

Display behaviour and relationships of the Argentine Blue-billed Duck

PAUL A. JOHNSGARD and CRISTI NORDEEN

During June of 1978 while visiting the Wildfowl Trust the senior author observed that a group of Argentine Blue-billed Ducks *Oxyura vittata* were engaged in sexual display, and over the next several days approximately 400 feet of 16 mm film footage was obtained for the four males and three females that were involved in this activity. Other than a few incomplete observations made on this species in the Philadelphia Zoo in the early 1960s and reported on earlier (Johnsgard 1965), almost no published descriptions of this species' displays exist. Bradbury & Bradbury (1968) provided a few brief comments on the species' displays in captivity, and Weller (1967) also briefly reported on displays in wild birds. The findings presented here are primarily based on analyses by the junior author of the footage obtained at the Wildfowl Trust, some notes based on earlier footage loaned the senior author by Dr J. Bradbury, and observations made at the Trust at the time that the filming was done.

Because it seems quite evident that the species' display repertoire has the greatest degree of similarity to that of the Australian Blue-billed Duck *Oxyura australis*, the primary comparative comments will be directed toward that species, but some additional comparisons will be made with other stiff-tail species, particularly the Maccoa Duck *O. maccoa*, the White-headed Duck *O. leucocephala*, and the North American Ruddy Duck *O. j. jamaicensis*.

Male behaviour patterns

Dab-preening. In this display the bill is lowered and the neck is somewhat stretched, and the bill is moved laterally against the breast. The display is much like the comparable one of the Maccoa Duck (in which it is called 'false preening' by Siegfried & van der Merwe 1975), and as in that species it is apparently relatively uncommon and is not obviously ritualized. However, in *australis* the display is extremely common and highly ritualized (Johnsgard 1966). In the filmed sequences

it occurred only twice, with a single preening movement performed each time. It was preceded by a body shake on one occasion and a head shake on the second. It was followed by bill-dipping once and a wing-ruffling and tail-wagging on the other occasion.

Bill-dipping. In this display the bill is dipped almost entirely into the water while being held vertically, and is usually slightly shaken from side to side. The head is then raised and the tail is usually slightly wagged without raising it from the water. Similar bill-dipping has been observed in *maccoa* (Johnsgard 1968), *jamaicensis* (Johnsgard 1965), and *australis*, although in the last-named species these movements have been observed only as a terminal phase of the more complex 'sousing' display (Johnsgard 1966). In three filmed observations the most prolonged series of bill-dipping movements (involving nine such movements before the film ran out) was associated with a number of other intervening displays (cheek-rolling, head-shaking, splash-bathing, neck-jerking) that seemed to be performed in an unprogrammed sequence, but nevertheless were strongly reminiscent of precopulatory behaviour in *jamaicensis*, in which bill-dipping is an important component (Johnsgard 1965).

Motor-boating. This display, first named by Johnsgard (1966) in *australis*, was observed and filmed only once. It began from a normal swimming posture, with the bird swimming progressively faster while ruffling the body feathers and holding the bill low and parallel to the water, causing a strong wake to form behind, and with the body rocking slightly from side to side as a result of the vigorous paddling. A similar if not identical display has been seen in *maccoa* (Johnsgard 1968), and has been called 'skiing' by Siegfried and van der Merwe (1975). The 'rush' of *jamaicensis* is likewise very similar. In all these species the display is usually performed when approaching a female, but rarely may be used in aggressive encounters between males, where it has been called the 'hunched rush' posture in *jamaicensis* (Johnsgard 1965). In the single filmed sequence it was preceded by a

head-shake, and was oriented toward a female, which aggressively gaped toward the approaching bird, apparently causing it to turn and dive.

Head-shake. This display is a rapid lateral shaking movement of the head, with the bill tilted upwardly. It is performed as an independent movement as well as being part of the general body shake, and the tail is occasionally also shaken during the head-shake or immediately follows it. In all of 11 filmed sequences there was only a single head-shake performed each time, and it was not part of any obvious sequence. The only possible exception to this occurred in the possible precopulatory sequence (see bill-dipping above), in which the head-shake occurred twice. In 7 of the 11 instances the head-shake was preceded by cheek-rolling, but in no other cases did any single display occur more than once as an antecedent. In 4 cases it was followed by neck-jerking, in 3 by body-shaking, and in the remaining instances it was followed by nothing or by various other displays. A very similar display or possible variant of head-shaking was filmed once, and consisted of a slower and more pronounced lateral movement of the head, with the bill held horizontally. This head-flagging movement has not been previously described as a display in *Oxyura*, but does occur in films made of *australis*, where it sometimes occurs after sousing, dab-preening, or independently. Whether it represents a ritualized display or not seems questionable at present.

