IDENTIFICATION KEY OF *O. JAMAICENSIS*, *O. LEUCOCEPHALA* AND THEIR HYBRIDS

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INTRODUCTION

The Ruddy Duck *(Oxyura jamaicensis)* is an american species with three accepted subspecies: *O. jamaicensis jamaicensis, O. j. andina* and *O. j. ferruginea*. The North-american race *(O. j. jamaicensis)* was introduced into Great Britain in the 1950's, first because of accidental escapes and voluntary releases thereafter. Since then the british population has increased exponentially, reaching up to the 3.500 individuals at the beginning of the 1990's.

This species was first recorded in continental Europe in 1965 in Sweden, and subsequently in Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Holland, Norway, Portugal, Spain and Switzerland. There are also confirmed records of this species in Morocco and a recent not authentified record from Ukrania.

It has definetely bred in Iceland, Belgium, France and Spain. It is in this latter country where the invader species first met the palearctic stifftail: the White-headed Duck *(Oxyura leucocephala),* a globally threatened species, originating a very important conservation problem that is jeopardizing the survival of the Oxyura leucocephala as a genetically pure species.

The easy intercrossing of *O. jamaicensis* with *O. leucocephala* was actually first proved in the wildfowl breeding facilities owned by the Wildfowl and Wetlands Trust, in Slimbridge (U.K.). Some years later it was also proved that the hybrids were fertile, increasing the seriousness of the problem.

Since 1983 when *O. jamaicensis* was first recorded in Spain up until the present days, its records have been dramatically increased, especially within the Iberian range of *O. leucocephala,* the hibridization between both species being only a question of time.

The first data relating to this problem were collected in 1990, when a hybrid male showing the features of one of the hybrid types described presently was located in Laguna Salada of Puerto de Santa María, (Cádiz). Two new hybrid males were found in June 1991 in Laguna del Rincón, (Córdoba). The same year the first breeding record of *O. jamaicensis* in El Hondo dam (Alicante) was obtained. The production of hybrids in this site was also recorded.

Facing this problem the Spanish Administration and the corresponding regional Autonomous Administrations began with a Programme to eliminate any *O. jamaicensis* and its

hybrids with *O. leucocephala*. One can deduce from just a superficial analysis of the first captured individuals that the hybridization between both *Oxyura* species started in Spain as early as 1987/88.

All individuals that were shot and retrieved have been stored in Doñana National Park (with the exception of those shot in the province of Cordoba) and with them this Identification Key was made.

The serious situation advised the holding of some international meetings to adopt any corrective measure required. One of the decisions produced of the last meeting in Arundel (U.K.), was to make an Identification Key of the hybrids to be used inmediately by the observers of the affected countries.

The main aim of this paper where all knowledge about the hybrids is summarised, is to help any amateur or professional ornithologists to detect any suspicious hybrid *Oxyura* or *O. jamaicensis*.

Detailed descriptions of all known hybrid types will be given in a more extensive paper currently in preparation, (Pereira & Urdiales, in prep.).

The numbers of the hybrid types shown in the Tables is referred to the above mentioned paper.

MATERIAL AND METHOD

Seventeen hybrid specimens were studied, (13 males and 4 females), and also 4 male specimens of *O. jamaicensis,* and some hundred individuals of *O. leucocephala* of Iberian origin, both skin specimens and alive birds bred in captivity. With all of them the tables with the identification features were elaborated.

For behaviour and living aspects of the birds we have used some video recordings of hybrids and pure exemplars of *O. jamaicensis* as well as personal observations in the field. This type of information is particularly well known to us in the case of *O. leucocephala,* the species we have being carrying out a successfull Captive Breeding Scheme for more than 10 years. This fact has allowed us to manage and keep observations over some hundred exemplars.

We must make it clear that the hybrid specimens studied are obviously of unknown exact genealogy. Therefore and only having as known reference pictures of two hybrids of first (♂ and ♀) and one of second generation artificially obtained in Slimbridge, the interpretation we give about the origin of each type of hybrid must be taken with reserve, as discussed later.

Finally we have to emphasize that *O. leucocephala* has two, up to now, undescribed colour phases (pale and dark) that logically yield different types of hybrids. That is why though a very precise description of these two phases is still in preparation, (Pereira & Urdiales, in prep.), we present an advance of the main features of both phases in order to make their identification possible.

For each hybrid type and for the parent species the following bird topography shown in Figure 1 were used.

1. Bill.
2. Forehead.
3. Crown.
4. Cap.
5. Nape.
6. Cheek.
7. Neck.
8. Mantle.
9. Back.
10. Scapulars.
11. Rump.
12. Upper-tail coverts.
13. Rectrices.
14. Under-tail coverts.
15. Vent.
16. Flancs.
17. Belly.
18. Breast.
19. Throat.
20. Chin.
21. Cheek feathering line.
22. Great under-wing coverts.
23. Medium under-wing coverts.
24. Lesser under-wing coverts.
25. Lesser under-wing primary coverts.
26. Medium under-wing primary coverts.
27. Great under-wing primary coverts.
28. Primaries.
29. Secundaries.
30. Tertials.
31. Axillaries.
32. Great upper wing coverts.
33. Median upper wing coverts.
34. Lesser upper wing coverts.
35. Lesser upper primary coverts.
36. Median upper primary coverts.
37. Great upper primary coverts.
38. Primaries.
39. Secondaries.
40. Tertials.

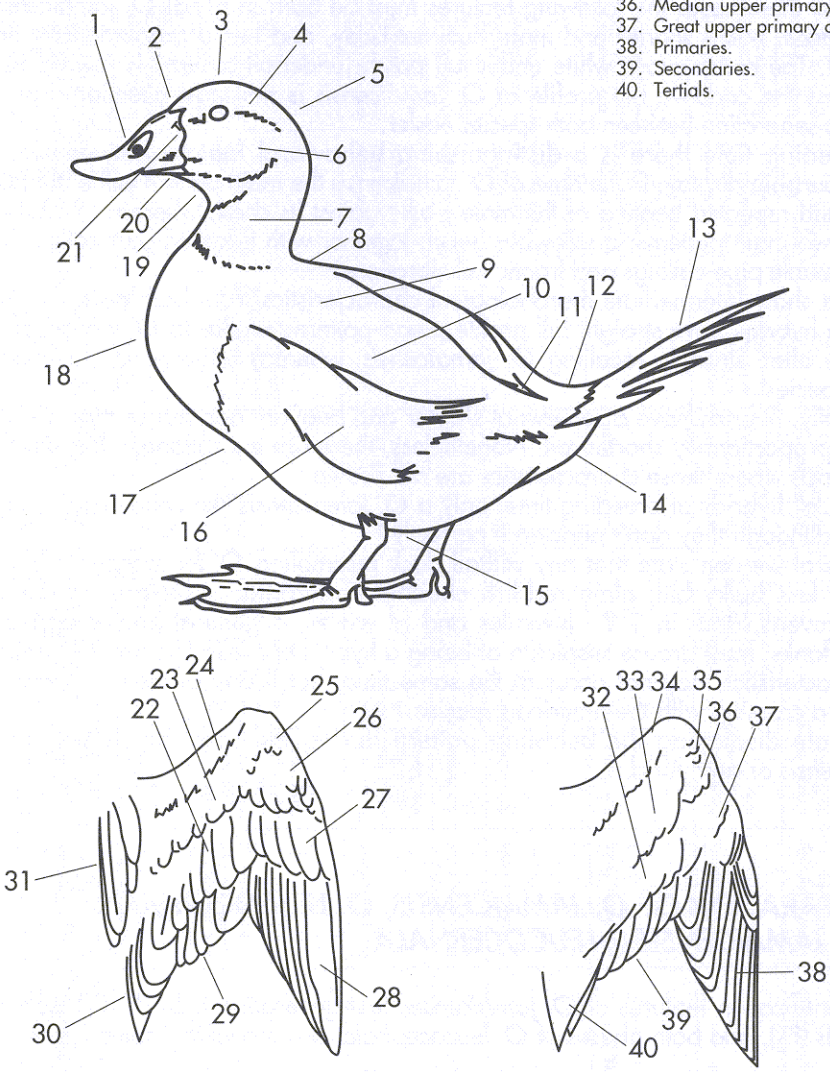


Figure 1: *Topography of a Stiff-tail Duck used in this paper*

FIELD DIAGNOSIS

The separation between *O. jamaicensis* and *O. leucocephala* is relatively easy, especially if we refer to males in breeding plumage. The almost invariable head-pattern of *O. jamaicensis,* its concave-profiled bill, its plain chestnut upperparts and the pure white undertail-coverts, are all features that contrast strikingly with the highly variable head-pattern, the swollen bill, the variegated upperparts and ochre or chestnut undertail-coverts of *O. leucocephala.*

Somewhat more complicated is the separation of females, juveniles, and males in winter plumage. In all these cases the following features must be born in mind: *O. jamaicensis* is greyer in appareance, has a shorter and more buoyant body, and has a proportionally often fanned shorter tail. The conspicuous white under-tail patch (undertail-coverts) is always very striking. Nevertheless the concave bill profile of *O. jamaicensis* is the most attention-drawing feature making the separation between both species easier.

