

A KEY TO DOWNY CYGNETS WITH ANALYSIS OF PLUMAGE CHARACTERS¹

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Boyd (in Scott et al. 1972), noting the difficulty in identifying newly-hatched cygnets, provided color descriptions, based on live specimens, of the natal plumage and unfeathered parts of the true swan species and the Coscoroba (*Coscoroba coscoroba*). Having examined study skins of young cygnets of all species, except the Coscoroba, and having studied live cygnets of the 3 North American species, I found that the various downies could also be distinguished by means of bill and down characters. To assist field and laboratory ornithologists, I present here an illustrated key (Figs. 1-28) based on these characters and describe the plumage colors and patterns that further characterize the cygnets. Specimens examined are listed in the Appendix.

The classification used in the key departs from the congeneric concept put forth by Delacour and Mayr (1945) and uses instead the genera *Cygnus* and *Olor*, proposed by Wetmore (1951) for the white swans, supported by osteological evidence presented by Howard (1946) and Woolfenden (1961). This is the generic classification adopted in the *A.O.U. Check-list of North American Birds*, 5th edition (1957). The classification of species within the genus *Olor* is that of Parkes (1958); species of *Cygnus* are classified according to Delacour and Mayr (1945).

¹I dedicate this paper to Dr. Alexander Wetmore, on the occasion of his 90th birthday.

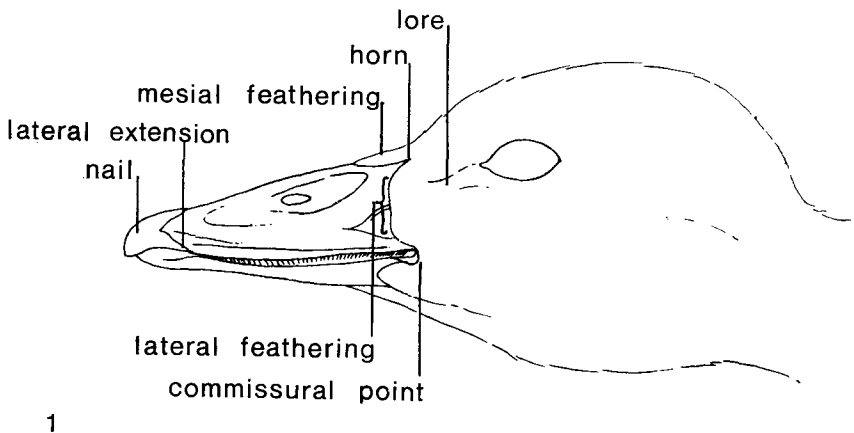
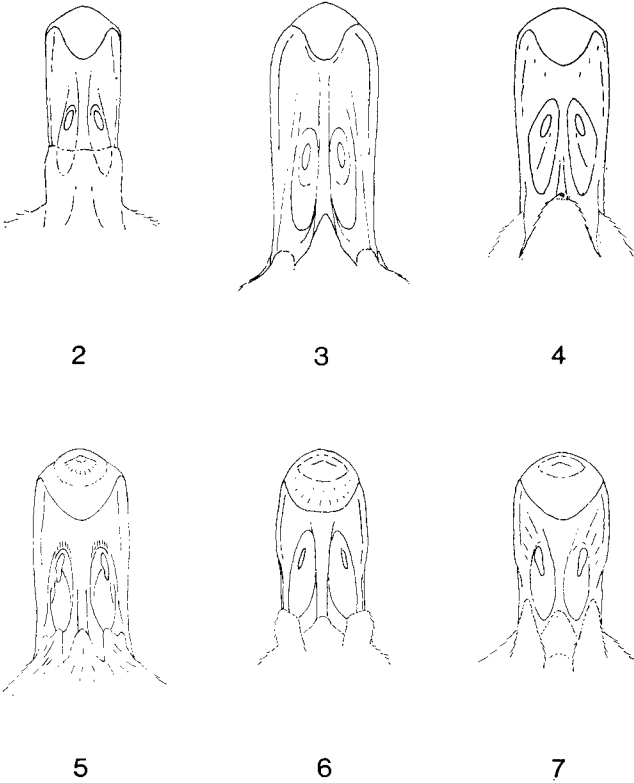


FIG. 1. Glossary of terms.



