

Colour morphs, downy and juvenile plumages of Trumpeter and Mute Swans

Harry G. Lumsden

Both Trumpeter Swans (*Cygnus buccinator*) (hereafter Trumpeters) and Mute Swans (*Cygnus olor*) (hereafter Mutes) have two colour morphs, a normal and a leucistic morph. These are most obvious in the cygnets, but are discernible in adults with careful observation.

Munro *et al.* (1968) studied the genetic control of normal grey (also called Royal) and leucistic (also called Polish) colour morphs of Mutes in Rhode Island and concluded that a single sex-linked gene controlled their frequency with grey being dominant. They found that 10% (N=29) of the male, 26% (N=51) of the female cygnets and overall 16% were leucistic. Reese (1975) found that 19% (N=25) of the Mute hatchlings in Chesapeake Bay, Maryland, were leucistic. Bacon (1980) hypothesized that leucistic Mute females may be more productive than the normal colour morph. Because of their white plumage, leucistic swans appear to be a year older than they actually are, and may obtain a mate at two

years of age and breed at three years of age; by doing so leucistic females have an advantage over normal females which seldom breed at three years of age. His hypothesis predicts that leucistic genes should be more common in low density and expanding populations. This is consistent with the situation in Ontario where Mute populations have been expanding (Petrie and Francis 2003). In a sample of adult Mutes banded in the spring of 1983 and 1984 on the northwest shore of Lake Ontario, there were 11 leucistic females (69%) and only five (31%) that were grey. Of the males, 10 (37%) were leucistic and 17 (63%) were grey.

Leucistic Trumpeters are rare compared to leucistic Mutes. In the Rocky Mountain population, the only records of leucistics come from Yellowstone National Park where Condon (1941 in Banko 1960) found nine leucistics among 58 cygnets (13%) from 1937-1940. McEaney (2005) described in detail the plumages and the colour of bill, legs and



Figure 1. Five normal grey Trumpeter Swan cygnets in primary natal down, about four days old.
Photo: Harry Lumsden.

feet of subadult and adult leucistic Trumpeters in Yellowstone National Park. Banko (1960) found none at Red Rock Lake National Wildlife Refuge in Montana and leucistics do not seem to have been recorded in the Pacific population in Alaska.

In Ontario, among the Rocky Mountain population adult stock bought from aviculturists for restoration, none were leucistic but three of these released pairs produced leucistic cygnets. These presumably trace their origin to Yellowstone National Park. The normal female #839 with her normal mate #812 hatched seven (39%) leucistics among 18 cygnets produced from 2006-2009 at Aurora (44° 00' N 079° 28' W), indicating the presence of the recessive gene. The male #812 was killed when he landed in front of a car on a busy highway in 2010 and subsequently #839 mated with a new normal

mate H24, and together they hatched 25 cygnets from 2010-2015, but none were leucistic. This indicates it was #812 that carried the recessive gene. At Bluffers Park (43° 42' N, 079° 14' W), the normal female A70 with a normal mate #197 hatched 37 cygnets from 2004-2010 of which four (11%) were leucistic cygnets. Another normal pair near Portland (44° 42' N 076° 12' W) is also reported to have hatched leucistics.

Downy and Juvenile Plumages

The Common Loon (*Gavia immer*) replaces stage A down with stage B down (Palmer 1962), and the Eagle Owl (*Bubo bubo*) and presumably the Great Horned Owl (*Bubo virginianus*) are other examples of birds which replace the first down (neoptile) with a second down (mesoptile) (Cramp 1985). Unlike these species, there is no moult of primary down to



Figure 2. One normal (grey) and three leucistic Trumpeter Swan cygnets (white) in primary down about 10 days old.

Figure 3. Five normal (grey) Trumpeter Swan cygnets in secondary down on 9 August 2013, 30 days old.