At breeding time there is a distinguishing behavioral feature between both species: the ♂♂ courtship display. In the case of *O. jamaicensis* the main pattern is the bubbling, caused by quick and repeated beating of the male's bill against its chest, whereas in *O. leucocephala* there are two main patterns: a sideways hunch together with tickering-purr calling, and a kick-flap with double pipe-callings and frantic tail vibrations.

Hybrids show intermediate morphological characteristics from both parental species. First generation hybrids have straight bill profile, head-patterns similar to *O. leucocephala,* upperparts quite often strongly recalling *O. jamaicensis,* whereas underparts may resemble both parental species.

Generally, hybrids have a somewhat shorter and buoyant apparence than *O. leucocephala,* with a proportionally shorter tail. Nonetheless, there are exceptionally big-sized first generation hybrids where those characteristics are not shown.

For the ♂ hybrids at breeding time, only a *O. jamaicensis*'like courtship display has been recorded, although they don't perform it perfectly.

In general we can state that any stifftail duck resembling *O. leucocephala* but showing a smooth or less bulky bill, plain reddish chestnut upperparts, silver-grey underparts, white undertail-coverts, and, in ♀♀, juveniles and ♂ winter, a general greyer appearance with very pale flanks, must arouse suspicion of being a hybrid between this and *O. jamaicensis.* All these characteristics may not occur at the same time, but if any of them is shown it is proof enough of a crossing with the american species.

Any male displaying the bubbling pattern during the courtship is without doubt an *O. jamaicensis* or an hybrid.

FIELD SEPARATION OF *O. JAMAICENSIS, O. LEUCOCEPHALA* AND *O. JAMAICENSIS* × *LEUCOCEPHALA*

The identification features of *O. jamaicensis,* first generation hybrids (F_1), second generation hybrids (F_2), and both phases of *O. leucocephala,* are shown in Tables 1 to 4.

TABLE 1

Males breeding plumage

Characteristic	*O. jamaicensis*	F_2 (Type 5) F_1 × OJ	F_1 (Type 1) ♂ OJ × ♀ OL dph	F_1 (Type 2) ♂ OJ × ♀ OL dph	F_1 (Type 4) ♂ OL pph × ♀ OJ	F_1 (Type 3) ♂ OL dph × ♀ OJ	F_2 (Type 6) ♂ F_1 × ♀ OL*	*O. leucocephala* pale phase	*O. leucocephala* dark phase
BILL	Concave profile, without bulkiness. Fig.: 2-e.	Straight or slightly concave profile, without bulkiness. Fig.: 2-d.	Stright profile. Slight upper bulkiness. Without lateral bulkiness. Fig.: 2-c.	Stright profile. Slight upper bulkiness. Without lateral bulkiness. Fig.: 2-c.	Stright profile. Slight upper bulkiness. Without lateral bulkiness. Fig.: 2-c.	Stright profile. Slight upper bulkiness. Without lateral bulkiness. Fig.: 2-c.	Concave-convex profile. Upper bulkiness remarkable, small lateral bulkiness. Fig.: 2-b.	Convex-concave profile. Big upper and lateral bulkiness. Fig.: 2-a.	Convex-concave profile. Big upper and lateral bulkiness. Fig.: 2-a.
HEAD PATTERN	Black cap including the eyes. White face. Throat chestnut. Picture: 33.	Similar to OJ, but with bigger extension of white towards the head top and throat. Black specks over the white cheeks. Picture: 16.	Similar to OL, but white forehead more extensive. Black cap without narrowness on the nape. Picture: 3.	Almost identical pattern than in dark phase OL. Picture: 6.	Basically as pale phase OL but white very extensive and down the hindneck. Picture: 12.	Almost identical pattern than in dark phase OL. Picture: 9.	Almost identical pattern than in dark phase OL. Picture: 9.	Head mostly white with a black area on the crown that can reach the eyes and that narrow or interrupt on the nape. Can show dark patches on the face.	Pattern basically as in pale phase. During their first two or three years they show a higher amount of black, or even a completaly black head. Picture: 32.
NECK	Plain chestnut. Picture: 33.	Foreneck and sides of neck chestnut. Black hindneck flecked with white. Picture: 16.	#	Foreneck and sides of neck chestnut. Black hindneck. Picture: 6.	#	Foreneck and sides of neck chestnut. Black hindnesck with some white feathers. Picture: 9.	Black upper half of the neck. Lower half chestnut but for black hindneck. Picture: 19.	Black.	Black. Picture: 32.
MANTLE	Plain chestnut. Picture: 35.	Plain chestnut. Picture: 15.	#	Plain chestnut. Picture: 5.	#	Plain chestnut. Picture: 8.	Predominantly plain chestnut. Picture: 18.	Ochre brown dotted black.	Ochre brown dotted black. Picture: 35.
BACK	Plain chestnut. Picture: 35.	Plain chestnut. Picture: 15.	#	Plain chestnut. Picture: 5.	#	Intermediate appearance between OJ and OL, though the typical OJ chestnut tinge dominates. Picture: 8.	Chestnut with blackish grey and ochre vermiculations. Picture; 18.	Ochre brown with fine blackish grey vermiculations.	Ochre brown with fine blackish grey vermiculations. Picture: 35.
SCAPULARS	Plain chestnut. Picture: 35.	Plain chestnut. Picture: 15.	#	Plain chestnut. Picture: 5.	#	Intermediate appearance between OJ and OL, though the typical OJ chestnut tinge dominates. Picture: 8.	Some pattern that OL but for the clearly finer vermiculations. Picture: 18.	Brown somewhat redish with distinct black and ochre vermiculations.	Brown somewhat redish with distinct black and ochre vermiculations. Picture: 35.
RUMP	Uniformly greyish brown.	Almost identical to OJ but finaly dotted off-white.	Intermediate appearance: blacker than OL but less than OJ. With fine vermiculations.	Intermediate appearance: blacker than OL but less than OJ. With fine vermiculations.	Intermediate appearance: blacker than OL but less than OJ. With fine vermiculations.	Intermediate appearance, darker than OL but less than OJ. With fine vermiculations.	Intermediate appearance, darker than OL but less than OJ. With fine vermiculations.	Medium gray with buff vermiculations.	Medium grey with buff vermiculations.
UPPERTAIL COVERTS	Uniformly deep chestnut. Picture: 35.	Uniformly deep chestnut. Picture: 15.	#	Uniformly deep chestnut. Picture: 5.	#	Uniformly deep chestnut. Picture: 8.	Uniformly deep chestnut. Picture: 18.	Uniformly deep chestnut.	Uniformly deep chestnut. Picture: 35.

Used abbreviations: OL = Oxyura leucocephala; OJ = Oxyura jamaicensis; F_1= First generation Hybrid; F_2= Second generation Hybrid; pph = pale phase; dph = dark phase.

* We don't know which phase this ♀OL belongs to. Among the ancestors of this hybrid there is, undoubtedly, a dark phase OL, but there is no posibility to establish if that parental took.