FIGS. 2-4. Bills of *Cygnus* species. FIGS. 5-7. Bills of *Olor* species.

A Key to the Downy Cygnets of the World

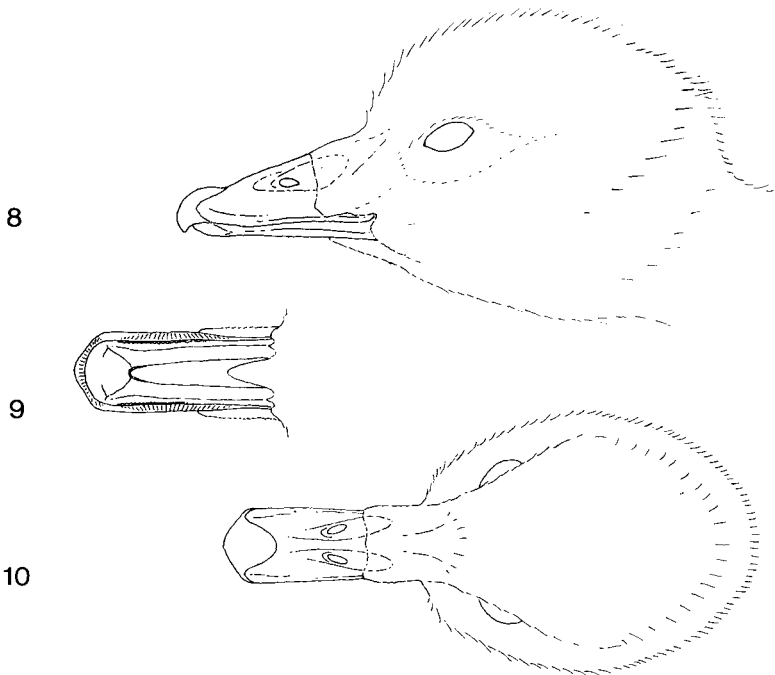
- 1a. Compared to size of bill, nail small and/or narrow, especially toward posterior border (Figs. 2 and 3); lateral extensions of nail prominent in dorsal view (Fig. 4); bill dark-colored, nail *markedly lighter*. Genus *Cygnus*. Go to 2.
- Caution:* in very young *live* cygnets, nail appears colorful because it is translucent and color of blood shows through.
- 1b. Compared to size of bill, nail large and wide, *slightly* narrower near posterior border (Figs. 5 and 6); lateral extensions of nail *not* prominent in dorsal view (Fig. 7); bill light-colored, nail more or less *same color*. Genus *Olor*. Go to 4.
- 2a. Lateral feathering extends along edges and over top of upper mandibles nearly to nostrils. Black-necked Swan, *Cygnus melanocoryphus*. Figs. 8-10.
- 2b. Lateral feathering extends only slightly (2-4 mm.) beyond commissural point. Go to 3.
- 3a. Lateral feathering curves back toward eyes from commissural point; lores *unfeathered*. Black Swan, *Cygnus atratus*. Figs. 11-13.

- 3b. Lateral feathering extends upward in nearly straight line from commissural point; lores *feathered*. Mute Swan, *Cygnus olor*. Figs. 14–16.
- 4a. Lateral feathering extends forward in *single long point well beyond* mesial feathering, often nearly to nostrils. Whooper Swan, *Olor cygnus*. Figs. 17–19.
- 4b. Lateral feathering extends forward more or less *equally* with mesial feathering, *never* in single long point, *never* nearly to nostrils. Go to 5.
- 5a. Lateral feathering markedly “sculptured,” horns of bill *never* feathered; nail more or less *triangular* posteriorly; down on face and around bill short and velvety, more or less smoothly appressed to head. Trumpeter Swan, *Olor buccinator*. Figs. 20–22. See also photographs in Banko (1960:118–119) and in Scott et al. (1972: plate 26).

