

## Diseases of sheldgeese and shelducks in captivity

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This is the second 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 (1959–69), by N. A. Wood (1970–73), and by M. J. Brown subsequently.

Within the sheldgeese and shelduck tribe (*Tadornini*) we have included the following genera: *Tadorna* shelducks, *Alopochen aegyptiacus* Egyptian Goose, *Neochen jubatus* Orinoco Goose, *Cyanochen cyanopterus* Abyssinian Blue-winged Goose, *Chlœphaga* South American sheldgeese, and *Tachyeres* steamer ducks. The Cape Barren Goose *Cereopsis novaehollandiae* and Crested Duck *Lophonetta (Anas) specularioides* appear not to be so closely related to the shelduck and geese as was once thought, and will be dealt with elsewhere.

The evolutionary origin of the tribe was probably in the southern hemisphere. The steamer ducks, South American sheldgeese and four species of shelduck (Radjah *Tadorna radjah*, Cape *T. cana*, Paradise *T. variegata* and Australian *T. tadornoides*) are still wholly of that region; the Orinoco, Egyptian, and Blue-winged Geese are largely tropical, and only the Common *T. tadorna* and Ruddy Shelduck *T. ferruginea* of Europe and Asia occur in the northern temperate zone, as did the recently extinct Crested Shelduck *T. cristata*. No member of the tribe is today represented in North America, although they are found there as fossils. The sheldgeese are the southern 'replacements' of the true grazing geese of the north; like them they are vegetarian and breed in short grassland areas from sea level to the mountains. The steamer ducks, shelducks, and Orinoco and Egyptian Geese are more omnivorous—they feed on animal matter as young, and a few continue to do so as adults. The Kelp Geese *Chlœphaga hybrida* and steamer ducks are essentially marine and some of the shelducks are coastal birds. All members of the tribe tend to mature slowly: most species do not breed before they are two years of age and, in many cases, they may be three when they nest for the first time.

### History in captivity

With the exception of the Kelp Goose, sheldgeese and shelducks have done well in captivity (Delacour 1954). Ashyheads bred first at Knowsley Hall before 1850; London Zoo bred Magellans in 1863, Ruddyheads in 1865 (Sclater 1880), and the Andean Goose in 1915, while the Abyssinian Blue-wing first produced young in captivity at Gooilust in the Netherlands in 1926. Lord Derby, again at Knowsley Hall, bred the first captive Orinoco Goose. The Ruddy and the Paradise Shelducks bred at London Zoo in 1859 and 1865 respectively (Sclater 1880), while a pair of tame Cape Shelduck reared a brood of ducklings in St. James' Park, London, in 1930. The Australian Shelduck first bred at Cleres, France, as recently as 1939, and the Radjah Shelduck at Leckford in 1940 (Delacour 1954).

The steamer ducks have not done so well in captivity as others of the group. The Flying Steamer Duck *Tachyeres patachonicus* has not bred, and the other two species nested for the first time in the 1960s.

### Materials

Post-mortem data from 335 shelducks, sheldgeese and steamer ducks dying between 1959–76 have been examined. These comprise 182 adults, 69 juveniles and 84 downies, and have been divided into five groups (Table 1). The only shelduck for which many records are available is the Common Shelduck, and among the sheldgeese, post-mortem data for the Kelp and Orinoco are comparatively rare. 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 a young bird that is not fully feathered.