Photos: Harry Lumsden



make way for secondary down in Trumpeters and Mutes. The primary down of swan cygnets at hatch develops from feather follicles within the egg during embryonic life (Vetkevich 1966). The cygnets grow very fast and as their skin area expands, down that develops from secondary follicles fills the empty space between the primary follicles. The primary down feathers of normal Trumpeters are very pale grey over most of the body but whiter on the under parts and the bill is dull pink shading to grey

laterally and proximally, the nail is a dark grey and the feet and legs are flesh-coloured (Figure 1). Leucistic cygnets have pure white primary down (Figure 2) and secondary down with the colour of the bill and feet similar to their normal siblings (Vetkevich 1966). In normal morph cygnets, these new follicles produce a darker more cryptic secondary down which differs in colour from that of the primary down (Figure 3). Banko (1960) described this secondary down as mouse-grey in colour.

The primary down of normal Mute cygnets is pale greyish-brown with white underparts (Witherby *et al.* 1939). As in Trumpeters, the secondary down is darker than the primary down. Leucistic Mute cygnets hatch with pale cinnamon down also grading to white on the breast and head (Figure 4) and again, like Trumpeters, secondary down is white and remains white for life.

The parents of both Trumpeters and Mutes are remarkably sensitive to the colour of their newly hatched cygnets. Although the difference at hatch between normal and leucistic cygnets is slight (e.g., in Trumpeters, Figure 2.) there are records of parents of both species attacking and killing their own leucistic cygnets. Scott (1972) lists five accounts in Europe of Mutes killing their own cygnets. In Ontario, a Trumpeter parent is suspected of killing one leucistic cygnet in 2008. The cygnet was found dead on

the nesting raft the day after it hatched, much bloodied around the head (H. Lumsden, pers. obs.). At Bluffer's Park in 2004, the Trumpeter male #197 killed two of his leucistic cygnets (R. Griffiths, pers. comm.). In the early stages of Trumpeter Swan restoration, Trumpeter eggs were placed in Mute nests as part of a cross fostering technique. Attacks by Mutes on the "wrong" coloured cygnets were effectively prevented by tinting the tips of the down with a black dye at hatch (Lumsden and Drever (2002). At about 30 days of age, the secondary coat of down on these cygnets was spotted with darker clusters of filaments from the dyed primary down.

The parents of both Trumpeters and Mutes are remarkably sensitive to the colour of their newly hatched cygnets.



Figure 4. Two normal cygnets (left) and one leucistic (far right) Mute cygnet, newly hatched and still on the nest. *Photo: Harry Lumsden*



Figure 5. Leucistic Trumpeter Swan cygnet #395 in juvenile plumage on 22 January 1998, 7 months old.

Photo: Harry Lumsden

The juvenile contour feathers in the plumage of normal Trumpeter cygnets is about the same colour grey as that of the secondary down. These feathers, growing from both primary and secondary follicles, push the down off as they grow (Vetkevich 1966). The feet of normal juveniles change to yellowish grey and darken with age finally becoming black at maturity.

At seven months, a typical leucistic male Trumpeter cygnet, #395 (Figure 5), had fully developed his white juvenile plumage. His bill was mostly pink flecked with black with bare lores, off-white in colour. His feet were bright orange-yellow which he will retain for life. By 25 months, the bill of another

leucistic male, C04, had changed to black with small yellow spots on the lores, near the gape and at the nostril (Figure 6).

At 31 months, another leucistic male, #091, showed only one tiny yellow spot on the lores (Figure 7). Trumpeters very rarely have a yellow mark on the lores which is not associated with leucism (Figure 8). Such birds may be mistaken for Tundra Swans (*Cygnus columbianus*) but the length of their bills (longer in Trumpeters) (Johnsgard 1974), the terminal feathering on the forehead (square or slightly rounded in Tundras, slightly pointed in Trumpeters) and quality of the yellow patch establishes their identity as Trumpeters. The quality of the yellow patch in Tundras is clear yellow and its location is close to the apex of the bill process, whereas in Trumpeters, the yellow is comprised of clustered speckles and streaks of yellow on a black background and is sometimes located well below the apex of the bill process close to the middle of the lores.