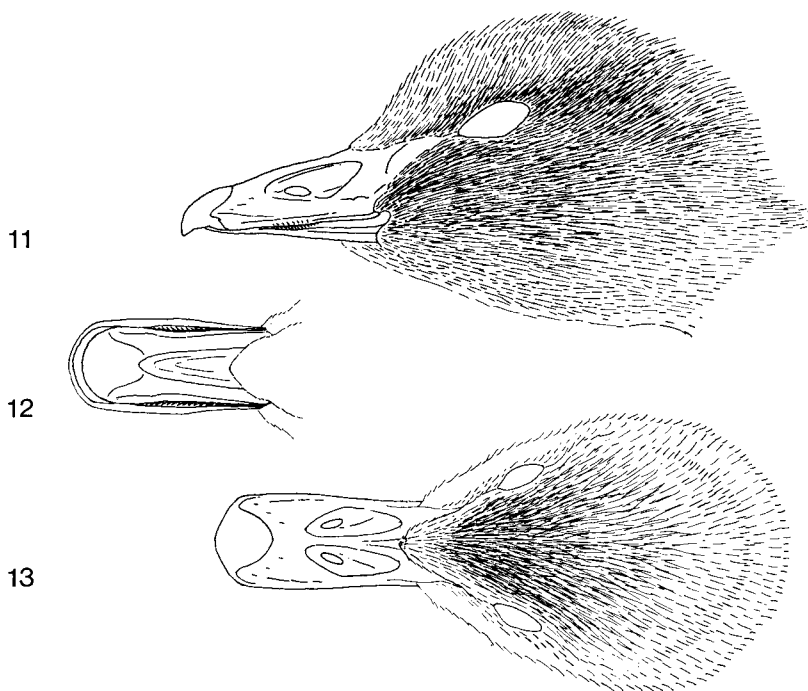
Caution: in museum specimens prepared from *unhatched* cygnets, down of all species may appear short and rumped.

- 5b. Lateral feathering “sculptured” but edges frequently obscured by down (Fig. 23), horns of bill *frequently* feathered; nail usually more or less *rounded* posteriorly; down on face and around bill relatively long and fluffy, often standing out markedly from head. Whistling Swan, *Olor c. columbianus*, Figs. 23–25, and Bewick’s Swan, *Olor c. bewickii*, Figs. 26–28. See also photographs in Bailey (1948:150) and in Scott et al. (1972: plate 32).

Caution: a few *O. c. bewickii* may have nails somewhat triangular posteriorly, but the down characters will serve to separate these from *O. buccinator*.



FIGS. 8–10. Black-necked Swan, *C. melanocoryphus*. BM(NH)97.11.14.184.

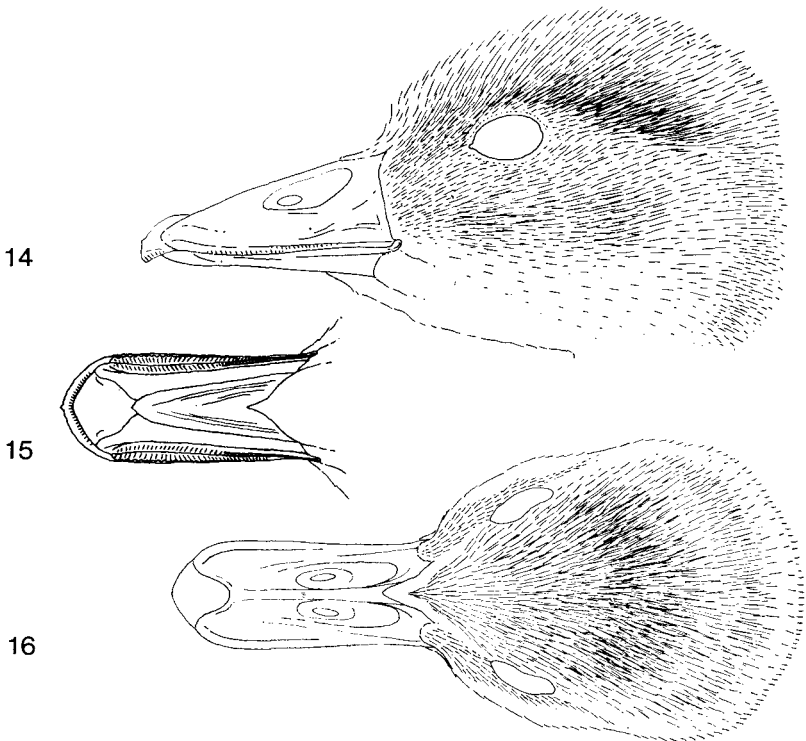


FIGS. 11-13. Black Swan, *C. atratus*. UND uncat. ♀.