### Results

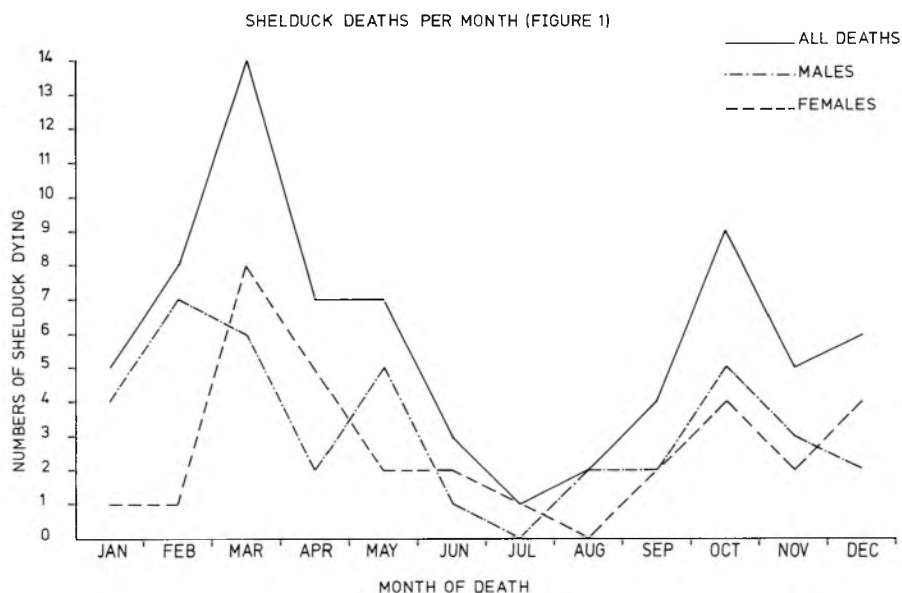
The average age at death of captive shelducks was 4.4 years (this figure is based on the 45% of those examined whose age

was known). Males died earlier than females at an average of 4.0 years, while females died at 4.9 years. Birds who died at about one-year-old constituted 37% of the total of those of known age: in other words, over a third never reached breeding age. The oldest record was of a female New Zealand Shelduck that died at 15 years, and there is another record of a 14-year-old Cape Shelduck. Shelducks at a great age are still alive in the collections of the Wildfowl Trust, and one captive Cape Shelduck lived in Holland for more than 40 years (Duijzend 1969). The average age at death of six adult male Orinoco Geese was 3.8 years, while the

average age of six females was 5.1 years (for all Orinocos, it was 4.5 years). The oldest birds died at 11 years old, and both a male and a female lived to this age. The average age at death of adult sheldgeese was 3.8 years (a figure based on the 37% of those examined whose age was known), and males again died younger than females at 3.3 years, while females lived on average to 4.6 years. Fifty percent of all male deaths were of birds in their first year, while only 30% of dead females were in this age category. The oldest recorded birds were a female Magellan Goose *Chloephaga picta* and a female Ashyhead *C. poliocephala*, both dying at 16

**Table 1.** The number of shelducks, sheldgeese and steamer ducks dying in Wildfowl Trust collections, 1959–1976.

	Adult	Juvenile	Downy	Total
Shelducks <i>Tadorna</i>	71	19	24	114
Egyptian Goose <i>Alopochen</i>	1	3	9	13
Orinoco Goose <i>Neochen</i>	13	0	3	16
Sheldgeese <i>Cyanochen</i> <i>Chloephaga</i>	87	43	47	177
Steamer ducks <i>Tachyeres</i>	10	4	1	15
Totals	182	69	84	335



**Figure 1.** Numbers of male and female shelducks dying per month in Wildfowl Trust collections, 1959–1976.

years; the oldest gander was a 10-year-old Magellan Goose. Blaaw (1904) noted a male Ruddyhead *C. rubidiceps* that had been imported from the wild and was still in his collection after 17 years of captivity.

In adult shelduck, most birds died during February, March and April, and there is another peak of mortality in October. Relatively few adult birds died in June, July and August (Figure 1). Death in the sheldgeese, the Orinoco and Egyptian Goose could not be so clearly related to the seasons.

At post-mortem examination a primary cause of death was assigned and it is these conditions that are discussed below. Although Delacour (1954) stated that in the *Tadornini* 'losses must be expected from Spring fighting', we have found few cases of death from trauma. For information on treatment and prevention of disease, the reader is referred to Hillgarth & Kear (1979a), Arnall & Keyner (1975), and the Game Conservancy (1974).