Body-shake. This display may be a more elaborate version of head-shaking, and occurs with varying degrees of intensity. In its milder form the chest is scarcely raised from the water as the head is shaken, which is followed by a general body and tail shake, and ends with slower tail-wagging. In a more vigorous form the bird paddles to lift the chest out of the water, producing a side-to-side rocking movement of the body. The display is obviously very much like the 'swimming shake' described for *maccoa* (Siegfried & van der Merwe 1975), but it is not preceded by a tail-wag and does not proceed from the tail to the head, but rather either starts with the head or begins with the head and body simultaneously, and almost always concludes with a tail-wag. In nine filmed sequences it was preceded by a head-shake three times, by nothing three times, and once each by various other displays. It was followed by splash-bathing three times, twice each by

neck-jerking or nothing, and once each by dab-preening and head-flagging. It was always performed only once each time it was seen, and was never observed as part of an obvious sequence.

Cheek-rolling. This display is essentially identical to cheek-rolling in *maccoa* (Siegfried & van der Merwe 1975) and 'head-rolling' in *australis* (Johnsgard 1966). In *vittata* it is usually done in a series of three rolling movements, alternating sides, and with three cheek-rubs per side. In all of 11 cases filmed the male began on the right side, and 7 of the 11 cases were series of 3 (R-L-R). There was also one series of 4, 2 series of 2, and a single instance of an individual cheek-roll. In 6 of the 11 filmed cases it was preceded by neck-jerking, while in the other 5 it was preceded by nothing or by various other displays. In 7 of the 11 cases it was followed by head-shaking, in 3 by neck-jerking, and once by a body-shake.

Splash-bathing. This display is apparently comparable to that named 'head-dipping' by Siegfried & van der Merwe (1975) in *maccoa*. The head and bill are dipped into the water, then are quickly lifted, usually with a sideways flick of the bill, splashing water backwards, creating a wave and splashing sound, and usually ending with a tail-shake. In *vittata* the head and body are almost completely submerged in the early stages, and in this respect the species seems to be less like *maccoa* than like *australis*, which performs almost identical behaviour during the final stages of the sousing sequence (Johnsgard 1966). Of 9 filmed sequences, the average number of bathing movements per sequence was 4.5, and the range was 1-14. Splash-bathing was usually (5 of 9 cases) performed independently of other preceding displays, but in three cases was preceded by a body-shake. It was also usually (6 of 9 cases) not followed directly by other displays, but in two cases was followed by neck-jerking.

Neck-jerking. This distinctive display was initially described by Johnsgard (1965). It is rather variable in amplitude, and during the upward jerking phase the bill may be held either parallel to the water or variably tilted upwards to as much as about 45°. The tail is held below the surface, but at times the rocking body movement that is typically generated is enough to partially expose the tail. A series of waves are thus produced and emanate from the male, and often are sufficiently

strong to cause nearby birds to bob about in the water. Of 26 filmed sequences, the average number of neck-jerks per sequence was 5.5, and the range was 1–13. Neck-jerking was usually (15 of 26 cases) performed independently of other preceding displays, but on two or more occasions each it was preceded by head-shaking, cheek-rolling, body shaking or splash-bathing. It was also usually (17 of 26 cases) not followed directly by other displays, but in six cases was terminated by cheek-rolling. In ten cases the neck-jerking was neither preceded nor followed by other displays.

Sousing (Figure 1). This most elaborate display of *vittata* has not previously been adequately described. Johnsgard (1965) did not observe it, but Weller (1967) described it as consisting of a preliminary 'head-pumping' followed by a prolonged

'choking' sequence, usually given directly before a female. In both of the two filmed sequences this also seemed to apply. The male initiated the display while still some distance (up to about 6 m) from a female, but clearly directed the display toward her and gradually approached her in the course of the display. In this respect, *sousing* of *vittata* differs considerably from that of *australis*, in which the display is not clearly directed towards other birds and often is performed in the visual absence of females. The display begins with a gradual tail-cocking to the vertical, and a simultaneously lifting of the head vertically and slightly posteriorly. The bird then begins a series of strong downward and forward movements of the head and bill, with the tail still strongly cocked, and the body rocking in a repetitive convulsive manner, with the neck region greatly expanded. In three