CYGNET COLOR COMPARISONS

Other characters that separate the cygnets into 2 distinct groups are the pattern of the dorsum and the hues of the plumage. Both of these characters are best seen in live, newly-hatched cygnets or in clean, well-prepared skins. The *Olor* cygnets have 2 large white shoulder spots and narrow white wing-patches, while the *Cygnus* downies are without dorsal spots. Two Black-necked cygnets were checked at the base of the dorsal down for evidence of spots; there was none. Only the Mute and Black cygnets have narrow, inconspicuous, pale grayish wing-patches; the Black-necked cygnet appears almost completely white.

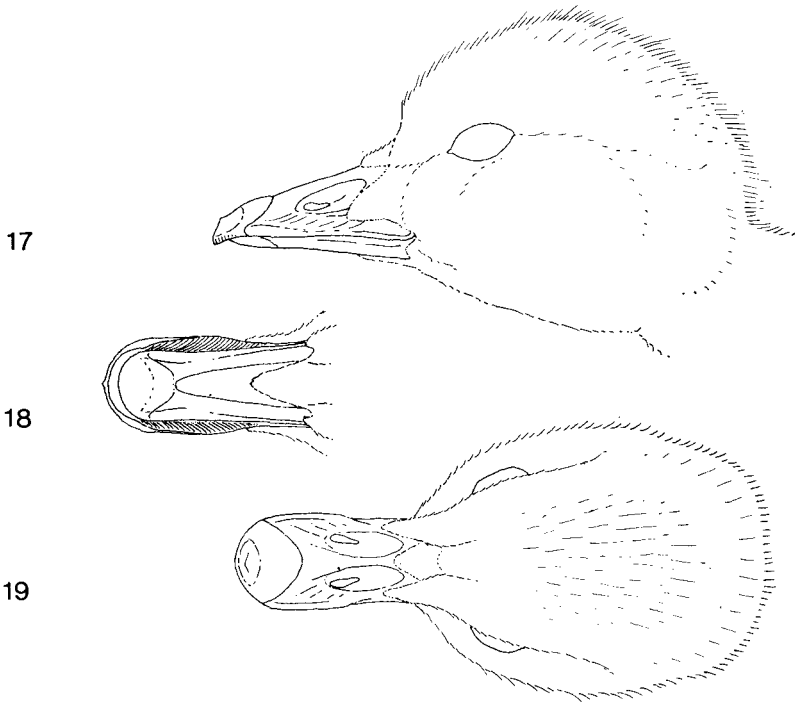
While Delacour's statement (1954) that downy cygnets are "pale grey and white, without any distinct markings" is basically true, the grays of the two groups are discernibly different in both hue and value. Using terms suggested by Palmer (1962), the basic hue of the *Cygnus* group on the Villalobos scale is scarlet-orange; that of the *Olor* cygnets, orange-scarlet. The scarlet-orange appears as a brownish or yellowish gray, the orange-



FIGS. 14-16. Mute Swan, *C. olor*. BM(NH) 81.5.1.6056.

scarlet as a warm, yet rather “bluish” gray (Table 1). *Cygnus* downies are also measurably darker than those of *Olor*. This is true even of the downy Black-necked Swan, outwardly the whitest of all the cygnets, but darker than any other species at the *base* of the dorsal down. The contrast in value between down tip and down base is startling.