\# No breeding plumage specimens availables.

TABLE 1 *(Cont.)*

Characteristic	*O. jamaicensis*	F_2 (Type 5) F_1 × OJ	F_1 (Type 1) ♂OJ × ♀OL pph	F_1 (Type 2) ♂OJ × ♀OL dph	F_1 (Type 4) ♂OL pph × ♀OJ	F_1 (Type 3) ♂OL dph × ♀OJ	F_2 (Type 6) ♂F_1 × ♀OL*	*O. leucocephala* pale phase	*O. leucocephala* dark phase
BREAST	Center pale grey barred chestnut and off-white. Sides of breast chestnut. Some individuals show a yellowish tinge in this area. Picture: 34.	Very similar to OJ pattern but for the deeper chestnut tinge on the upperbreast. Picture: 14.	#	Ochre brown. Picture: 4.	#	General shade dark chestnut indistinctly barred transversely black and ochre. Picture: 7.	Ochre brown. Picture: 17.	Deep dark chestnut.	Deep dark chestnut. Picture: 34.
BELLY AND VENT	From off white to very pale grey barred medium grey transversely. Glossy appearance. Picture: 34.	From off white to very pale grey barred medium grey transversely. Glossy appearance. Picture: 14.	From off white to vey pale grey barred medium grey transversely. Glossy appearance. Picture: 1.	From off white to very pale grey barred medium grey transversely. Glossy appearance. Picture: 4.	Yellowish ochre barred medium grey. Picture: 10.	Dark greyish ochre that reminds a «discoloured» version of the same area in the dark male ♂OL. Picture: 7.	From off white to very pale grey barred transversely medium grey. Glossy appearance. Picture: 17.	Pale ochre barred transversely medium grey.	Dark brown with ochre sheen barred transversely dark grey. Picture: 34.
FLANKS	Plain chestnut. Picture: 35.	Plain chestnut. Picture: 15.	#	Intermediate pattern between OL and OJ. Chestnut coloured intensaly vermiculated dark grey and ochre. Picture: 5.	#	Chestnut coloured intensely vermiculated dark grey and ochre. Picture: 8.	Chestnut intensely vermiculate dark grey and ochre. Picture: 18.	Dark chestnut finely vermiculated black and ochre.	Dark chestnut finely vermiculated black and ochre. Picture: 36.
UNDERTAIL COVERTS	Pure white. Picture: 34	Pure white. Picture: 14.	Pure white. Picture: 1.	Pure white. Picture: 4.	Off white intensely barred greyish brown and dark grey. Picture: 10.	Reddish ochre strongly barred blackish grey. Picture: 7.	Hinder half of this area pure white, whilst the half cotiguous to the chloaca is very pale grey barred medium grey. Picture: 17.	Very pale yellowish ochre somewhat marked pale grey.	Dark chestnut barred transversely blackish grey. Picture: 34.
UPPERWING COVERTS	Plain dark grey. Picture: 37.	Grey somewhat paler than OJ's finely dotted ochre and pale grey, less distinct than in OL.	Grey somewhat paler than OJ's finaly dotted ochre and pale grey, less distinct than in OL.	Grey somewhat paler than OJ's finely dotted ochre and pale grey, less distinct than in OL.	Grey somewhat paler than OJ's finely dotted ochre and pale grey. less distinct than in OL. Picture: 11.	Grey somewhat paler than OJ's finely dotted ochre and pale grey, less distinct than in OL. Picture: 8	Grey somewhat paler than OJ's finely dotted ochre and pale grey, less distinct than in OL.	Pale grey intensely vermiculated pale ochre and dark grey.	Pale grey intensely vermiculated pale ochre and dark grey.
UNDERWING COVERTS	From dark grey to medium grey with a central white stripe. Picture: 36.	From dark grey to medium grey with a central white stripe.	From dark grey to medium grey with a central white stripe.	From dark grey to medium grey with a central white stripe.	White area somewhat less extended than in OJ. Picture: 10.	Plain gray with hardly any white. Picture: 7.	From dark grey to medium grey with a central wehite stripe.	Medium grey crossed by a white stripe somewhat less distinct than in OJ.	Dark grey with some indistinct white patches in the central area.
RECTRICES	Wide and round-pointed. Blackish brown.	Wider and more round-pointed than OL's, but narrower and more sharp-pointed than OJ's. They tend to curl near the tip. Blackish brown.	Blackish brown. Outer pairs almost as round-tipped as in OJ. Inner pairs more sharp-pointed. All shorter and wider than OL's.	Aspect as in F_1: ♂OJ x pph ♀OL Tip and edges of the outer pairs tinged reddish.	@	Aspect as in F_1: ♂OJ x dph ♀OL, including the reddish tinge of the outer pairs.	Similar aspect to all F_1's. Outer pairs show similar aspect to OL's.	Long, narrow, sharp-pointed and with the feather web edges upcurled. The four outer pairs finely dotted ochre along the outer web.	Long, narrow, sharp-pointed and with the feather web edges upcurled. The four outer pairs finely dotted ochre along the cuter web.

Used abbreviations: OL = *Oxyura leucocephala;* OJ = *Oxyura jamaicensis;* F_1 = First generation Hybrid; F_2 = Second generation Hybrid; pph = pale phase; dph = dark phase.
*: We don't know which phase this ♀ OL belongs to. Among the ancestors of this hybrid there is, undoubtedly, a dark phase OL, but there is no posibility to establish if that parental took part in the first or in the second generation.
@: The only specimen available is moulting and lacks the tail feathers.

TABLE 2

Males non breeding

Characteristic	*Oxyura jamaicensis*	F_2 (Type 5) $F_1 \times$ OJ	F_1 (Type 1) ♂ OJ × ♀ OL pale phase	F_1 (Type 4) ♂ OJ pale phase × ♀ OJ	*O. leucocephala* pale phase	*O. leucocephala* dark phase
HEAD PATTERN	Similar to the breeding plumage head pattern but with the cap very flecked with chestnut on the crown and with pale grey on the nape.	Similar to the breeding plumage but with some brown feathers on the crown and the black less deep.	Pattern basically as in the breeding plumage but with blackish brown feathers flecked on the crown. Picture: 3.	Head pattern as in the breeding plumage but with blackish brown feathers on the crown, and black feathers fringed brown giving it an scaly appearance. Picture: 12.	As in the breeding plumage but with some blackish brown feathers as well as black feathers flecked with brown, both in the dark patches on crown and face.	As in the breeding plumage but with some blackish brown feathers as well as black feathers flecke with brown, both in the dark patches on crown and face.
NECK	Pale grey indistinctly vermiculated dark grey on the sides of the neck. Paler on the foreneck and darker on the hindneck.	Pale grey intensely stripped blackish grey on the foreneck and sides of the neck. All this area is very dark. The blackish of the cap goes on all over the hindneck. here flecked with some white feathers.	Pale greyish brown dotted dark grey on foreneck and sides of the neck. Hindneck darker and with indistinct pattern. In this part the crown dark colour goes on over its upper half. Picture: 3.	Pale ochre indistinctly vermiculated medium grey on sides and foreneck. The white of the face goes on over the upper half of the hindneck, here flecked with some dark feathers. Pictures: 12 y 13.	Sides of the neck pale grey indistinctly vermiculated medium grey. Foreneck brown somewhat flecked with grey that melt into the face white on the chin. Hindneck blackish grey.	Sides of the neck pale grey indistinctly vermiculated medium grey. Foreneck brown somewhat flecked with grey that melt into the face whtie on the chin. Hindneck blackish grey.
MANTLE	Dark grey vermiculated greyish ochre and off white.	Blackish grey dotted chestnut.	Greyish ochre with vermiculated blackish grey. Picture: 2.	Ochre vermiculated blackish grey and off white. Picture: 11.	Greyish brown vermiculated blackish grey.	Greyish brown vermiculated blackish grey.
BACK	Blackish grey with each feather dotted ochre an dwith an off white irregular subterminal bar, giving an scaly appearance to this area.	Blackish grey dotted chestnut.	Greyish ochre with wide vermiculations blackish grey. Picture: 2.	Pale ochre vermiculated blackish grey and off white. Picture: 11.	Ochre brown vermiculated blackish grey.	Ochre brown vermiculated blackish grey.
SCAPULARS	Blackish grey dotted ochre or chestnut. On the subterminal area of each feather there are several lines off white dots forming a discontinous fringe.	Blackish grey dotted chestnut and ochre near the tip.	Ochre strongly vermiculated blackish grey. In some of them the ground colour of the tip tend to reddish brown. Picture: 2.	Ochre, that becomes paler towards the tip, and the edges intensely vermiculated blackish grey. Picture: 11.	From yellowish brown to ochre vermiculated blackish grey.	From yellowish brown barred transversely blackish grey.
UPPERTAIL COVERTS	Blackish grey barred transversely ochre and off white.	Dull black dotted chestnut.	Yellowish brown vermiculated blackish grey. Picture: 2.	Pale grey tinged ochre finely dotted blackish grey. Picture: 11.	Brown somewhat reddish barred transversely blackish grey.	Brown somewhat reddish barred transversely blackish grey.
BREAST	Pale grey strongly barred medium and dark grey. Some individuals show a yellowish tinge in this area.	Upper breast dark chestnut strongly barred black with some fine ochre stripes. Towards the lower breast it becomes progressively to pale grey barred blackish grey.	Reddish ochre barred transversely medium grey. Most of the feathers have the tip more yellowish. Picture: 1.	Yellowish ochre barred medium grey. Picture: 10.	Reddish brown finely vermiculated blackish grey.	Reddish brown finely vermiculated. blackish grey.
FLANKS	Each feather medium grey dotted off white that form two or three irregular bars near the tip.	Dark grey dotted brown, off white and chestnut.	Pale ochre vermiculated medium grey and dark grey. Picture: 2.	From very pale ochre to off white vermiculated greyish brown. Picture: 11.	From brown to yellowish brown, finely vermiculated dark grey.	From brown to yellowish brown, finely vermiculated dark grey.

