, the perching duck are not highly territorial and rarely seem to fight one another in any dangerous way.

Tuberculosis

It is obvious that in comparison with the other waterfowl groups perching ducks are peculiarly and overwhelmingly susceptible to avian tuberculosis. Of adults examined, 49% died from this cause (see Table 2) and 4·5% of dead juveniles had also been affected. Out of the 354 adults with tuber-

Table 1. Totals of perching ducks examined at post-mortem.

Species	Genera	Totals
Brazilian Teal	Amazonetta	46 adults
		24 juveniles
		17 downies
Maned Goose	Chenonetta	53 adults
		28 juveniles
		19 downies
Mandarin Duck	Aix	244 adults
Carolina		67 juveniles
		518 downies
Ringed Teal	Calonetta	118 adults
		37 juveniles
		178 downies
Pygmy Geese	Nettapus	72 adults
		0 juveniles
		0 downies
Comb Duck	Sarkidiornis	40 adults
		13 juveniles
		100 downies
Hartlaub's Duck	Pteronetta	25 adults
		12 juveniles
		21 downies
White-winged	Cairina	114 adults
Wood Duck		20 juveniles
Muscovy Duck		62 downies
Spur-winged	Plectropterus	12 adults
Goose		1 juvenile
		2 downies

Table 2. Incidence of avian tuberculosis in adult perching duck at post-mortem examination.

	♂	♀	Total	%
Brazilian Teal	12	9	21	45·7
Maned Goose	7	15	22	41·5
Mandarin	23	14	37	50·0
Carolina	53	35	88	51·8
Pygmy Goose	14	13	27	37·5
Comb Duck	5	7	12	30·0
Hartlaub's Duck	2	4	6	24·0
White-winged Wood Duck	21	38	59	79·7
Muscovy Duck	6	9	15	37·5
Spur-winged Goose	1	2	3	25·0
Ringed Teal	36	28	64	54·2
	180	174	354	
	51·0%	46·9%	48·9%	

culosis, the age is known of 173 of them, and their age at death was compared with that of birds dying of other diseases (see Figure 3). The data were analysed making the assumption that the number of deaths from tuberculosis is independent of deaths from other causes, and the differences in age at death were found to be significant ($\chi^2 = 48{\cdot}9$, $P = > 0{\cdot}001$). In other words,

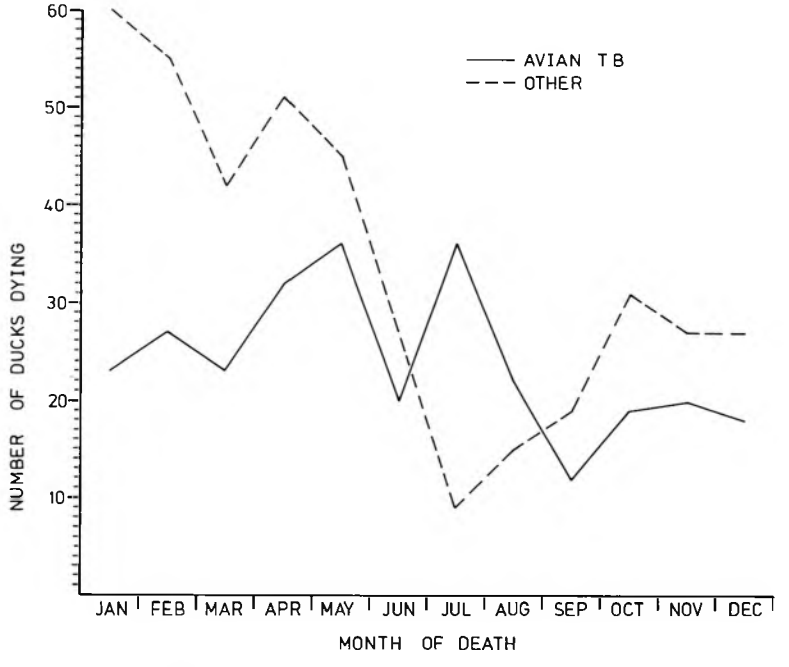

Figure 3. Number of perching ducks dying of avian tuberculosis compared with other diseases.