I determined the colors present in the plumage of the cygnets by matching certain areas on clean, well-prepared specimens to each of 3 commonly used color standards. Areas measured were the superciliary area, the cheeks, crown, hindneck, upper back, rump, and underparts. The cygnets were viewed on a light-colored wood table, with north daylight at the left, very pale-colored walls at the right, and fluorescent light on an off-white ceiling. A white paper was placed beneath each bird being measured and appropriate masks were used in comparing samples. The sample areas were matched first to the Villalobos *Atlas de los Colores* (1947), then to the Munsell *Book of Color* (1929). The nearest Ridgway (1912)

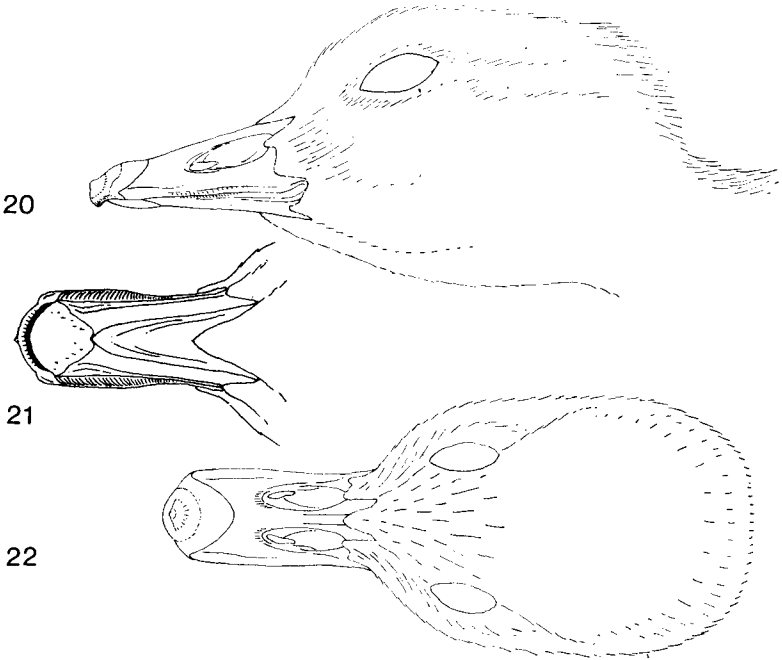


FIGS. 17-19. Whooper Swan, *O. cygnus*. WTS 3244 ♂.

equivalents were determined first by correlating the Villalobos samples to a reverse index prepared from the Conversion Tables appended to the *Atlas* and then checking the Ridgway equivalents thus obtained against the specimen, using color chips from a good copy of the latter work. For the sake of brevity, only the lightest and near-darkest colors are listed in Table 1. These are, respectively, the colors of the underparts and of the upper back, the latter being, in nearly all cases, of a lower value than those of the crown and hindneck, but higher than that of the rump, which is usually the darkest part of the bird.

Precise comparisons between my correlations and those of Hamly (1949) and Smithe (1974) proved unfeasible because of dissimilar viewing conditions and the use of different copies of Ridgway's work, many of which vary slightly from one to another.

The Ridgway verbal color notation is well-known to biologists, but a short resumé of the less frequently used Villalobos and Munsell systems would be useful here. In both systems, the *hues*, composed of basic colors,



FIGS. 20-22. Trumpeter Swan, *O. buccinator*. UND uncat. ♀.

such as reds, yellows, greens, purples, and combinations thereof, are identified by *letter* symbols. The Munsell system has, in addition, a numeral preceding the letter or letters to designate the proportions of basic colors present in the hue. In both systems, the *first* numerals following the letters indicate the lightness or *value* of the hue (Villalobos scale = 0 to 20; Munsell scale = 1 to 10); the *second* numerals describe its brightness or *chroma* (Villalobos scale = 1° to 12°; Munsell scale = 1 to 20). Saturated (= brilliant) hues used in the 2 systems are not always equivalent, nor can all values and chromas of a single hue in one system be matched entirely within a single hue in the other. This latter is especially true of dull colors that are either very pale or very dark. Similar variations exist between the Ridgway notation and both the Munsell and Villalobos notations. These and other color systems have been discussed by Palmer and Reilly (1956) and more recently by Smithe (1974).