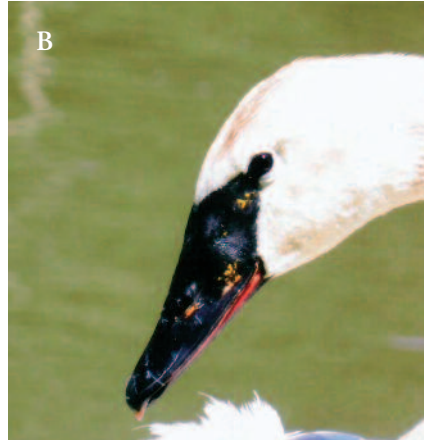
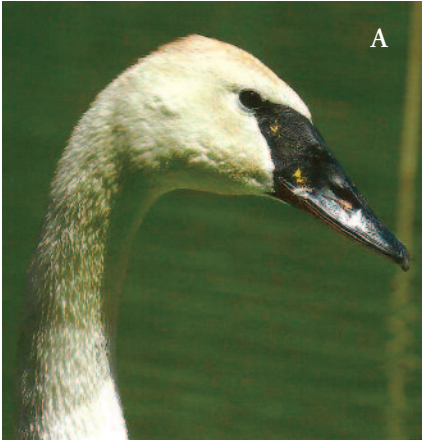


Figure 6. At 25 months, leucistic male C04 had yellow spots on the lores near the gape and at the nostrils. These markings were asymmetrical. A: right facing, B: left facing.

Figure 7. Left: At 30 months, leucistic male #091 showed only one tiny yellow spot at the lores.

Figure 8. Below: Female #116 with a yellow mark on the lores. She was not a leucistic bird.

Photos: Harry Lumsden



Acknowledgments

I thank Diana Lumsden for typing, handling email and for research assistance, Dr. Vernon Thomas for references and valued comments of the manuscript and the referees for improvements in the text.

Literature Cited

- Banko, W.E.** 1960. The Trumpeter Swan. *North American Fauna* 63:1-214. U.S. Bureau of Sports Fisheries and Wildlife. Washington, D.C.
- Bacon, P.J.** 1980. A possible advantage for the "Polish" morph of the Mute Swan. *Wildfowl* 31:51-52.
- Condon, J. de L.** 1941. Unpublished MS on Trumpeter Swans in the Yellowstone National Park region. [No other details available.]
- Crampton, S.** (ed.). 1985. *Handbook of the Birds of Europe, the Middle East and North Africa*. Vol. 4. Oxford University Press, Oxford. 960 pp.
- Johnsgard, P.A.** 1974. The taxonomy and relationship of the northern swans. *Wildfowl* 25:155-161.
- 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.
- McEneaney, T.** 2005. Rare colour variants of the Trumpeter Swan. *Birding*. [March/April]: 148-154.
- Munro, R.E., L.T. Smith** and **J.J. Kupa.** 1968. The genetic basis of color differences in the Mute Swan (*Cygnus olor*). *Auk* 85: 504-505.
- Palmer, R.S.** (Ed.) 1962. *Handbook of North American Birds*, Vol. 1, Yale University Press, New Haven. 567 pp.
- Petrie, S.A.** and **C.M. Francis.** 2003. Rapid increase in the lower Great Lakes population of feral Mute Swans: a review and a recommendation. *Wildlife Society Bulletin* 31: 407-416.
- Reese, J.G.** 1975. Productivity and management of feral Mute Swans in Chesapeake Bay. *Journal of Wildlife Management* 39:280-286.
- Scott, P.** [and **the Wildfowl Trust**]. 1972. *The Swans*. Houghton Mifflin Company, Boston. 242 pp.
- Vetkevich, A.A.** 1966. *The feathers and plumage of birds*. October House Inc. New York. 335pp.
- Witherby, H.F., F.C.R. Jourdain,** **N.F. Ticehurst** and **B.W. Tucker.** 1939. *The Handbook of British Birds*. Vol. 3. H.F. & G. Witherby, London. 387pp.

Harry G. Lumsden
44 Hillview Road
Aurora, Ontario L4G 2M5