#### *Tuberculosis*

Avian tuberculosis is the commonest disease of adults—24% of shelducks and 29% of sheldgeese dying from this cause. Five per cent of shelducks juveniles and one juvenile sheldgoose were also found to have advanced tuberculosis at death.

All captive wildfowl are susceptible to tuberculosis, especially older birds. Fourteen sheldgeese whose age was known had died from tuberculosis at an average age of 4.8 years, almost one year later than the overall age at death. On the other hand, of the 12 adult shelducks whose age was known, the average age at death was 4.4 years, which is the same as the overall average. It is notable that there are no recorded cases of tuberculosis in Kelp Geese or Andean Geese *C. melanoptera*; probably no Kelp Geese lived long enough in captivity to develop the condition; of the ten adults examined, the age of only five was known, and these were all first year birds.

#### *Aspergillosis*

Aspergillosis was the second commonest cause of death. In shelducks, 16% of adults and 5% of juveniles were found to die of this condition, while in sheldgeese, 25% of adults, 33% of juveniles and 6% of downies had the disease. Unlike seaducks, the group whose terminal illnesses have first been examined in detail (Hillgarth & Kear 1979a), shelducks and sheldgeese are not particularly susceptible to attack by *Aspergillus fumigatus* at a very young age. It is probable, however, that

if more Kelp Geese and steamer duck downies had been included in this analysis, the incidence of aspergillosis might have been higher, since birds that normally inhabit salt water seem to be far more prone than others.

#### *Amidostomiasis or gizzard worm*

This is a condition caused by heavy infestation of the gizzard worm *Amidostomum anseris*. The larvae attach themselves to grass blades and are taken in by grazing wildfowl. Most healthy geese have a few of these thread-like nematodes living beneath the horny lining of the gizzard. If the bird is young or in a weak condition and the infestation becomes heavy, then the gizzard lining may be severely damaged: the bird cannot digest its food properly and eventually dies. As the eggs of the parasite are passed out with the droppings on to the grass, infestations can be controlled by good management of the land and by routine treatment of affected birds using Tetramisole (marketed under the name of Nilverm, for example) or Nebendazole (Mebenvet or

Eighteen adult sheldgeese, 21% of the total, died of severe gizzard worm infection. Death occurred usually in the autumn and winter; indeed, there is no mortality from this cause between April and August. Of the eight birds dying in January, seven were in their first winter, and three of the four birds dying in March were year-old birds. Ten juveniles (23% of the total) also died of amidostomiasis. Therefore we can assume that this is primarily a disease of young or of stressed birds. It seems significant that there are no cases recorded in the Andean Goose or its relative the Abyssinian Blue-wing (both of which come from high mountain grasslands), while Magellans, Ashyheads and Ruddyheads were badly affected as juveniles and as adults.

#### *Atherosclerosis*

Other disease conditions constituted less than 10% of adult deaths in all species, with two exceptions, the Orinoco Goose, and the steamer ducks. Nearly half the 13 deaths of adult Orinoco Geese were caused by cardiac diseases associated, apparently, with atherosclerosis or hardened arteries. The cause of death of four out of ten adult steamer ducks was also atherosclerosis, while aspergillosis killed another three birds. Humphreys and Beer (1971) found that 50% of *Tadornini* showed some incidence of atherosclerosis at post-mortem examination—considerably higher than the proportion of seaducks.

### Discussion

The only unusual point to emerge from the records of seven adult and three juvenile Abyssinian Bluewings seems to be the negative one—that gizzard worm is unknown. This is also true of 12 adult and six juvenile Andean Geese. Half of both these age groups, and a quarter of the adult deaths were due to visceral gout or renal failure. In Magellan Geese, Ashyheads and Ruddy-heads, tuberculosis, gizzard worm and aspergillosis are common, and gizzard worm also affects the juveniles. Among the downies, pneumonia is the usual cause of death. In Kelp Geese, on the other hand, 80% of adults and juveniles died of aspergillosis, a disease that is often common in marine waterfowl.