SUMMARY

Differences in bill and down characters, as well as those of pattern and basic hue, will separate the downy young of all swan species. On the

TABLE 1
 COLOR ANALYSIS OF DOWNY CYGNET PLUMAGE¹

Species	Underparts	Upper back
<i>C. olor</i>		
Gray phase	N/OOS-19-1° ²	OOS-13-2°
BM (NH) 1925.5.17.1	10 YR 9/0.25 ± White	10 YR 6.5/1 ± XLVI Drab-Gray/ XLVI Light Drab
White phase		
(Prepared newly-hatched specimen not available).		
<i>C. atratus</i>	OOS-18-2° ³	OOS-11-2°
UND uncat. ♀	10 YR 8.5/0.5 White/LI Pale Olive-Gray	10 YR 5.5/1.5 ± LI Deep Olive-Gray/ XLVI Drab
<i>C. melanocoryphus</i>	N/OOS-19-1°	N/OOS-17-1° ⁴
BM (NH) 1935.4.1.2	10 YR 9/0.25 ± White	10 YR 8/0.5 ± White/XLVI Pale Smoke Gray
<i>O. cygnus</i>	N-19/20	SSO-13-1°
WTS 3244 ♂	5 YR 9.5/0.25 ± White	5 YR 6.5/0.5 ± XLVII Light Mineral Gray
<i>O. buccinator</i>	N-19/20	N/SSO-14-1°
UND uncat. ♀	5 YR 9.5/0.25 ± White	5 YR 7/0.25 ± XLVII Light Mineral Gray
<i>O. c. columbianus</i>	N/SSO-19-1°	SSO-14-2°
MMMN 2323	5 YR 9/0.25 ± White	5 YR 7/0.75 ± XLVII Light Mineral Gray
<i>O. c. bewickii</i>	N-19/20	SSO-15-1°
WTS 681 ♀	5 YR 9.5/0.25 ± White	5 YR 7.5/0.5 ± XLVII Light Mineral Gray/LI Pallid Mouse Gray

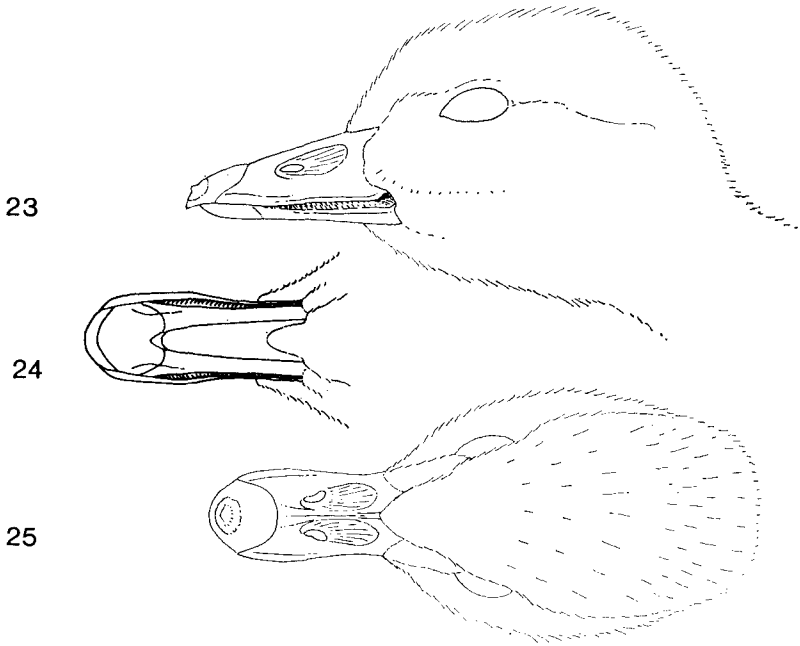
¹ Order of listings: Villalobos, Munsell, Ridgway (plate number and named color only).

The diagonal (/) is a regular part of the Munsell notation; used elsewhere, it denotes a shade between those given on either side of it.

² Chin was a bit darker: N-17; 10 YR 8/0.25; ± White/LI Pale Olive-Gray.