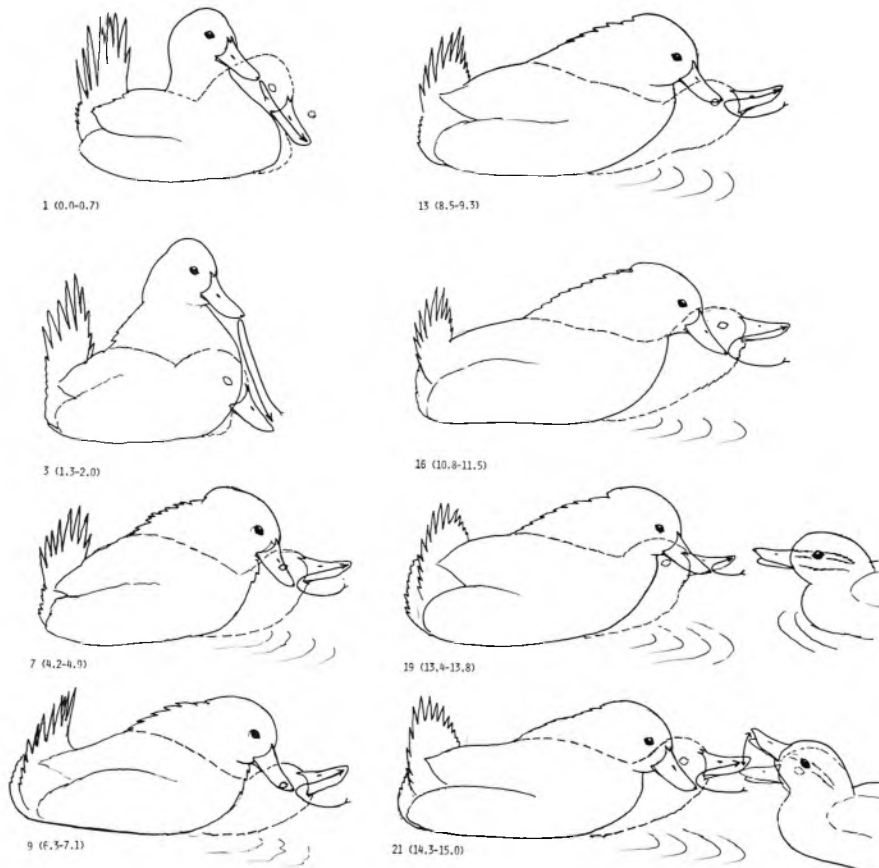


Figure 1. The *sousing* display of the Argentine Blue-billed Duck. Drawings from cine-film.

filmed sequences (including one loaned by Dr J. Bradbury) there were from at least 10 (incomplete sequence) to 21 such rocking movements, averaging 17, and one complete filmed sequence lasted over 15 seconds. By comparison, in *australis* the number of similar convulsions ranges from 3 to 7, and averages about 5 (Johnsgard 1966). A second difference is that *australis* typically terminates the display by holding both the head and tail under water for a short time, and finally raises the head and performs a variable number of bill-dipping and head-shaking movements. In neither species are any vocalizations evident, although the sounds produced by splashing water are considerable and may mask any such utterances. In one of the filmed *vittata* sequences the male moved to within an inch or less of a gaping female, and in both observed cases the display clearly served to bring the male quite close to a specific female. In one case the display was followed by turning and diving to elude a threatening female, while in the second case no obvious display behaviour followed sousing.

Although the display similarities of sousing in *vittata* and *australis* are obvious, it should be noted that *maccoa* also has a sousing display (Johnsgard 1968; Siegfried & van der Merwe 1975). No cine films were available for close comparisons between *vittata* and this species, but *maccoa* clearly resembles *australis* more than *vittata* in that the final phases of sousing in *maccoa* involve the male lowering his head to the water and performing a series of water-flicking movements. In *maccoa* the display may be stimulated by a female, by human disturbance, or by no apparent external stimulus (Siegfried & van der Merwe 1975). Further, the 'sideways-piping' display of *leucocephala* also bears a few resemblances to the sousing of *vittata*, particularly in its repetitive convulsive movements and its strong orientation toward a specific female. In this species, however, vocalizations are an important part of the display (Matthews & Evans 1974).

Female behaviour

In *vittata*, as in all other species of *Oxyura* so far studied, the female apparently lacks any definite ritualized display behaviour, with an open-bill or gaping threat posture the usual response to all male approaches.

Copulation has not yet been described for this species, and in the only possible precopulatory sequence observed and filmed by us the female did not overtly respond to the male's bill-dipping and other displays. However, bill-dipping, cheek-rubbing, body-shaking and other apparently unritualized comfort movements are sometimes performed by females while males are displaying near them. Copulation in *maccoa* is typically preceded by the male uttering the 'vibrating trumpet call' and the female responding either with water-flicking or by simply assuming a prone, receptive posture (Siegfried & van der Merwe 1975). Females of *jamaicensis* apparently also do not perform any specific precopulatory displays (Johnsgard 1965). Little or nothing is known of the other species of stiff-tails as to the usual pattern of precopulatory behaviour, but in at least some cases it appears to be rape-like (Johnsgard 1966).