Used abbreviations: OL = *Oxyura leucocephala*; OJ = *Oxyura jamaicensis*; F_1 = First generation Hybrid; F_2 = Second generation Hybrid; pph = pale phase; dph = dark phase.
In all cases the bill shape is similar to the described one under the breeding plumage, varying only the bill colour; pale blue in breeding plumage and black in non-breeding plumage. For all the types rump, belly, vent, undertail coverts and rectrices similar to the breeding plumage. For the types 2, 3 and 6, we don't know any individual in winter plumage.

TABLE 3

Females

Characteristic	*Oxyura jamaicensis* *	F_1 (Type 8) ♂ OJ × ♀ OL pph	F_1 (Type 7) ♂ OJ × ♀ OL dph	F_1 (Type 9) ♂ OL dark phase × ♀ OJ	*Oxyura leucocephala* pale phase	*Oxyura leucocephala* dark phase
BILL	Concave profile. Fig.: 2-e.	Straight profile. Small upper bulkiness. Without lateral bulkiness. Fig.: 2-c.	Straight profile. Small upper bulkiness. Without lateral bulkiness. Fig.: 2-c.	Straight profile. Small upper bulkiness. Without lateral bulkiness. Fig.: 2-c.	Convex-concave profile. Big upper and lateral bulkiness.	Convex-concave profile. Big upper and lateral bulkiness.
HEAD AND NECK	**Breeding:** Cap (that includes the eyes) and hindneck dark brown with reddish tinges. Off white face with an indistinct, narrow, dark brown stripe from nape to gape. White chin. Thoat and sides of neck greyish brown. **Non breeding:** Face greyer and face stripe less distinct.	Practically indistinguishable from pale phase *Oxyura leucocephala* pattern. Picture: 25.	Similar to dark phase *O. leucocephala* pattern, but for chin and throat fairly less dotted. Picture: 22.	Similar to dark phase *O. leucocephala* pattern, but for chin and throat fairly less dotted. Picture: 22.	**Non breeding:** Cap (including eyes) and hindneck dark brown dotted pale reddish brown. Off white face crossed by a wide, tapered, equally patterned stripe from nape to gape. White chin and throat. Sides of neck off white stripped greyish brown. **Breeding:** Face darkened because of a dark brown dotted. White chin. Picture: 38.	**Non breeding:** Basic pattern similar to pale phase *O. leucocephala*, but cap and face stripe very dark brown, white areas on face, chin and throat strongly dotted dark brown; sides of neck dark grey. **Breeding:** Dark dotted on face much more intense. The whole head appears uniformly dark brown.
MANTLE, BACK AND SCAPULARES	**Breeding:** Dark brown tinged reddish finely flecked and vermiculated buff on feather tips. **Non breeding:** Greyer with a more distinct barred.	**Non breeding:** Basically as in *O. leucocephala;* the general shade is greyer, closer to *O. jamaicensis's*, although with a less distinct barred than in this species. Picture: 24.	**Breeding:** Indistinguishable from dark phase *O. leucocephala's*. Picture: 21.	**Breeding:** Indistinguishable from dark phase *O. leucocephala's*. Picture: 27.	**Breeding:** Ochre brown strongly vermiculated dark grey. **Non breeding:** Slight variations. Usually the vermiculateions are less distinct. Picture: 41.	**Breeding:** Similar to pale phase, but slighthy darker and more reddish. **Non breeding:** Indistinguishable from pale phase.
RUMP	Plain greyish brown.	Intermediate aspect, darker than in OL, but non as much as in OJ. Finely vermiculated.	Intermediate aspect, darker than in OL, but non as much as in OJ. Finely vermiculated.	Intermediate aspect, darker than in OL, but non as much as in OJ. Finely vermiculated.	Medium grey vermiculated buff, somewhat more distinct than in male's.	As in pale phase *O. leucocephala*, but with less clear pattern.
UPPERTAIL COVERTS	**Breeding:** From buff to off white. Base of feathers glossy black. **Non breeding:** Brown more distinct barred.	**Non breeding:** Ochre brown intensely barred blackish grey. Picture: 24.	**Breeding:** Dark reddish brown intensely vermiculated blackish grey. Picture: 21.	**Breeding:** From ochre brown to reddish vermiculated blackish grey. Picture: 27.	**Breeding/Non breeding:** Brown somewhat reddish, strongly barred blackish grey. Picture: 41.	**Breeding/Non breeding:** Dark reddish brown barred blackish grey.

Used abbreviations: OL = *Oxyura leucocephala;* OJ = *Oxyura jamaicensis;* F_1 = First generation Hybrid; F_2= Second generation Hybrid; pph = pale phase; dph = dark phase.
*: From CRAMP & SIMMONS (1977).

TABLE 3 (Cont.)