³ Chin was noticeably darker and a bit duller: OOS-14-1°; 10 YR 6.5/0.5; ± XLVI Pale Smoke Gray/XLVI Drab-Gray.

⁴ Base of dorsal down: OOS-7-2°; 10 YR 4/1.5; Broccoli Brown/XLVI Chaetura Drab. I was unable to obtain a sample of Broccoli Brown to check.

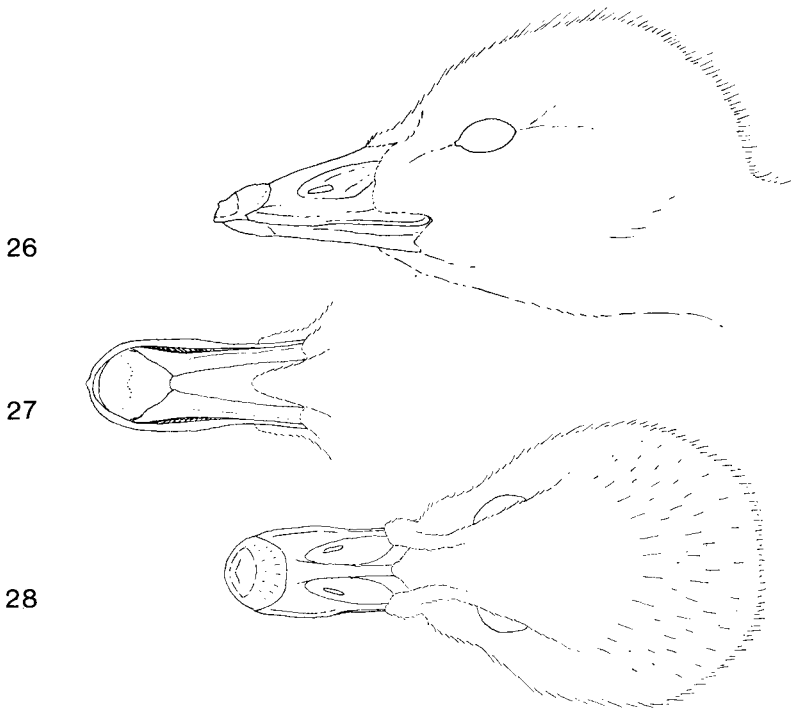


FIGS. 23-25. Whistling Swan, *O. c. columbianus*. FMNH 13566.

basis of these characters, cygnets fall into 2 groups, the same 2 groups into which their adult counterparts can be placed according to osteological evidence put forth by Howard (1946) and Woolfenden (1961) as well as to anatomical and plumage characters described by Wetmore (1951). The plumage and bill character differences among *Olor* cygnets support the species allocation proposed for this genus by Parkes (1958) on the basis of anatomical and behavioral characters. Two genera, *Cygnus* and *Olor*, and 6 species are recognized.

ACKNOWLEDGMENTS

Live specimens were provided by the Rhode Island and Michigan Departments of Natural Resources, the Round Lake Waterfowl Station, the Delta Waterfowl Research Station, and the Wildfowl Trust; study skins were loaned by the British Museum (Natural History), the American Museum of Natural History, the U. S. National Museum, the Field Museum of Natural History, the Royal Ontario Museum, the University of North Dakota, and the Wildfowl Trust. Permission to import eggs and young



FIGS. 26-28. Bewick's Swan, *O. c. bewickii*. BM(NH) 1938.12.14.177.

of Mute Swans was granted by the Canadian Wildlife Service; rearing pens were loaned by Delta Waterfowl Research Station and Canada Cement Company, Ltd. Research facilities were used at the Delta Waterfowl Research Station, the Round Lake Waterfowl Station, the Wildfowl Trust, the Shubenacadie Provincial Wildlife Park, the Manitoba Museum of Man and Nature, the Carnegie Museum, and the National Museum of Canada. I acknowledge gratefully the assistance of these institutions. Research for the project of which this paper is a part was assisted in 1963 by a grant from the Chapman Fund of the American Museum of Natural History and by a Grant-in-Aid-of-Research from the Society of the Sigma Xi—RESA, in 1969 by a short-term artist's grant with travel allowance from the Canada Council, and in 1975 by a grant from the Explorations Program of the Canada Council. In addition, Carnegie Museum provided *per diem* expenses during a short visit in 1967. I thank these agencies for their generous support. Finally, I wish to thank Kenneth C. Parkes for a critical reading of the manuscript.

