Egg carrying by a Trumpeter Swan

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Flying Trumpeter Swan carrying an egg from her nest in Milliken District Park. *Photo by Kim Stevenson*

On 5 June 2015, Kim Stevenson photographed a leucistic female Trumpeter Swan (*Cygnus buccinator*) (Tag H11) carrying an egg with some nest material at Milliken District Park (43° 82' N 079° 27' W), Toronto. The swan gripped the egg with her lower mandible, apparently through a hole in the shell (*right)*. She was also seen carrying the egg while flying (*above*) from her nest to the far end of the pond, where she dumped the presumably damaged egg and then swam back to the nest, accompanied by her mate (Tag L42). Six days later she completed incubation of her remaining eggs and hatched four cygnets.

This seems to be the first report of any swan carrying a complete egg. Bollinger and King (2002) reported "direct evidence of hatching (i.e., newly hatched cygnets and/or the female tossing eggshell fragments over the side of the nest)." At Aurora, Ontario, where nesting Trumpeter Swans have been intensively observed over many years, no observations of removal of hatched shells from the nest have been made (H. Lumsden,

Female Trumpeter swan gripping an egg with her lower mandible apparently through a hole in the shell. Note attached nesting material. *Photo by Kim Stevenson*

pers. obs.). Shells remain crushed flat beneath the newly hatched cygnets, as is the case in the wild with other swans, geese and most ducks. Perrins (1969) reported that when an incubating Mute Swan (*Cygnus olor*) broke an egg in defence of her nest, she ate the contents and carried three pieces of the shell, one at a time, about 4 m to the river's edge and dropped them. In contrast, there are many accounts of ducks carrying eggs, e.g., Hindman (2015) saw a male Wood Duck (*Aix sponsa*) carrying an egg. Between his literature search and Johngard and Kear (1968), records of 14 additional species of ducks carrying eggs were listed. Removal of shells of hatched eggs with deposition at a distance from the nest is a common behaviour of birds (e.g., shorebirds; Sandercock 1996), presumably due to heightened risk of predator attraction or other risks to the remaining eggs.

The restored population of Trumpeter Swans in Ontario originated from the Rocky Mountain-Greater Yellowstone breeding population (Lumsden and Drever 2002). Oyler-McCance *et al.* (2007) documented a low level of genetic variability in this population. This may account for the relatively poor reproductive performance of Rocky Mountain origin pairs in Ontario whose proportion of eggs hatched was 57% (N = 262), and whose cygnet survival to fledging was 64% (N = 96). In a 1994 incubator study of egg hatching rates from these pairs, Hamilton (1996) found that 34% of the embryos died during the first 14 days of incubation and 29% died in late incubation. She also found that 14% of the eggs were infertile. Eighty-eight unhatched eggs were collected from the nests of captive pairs of Trumpeter Swans used in the Ontario restoration program (Lumsden and Drever 2002). They were refrigerated and later examined by the late R. Hampson (Veterinary College, University of Guelph) and H. Lumsden. Of these eggs, 32% of the embryos were diagnosed as having died in the early stages of incubation (similar to Hamilton's results). These results indicate that incubating female Ontario Trumpeter Swans may frequently have to cope with nonviable eggs.

Study of Mute Swan eggs in very early stages of incubation showed that developing embryos envelop the yolk with a network of blood vessels, whereas this does not occur in infertile eggs (H. Lumsden, pers. obs.). Eggs possess physical and biological defence systems to protect the live embryo from invasion by microorganisms (Kovacs-Nolan *et al.* 2005). However, on the death of the embryo, the haemoglobin in these eggs decomposes rapidly and gas exchange through the porous shell may allow invasion by bacteria. Diagnosis of early embryonic death is a dark grey stain in the egg contents caused by sulphur amino acid decomposition (V. Thomas, pers. comm.). Pressure builds within the shell. A puncture will cause the egg to explode, spattering the nest contents (R. Hampson and H. Lumsden, pers. obs.). Should such contents smear the remaining eggs in the nest, shell pores would be plugged and gas exchange impaired, potentially causing death of those embryos. In contrast to eggs with decomposing embryos, infertile Trumpeter Swan eggs have endured incubation

of 33 days without obvious bacterial infection (H. Lumsden, pers. obs.) and when opened two days after the other eggs hatched, a yellowish liquid of a thick consistency was found with little or no pressure within the shell. Cracked eggs may also decompose with results similar to eggs with dead embryos. Removal of cracked eggs from a nest under incubation has been documented for many species, and nearly all bird species reject broken eggs (Kemal and Rothstein 1988). Predators search for unhatched eggs and disturb hatched shells in the nest. Presumably they look for egg membranes and perhaps the droppings passed by the embryo before emerging from the shell.

It is possible that the female swan H11 was carrying a decomposing egg, the shell of which had ruptured. This may explain the adhering nest material. Given the advanced state of incubation of the nest at the time of the observation (i.e., within six days of hatch), it appears likely that the egg was one with a dead embryo. The egg was abandoned at the far end of the pond and was not examined, thus its condition was not confirmed.

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Literature Cited

Bollinger, K.S. and **R.J. King**. 2002. Activity budgets of nesting Trumpeter Swans in interior Alaska. Waterbirds 25 (Special Publication 1):285-295.

Hamilton, E.C. 1996. Factors affecting the hatchability of Trumpeter Swan eggs: The Ontario Restoration program. Master of Science Thesis. University of Guelph.104 pp.

Hindman, L.J. 2015. Egg carrying by a male Wood Duck (*Aix sponsa*). Wilson Journal of Ornithology 127:752-761.

Johnsgard, P.A. and **J. Kear**. 1968. A review of parental carrying of young by waterfowl. Living Bird 7:89-102.

Kemal, R.E. and **S.I. Rothstein**. 1988. Mechanisms of avian egg recognition: adaptive responses to eggs with broken shells. Animal Behaviour 36:175-183.

Kovacs-Nolen, J., M. Phillips and **Y. Mine.** 2005. Advances in the value of eggs and egg components for human health. Journal of Agricultural Food Chemistry 53:8421-8431.

Lumsden, H.G. and **M.C. Drever**. 2002. Overview of the Trumpeter Swan reintroduction program in Ontario 1982-2000. Waterbirds 25 (Special Publication 1):301-312.

Oyler-McCance, **S.J., F.A. Rausler**, **L.K. Berkman** and **T.W. Quinn**. 2007. A range-wide population genetic study of Trumpeter Swans. Conservation Genetics 8:1339-1353.

Perrins, C.M. 1969. Mute Swan's method of disposing of broken egg. British Birds 62:383.

Sandercock, B. 1996. Egg capping and eggshell removal by Western and Semipalmated Sandpipers. Condor 98:431-433.

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