Characteristic	*Oxyura jamaicensis* *	F_1 (Type 8) ♂ OJ × ♀ OL pph	F_1 (Type 7) ♂ OJ × ♀ OL dph	F_1 (Type 9) ♂ OL dark phase × ♀ OJ	*Oxyura leucocephala* pale phase	*Oxyura leucocephala* dark phase
BREAST	Dark brown indistinctly barred buff brown.	General shade pale ochre, reminding a washed version of a pale phase female *O. leucocephala* pattern. Picture: 23.	Pale chestnut arred dark grey and pale ochre. Picture: 20.	Deep pale chestnut strongly barred blackish grey. Picture: 26.	Pale ochre tinged roseate on lower part, barred medium grey. Picture: 42.	Reddish chestnut barred blackish grey.
BELLY AND VENT	From white to very pale silvery grey barred transversely medium grey. Glossy appearance.	From off white to very pale silvery grey barred transversely medium grey. Glossy appearance. Picture: 23.	From off white to very pale silvery grey barred transversely medium grey. Glossy appearance. Picture: 20.	Dark ochre brown intensely barred blackish grey. Picture: 26.	From pale ochre to cream colour indistinctly barred medium grey. Picture: 42.	Dark brown with yellowish shines, indistinctly barred blackish grey.
FLANKS	**Breeding/Non breeding:** Dark brown indistinctly barred buff brown.	**Non breeding:** Off white strongly barred brown and blackish grey. General shade very pale. Picture: 24.	**Breeding:** Ochre brown stronglu vermiculated blackish grey. Picture: 21.	**Breeding:** Ochre brown strongly vermiculated blackish grey. Picture: 27.	From dark ochre to cream colour vermiculated dark brown and medium grey. Picture: 41.	Dark chestnut vermiculated blackish grey.
UNDERTAIL COVERTS	Pure white.	White with some medium grey feathers intermingled. Picture: 23.	Off white. Picture: 20.	Ochre brown strongly barred blackish grey. Picture: 26.	Pale cream colour indistinctly barred medium grey. Picture: 42.	Dark chestnut barred blackish grey.
UPPERWING COVERTS	Plain dark grey.	Grey somewhat paler than in *O. jamaicensis* finely dotted ochre and pale grey less distinct than in *O. leucocephala*.	Grey somewhat paler than in *O. jamaicensis* finely dotted ochre and pale grey less distinct than in *O. leucocephala*.	Grey somewhat paler than in *O. jamaicensis* finely dotted ochre and pale grey less distinct than in *O. leucocephala*. Picture: 27.	Pale grey intensely vermiculated pale ochre and dark grey. Picture: 41.	Pale grey intensely vermiculated pale ochre and dark grey.
UDERWING COVERTS	From dark grey to medium grey with a central white stripe, wider than male's.	Similar pattern to *O. jamaicensis's*, but the edge wing coverts darker.	Similar pattern to *O. jamaicensis's*, but the edge wing coverts darker.	Plain greyish brown crossed by an indistinct off white stripe. Picture: 26.	Medium grey crossed by a somewhat less distinct stripe than in *O. jamaicensis*. Picture: 42.	Dark grey with some undistinct markings in the central area.
RECTRICES	Blackish brown, round tipped.	More sharp pointed than in *O. jamaicensis* but less than in *O. leucocephala*. Blackish brown. The outer web edges of the three outer pairs show a narrow pale ochre stripe.	More sharp pointed than in *O. jamaicensis* but less than in *O. leucocephala*. Blackish brown.	More sharp pointed than in *O. jamaicensis* but less than in *O. leucocephala*. Blackish brown. The outer pairs show an slight dotted chestnut on the outer web.	Long, narrow, sharp pointed and whith the feather web edges up curled. Blackish brown. They can show from an ochre and off white dotted on the outer web and distal third of the whole feather in all pairs to a total lack of patern, including specimens that only show dotted on the outer pairs.	Similar to pale phase, but the dotted, with present, is chestnut.

Used abbreviations: OL = *Oxyura leucocephala*; OJ = *Oxyura jamaicensis*; F_1 = First generation Hybrid; F_2= Second generation Hybrid; pph = pale phase; dph = dark phase.
*: From CRAMP & SIMMONS (1977).

TABLE 4

Juveniles

Characteristic	*Oxyura jamaicensis**	F_1 (Type 10) ♂ OJ × ♀ OL pale phase	*Oxyura leucocephala* pale phase	*Oxyura leucocephala* dark phase
BILL	Concave profile. Fig.: 2-e.	Stright profile. Slight upper bulkiness abultamients; without lateral bulkiness. Fig.: 2-c.	Convex-concave profile. Upper and lateral bulkiness less obvious than in adult birds.	Convex-concave profile. Upper and lateral bulkiness less obvious than in adult birds.
HEAL AND NECK	As in adult female, but the face is greyer and the cap dull black. The face dark strip less distinct.	As in adult female F_1 but for the pale areas on the face somewhat off white. Picture: 31.	As in adult female, but for the greyer face.	As in adult female, but for the face somewhat tinged ochre.
UPPERPARTS	As in adult female, but more barred.	As in adult female, but pattern less distinct. Picture: 30.	As in adult female, but pattern less distinct.	As in adult female, but pattern less distinct.
BREAST, BELLY AND VENT	Greyish brown feathers with a narrow, silvery grey terminal band, giving it an scaly appearance.	Greyish brown feathers with a narrow, silvery grey terminal band, giving it an scaly appearance. Picture: 29.	As in adult female, but breast tinge more reddish.	As in adult female, but breast tinge more reddish.
FLANKS	Greyish brown feathers with a narrow, silvery grey terminal band. Neatly barred appearance.	Off white, strongly barred brown and blackish grey. Very pale general appearance. Picture: 30.	Ochre brown slightly vermiculated greyish brown.	Pale chestnut indistinctly vermiculated dark grey.
UNDERTAIL COVERTS	White barred greyish brown.	Mostly white, but barred dark grey near the cloaca and some areas tinged ochre. Picture: 29.	Pale cream coloured slightly barred pale grey.	Dark chestnut barred dark grey.
RECTRICES	Narrower than in adult and with bare shaft projecting tip.	?	As in adult female, but no patterned in general and with bare shaft projecting tip. Some individuals show the tail feather shafts pale coloured, while black in others.	As in adult female, but no patterned in general and with bare shaft projecting tip. Feather shafts always black.

Used abbreviations: OL = *Oxyura leucocephala;* OJ = *Oxyura jamaicensis;* F_1 = First generation Hybrid; F_2 = Second generation Hybrid; pph = pale phase; dph = dark phase.
?: Unknown, since the specimen available upon which this description was made is finishing the moulting of its tail feathers. Nevertheless they are likely to be as in the adult, but with the bare shaft projecting tips of all *Anatidae* species.
*: From CRAMP & SIMMONS (1977).