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318 WILDWOOD PARK, WINNIPEG, R3T OE5, AND MANITOBA MUSEUM OF MAN AND NATURE, WINNIPEG, R3B ON2, MANITOBA. ACCEPTED 22 DEC. 1975.

APPENDIX

Institutional abbreviations are used as follows: American Museum of Natural History = AMNH, British Museum (Natural History) = BM (NH), Delta Waterfowl Research Station = DWRS, Field Museum of Natural History = FMNH, Manitoba Museum of Man and Nature = MMMN, National Museum of Canada = NMC, Royal Ontario Museum = ROM, Round Lake Waterfowl Station = RLWS, U.S. National Museum = USNM, University of North Dakota = UND, The Wildfowl Trust, Slimbridge = WTS.

Live cygnets examined: all 1–2 days old

- C. olor* Michigan: Grand Traverse Co., $\frac{1}{4}$ mi. N Traverse Cy. on East Bay (1 gray ♂, 2 white ♀♀); Rhode Island: Newport Co., Little Compton (3 ♀♀; 2 gray, 1 white).
- O. buccinator* British Columbia: 21 mi. SE Atnarko, Lonesome Lk. (2 n.s.), in coll. WTS; Montana: Beaverhead Co., Red Rock Lakes Migratory Waterfowl Refuge (1 ♀, 1 n.s.), in coll. DWRS. *No leucistic cygnets seen.*
- O. c. columbianus* Alaska: between Bethel and Hazen Bay—the “flats” (8 n.s.), in coll. RLWS.
- C. atratus*, *C. melanocoryphus*, *O. cygnus*, *O. c. bewickii*: no live cygnets seen.

Prepared specimens examined: mostly very young; ages given are from tag data

- C. olor* England: Thames, BM(NH) 81.5.1.6056, and Thames at Sunbury, BM(NH) 1925.5.17.1, both gray; Ontario: York Co., Stouffville, ROM 10096 ♂, white, captive.
- C. atratus* New York: Nassau Co., NYC, Central Pk., AMNH 35201, captive; Oklahoma: Cleveland Co., Norman, Lemmon's Farm, UND uncat. ♀, captive, c. 2½ wks.
- C. melanocoryphus* Argentina: Entre Rios, Santa Elena, BM(NH) 97.11.14.184; no loc., BM(NH) 1935.4.1.2 ♀, captive, 14 da.
- O. cygnus* England: Menagerie, BM(NH) J.42, captive; no loc.: “Ex Coll. Baker,” BM(NH) unreg'd.; orig. loc.? WTS 3244 ♂, captive, 1 da.
- O. buccinator* Alberta: Grande Prairie region, Airport Slough, Hermit Lk., Wolf Lk., NMC uncat. ♂♂ (3), and Buffalo Lakes nr. Sexsmith, Clairmont Lk., Saskatoon Lk. nr. Wembley, NMC uncat. ♂♂ (4), n.s. (2), 4 taken from shell, others newly-hatched except Wolf Lk. specimen c. 2 da.; Montana: Beaverhead Co., Red Rock Lakes Migratory Waterfowl Refuge, UND uncat. ♀, captive, 3 da. *No leucistic specimens examined.*
- O. c. columbianus* Alaska: Pt. Barrow, Chipp R., FMNH 13566; NW Territories: Dist. Keewatin, Southampton I., MMMN 2323, 1 week; Adelaide Penin., nr. E side Sherman Basin, NMC 46317, 46319–20 ♂♂, 46318; Dist. Mackenzie, Mackenzie Delta, Kendall I., 135° 18' W long., 69° 26' N lat., USNM 46926, c. 2 da.
- O. c. bewickii* Siberia: Yenisei, BM(NH) 1938.12.14—176 and 177; orig. loc.? parents wild-caught in Holland and England, WTS 681 ♀, captive.