tuberculosis is mainly lethal to birds in their second and following years of life; it is not a killer of youngsters. Does it kill these older birds more at one season than another? Examination of Figure 4 indicates that, in comparison with other diseases, birds die of avian TB between April and July rather than in winter ($\chi^2 = 40{\cdot}5$, $P = > 0{\cdot}001$). Although all perching ducks appear to be susceptible, the White-winged Wood Duck stands out as dying of very little else, and the Mandarin and Carolina also appear to have a particular sensitivity. The rather high incidence of TB in Ringed Teal suggests that, in its diseases, it behaves like a perching duck rather than the dabbling ducks with which it is sometimes classified.

Aspergillosis

In comparison with TB, other disease conditions are rare in perching ducks, but amongst those dying of a variety of minor conditions, aspergillosis was fairly prominent, affecting in total 7·5% of adults and 8·5% of juveniles. Only one of 74 adult Mandarins and one of 40 Comb Ducks died of aspergillosis. On the other hand, 15% of Carolina downies (25 out of 170) and 13% of Carolina juveniles (7 of 53) suffered. Five of 20 adult (25%) and 3 of 12 juvenile (25%) Hartlaub's Duck were also affected.

Renal failure

Renal failure, affecting 11% of all adults, was another unusual condition, which also killed 11% of juveniles and 15% of downies. The only species with a fairly high incidence was the Pygmy Goose at 19%, while Carolinas showed a particularly low level of renal failure during the juvenile stage (0 of 53).

Enteritis

We found that 10·8% of all adults, 11·5% of juveniles and 4·6% of downies died of enteritis, with 22% of juvenile Ringed Teal suffering from this condition.

Pneumonia

Some 4·8% of perching duck adults, 13% of juveniles and 57·6% of downies had pneumonia. Among the downies 60·6% of Mandarin and 53·6% of Carolina died of pneumonia, and there was a slightly higher incidence in adults of these species than in the rest of the group. Ringed Teal downies showed a particular susceptibility at 72% and so did very young Comb and Hartlaub's Ducks at 70%.

Other diseases

Internal parasites, such as gizzard or gape

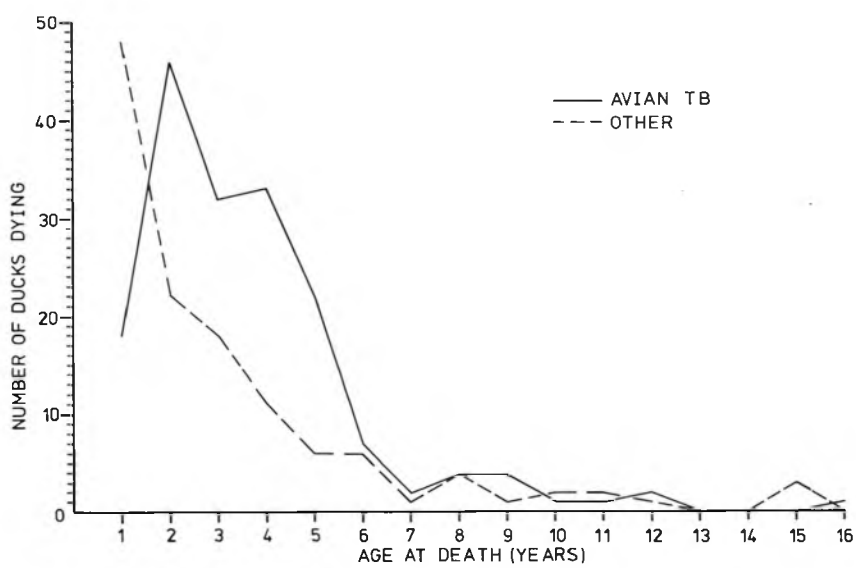

Figure 4. Age of perching ducks dying of avian tuberculosis compared with other diseases.

worms, appear to be uncommon, even in the grazing species such as the Maned Goose and the Spur-winged Goose. This may suggest that the parasites have not been brought into captivity along with their hosts, or perhaps that the birds are unaffected even in the wild in Australia and Africa. It may be significant that the Abyssinian Blue-winged Goose, another African grazing waterfowl species, appears to be immune to *Amidostomum* (Hillgarth & Kear 1979) while other sheldgeese are severely affected.