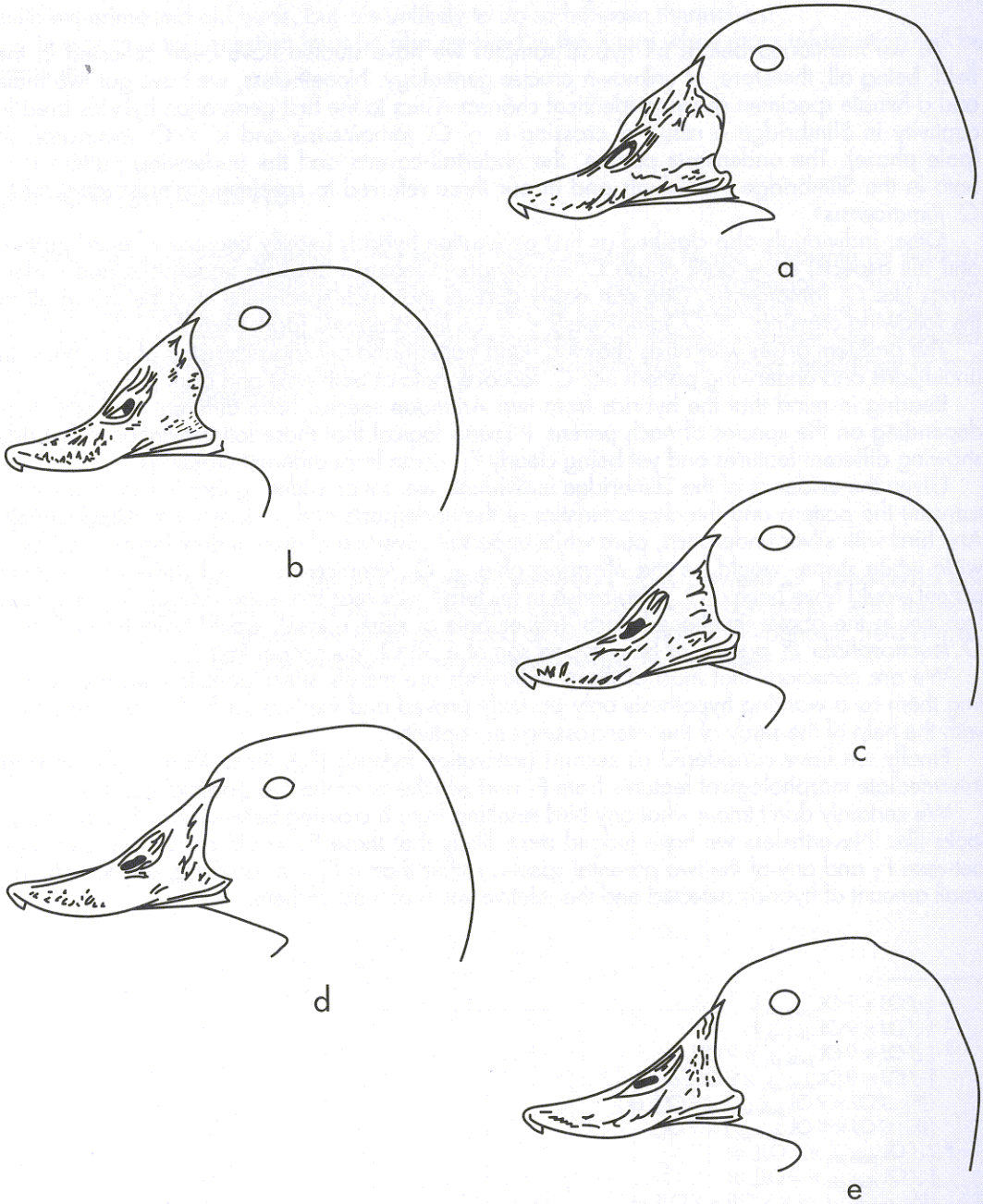


Figure 2: *Culmen profile and bill-cheek feathering line*

DISCUSSION

As we mentioned before all hybrid samples we have studied have been collected in the field, being all, therefore, of unknown precise genealogy. Nonetheless, we have got two male and a female specimen showing identical characteristics to the first generation hybrids bred in captivity in Slimbridge a result of crossing a ♂ *O. jamaicensis* and a ♀ *O. leucocephala* (pale phase). The underparts pattern, the undertail-coverts and the underwing pattern are, both in the Slimbridge individuals and in our three referred to specimens almost identical to *O. jamaicensis*[6].

Other individuals also clasified as first generation hybrids (mostly because of head pattern and bill aspects) show dark phase *O. leucocephala* features but with underparts and underwings like *O. jamaicensis*. One can easily deduce that such specimens must be the result of the following crossing: ♂ *O. jamaicensis* × ♀ *O. leucocephala* (dark phase)[7].

The problem arises with birds showing head pattern and bill characteristics of a F_1 but with underparts and underwing pattern like *O. leucocephala* of both pale and dark phase.

Bearing in mind that the hybrids from two *Anatidae* species have different characteristics depending on the species of each parent, it seems logical that those latter mentioned hybrids showing different features and yet being clearly F_1, come from different crossings.

Given the evidence of the Slimbridge individuals we are considering that it is the male who transmit the pattern and the characteristics of the underparts and underwing to its offsprings. Any bird with silver underparts, pure white undertail-coverts and grey underwing crossed by a wide white stripe, would be the offspring of a ♂ *O. jamaicensis* or a hybrid whose male parent would have been a *O. jamaicensis* in his turn[8], whereas those showing *O. leucocephala* features in the above mentioned parts, (either pale or dark phase), would have had either a *O. leucocephala* ♂ parent, or be a hybrid son of a ♂ *O. leucocephala*[9].

We are conscious that most of these statements are merely speculative but we are accepting them as a working hypothesis only partially proved and waiting for further confirmations with the help of the study of the intercrossings in captivity.

Finally we have considered as second generation hybrids (F_2), those individuals showing intermediate morphological features from F_1 and whichever of the two parental species[10].

We certainly don't know what any bird resulting from a crossing between two F_1 individuals looks like. Nevertheless we have judged more likely that those F_2 would come from crossings between F_1 and any of the two parental species rather than a $F_1 \times F_1$ crossing, due to both the small amount of hybrids detected and the relative youth of most of them.

---

6 [♂ OJ × ♀ $OL_{pale\ ph.}$].

7 [♂ OJ × ♀ $OL_{dark\ ph.}$].

8 [♂ OJ × ♀ $OL_{pale\ ph.}$ × ♀ OL], or
[♂ OJ × ♀ $OL_{dark\ ph.}$ × ♀ OL], or
[{F_1: ♂ OJ × ♀ $OL_{pale\ ph.}$} × ♀ OL], or
[{F_1: ♂ OJ × ♀ $OL_{dark\ ph.}$} × ♀ OL].

9 [♂ $OL_{pale\ ph.}$ × ♀ OJ], or
[♂ $OL_{dark\ ph.}$ × ♀ OJ], or
[{F_1: ♂ $OL_{pale\ ph.}$ × ♀ OJ} × ♀ OJ], or
[{F_1: ♂ $OL_{dark\ ph.}$ × ♀ OJ} × ♀ OJ].

10 [F_1 × OJ] and [F_1 × OL].

This latter detail is of most importance because young birds can eventually manage to bred with experimented old birds, but are unlikely to do so between themselves.

In any case this question must be also reviwed in the future when more information will be available.

AKNOWLEDGEMENTS

We are particulary grateful to the staff of the «Agencia de Medio Ambiente de Andalucía», as well as the «Conselleria de Medi Ambient de la Generalitat Valenciana», the «Consejería de Agricultura de la Junta de Comunidades de Castilla-La Mancha», and ICONA, for the identification and capture of the hybrid specimens upon which this paper was prepared. Also grateful to Héctor Garrido for his invaluable contribution of video-recordings of both hybrids and *O. jamaicensis*.

SUMMARY

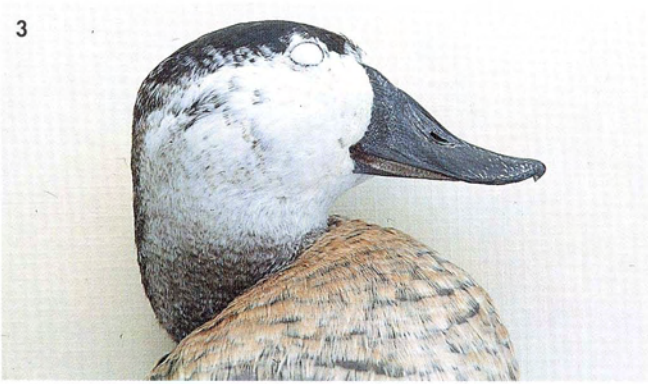
The main features of all the different identified hybrid types between *O. jamaicensis* and *O. leucocephala* captured up to date in Spain are shown and compared with those of *O. jamaicensis* and both phases (pale and dark) of *O. leucocephala*. Diagnostic field characteristics and a possible interpretation of their genealogy are also included.

APPENDIX 1

Pictures of the currently known hybrid types

Picture 1: Hybrid male Type 1 (♂ *O. jamaicensis* × ♀ *O. leucocephala* pale phase). Below.

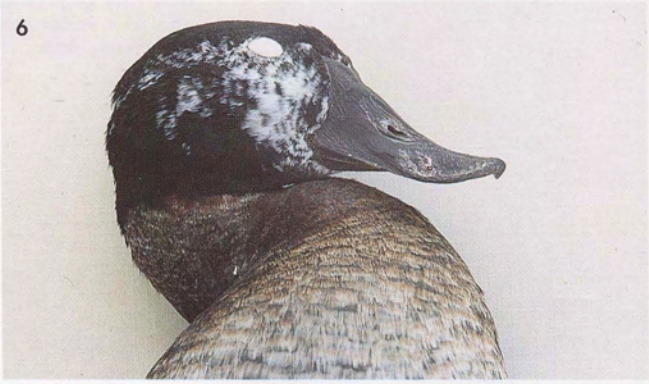
Picture 2: Hybrid male Type 1 (♂ *O. jamaicensis* × ♀ *O. leucocephala* pale phase). Back.



Picture 3: Hybrid male Type 1 (♂ *O. jamaicensis* × ♀ *O. leucocephala* pale phase). Head.

Picture 4: Hybrid male Type 2 (♂ *O. jamaicensis* × ♀ *O. leucocephala* dark phase). Below.

Picture 5: Hybrid male Type 2 (♂ *O. jamaicensis* × ♀ *O. leucocephala* dark phase). Back.



Picture 6: Hybrid male Type 2 (♂ *O. jamaicensis* × ♀ *O. leucocephala* dark phase). Head.