Tuberculosis and aspergillosis accounted for half the adult Ruddy Shelduck, and this was a typical pattern in the other shelducks. Aspergillosis was the cause of death in three out of the seven adult Cape Shelducks and in *all* the juveniles. Sixty per cent of adult Australian Shelducks died of tuberculosis. As this species has only recently started breeding at the Wildfowl Trust, there are no recorded deaths amongst juveniles or downies. Forty per cent of adult New Zealand Shelducks died of tuberculosis, and tuberculosis, renal failure and hepatitis accounted for more than half of the 11 adult deaths in Radjah Shelducks. Of the five juveniles, two died of aspergillosis and three of cardiac failure. Amongst 29 adult Common Shelducks, tuberculosis and aspergillosis were the commonest cause of death. Deaths from enteritis, renal failure and pneumonia were also significant. Amyloid disease, cyathostomiasis (gape worm) and lead poisoning accounted for two adults each. Amongst nine juveniles, three died of enteritis and two of *Acuaria* infection (see also Wood 1974).

The fact that females tend to live longer than males makes the shelducks and geese unique (as far as we know) among waterfowl. In all other groups and species that have been studied, males tend to survive better, and the sex ratio of an adult population is biased so that males predominate over females. It is significant, therefore, that in some wild shelducks (Siegfried 1976; Riggert 1978) the sex ratio has been found to be biased the other way, in favour of the females. And it is a common observation that the female is the 'dominant' partner of the pair so much so that in the Paradise Shelduck it is she that assumes the bright

breeding plumage and the male that is dull in colour.

The numbers of males and females in our mortality records also suggest a slight bias in favour of older females. There are 38 male and 43 female downies (and one of unknown sex), 37 males and 28 female juveniles, and 91 male and 81 female adults—a total of 166 males to 152 females, or a ratio of 52:48. Presumably there are a disproportionate number of aged female shelducks and geese still alive in the Wildfowl Trust collections.

Compared with seaducks, captive shelducks and sheldgeese are less prone to suffer from aspergillosis in the very early stages, although among juveniles past the downy stage, and in adults, aspergillosis has almost equal significance. Candidiasis, another fungal disease that is found (rather rarely) in seaducks, occurred only once in 334 Tadornini deaths. Renal failure and impactions of the gizzard tend to be less common, while internal parasites are much more important, especially amongst the grazing sheldgeese. Lead poisoning, as in seaducks, is rare.

Unfortunately, we have almost no information on the incidence of disease and the causes of mortality in wild populations of sheldgeese and shelducks. The oldest ringed wild Common Shelduck lived to 15 years (Rydzewski 1974), and the life expectancy of this same species has been calculated as 4.5 years (Boyd 1962) almost exactly that of the whole shelduck group in captivity.

Specific disease patterns have emerged from these captivity records. The high incidence of aspergillosis in Kelp Geese is not unexpected, but the importance of heart disease and atherosclerosis in Orinocos and steamer ducks is not easy to explain. Perhaps they are peculiarly stressed in captivity, or their diets are inadequate. The lack of gizzard worm problems in Andean and Blue-winged Geese is interesting and worthy of further investigation, as is the apparent immunity of the Andean Goose to avian tuberculosis. Delacour (1954) wrote 'In a cool climate, with plenty of shade and cold water, Andean Geese are not difficult to keep or to breed. But they are apt to contract tuberculosis, aspergillosis and other diseases in warmer districts'. Records from other collections of waterfowl should prove interesting.

Sheldgeese seem to be comparatively short-lived in captivity; a large proportion of birds die in their first year, mostly of gizzard worm. Routine dosing with a vermicide in

the early autumn should alleviate the condition, and allow the geese to attain a greater age.

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#### Summary

Post-mortem data from 335 shelducks, sheldgeese and steamer ducks of the tribe Tadornini dying in Wildfowl Trust collections between 1959 and 1976 have been analysed. The most important primary causes of death were tuberculosis, aspergillosis and, in certain species, gizzard worm.

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A pair of Cape Shelduck *Tadorna cana*; the male is raising his head to call. (*Joe B. Blossom*)