Discussion

Of the nine male displays described here, all except perhaps the neck-jerking have obvious homologous counterparts in other species of *Oxyura*, and interestingly neck-jerking is the most commonly performed of all *vittata* displays. In that sense it seems to be the functional counterpart of dab-preening in *australis* and 'bubbling' (Johnsgard 1965) in *jamaicensis*, and there are some general similarities in the motor patterns of all these postures. All are performed repetitively, are given more intensively in the presence of females than when the male is displaying alone, and are silent or nearly so (*jamaicensis* has a weak call at the end of bubbling). Like *australis*, there are no obvious vocalizations associated with male display in *vittata*, although several of the displays generate loud water-splashing noises that probably contribute an acoustic component. In both *maccoa* and *leucocephala* vibrating or piping calls are apparently important parts of the male's display, and in these two species the calls apparently serve for territorial pronouncement and/or for short-distance male-to-female communication.

As has been suggested earlier (Johnsgard 1967), *vittata* appears to be part of a southern hemisphere group of species that also includes *australis* and probably *maccoa*. Siegfried & van der Merwe (1975) supported the view that these three species

form a more or less homogenous group, and that *maccoa* is probably not a transitional form, as Johnsgard (1968) suggested. Siegfried (1976) also took the view that the South American form or Peruvian Ruddy Duck *O. jamaicensis ferruginea* perhaps evolved as a result of separation from *vittata* rather than being derived from *jamaicensis* as Johnsgard (1965) proposed, with the Colombian Ruddy Duck *O. j. andina* being a possible semispecies. On opposition to this view, we would like to report that observations on several male *ferruginea*, one male *andina*, and several male hybrids between *ferruginea* and *j. jamaicensis* indicate that all these forms exhibit a *jamaicensis*-like bubbling display and totally lack sousing. Films of 15 bubbling sequences by *ferruginea* males indicate that bubbling in that form as from 2–4 bill-strokes, while 19 filmed sequences of bubbling in *j. jamaicensis* indicate a range of 5–8 bill-strokes, but otherwise the displays are virtually identical. It would thus appear that *ferruginea* is clearly an offshoot of *jamaicensis* (or vice versa), rather than

being derived from *vittata* as Siegfried has suggested.

Summary

An analysis of the male postural displays of Argentine Blue-billed Ducks *Oxyura vittata* indicate that nearly all of these are derived from rather simple comfort movements which have been modified but little through ritualization. One ritualized posture (neck-jerking) appears to be unique to the species, and is also the most commonly performed display, whereas the most complex display (sousing) is very similar in form to the corresponding displays of the Australian Blue-billed Duck *O. australis* and the Maccoa Duck *O. maccoa*. A close evolutionary relationship among these three species is thus supported, and on the other hand there is no behavioural evidence suggesting a close phyletic relationship with the Peruvian Ruddy Duck *O. jamaicensis ferruginea*, a partially sympatric sibling species that is evidently part of the North American Ruddy Duck *O. j. jamaicensis* complex.

References

- Bradbury, J. & Bradbury, I. 1968. Duck displays. *Animal Kingdom* 71: 13–15.
 Johnsgard, P. A. 1965. *Handbook of Waterfowl Behavior*. Ithaca: Cornell University Press.
 Johnsgard, P. A. 1966. Behavior of the Australian Musk Duck and Blue-billed Duck. *Auk* 83: 98–110.
 Johnsgard, P. A. 1967. Observations on the behavior and relationships of the White-backed Duck and the stiff-tailed ducks. *Wildfowl* 19: 98–107.
 Johnsgard, P. A. 1968. Some observations on Maccoa Duck behaviour. *Ostrich* 39: 219–22.
 Matthews, G. V. T. & Evans, M. E. 1974. On the behaviour of the White-headed Duck with especial reference to breeding. *Wildfowl* 25: 56–66.
 Siegfried, W. R. 1976. Social organization in Ruddy and Maccoa Ducks. *Auk* 93: 560–70.
 Siegfried, W. R. & Merwe, F. van der 1975. A description and inventory of the displays of the Maccoa Duck. *Z. Tierpsychol.* 37: 1–23.
 Weller, M. W. 1977. Notes on some marsh birds of Cape San Antonio, Argentina. *Ibis* 109: 391–416.

Prof. Paul A. Johnsgard and Cristi Nordeen, School of Life Sciences, University of Nebraska-Lincoln, Lincoln, Nebraska 68588.



Argentine Blue-billed or Ruddy Duck *Oxyura vittata*. Upper: male bathing. Lower: female giving body-shake while male prepares to head-jerk. (Philippa Scott)