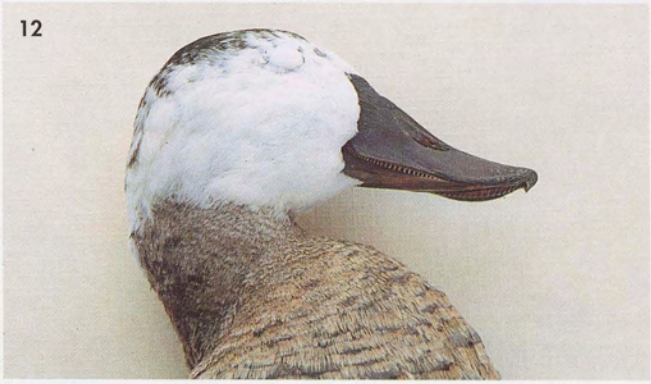
Picture 8: Hybrid male Type 3 (♂ *O. leucocephala* dark phase × ♀ *O. jamaicensis*). Back.

Picture 7: Hybrid male Type 3 (♂ *O. leucocephala* dark phase × ♀ *O. jamaicensis*). Below.

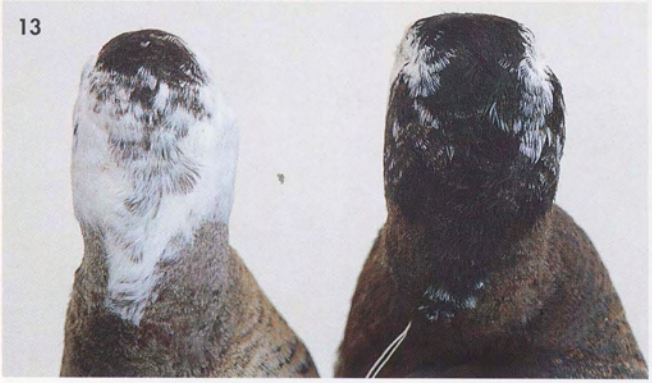
Picture 9: Hybrid male Type 3 (♂ *O. leucocephala* dark phase × ♀ *O. jamaicensis*). Head.

Picture 10: Hybrid male Type 4 (♂ *O. leucocephala* pale phase × ♀ *O. jamaicensis*). Below.

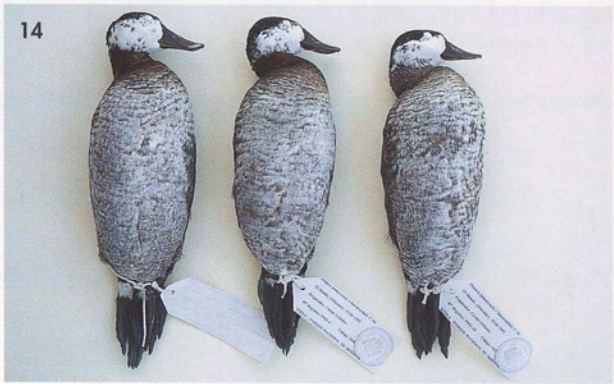
Picture 11: Hybrid male Type 4 (♂ *O. leucocephala* pale phase × ♀ *O. jamaicensis*). Back.



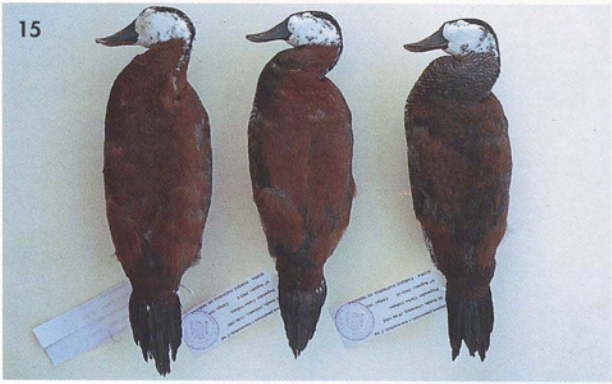
Picture 12: Hybrid male Type 4 (♂ *O. leucocephala* pale phase × ♀ *O. jamaicensis*). Head.



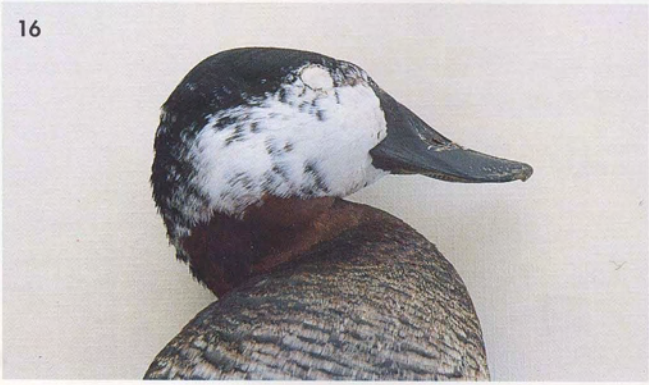
Picture 13: Hindneck pattern of a Hybrid Type 4 (♂ *O. leucocephala* pale phase × ♀ *O. jamaicensis*) left, and of a dark phase male *O. leucocephala*, right.



Picture 14: Hybrid males Type 5 (F_1 × ♀ *O. jamaicensis*). Below.



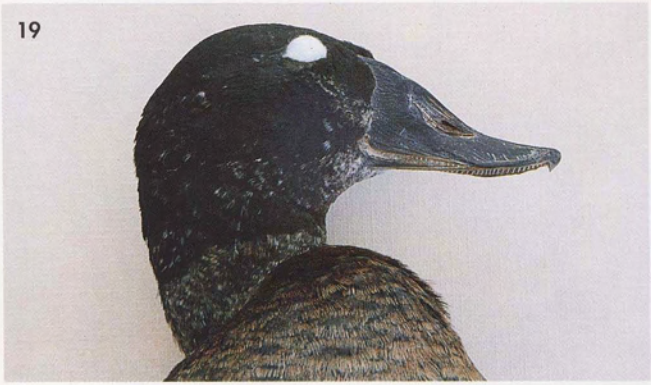
Picture 15: Hybrid males Type 5 (F_1 × ♀ *O. jamaicensis*). Back.



Picture 16: Hybrid male Type 5 (F_1 × ♀ *O. jamaicensis*). Head.

Picture 17: Hybrid male Type 6 (♂ F_1 × ♀ *O. leucocephala*). Below.

Picture 18: Hybrid male Type 6 (♂ F_1 × ♀ *O. leucocephala*). Back.



Picture 19: Hybrid males Type 6 (♂ F_1 × ♀ *O. leucocephala*). Head.

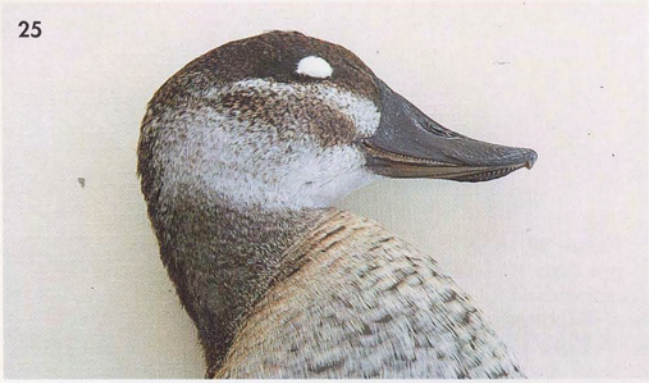
Picture 20: Hybrid female Type 7 (♂ *O. jamaicensis* × ♀ *O. leucocephala* dark phase). Below.

Picture 21: Hybrid female Type 7 (♂ *O. jamaicensis* × ♀ *O. leucocephala* dark phase). Back.

Picture 22: Hybrid female Type 7 (♂ *O. jamaicensis* × ♀ *O. leucocephala* dark phase). Head.

Picture 23: Hybrid female Type 8 (♂ *O. jamaicensis* × ♀ *O. leucocephala* pale phase). Below.