Leadpoisoning (affecting 1·8% of adults) is relatively unusual but occurs in 5·5% of all juveniles and 20·8% of Carolina juveniles.

Impactions of the gut are rare, but 3·5% adult Carolinas and 9·4% juvenile Carolinas were affected, as were 5·7% of adult and 12% of juvenile Maned Geese.

Discussion

Captive perching ducks die at an earlier age than any of the waterfowl groups so far considered, i.e. seaducks, sheldgeese and shelducks. This is perhaps surprising since Avian TB, a disease that normally affects older birds, is the principle cause of mortality. However, our figures are probably weighted by the inclusion of large numbers of Carolinas, Mandarins and Ringed Teal, which mature in their first year and appear to be normally quite short-lived. Lack of immunity to TB may be related to the perching habit: an animal that is seldom on the ground may need no immunity to the bacilli present in droppings, since it simply does not come into contact with them. Although most female perching duck lay eggs in tree cavities, this need not be a source of infection, as birds do not defaecate within the nest (and males and females seem equally susceptible to TB). In captivity, pinioned perching ducks are brought into quite unnaturally close proximity to the build-up of droppings in their pen. The avian tuberculosis bacillus is highly resistant to normal disinfectants and can remain active in the soil for at least three years. Ultraviolet rays in sunlight are the best sterilizing agent so that the perching duck's general preference for shady conditions invites infection. The White-winged Wood Duck, which appears not even to display if kept on an open pond, presents particular husbandry problems.

That birds die during periods of stress, such as egg-laying, is not unexpected. Further information on mortality in relation to breeding season may come after comparisons of other wildfowl groups. It may be normal for females with temperate-type breeding regimes to die in the spring while those near-tropical species with the apparently more 'primitive' system in which daylengths remain stimulatory until after mid-summer, are more stressed in the winter. We have already shown that temperate shelducks die mainly in the spring (Hillgarth & Kear 1979).

In their study of the incidence of atherosclerosis in the Wildfowl Trust collections, Humphreys & Beer (1971) found 28% of dead Cairinini affected out of 64 examined. The overall figure for waterfowl in general was 36%, so the perching duck are less susceptible than most. Nevertheless, the youngest bird in which hardened arteries had been recorded, was an African Comb Duck of only nine months. Perhaps, being relatively short-lived in captivity, perching duck seldom reach an age at which large numbers will suffer from the debilitating disease.

The incidence of aspergillosis seems rather less common in perching ducks than in other groups, and another fungal infection, candidiasis, has never been recorded. Perching duck may have relative immunity to moulds, nesting as they do so frequently in holes in rotting tree stumps.

The rarity of internal parasites even in grazing birds has already been referred to, and seems worthy of further investigation. Is the structure of the gizzard of the Maned Goose fundamentally different from that of the true geese and the sheldgeese?

Lead poisoning, although generally infrequent, is fairly common in the Carolina as already pointed out by Beer & Stanley (1965). They thought that this was because Carolinas, Mandarins, and Brazilian Teal (the only species affected at the time that they did their investigation), obtained their food by picking up individual seeds rather in the manner of poultry. This seemed more likely to bring the birds into contact with lead pellets in the soil and at the edge of ponds, than the habits of, for instance, the grazing waterfowl.

The high incidence of pneumonia in very young perching duck probably reflects the equatorial origins of perching ducks, and the fact that their newly-hatched young are small in comparison with other waterfowl species. Most pneumonia-like ailments in

young birds can be attributed to a combination of low temperatures and wet down or plumage. Underfloor as well as overhead heating of the resting area will be found useful in preventing the condition in newly-hatched birds.

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