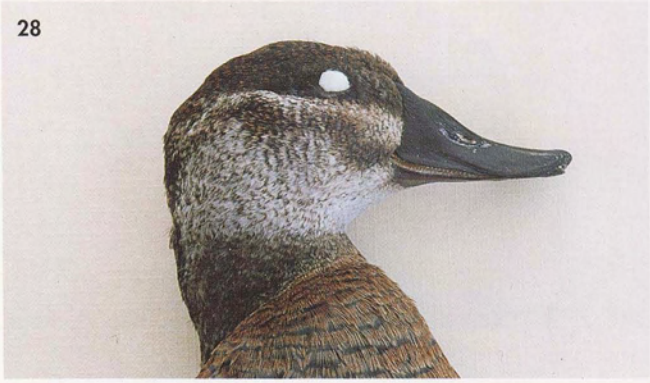
Picture 24: Hybrid female Type 8 (♂ *O. jamaicensis* × ♀ *O. leucocephala* pale phase). Back.



Picture 25: Hybrid female Type 8 (♂ *O. jamaicensis* × ♀ *O. leucocephala* pale phase). Head.

Picture 26: Hybrid female Type 9 (♂ *O. leucocephala* dark phase × ♀ *O. jamaicensis)*. Below.

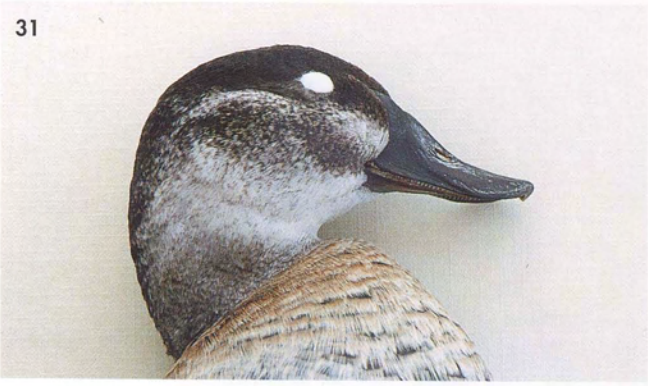
Picture 27: Hybrid female Type 9 (♂ *O. leucocephala* dark phase × ♀ *O. jamaicensis)*. Back.



Picture 28: Hybrid female Type 9 (♂ *O. leucocephala* dark phase × ♀ *O. jamaicensis)*. Head.

Picture 29: Hybrid juvenile Type 10 (♂ *O. jamaicensis* × ♀ *O. leucocephala* pale phase). Below.

Picture 30: Hybrid juvenile Type 10 (♂ *O. jamaicensis* × ♀ *O. leucocephala* pale phase). Back.



Picture 31: Hybrid juvenile Type 10 (♂ *O. jamaicensis* × ♀ *O. leucocephala* pale phase). Head.

APPENDIX 2

Complementary pictures

32

Picture 32: Adult male *O. leucocephala* dark phase. Head.

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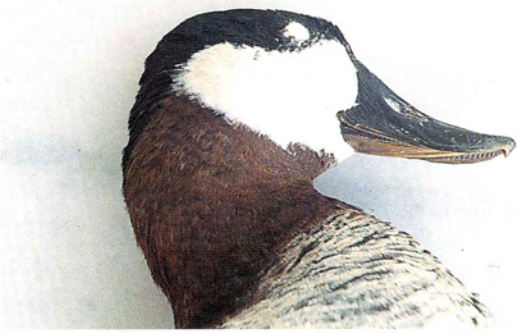


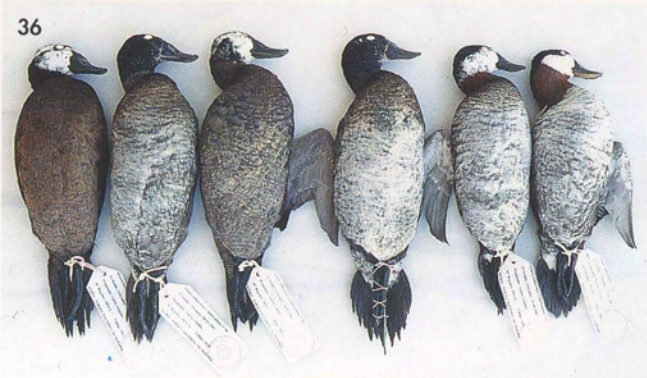
Picture 33: Adult male *O. jamaicensis*. Head.

34

Picture 34: From left to right: ♂ *O. leucocephala* dark phase, ♂ F_1 (Type 2), ♂ *O. jamaicensis*. Underside.

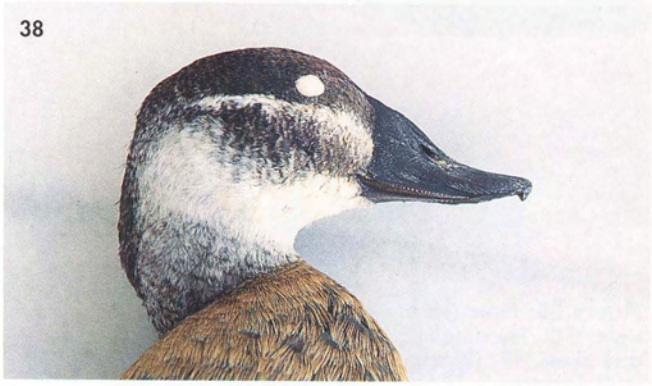
35

Picture 35: From left to right: ♂ *O. leucocephala* dark phase, ♂ F_1 (Type 2), ♂ *O. jamaicensis*. Upperside.

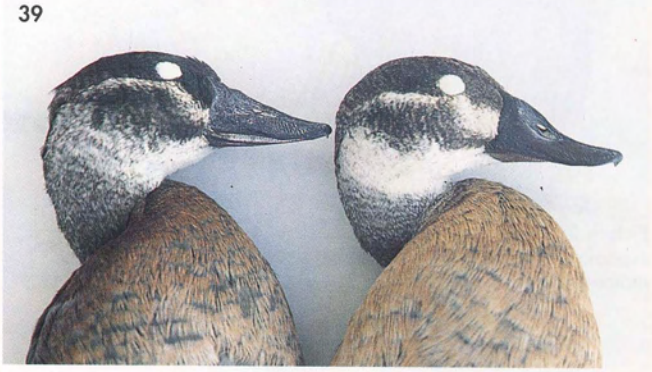


Picture 36: From left to right, males of: *O. leucocephala* dark phase, F_2 (Type 6), F_1 (Type 3), F_1 (Type 2), F_2 (Type 5), *O. jamaicensis*. Underside.

Picture 37: From left to right, males of: *O. leucocephala* dark phase, F_2 (Type 6), F_1 (Type 3), F_1 (Type 2), F_2 (Type 5), *O. jamaicensis*. Upperside.

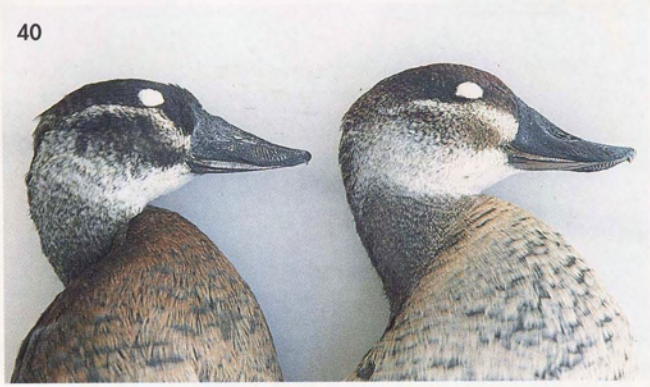


Picture 38: Pale phase female *O. leucocephala*. Head.



Picture 39: From left to right: Newly fledged juvenile *O. leucocephala* pale phase, and adult female *O. leucocephala* pale phase. Head.

40



Picture 40: From left to right: Newly fledged juvenile *O. leucocephala* pale phase, and ♀ F_1 (Type 8). Head.

41

Picture 41: From left to right: Adult female *O. leucocephala* pale phase and ♀ F_1 (Type 8). Upperside.

42

Picture 42: From left to right: Adult female *O. leucocephala* pale phase and ♀ F_1 (Type 8). Underside.

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